

# Cellular Networks

## Contents

<b>1</b>	<b>Introduction.....</b>	<b>2</b>
<b>2</b>	<b>Simulation GUI.....</b>	<b>2</b>
	2.1 Create Scenario.....	2
	2.2 Set Node, Link and Application Properties.....	3
	2.3 Enable Packet Trace, Event Trace & Plots (Optional).....	3
	2.4 Run Simulation.....	4
<b>3</b>	<b>Featured Examples.....</b>	<b>4</b>
	3.1 Example 1: GSM Handover .....	4
	3.2 Example 2: CDMA Handover .....	6
<b>4</b>	<b>Note: Release on Unsupported Basis .....</b>	<b>7</b>
<b>5</b>	<b>Latest FAQs.....</b>	<b>7</b>

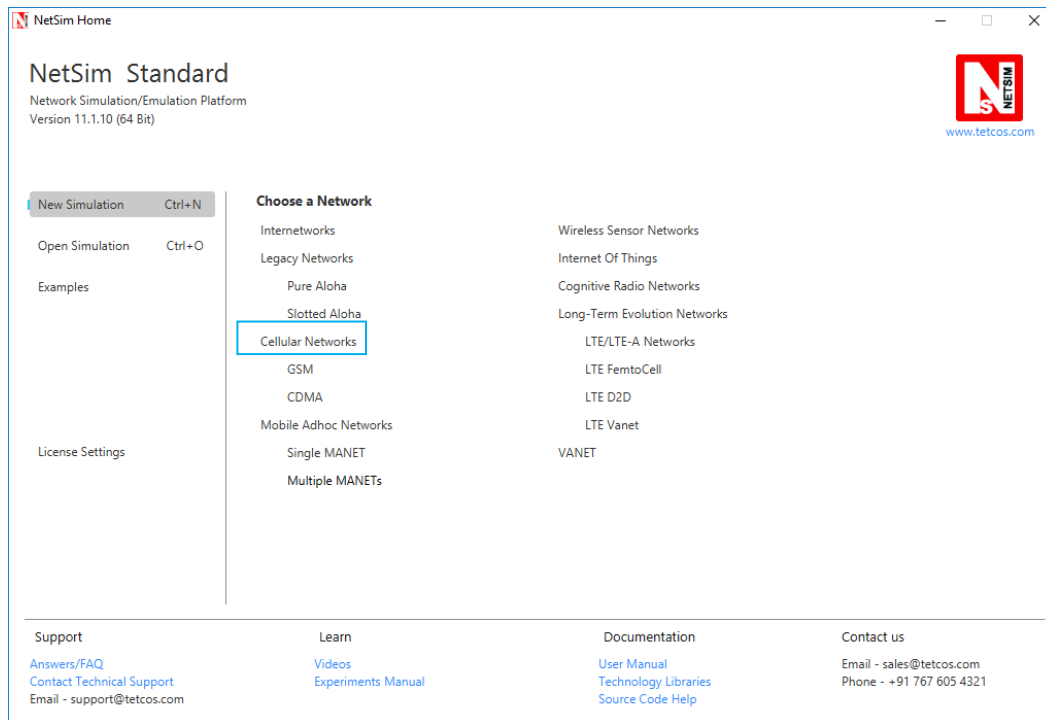
# 1 Introduction

In NetSim, you can simulate and analyze the following cellular networks: (Global System for Mobile communication) GSM and Code-Division Multiple Access (CDMA).

## 2 Simulation GUI

In the Simulation menu select →**New Simulation**→**Cellular Networks**

For Example, to Open GSM/ CDMA Network, In the Simulation menu select →**New Simulation**→**Cellular Networks**→**GSM/ CDMA**



### 2.1 Create Scenario

**Adding Base Transceiver Station (BTS)** - Click on the BTS icon in the toolbar and click it onto the environment.

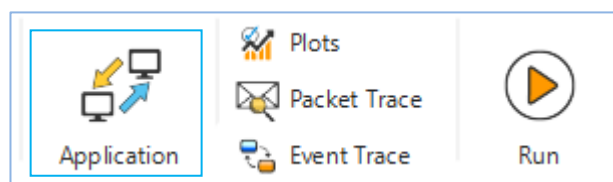
**Adding Mobile Switching Centre (MSC)** - Click and drop MSC in the environment.

