

NetSim Network Scenario Generator

Software Recommended:

NetSim v13.0 (32/64 bit), Visual Studio 2019 Community edition or higher

Project Download Link:

[Network_Scenario_generator_v13.0.zip](#)

Introduction:

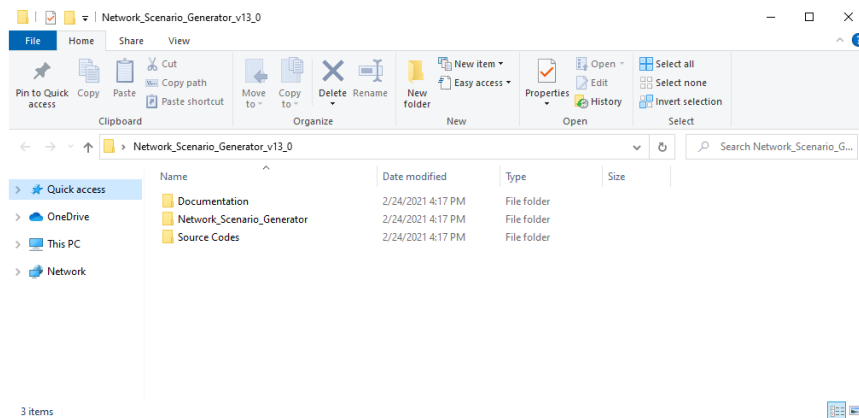
NetSim uses an XML Configuration file (Configuration.netsim) which contains the network scenario details including the device configuration, connection information, simulation parameters, etc. This file is automatically generated by the GUI whenever user creates a Network scenario using the GUI. This file is read by the simulation process when simulation is started. This file also acts as an input to the GUI to load any saved network scenarios.

The configuration file writing process can be automated to generate large network scenarios with specific device, link and traffic settings.

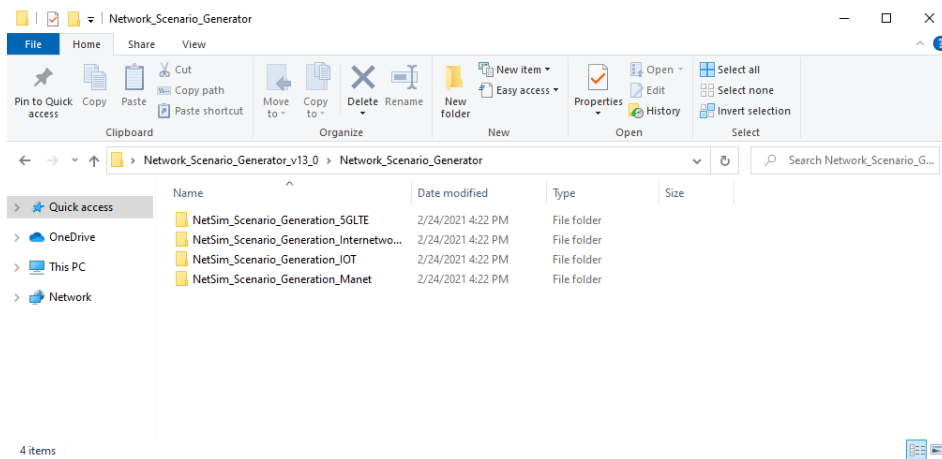
The NetSim Network Scenario Generator is an example of how users can generate network configuration files.

File Organization

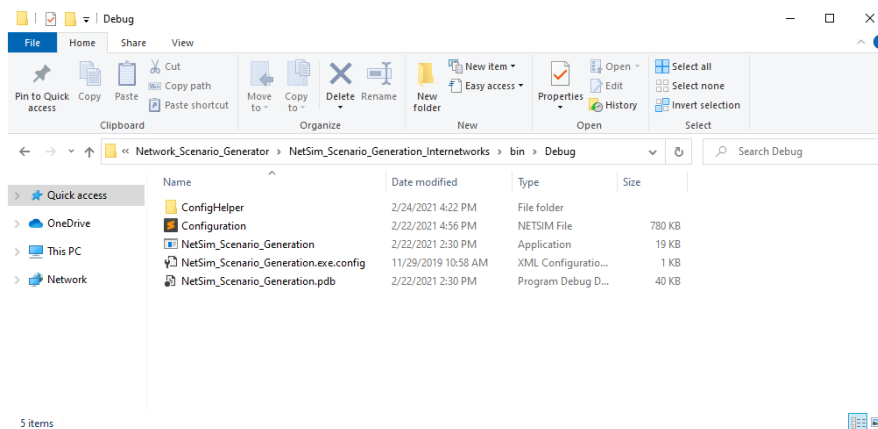
The project directory consists of Documentation, Network Scenario Generator Scripts and associated source codes.



