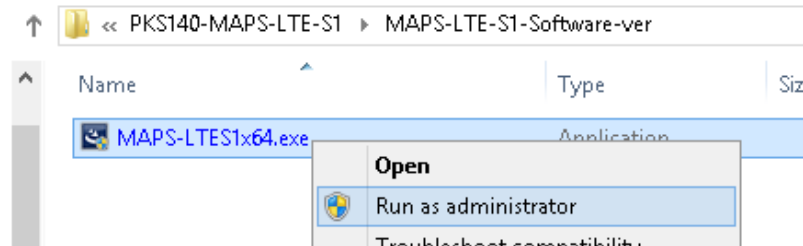


Software and License Installation

DO NOT CONNECT USB DONGLE TO THE PC FIRST. Perform Software installation first, followed by License installation and then plug-in the USB hardware dongle to the PC.

- PC Requirements
 - Windows® 7 and above Operating System (**64 bit Only**).
 - Core i3 to i7 (or equivalent), 4 GB Memory, NIC, and USB 2.0 Ports.
- Plug-in the **USB Installation Stick** (pen drive) to the PC. This is provided with the shipment package by GL Communications.
- Navigate to **PKS140-MAPS-LTE-S1\MAPS-LTE-S1-Software-verXX** folder, right click **MAPS-LTES1x64.exe** and select **Run as Administrator**. Follow the onscreen instructions and complete the installation.




- Navigate back to root directory in USB installation stick (pen drive) to **GL-Dongle License Installer** folder, execute **GLDongleLicenseInstaller_x64.exe**. Follow the onscreen instructions and complete the installation.
- NOW PLUG-IN the USB Dongle to the PC to the USB 2.0 port of your computer. Windows® should install all required drivers automatically. A red light should appear on the dongle indicating that the device is functioning correctly and ready to use.
- It is recommended to reboot the system after the software installation. If you had problems with installation so far, refer to [Troubleshoot](#) section explained in this document.
- You can verify if the required licenses are installed. Navigate to **C:\Program Files\GL Communications Inc\GLDONGLE** directory, execute **appl_list.exe** and confirm that the PKS140 (LTE-S1Interface Emulation) license is listed.


Verification

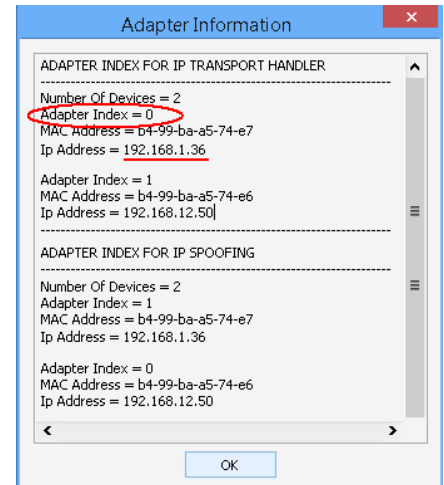
For functional verification, **MAPS-LTES1** application can be configured on a single PC in loopback mode.

On first instance, MAPS™ is configured as **eNodeB** (Evolved Node B), and on the second instance, MAPS™ is configured as **MME** (Mobile Management Entity) nodes simulating LTE S1 interface procedure. The following explains **MAPS-LTES1** configuration on the same PC in loopback mode.

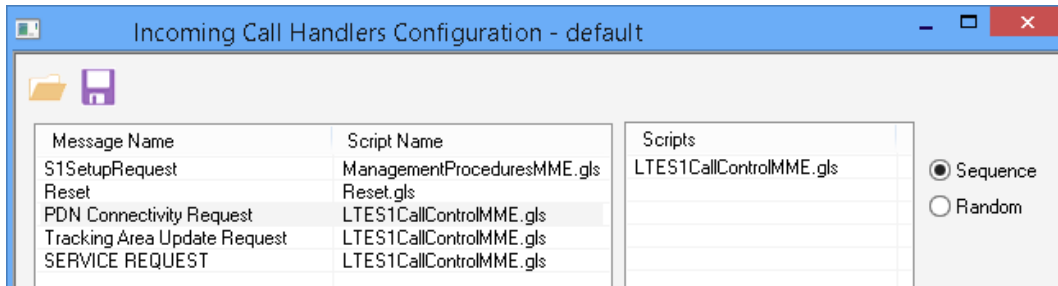
First MAPS™ LTE S1 (GUI) – (MME)

- Right-click on the **MAPS-LTES1** application using shortcut icon created on the desktop and select '**Run as Administrator**'. This instance of MAPS™ is configured for **Call Reception**.
- While invoking the first **MAPS-LTES1** instance, verify the following in the **Protocol Selection** window -
 - **Protocol Standard** is set to **LTE S1**
 - **Protocol Version** to **3GPP RELEASE 9**
 - Select **Node** as **MME**. Click **Ok**
- By default, **Testbed Setup** window is displayed. Click  and select **Self_Test_MME** and check for the parameter default values as listed below:



- 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 **MME IP Address** to PC IP address
- By default, **MME Port** is set to **36412**
- Set **eNodeB IP Address** to PC IP address
- Traffic = Disabled
- Click  **Save** button and overwrite the **Self_Test_MME** configuration file.



