

If this is your First-Time-Use of MAPS™ LTE X2 application, then we recommend you follow all the steps explained in MAPS-LTE-X2-Quick-Install-Guide to install MAPS™ LTE X2 application before proceeding with the steps below.

Verification


Functional verification of MAPS-LTE X2 application requires a system with 2 NIC cards for testing. MAPS-LTE X2 is configured as **Source eNodeB (Evolved Node B)** on one NIC and as **Target eNodeB (Evolved Node B)** on the other.

Note down the IP address of NIC1 and NIC2, in this example the IP addresses used and configured are:

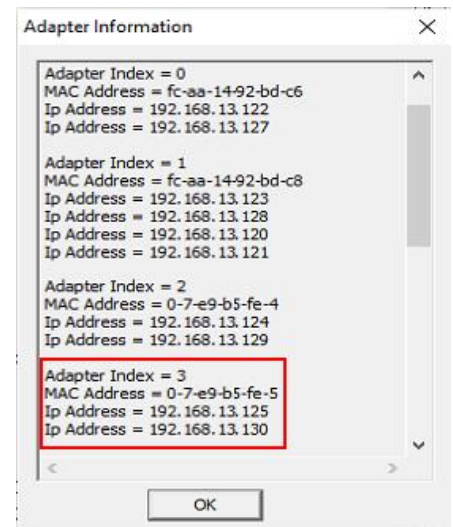
- NIC1 IP address is 192.xx.xx.120, and configured as Source eNodeB
- NIC2 IP address is 192.xx.xx.125, and configured as Target eNodeB


***Note:** In this test scenario, we have configured MAPS™ LTE X2 as Source eNodeB generating calls and Target eNodeB to receive calls.

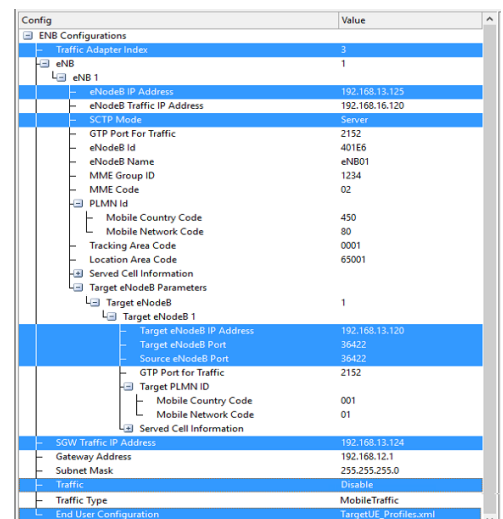
First MAPS™ LTE X2 (GUI) – (Target eNodeB)

- Right-click on the **MAPS-LTEX2_64** application using shortcut icon created on the desktop and select **‘Run as Administrator’**. This instance of MAPS™ is configured for **Call Reception**.
- Once the **MAPS-LTEX2** instance is invoked, by default, **Testbed Setup** window is displayed. Click  icon and select **Target_eNB** configuration file. Verify and validate the following parameter values:

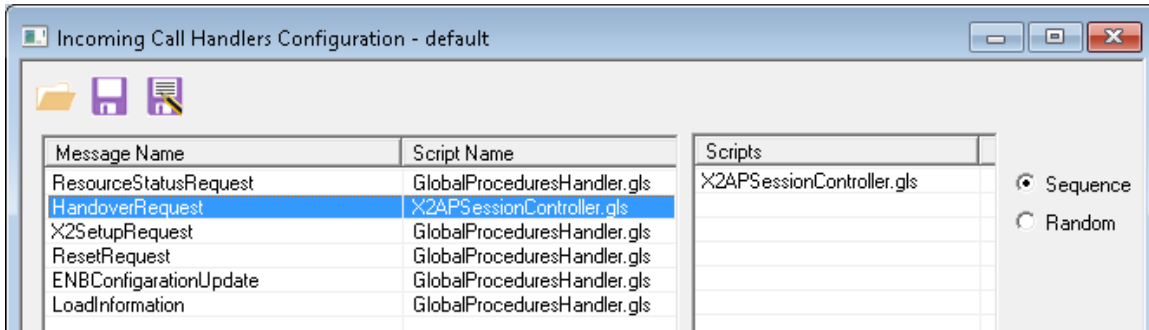
- The **Display Adapter Info** option from the **Help** menu displays all the network adapters available in the system. Choose and set the **Adapter Index** value displayed against the IP address in use.