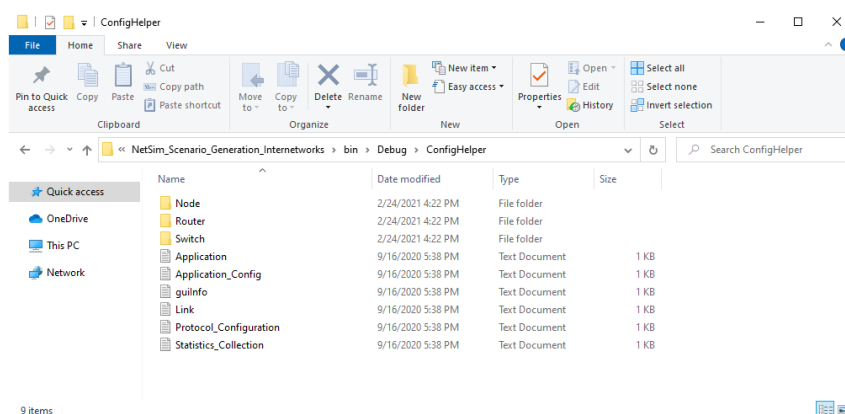
The Network Scenario Generators directory consists of separate scripts to generate Network Configurations for Networks such as Internetworks, 5G NR, MANETs and IoT:



The directory of Network Scenario Generator associated with each network consists of an executable to which users can pass arguments via command line to generate a Configuration.netsim file.



The ConfigHelper directory which is part of the directory each Network's Scenario Generator consists of the properties of devices, links and applications that are supported in the specific network in NetSim.



The properties related to Devices, Links and Applications can be modified by editing respective files in the ConfigHelper folder. A short explanation about the contents of the ConfigHelper directory is given in the following table:

File Name	Description
Node Folder	Parameters related to Wired Node properties. (All 5 Layers)
Router Folder	Parameters related to Router properties. (Incl Routing protocol)
Switch Folder	Parameters related to switching properties.
Application.txt and Application_Config.txt	Parameters related to Application Properties
guiInfo.txt	Parameters related to Network Design Environment settings
Link.txt	Parameters related to link properties
Protocol_Configuration.txt	Parameters related to general protocol configuration like ARP.
Statistics_Collection.txt	Parameters related to advanced options like Packet Trace, Event Trace, and Emulator PCAP files.

Running the Scenario Generator:

To run the scenario generator command prompt should be opened in the directory containing the scenario generator executable file. Then arguments can be passed to the executable via command line. Upon successful execution of the script the output Configuration.netsim file gets created the same folder that contains the scenario generator executable file.

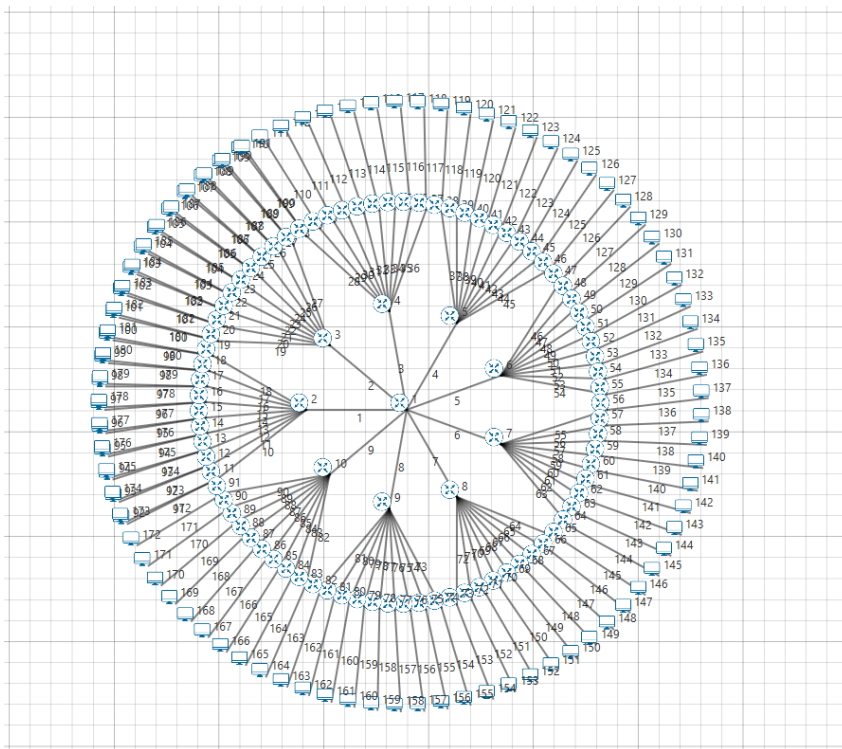
The input arguments may vary for the scenario generator associated with each network technology.

Internetworks:

NetSim_Scenario_Generation.exe<space>**<Number_of_Router_Interface>**<Space>**<Number_of_Hops>**<Space>**<Number_of_Nodes>**<Space>**<Number_of_application>**<Space>**<ConfigHelper_Path>**<Space>**<ExperimentName>**<Space>**<NetSim_Version_Name>**<Space>**<Simulation_Time>**

Parameter	Description
<Number of Router Interfaces>	Specifies the number of interfaces of each router where the minimum is 3 and the maximum is 24.
<Number of Hops>	Specifies the number of hops to reach the destination. i.e 2, 4 or 6.
<Number of Nodes>	Specifies the number of Wired nodes to generate, which takes a value in the range 1 to 1,00,000.
<Number of applications>	Specifies the number of applications to model with a minimum of 1 and a maximum of 1,00,000 Applications. Formula: No. of node*(No. of node-1)/2

The network when opened in NetSim after importing the output Configuration.netsim file that gets generated is shown below:



5G NR:

