**Modelling Obstacles between UEs and eNB in NetSim LTE**

**Software Recommended:** NetSim Standard v11.0 (64-bit), Visual Studio 2015/2017

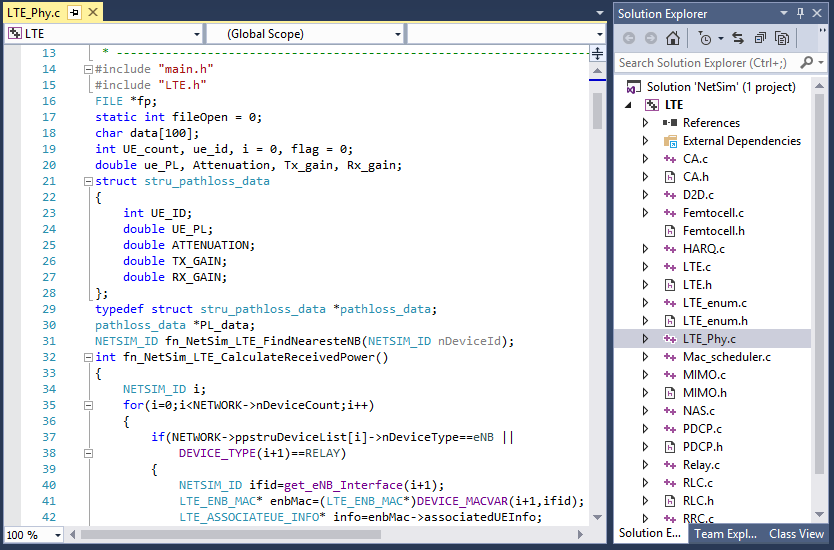
Users can model obstacles and varied channel conditions between the eNB and the connected UEs, by modifying the underlying LTE code.

This is required because, as of **NetSim v11.0**, in the GUI, the wireless link (between one eNB and the connected UEs) properties are same i.e. if we change in one link it reflects in all the other links of UEs connected to same eNB.

Obstacles are modelled by adding an attenuation (in dB) value. Varying channel conditions are modelled by changing the pathloss exponent between the eNB and connected UEs.

**Steps:**

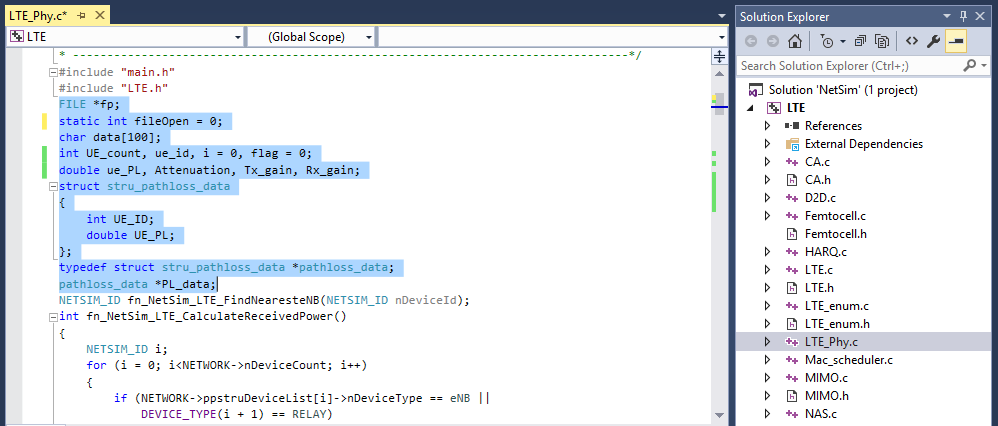
* Start NetSim and open **configuration.netsim** file present in the Config\_File folder (or create your own scenario as per the settings given below) and run the simulation.
* After simulation, note down the throughputs available in the metrics window.
* Open Code folder from the project downloaded and double click on the NetSim.sln file present to open the project in visual studio 2015, 2017



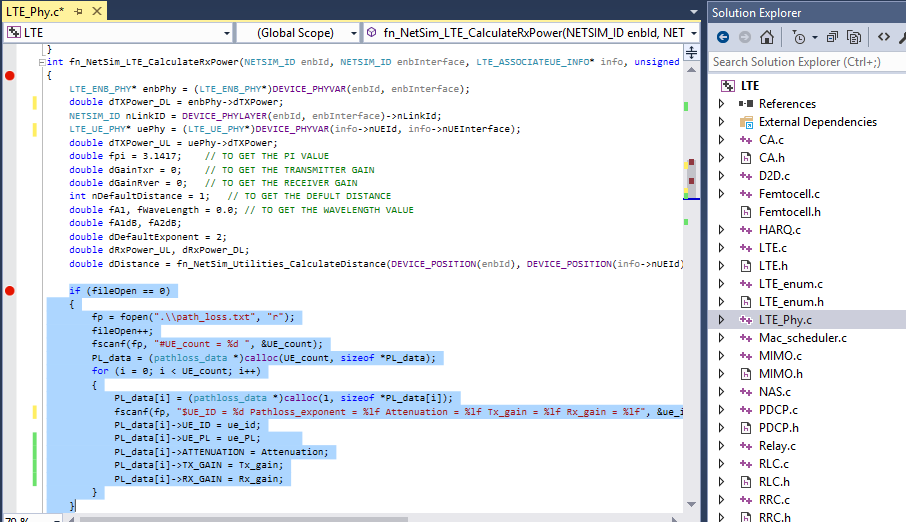
1. Right click on Solution in Solution Explorer and select rebuild solution
2. Upon rebuilding, libLTE.dll will get created in the path...\simulation\DLL
3. Now copy the libLTE.dll from DLL folder and paste it in NetSim bin folder present in the NetSim installation directory. The NetSim install directory would look something like **“C:\Program Files\NetSim Standard\bin”**.
4. Note that there exists libLTE.dll in bin folder. This is the default file being shipped with NetSim. The user is replacing this file with the newly built file
5. Therefore, take care to rename the original libLTE.dll file, so that it isn’t lost. For example, you may rename it as libLTE\_default.dll
6. Run NetSim and open **Configuration.netsim** file present inside the zip folder (or create your own scenario as per the settings given below) and run the simulation
7. After simulation, note down the throughputs available in the metrics window and compare with the previous results. Users can observe the change in throughputs