- Set **eNodeB IP Address** to 192.xx.xx.125 (NIC2 IP address)
- Set SCTP Mode to Server
- Set **Target eNodeB IP Address** to 192.xx.xx.120 (NIC1 IP address)
- By default, **Target eNodeB Port** is set to **36422**
- By default, **Source eNodeB Port** is set to **36422**
- Scroll down and set Traffic = Disabled
- By default, **End User Configuration** is set to **TargetUE_Profiles.xml**
- Click  **Save** to save the configuration.

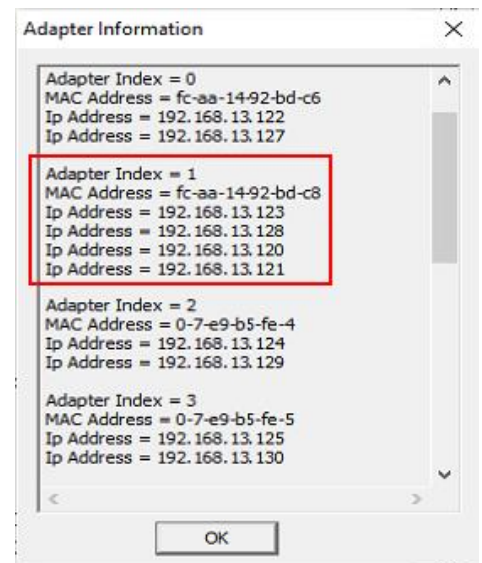


- On the same **MAPS-LTEX2 (Target eNB)** main window, from **Configuration** menu → select **Incoming Call Handler Configuration** and invoke the window. Verify that **X2APSessionController.gls** script is set against **HandoverRequest** to handle UE signaling procedure. Exit from the window.



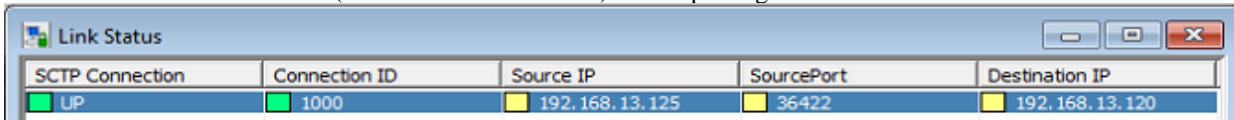
Second MAPS™ LTEX2 (GUI) – (Source eNodeB)

- Right-click on the **MAPS-LTEX2_64** application using shortcut icon created on the desktop and select 'Run as Administrator'. This instance of MAPS™ is configured for **Call Generation**.
- Once the **MAPS-LTEX2** instance is invoked, by default, **Testbed Setup** window is displayed. Click  icon and select **Source_eNB** configuration file. Verify and validate the following parameter values:
 - The **Display Adapter Info** option from the **Help** menu displays all the network adapters available in the system. Choose and set the **Adapter Index** value displayed against the IP address in use.
 - Set **eNodeB IP Address** to 192.xx.xx.120 (NIC1 IP address)
 - Set SCTP Mode to Client
 - Set **Target eNodeB IP Address** to 192.xx.xx.125 (NIC2 IP address)
 - By default, **Target eNodeB Port** is set to **36422**
 - By default, **Source eNodeB Port** is set to **36422**
 - Scroll down and set Traffic = Disabled
 - By default, **End User Configuration** is set to **SourceUE_Profiles.xml**
 - Click on  **Save** to save the configuration.