## Adding Mobile Station (MS) -

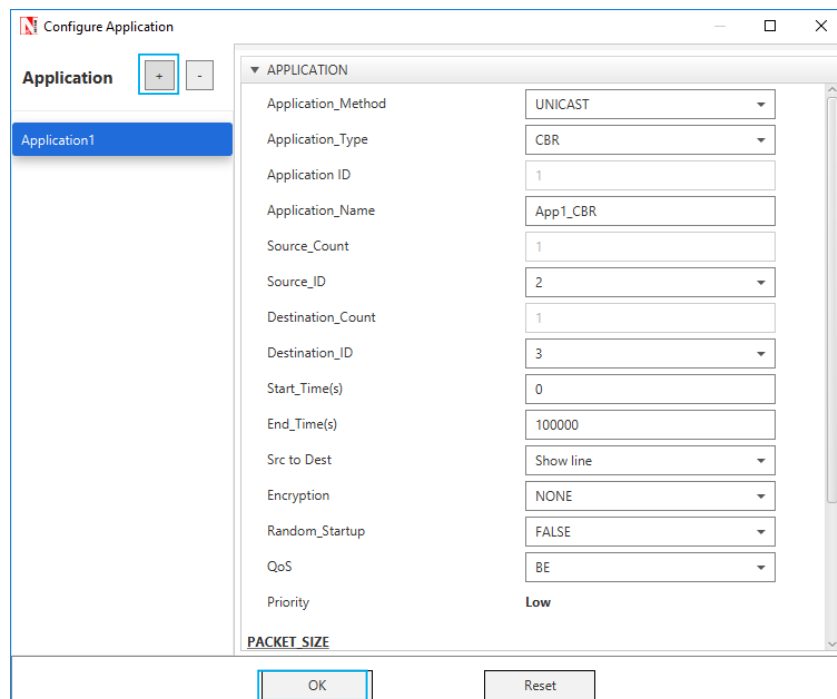
- Click on the **Mobile Station** icon in the tool bar, click and drop it on the **Base Station coverage area**
- **Mobile Station** cannot be placed on another **Mobile Station**. It has to be clicked and placed on the **Base Station coverage area**

## 2.2 Set Node, Link and Application Properties

- Right click on the appropriate node or link and select Properties. Then modify the parameters according to the requirements.

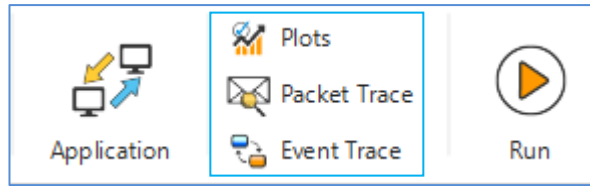


- Click on Application icon on the ribbon and set properties. Click on the '+' symbol to add more applications.
- Set the values according to requirement and click OK.



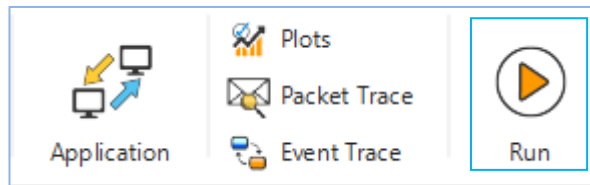
## 2.3 Enable Packet Trace, Event Trace & Plots (Optional)

Click Packet Trace / Event Trace icon in the tool bar and check Enable Packet Trace / Event Trace check box and click OK. To get detailed help, please refer sections 7.5 and 7.6 in User Manual. Select Plots icon for enabling plots and click OK.



## 2.4 Run Simulation

Click on **Run Simulation** icon on the top toolbar.



Set the Simulation Time and click on OK.

# 3 Featured Examples

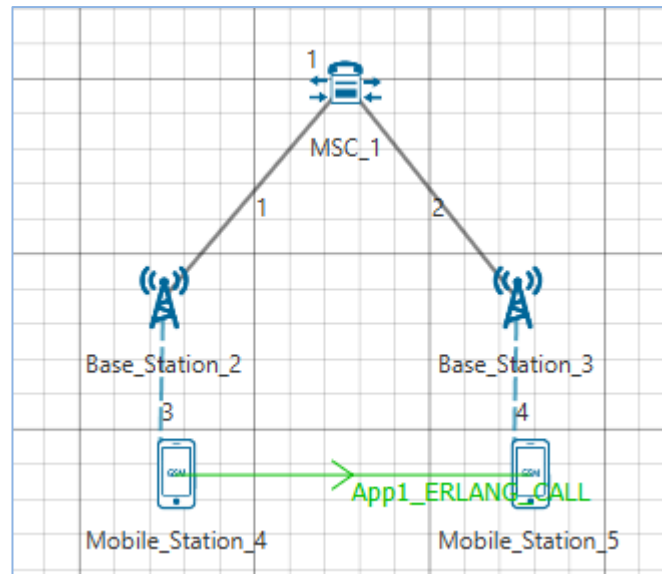
Sample configuration files for all networks are available in Examples Menu in NetSim Home Screen. These files provide examples on how NetSim can be used – the parameters that can be changed and the typical effect it has on performance.