**Steps to be done in NetSim to configure different path loss exponents:**

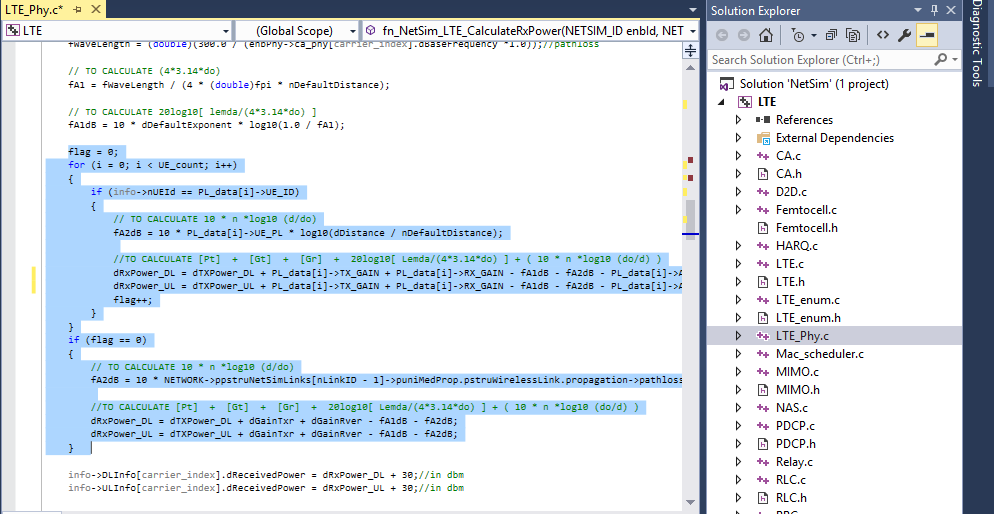
We have added the following lines of code in LTE\_PHY.c file present inside LTE project as shown below:



To read the file content, we have added the following lines of code in fn\_NetSim\_LTE\_CalculateRxPower() present in LTE\_PHY.c file.



And then the following lines in fn\_NetSim\_LTE\_CalculateRxPower() present in LTE\_PHY.c file.



Create a path\_loss.txt file and paste it in the install directory of NetSim would look something like **“C:\Program Files\NetSim Standard\bin”** and the file format should be

#UE\_count = 2

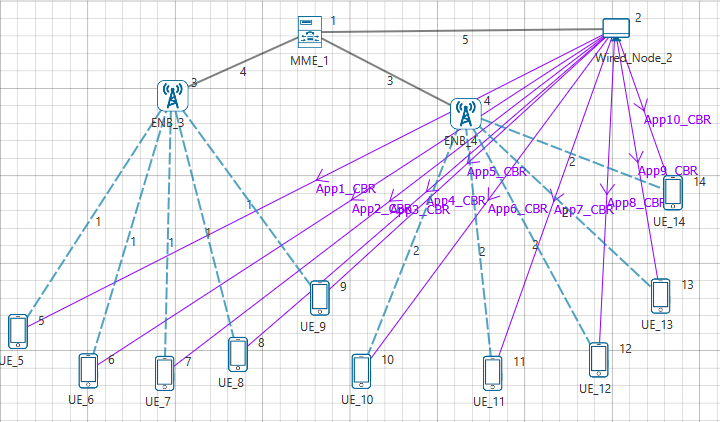
$UE\_ID = 13 Pathloss = 4.7 Attenuation = 2 Tx\_gain = 2 Rx\_gain = 2

$UE\_ID = 5 Pathloss = 4.7 Attenuation = 2 Tx\_gain = 2 Rx\_gain = 2

First line represents the number of UEs (whose path loss value needs to be changed). In the above sample, the numbers of UEs are 5. Second line represents UE id and the path loss exponent of particular UE link and so on.

**Settings to be done to create the network scenario:**

* Click and drop 1MME, 1 wired node, 2eNBs and 10UEs as per the below screenshot



* Create applications from wired node to all UEs with packet size 1460Bytes and Inter arrival Time 1168µs.
* Set channel characteristics as Path loss only, Path loss model as LOG DISTANCE and Path loss exponent to 3.5.

**Results:**

After simulation, note down the throughputs available in the simulation results window and compare with the previous results (Without Obstacles between UEs and eNB). Users can observe the change in throughputs