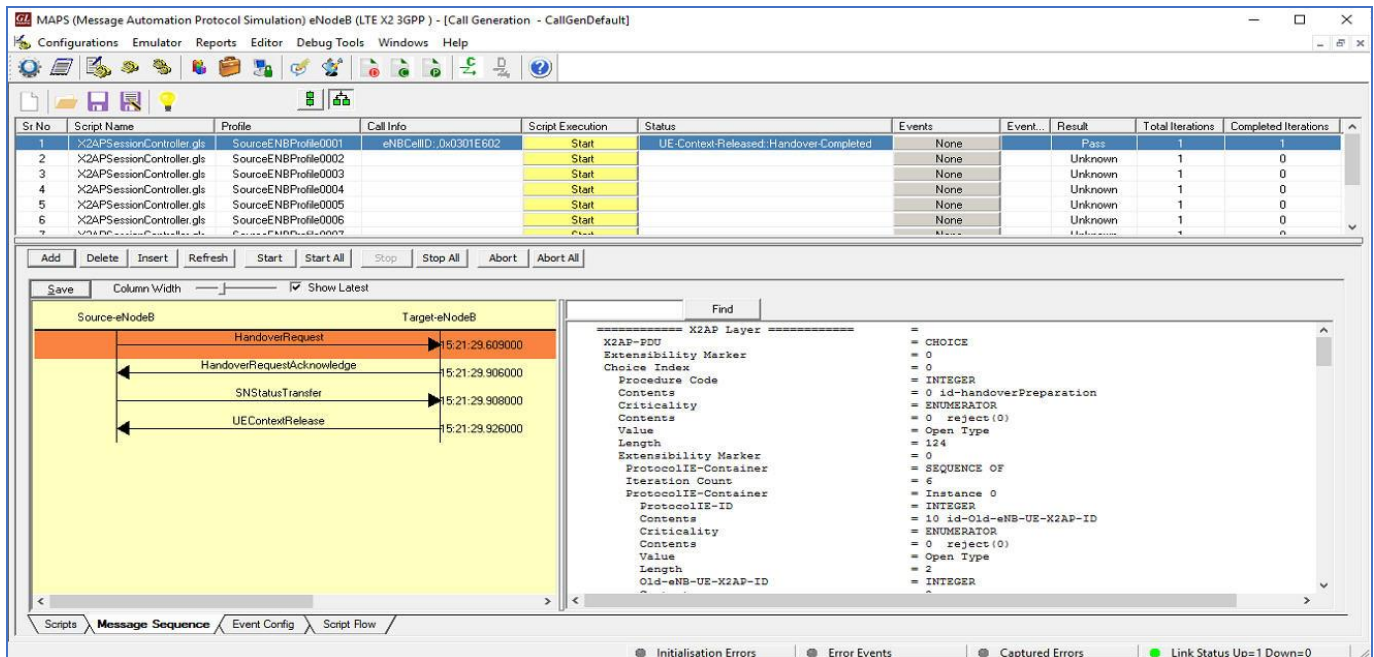
Config	Value
ENB Configurations	
Traffic Adapter Index	1
eNB	1
eNB 1	
eNodeB IP Address	192.168.13.120
eNodeB Traffic IP Address	192.168.16.119
SCTP Mode	Client
GTP Port For Traffic	2152
eNodeB Id	301E6
eNodeB Name	eNB01
MME Group ID	1234
MME Code	02
PLMN Id	
Mobile Country Code	001
Mobile Network Code	01
Tracking Area Code	0002
Location Area Code	65000
Served Cell Information	
Target eNodeB Parameters	
Target eNodeB	1
Target eNodeB 1	
Target eNodeB IP Address	192.168.13.125
Target eNodeB Port	36422
Source eNodeB Port	36422
GTP Port for Traffic	2152
Target PLMN ID	450
Mobile Country Code	450
Mobile Network Code	80
Served Cell Information	
SGW Traffic IP Address	192.168.13.124
Gateway IP Address	192.168.12.1
Subnet Mask	255.255.255.0
Traffic	Disable
Traffic Type	MobileTraffic
End User Configuration	SourceUE_Profiles.xml