## Cellular - Example Simulations

### 3.1 Example 1: GSM Handover

Handover refer to the process of transferring an ongoing call or data session from one channel connected to the core network to another channel.

Open NetSim, Select Examples->Cellular-Networks->GSM-Handover



### Settings done in sample network:

1. Change the Grid settings(Settings → Environment Settings) to 1000 \* 1000m
2. Drop the Base Station 2 at (300, 200) and the Base Station 3 at (500, 200).
3. Place Mobile station 4 at (300, 300) and set mobility to 20m/s(RANDOM\_WALK)
4. Place Mobile station 5 at (500, 300) set mobility to 0m/s(RANDOM\_WALK)
5. Generate traffic from Mobile station 4 to Mobile station 5 and set the following properties in Application
  - **Call Inter arrival time = 1s**
  - **Call duration(s) = 1000 s**

CALL	
Duration_Distribution	CONSTANT
Duration(s)	1000
Inter_Arrival_Time	1
IAT_Distribution	CONSTANT

6. Run simulation for 250 seconds.

### Results:

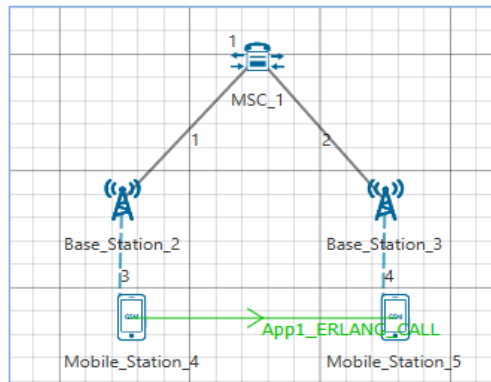
Check packet animation you are likely to see the mobile undergoing hand over between the two Base Station's.

As in the simulation results window, under the Cellular metrics (MS Metrics) users can find information about Handover Requests that were send by Mobile Station (MS).

**Note: In GSM hand over is based on distance (hard hand over), while in LTE it is based on SNR (soft hand over)**

### 3.2 Example 2: CDMA Handover

Open NetSim, Select Examples->Cellular-Networks->CDMA-Handover



#### Settings done in sample network:

1. Change the Grid settings(Settings -> Environment Settings) to 1000 \* 1000m
2. Drop the Base Station 2 at (300, 200) and the Base Station 3 at (500, 200).
3. Place Mobile station 4 at (300, 300) and set mobility to 20m/s(RANDOM\_WALK)
4. Place Mobile station 5 at (500, 300) set mobility to 0m/s(RANDOM\_WALK)
5. Generate traffic from Mobile station 4 to Mobile station 5 and set the following properties in Application
  - **Call Inter arrival time = 1s**
  - **Call duration(s) = 1000 s**

CALL	
Duration_Distribution	CONSTANT
Duration(s)	1000
Inter_Arrival_Time	1
IAT_Distribution	CONSTANT

6. Run simulation for 250 seconds.

#### Results:

Check packet animation you are likely to see the mobile undergoing hand over between the two Base Station's.

As in the simulation results window, under the Cellular metrics (MS Metrics) users can find information about Handover Requests that were send by Mobile Station (MS).

## 4 Note: Release on Unsupported Basis

From NetSim v10 onwards, no further development activity such as building of new features is expected for the GSM & CDMA protocol libraries

Source codes are provided on an unsupported basis

Cellular Networks is non-IP based protocols and runs stand alone. This means that cellular networks cannot be connected to Internetworks.

## 5 Latest FAQs

Up to date FAQs on NetSim's Cellular Networks library is available at <https://tetcos.freshdesk.com/support/solutions/folders/14000105117>