NetSim_Scenario_Generation_5GLTE.exe<space><SA/NSA><Space><OPTION_><Space><Number_of_Router><Space><Number_of_WiredNode><Space><Number_of_gNB><Space><Number_of_UE><space><Number_of_application><Space><ConfigHelper_Path><Space><ExperimentName><Space><NetSim_Version_Name><Space><Simulation Time>

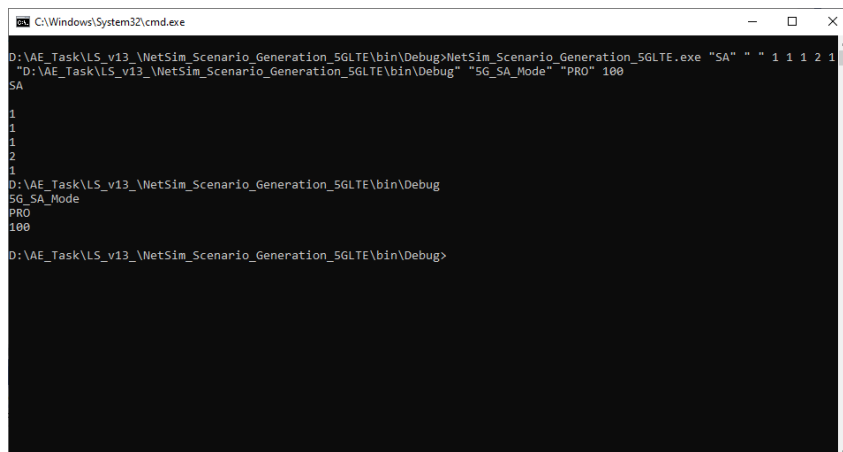
Parameter	Description
<SA/NSA>	Specify which mode of 5G scenario to generate.eg: SA or NSA
<OPTION_>	NSA mode has different OPTION_3, OPTION_3a, OPTION_3x, OPTION_4, OPTION_4a, OPTION_7, OPTION_7a, OPTION_7x. For SA mode – kept this place as like this “ ”.
<Number of Routers>	Specifies the number of routers to generate, which takes a value in the range 1 to 1,00,000.
<Number of Wired nodes>	Specifies the number of Wired nodes to generate, which takes a value in the range 1 to 1,00,000.
<Number of gNB>	Specifies the number of gNBs to generate, which takes a value in the range 1 to 1,00,000.
<Number of UE>	Specifies the number of UE's to generate, which takes a value in the range 1 to 1,00,000.

<Number of applications>	Specifies the number of applications to model with a minimum of 1 and a maximum of 1,00,000 Applications. formula: max_ue * max_node
<ConfigHelper_Path>	Specifies the path to the ConfigHelper folder in the directory. <i>Eg: C:\Users\SPEED MT5811\Desktop\Internetworks Scenario Generator</i>
<Experiment Name>	Specifies the name of the experiment.
<NetSim_Version_Name>	Specifies the NetSim Version, Only NetSim Professional users can simulate more than 500 Nodes. So version name will be always 'PRO' or 'STANDARD'
<Simulation Time> in seconds	Specifies the simulation time in seconds to simulate the network scenario 30s < T <100000s

For example,

To generate a network scenario with 1 router, 1 wired node, 10 gNB, 100 UEs, 1 EPC and 100 applications following arguments are passed as input to the NetSim_Scenario_Generation.exe file.

C:\Users\MT5815\Desktop\Network_Scenario_generator_v13.0\Network_Scenario_Generators\NetSim_5GLTE_v13.0>[NetSim_Scenario_Generation_5GLTE.exe](#) "SA" " " 1 1 1 2 1 "C:\Users\MT5815\Desktop\Network_Scenario_generator_v13.0\Network_Scenario_Generators\NetSim_5GLTE_v13.0" "5G_SA_Mode" "PRO" 100



```

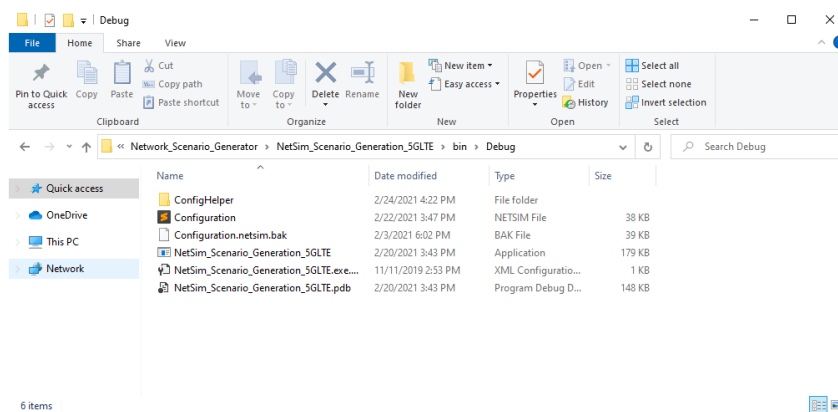
C:\Windows\System32\cmd.exe
D:\VAE_Task\LS_v13_\NetSim_Scenario_Generation_5GLTE\bin\Debug>NetSim_Scenario_Generation_5GLTE.exe "SA" " " 1 1 1 2 1
D:\VAE_Task\LS_v13_\NetSim_Scenario_Generation_5GLTE\bin\Debug>"D:\VAE_Task\LS_v13_\NetSim_Scenario_Generation_5GLTE\bin\Debug" "5G_SA_Mode" "PRO" 100
SA
1
1
1
2
1
1
D:\VAE_Task\LS_v13_\NetSim_Scenario_Generation_5GLTE\bin\Debug
5G_SA_Mode
PRO
100
D:\VAE_Task\LS_v13_\NetSim_Scenario_Generation_5GLTE\bin\Debug>