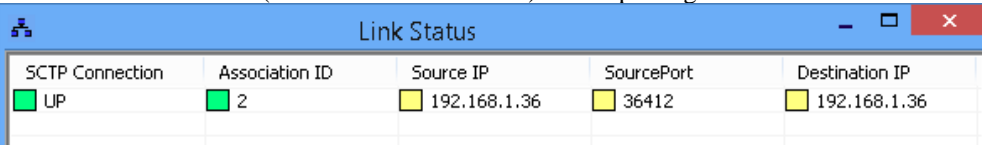
- On the same **MAPS-LTES1** main window, from **Configuration** menu > select **Incoming Call Handler Configuration** and invoke the window. Verify that **LTES1CallControlMME.gls** script is set against **PDN Connectivity Request** message. Exit from the window.



Second MAPS™ LTES1 (GUI) – (eNodeB)



- Right-click on the **MAPS-LTES1** application using shortcut icon created on the desktop and select 'Run as Administrator'. This instance of MAPS™ is configured for **Call Generation**.
- While invoking the second **MAPS-LTES1** instance, verify the following in the **Protocol Selection** window
 - **Protocol Standard** is set to **LTE S1**
 - **Protocol Version** is set to **3GPP RELEASE 9**
 - Select **Node** as **eNodeB**. Click **Ok**
- By default, **Testbed Setup** window is displayed. Click  and select **Self_Test_eNB** and check for the parameter default values as listed below:
 - 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 PC IP address
 - By default, **eNodeB Port** is set to **36413**
 - Set **MME IP Address** to PC IP address
 - By default, **MME Port** is set to **36412**
 - Traffic = Disabled
 - Click  **Save** button and overwrite the **Self_Test_eNB** configuration file.

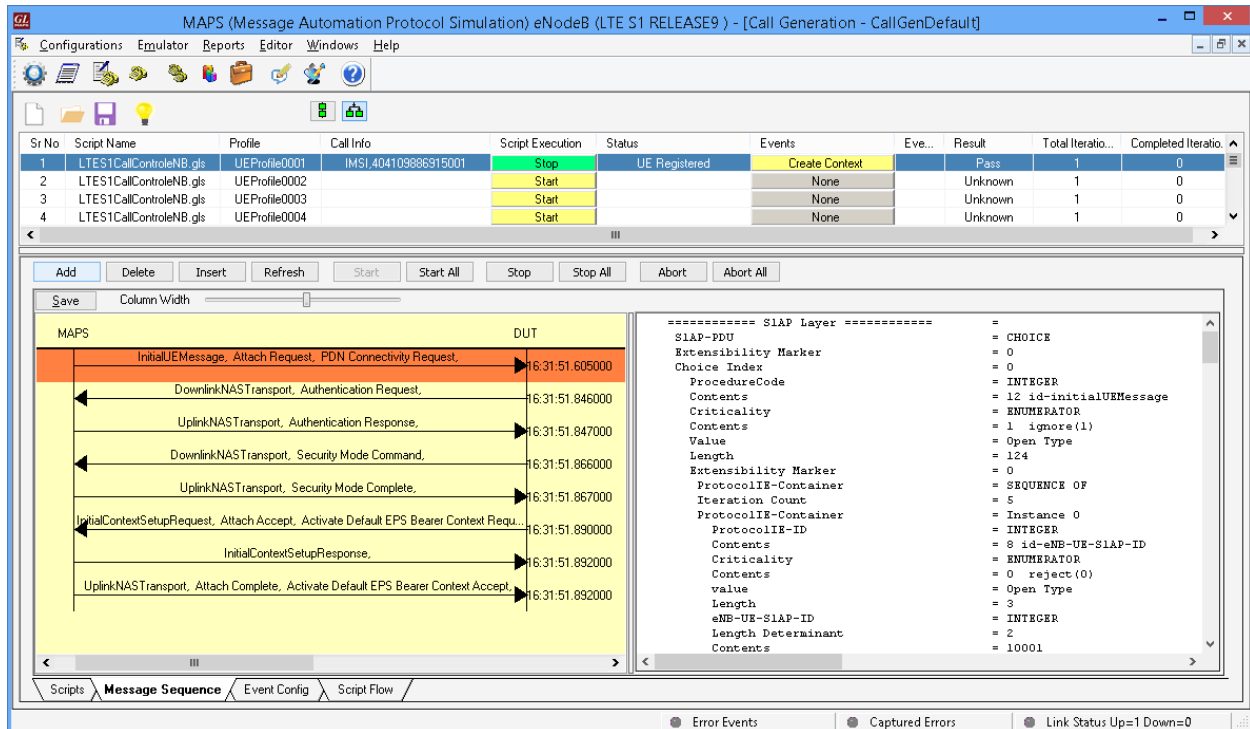
- Start the testbed on both the MAPS instances (eNodeB and MME).
- On both the MAPS instances main window, from **Reports** menu > select **Link Status** option to verify the link status. Verify that the **SCTP Link Status** is **UP** (indicated in Green color) before placing the



SCTP Connection	Association ID	Source IP	SourcePort	Destination IP
UP	2	192.168.1.36	36412	192.168.1.36

call.