- **Start** the testbed on both the MAPS instances (Source eNodeB and Target eNodeB).
- On both the MAPS instances main window, from **Reports** menu → select **Link Status** option to verify the link status. Verify that the **SCTP Link Status** is **UP** (indicated in Green color) before placing the call.



SCTP Connection	Connection ID	Source IP	SourcePort	Destination IP
UP	1000	192.168.13.125	36422	192.168.13.120

- **Note: Fails to start SCTP Services and associated SCTP Link status is Down**, then **Turn OFF Windows Firewall** (navigate to Control Panel → Systems & Security → Windows Firewall, click Turn Off Windows Firewall for all networks).
- On both instances of **MAPS-LTEX2** (Source eNodeB and Target eNodeB) main window, click **Call Reception**  icon and observe that the **Check_SCTP_Status.gls** script is activated.
- In the **MAPS-LTEX2** (Source eNodeB) instance, click the **Call Generation**  icon on main window, and invoke the **Call Generation** window.
- By default, you will observe multiple call instances loaded with **X2APSessionController.gls** script and **SourceENBProfile00**** profiles.
- Select the call instance loaded with **X2APSessionController.gls** script and **SourceENBProfile0001** profile in the Call Generation window, and click **Start** button to initiate the call generation.
- Wait for the calls to terminate, and verify the call flow under the **Message Sequence** tab at both generation and reception end.
- Select any message in the ladder diagram and observe the respective decode message on the right pane for the respective message.



Sr No	Script Name	Profile	Cell Info	Script Execution	Status	Events	Event...	Result	Total Iterations	Completed Iterations
1	X2APSessionController.gls	SourceENBProfile0001	eNBCellID: 0x0301E602	Start	UE-Context-Released; Handover-Completed	None		Pass	1	1
2	X2APSessionController.gls	SourceENBProfile0002		Start		None		Unknown	1	0
3	X2APSessionController.gls	SourceENBProfile0003		Start		None		Unknown	1	0
4	X2APSessionController.gls	SourceENBProfile0004		Start		None		Unknown	1	0
5	X2APSessionController.gls	SourceENBProfile0005		Start		None		Unknown	1	0
6	X2APSessionController.gls	SourceENBProfile0006		Start		None		Unknown	1	0
7	X2APSessionController.gls	SourceENBProfile0007		Start		None		Unknown	1	0

Message Sequence Diagram (Source-eNodeB to Target-eNodeB):

- HandoverRequest (15:21:29.609000)
- HandoverRequestAcknowledge (15:21:29.906000)
- SNStatusTransfer (15:21:29.908000)
- UEContextRelease (15:21:29.926000)

Decode Message (X2AP Layer):

```

X2AP-PDU = CHOICE
Extensibility Marker = 0
Choice Index = 0
Procedure Code = INTEGER
Contents = 0 id-handoverPreparation
Criticality = ENUMERATOR
Contents = 0 reject(0)
Value = Open Type
Length = 124
Extensibility Marker = 0
ProtocolIE-Container = SEQUENCE OF
Iteration Count = 6
ProtocolIE-Container = Instance 0
ProtocolIE-ID = INTEGER
Contents = 10 id-Old-eNB-UE-X2AP-ID
Criticality = ENUMERATOR
Contents = 0 reject(0)
Value = Open Type
Length = 2
Old-eNB-UE-X2AP-ID = INTEGER
  
```

- Return to instance of **MAPS-LTEX2** (Target eNodeB), in the **Call Reception** window, observe that the calls are automatically received running the Rx script.