```

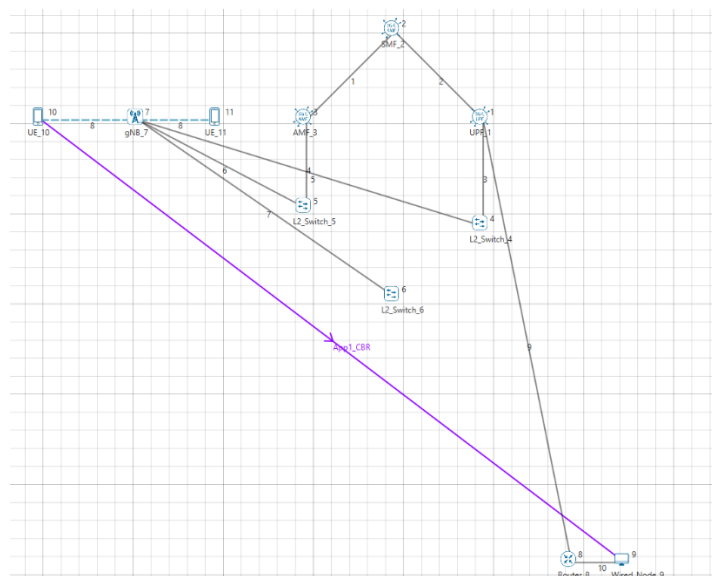
```
C:\Windows\System32\cmd.exe

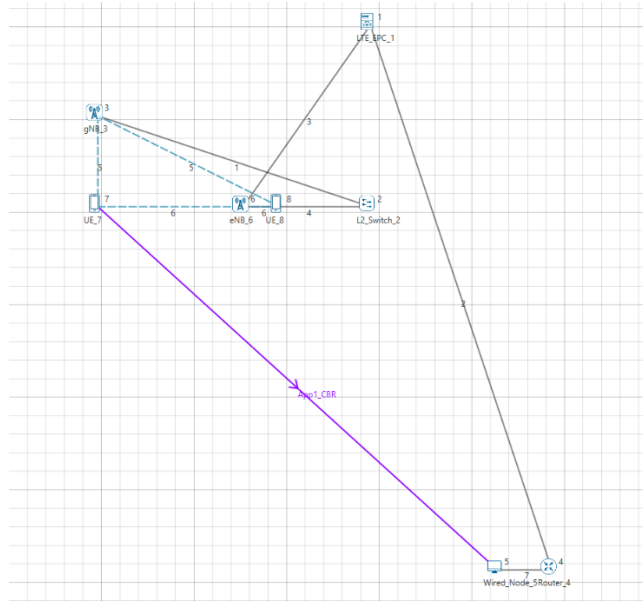
D:\VAE_Task\LS_v13_NetSim_Scenario_Generation_5GLTE\bin\Debug>NetSim_Scenario_Generation_5GLTE.exe "NSA" "OPTION_3" 1
1 1 2 1 "D:\VAE_Task\LS_v13_NetSim_Scenario_Generation_5GLTE\bin\Debug" "SG_SA_Mode" "PRO" 100
NSA
OPTION_3
1
1
1
1
2
1
D:\VAE_Task\LS_v13_NetSim_Scenario_Generation_5GLTE\bin\Debug
SG_SA_Mode
PRO
100
D:\VAE_Task\LS_v13_NetSim_Scenario_Generation_5GLTE\bin\Debug>
```

After successful execution of the command, the output Configuration.netsim file gets created in the same location where the NetSim_Scenario_Generation_5GLTE.exe file is present.



The network when opened in NetSim after importing the output Configuration.netsim file that gets generated is shown below:





MANETs:

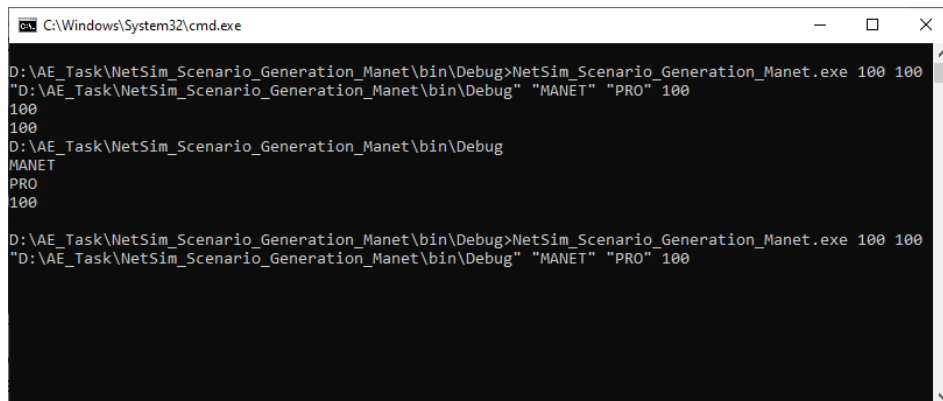
NetSim_Scenario_Generation_Manet.exe<space>**<Number_of_Nodes>**<space>**<Number_of_applications>**<space>**<ConfigHelper_Path>**<space>**<ExperimentName>**<Space>**<NetSim_Version_Name>**<Space>**<Simulation Time>**