- On both instances of **MAPS-LTES1** (eNodeB and MME) main window, click **Call Reception**  icon and observe that the **Check_SCTP_Status.gls** script is activated.
- In the second **MAPS-LTES1** (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 **LTES1CallControleNB.gls** scripts and **UEProfile00**** profiles.
- Select the call instance loaded with **LTES1CallControleNB.gls** script and **UEProfile0001** profile in the Call Generation window, and click **Start** button to initiate the call generation.
- Return to first instance of **MAPS-LTES1** (MME), in the **Call Reception** window, observe that the calls are automatically received running the Rx script.
- 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	Call Info	Script Execution	Status	Events	Eve...	Result	Total Iteratio...	Completed Iteratio...
1	LTES1CallControleNB.gls	UEProfile0001	IMSI_404109886915001	Stop	UE Registered	Create Context		Pass	1	0
2	LTES1CallControleNB.gls	UEProfile0002		Start		None		Unknown	1	0
3	LTES1CallControleNB.gls	UEProfile0003		Start		None		Unknown	1	0
4	LTES1CallControleNB.gls	UEProfile0004		Start		None		Unknown	1	0

Message Sequence Diagram (MAPS vs DUT):

- InitialUEMessage, Attach Request, PDN Connectivity Request (MAPS to DUT) 16:31:51.605000
- DownlinkNAS Transport, Authentication Request (DUT to MAPS) 16:31:51.846000
- UplinkNAS Transport, Authentication Response (MAPS to DUT) 16:31:51.847000
- DownlinkNAS Transport, Security Mode Command (DUT to MAPS) 16:31:51.866000
- UplinkNAS Transport, Security Mode Complete (MAPS to DUT) 16:31:51.867000
- InitialContextSetupRequest, Attach Accept, Activate Default EPS Bearer Context Requ... (MAPS to DUT) 16:31:51.890000
- InitialContextSetupResponse (DUT to MAPS) 16:31:51.892000
- UplinkNAS Transport, Attach Complete, Activate Default EPS Bearer Context Accept... (MAPS to DUT) 16:31:51.892000

Decode Pane (SIAP Layer):

```

===== SIAP Layer =====
SIAP-PDU = CHOICE
Extensibility Marker = 0
Choice Index = 0
ProcedureCode = INTEGER
Contents = 12 id-initialUEMessage
Criticality = ENUMERATOR
Contents = 1 ignore(1)
Value = Open Type
Length = 124
Extensibility Marker = 0
ProtocolIE-Container = SEQUENCE OF
Iteration Count = 5
ProtocolIE-Container = Instance 0
ProtocolIE-ID = INTEGER
Contents = 8 id-eNB-UE-SIAP-ID
Criticality = ENUMERATOR
Contents = 0 reject(0)
value = Open Type
Length = 3
eNB-UE-SIAP-ID = INTEGER
Length Determinant = 2
Contents = 10001
    
```

Troubleshoot

- **“Unknown device” error while installing USB Dongle.** If you see this error, ensure you have installed the GL Dongle License Installer software first and then plugged the USB Dongle to the PC. The USB Dongle will then be recognized as “SafeNetInc. USB Key” and appropriate drivers will get installed automatically. If problem still persists, plug the USB Dongle to a different USB2.0 port and try again.
- **Error: “Security Error: Application is not licensed”,** if you see this error when you run MAPS™ LTE S1 it indicates a problem with either your dongle or license file.
 - First verify that the dongle is plugged in and the red light is ON
 - To use MAPS™ 64-bit version – use *GLDongleLicenseInstaller_x64.exe* utility to install licenses
 - Navigate to *C:\Program Files\GL Communications Inc\GLDONGLE*
 - Run *haspinfohl.exe*. Verify that Status is **OK** and make a note of the Serial #.
 - Run *appl_list.exe*. Verify that there is a line in the table reading *PKS140 LTE-S1Interface Emulation* with the serial number you noted above.
 - If the dongle does not appear in *haspinfohl.exe*, verify that it appears as a USB device in the **Windows Device Manager**. If it does not appear even in the device manager, remove the dongle and plug it into a different USB port, preferably one directly on the motherboard.
- **Error: “Unable to create GLIpHandler:Invalid Arguments”,** if you see this error when you start the Testbed from MAPS™ LTE S1 application it indicates that the Network Adaptor is not configured correctly.
 - From **Help** menu -> run **Display Adaptor Info** and obtain the **Adaptor Index** for the IP address in use, which has to be appropriately configured in the Testbed.
- If you cannot resolve the issues, please contact GL Communications at info@gl.com for technical support.