Parameter	Description
<Number of Nodes>	Specifies the number of Wireless nodes to generate, which takes a value in the range 2 to 1,00,000.
<Number of applications>	Specifies the number of applications to model with a minimum of 1 and a maximum of 1,00,000 Applications. Formula: No. of node*(No. of node-1)/2
<ConfigHelper_Path>	Specifies the path to the ConfigHelper folder in the directory. <i>Eg: C:\Users\Admin\Desktop\Internetworks Scenario Generator</i>
<Experiment Name>	Specifies the name of the experiment.
<NetSim_Version_Name>	Specifies the NetSim Version, For example ' PRO ' or ' STANDARD '
<Simulation Time> in seconds	Specifies the simulation time in seconds to simulate the network scenario $30s < T < 100000s$

For example,

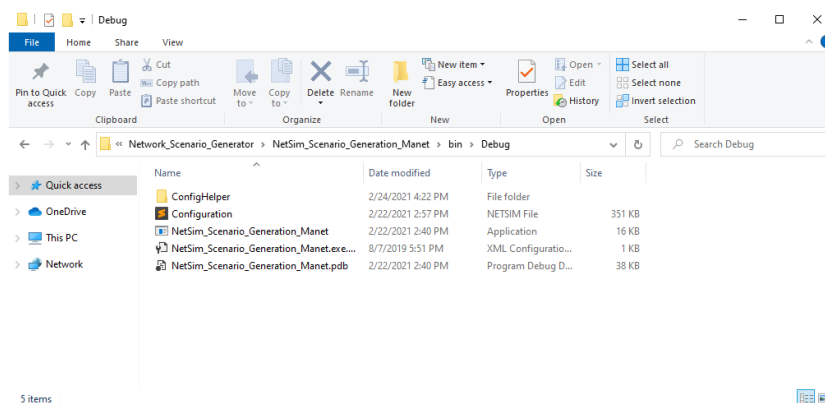
To generate a network scenario with 100 wireless nodes and 100 applications following arguments are passed as input to the NetSim_Scenario_Generation.exe file.

C:\Users\MT5815\Desktop\Network_Scenario_generator_v13.0\Network_Scenario_Generators\NetSim_MANET_v13.0>*NetSim_Scenario_Generation_MANET.exe 100 100*
"C:\Users\MT5815\Desktop\Network_Scenario_generator_v13.0\Network_Scenario_Generators\NetSim_MANET_v13.0" "MANET" "PRO" 100

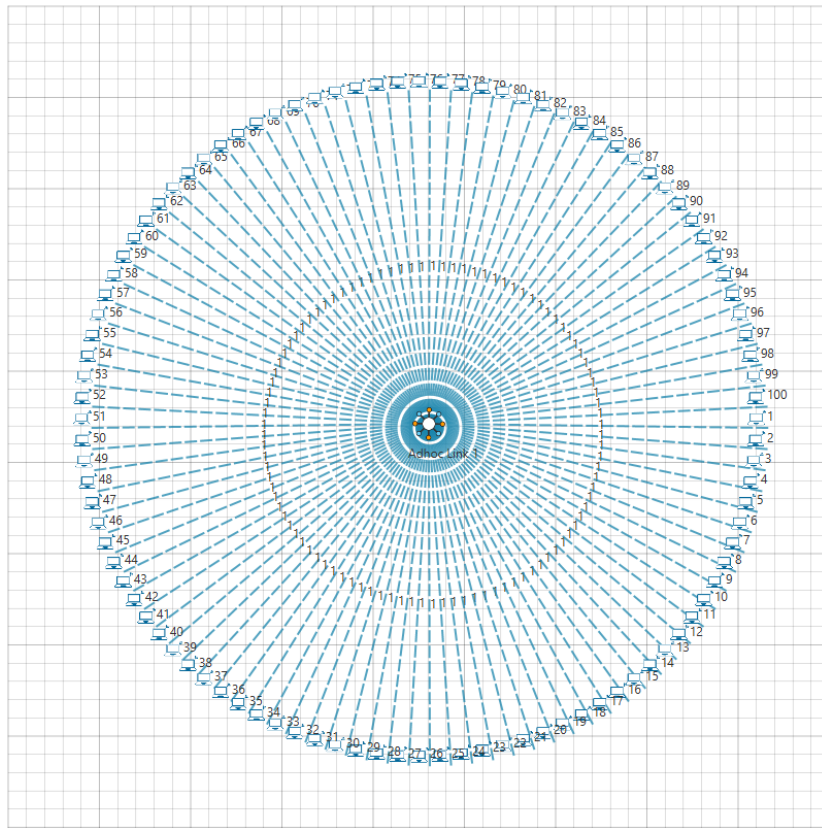


```
C:\Windows\System32\cmd.exe
D:\AE_Task\NetSim_Scenario_Generation_Manet\bin\Debug>NetSim_Scenario_Generation_Manet.exe 100 100
"D:\AE_Task\NetSim_Scenario_Generation_Manet\bin\Debug" "MANET" "PRO" 100
100
100
D:\AE_Task\NetSim_Scenario_Generation_Manet\bin\Debug
MANET
PRO
100
D:\AE_Task\NetSim_Scenario_Generation_Manet\bin\Debug>NetSim_Scenario_Generation_Manet.exe 100 100
"D:\AE_Task\NetSim_Scenario_Generation_Manet\bin\Debug" "MANET" "PRO" 100
```

After successful execution of the command, the output Configuration.netsim file gets created in the same location where the NetSim_Scenario_Generation_MANET.exe file is present.



The network when opened in NetSim after importing the output Configuration.netsim file that gets generated is shown below:



IoT:

NetSim_Scenario_Generation_IOT.exe<space>**<Number_of_Routers>**<space>**<Number_of_WiredNodes>**<space>**<Number_of_Sensors>**<space>**<Number_of_applications>**<space>**<ConfigHelper_Path>**<Space>**<Experiment_Name>**<Space>**<NetSim_Version_Name>**<Space>**<Simulation_Time>**

Parameter	Description
<Number of Routers>	Specifies the number of routers to generate, which takes a value in the range 1 to 1,00,000.
<Number of Wired Nodes>	Specifies the number of Wired nodes to generate, which takes a value in the range 1 to 1,00,000.
<Number of Sensor Nodes>	Specifies the number of Sensor nodes to generate, which takes a value in the range 1 to 1,00,000.
<Number of applications>	Specifies the number of applications to model with a minimum of 1 and a maximum of 1,00,000 Applications.
<ConfigHelper_Path>	Specifies the path to the ConfigHelper folder in the directory. <i>Eg: C:\Users\SPEED</i>

	<i>MT5811\Desktop\Internetworks Scenario Generator</i>
<Experiment Name>	Specifies the name of the experiment.
<NetSim_Version_Name>	Specifies the NetSim Version, For example ' PRO ' or ' STANDARD '
<Simulation Time> in seconds	Specifies the simulation time in seconds to simulate the network scenario 30s < T <100000s

For example,

To generate a network scenario with 2 routers, 1 wired node, 100 sensors and 100 applications following arguments are passed as input to the NetSim_Scenario_Generation.exe file.

C:\Users\MT5815\Desktop\Network_Scenario_generator_v13.0\Network_Scenario_Generators\NetSim_IoT_v13.0>*NetSim_Scenario_Generation_IOT.exe 2 1 100 100*
"C:\Users\MT5815\Desktop\Network_Scenario_generator_v12.2\Network_Scenario_Generators\NetSim_IoT_v13.0" "IoT" "PRO" 100

```

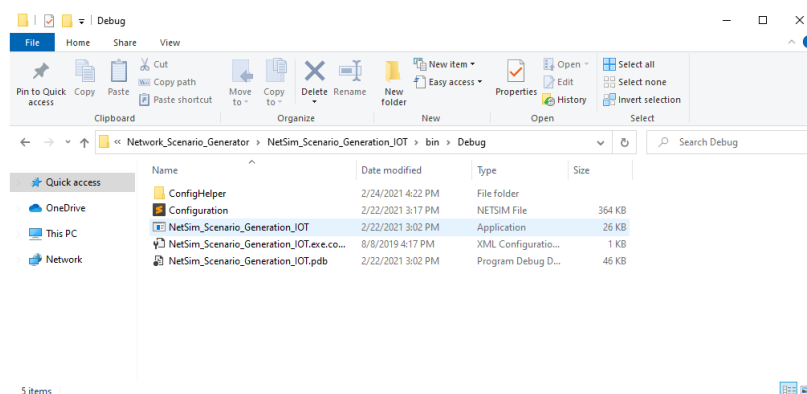
C:\Windows\System32\cmd.exe

D:\AE_Task\NetSim_Scenario_Generation_IOT\bin\Debug>NetSim_Scenario_Generation_IOT.exe 2 1 100 100
"D:\AE_Task\NetSim_Scenario_Generation_IOT\bin\Debug" "IoT" "PRO" 100
2
1
100
100
D:\AE_Task\NetSim_Scenario_Generation_IOT\bin\Debug
IoT
PRO
100

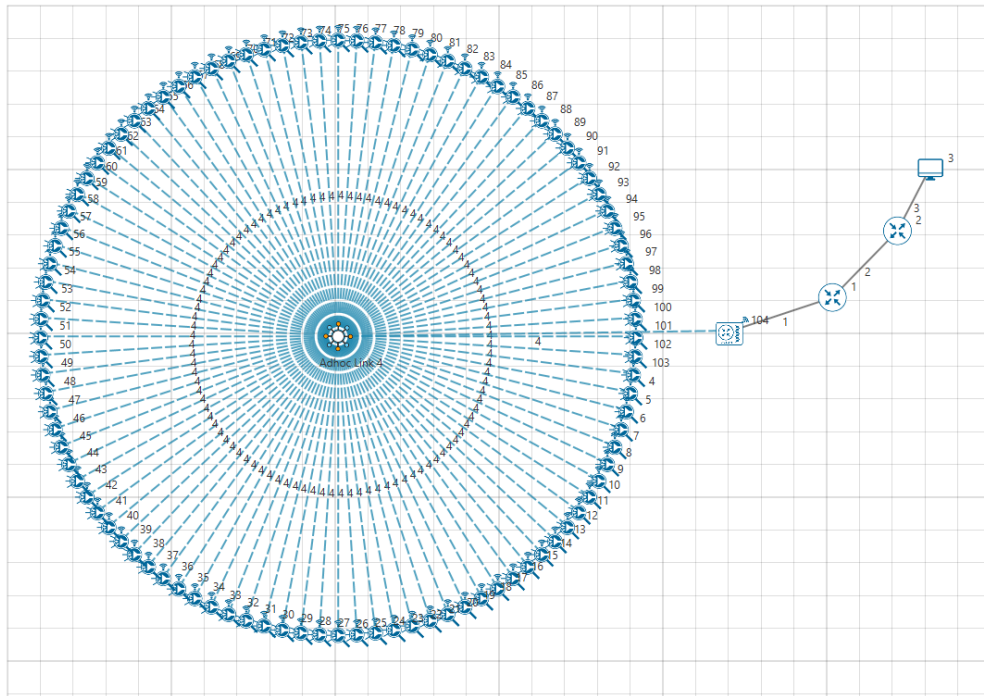
D:\AE_Task\NetSim_Scenario_Generation_IOT\bin\Debug>NetSim_Scenario_Generation_IOT.exe 2 1 100 100
"D:\AE_Task\NetSim_Scenario_Generation_IOT\bin\Debug" "IoT" "PRO" 100

```

After successful execution of the command, the output Configuration.netsim file gets created in the same location where the NetSim_Scenario_Generation_5GLTE.exe file is present.

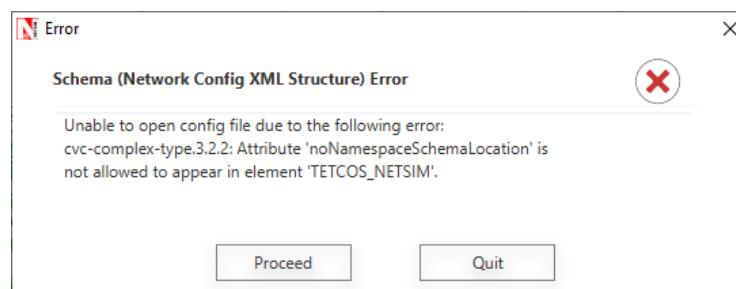


The network when opened in NetSim after importing the output Configuration.netsim file that gets generated is shown below:



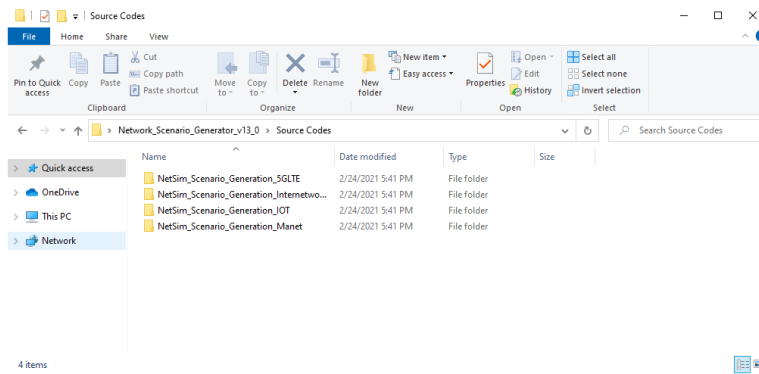
Note:

The following warning message that may be displayed when attempting to open the Configuration.netsim file generated using the scenario generator, can be ignored by clicking on the proceed button.

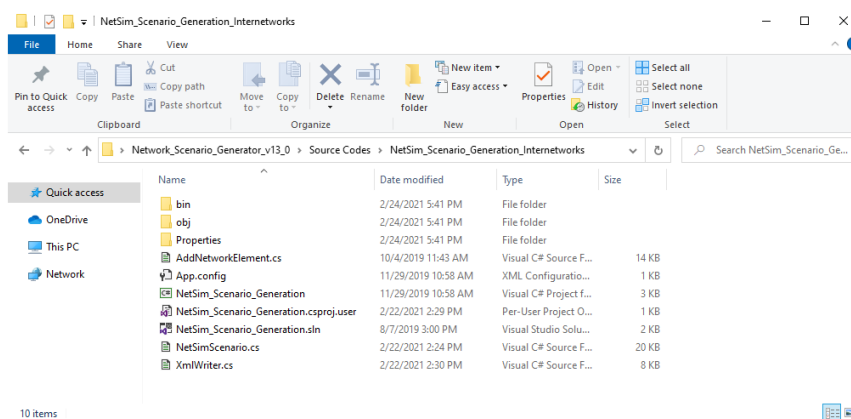


Customizing the Network Scenario Generator:

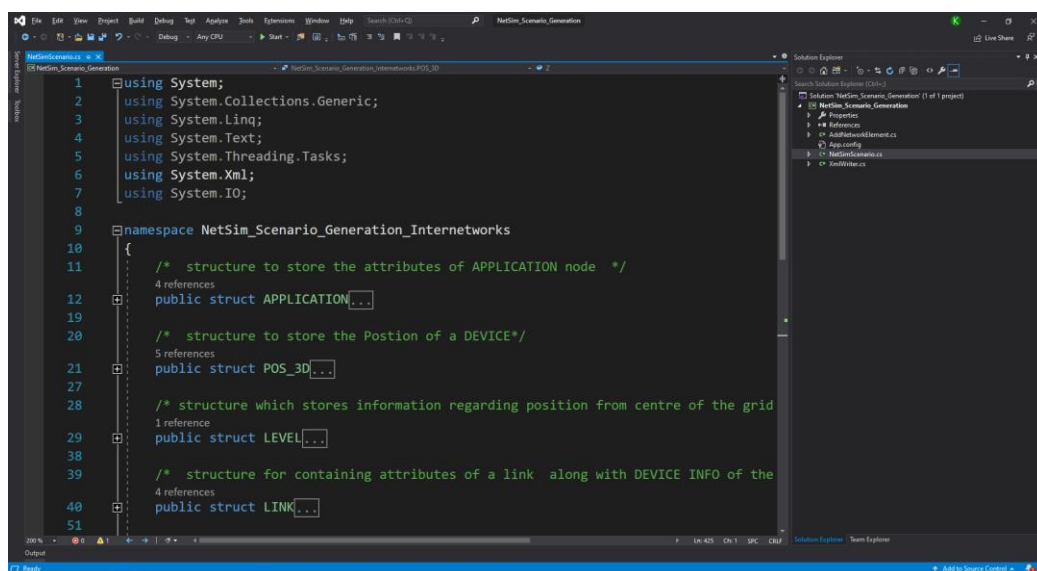
The Source Codes directory that is part of the project consists of the source codes associated with the Scenario Generators of Internetworks, 5G NR, MANETs and IoT.



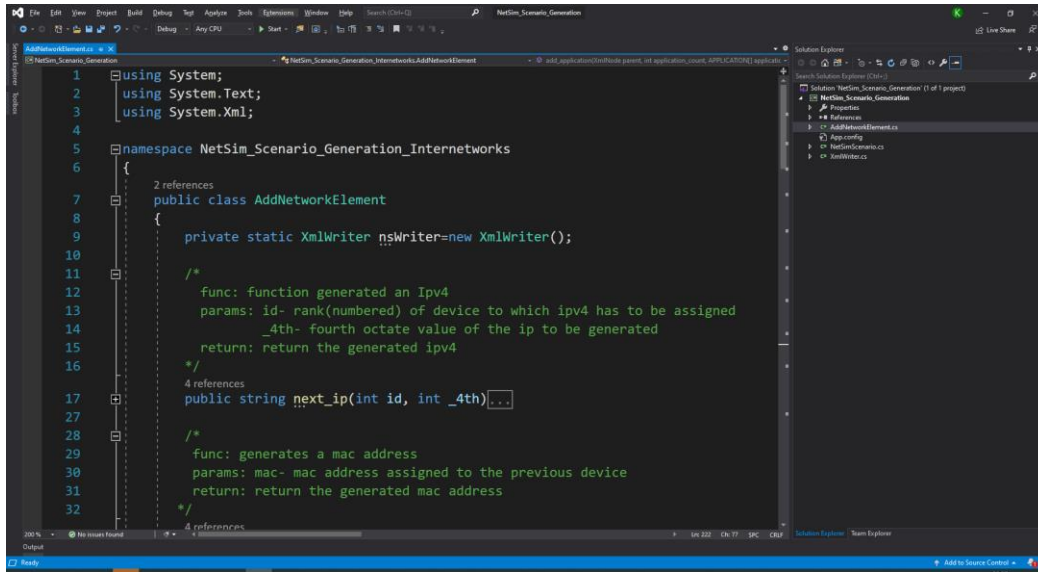
The source codes are written in C# and can be loaded in visual studio by double-clicking on the visual studio solution file (*.sln) from the respective network folder.



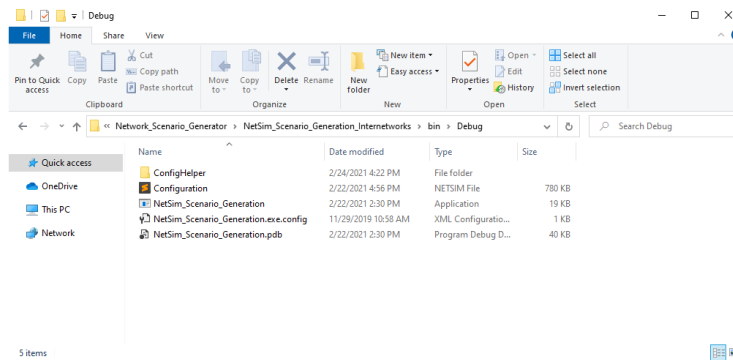
NetworkScenario.cs is the main file that contains the source codes to generate the Configuration.netsim file as per the user input.



AddNetworkElement.cs is the file which reads from the text files present in the ConfigHelper directory of the scenario generator and accordingly updates the Configuration.netsim file for addition of nodes, links, applications, etc. This file also consists of functions for generating IP addresses, MAC addresses, etc.



Similar to the Network Scenario Generators folder each Source Code Folder contains a ConfigHelper directory in the <Network_Source_Code_Folder>/bin/Debug path with text files containing the properties related devices, links and applications.



If source codes are modified, the codes must be rebuilt and the newly generated Network Scenario Generator in the <Network_Source_Code_Folder>/bin/Debug path should be used to generate a configuration file for changes done to take effect.

