# E7630A-MTP UXM Message Editor

For use with the E7515A Wireless Test Set

User's Guide

KEYSIGHT TECHNOLOGIES

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## Manual Part Number

E7515-90010

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# Table of Contents

# 1 Introduction

Welcome to the *E7630A-MTP Message Editor User's Guide* for the E7515A UXM Wireless Test Set (UXM). The purpose of this guide is to provide you with installation instructions and user information for the E7630A-MTP LTE Message Editor software application. For more information about the UXM and other UXM software products, refer to the UXM Getting Started Guide and the UXM User's and Programmer's Guide.

## Latest Documentation

For the latest version of all documentation, please go to www.keysight.com/find/UXM-Manuals.

## Latest Software Application Releases

For the latest release of all UXM related software, please go to http://www.keysight.com/find/softwaremanager.

# 2 System Architecture

The E7630A-MTP LTE Message Editor software application runs on PCs using the Microsoft (MS) Windows 7 operating system. The E7630A-MTP is connected to the UXM via a private Ethernet interface to enable you to create and modify scenario files for download into the UXM. An example E7630A-MTP user interface is shown below.

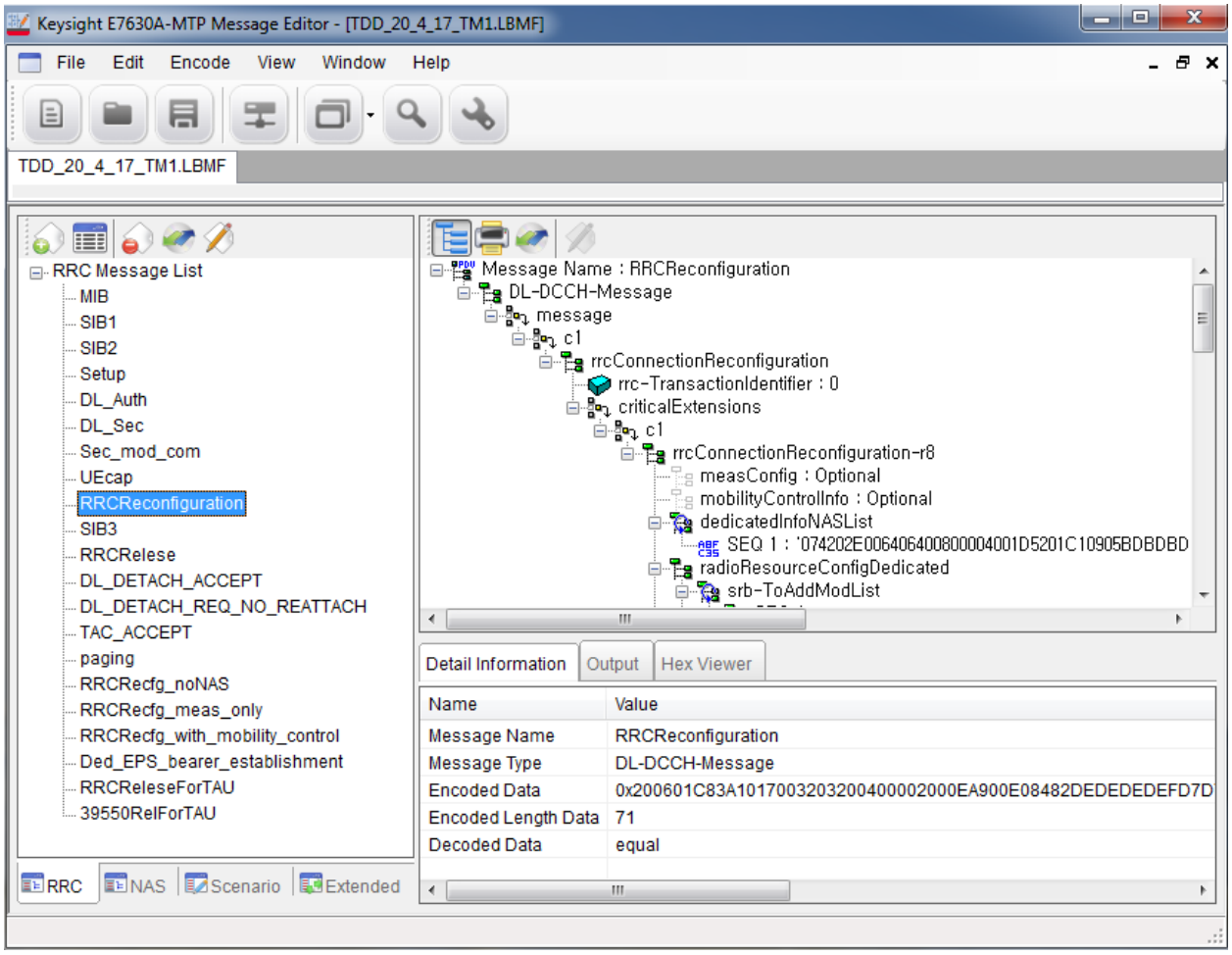



Figure 2-1: E7630A-MTP Message Editor

# 3 E7630A-MTP Software Installation

## Installation Computer Minimum Requirements

For successful operation, the installation computer for the E7630A-MTP LTE Message Editor must meet or exceed the following specifications:

| Minimum System Requirements | |
|---|---|
| Operating System | Computer running Windows 7 |
| Communication with Test Set(s) | Ethernet |
| RAM (Memory) | 4 GB RAM (Minimum) |
| Processor | >2.5 GHz Intel Pentium® Quad core or equivalent |
| .NET Framework | Version 4.0 or later |

NOTES:

1. Consideration for storage space should be given for storing scenario files and supporting documentation.
2. A clean installation of the Operating System is required to ensure freedom from Ad-ware, Spy-ware, updaters and other processor resource consuming applications. For expected performance, Antivirus software should not be running.
3. Connecting the UXM and the message editor PC to a network is not recommended.

## Downloading the Latest Version of E7630A-MTP Message Editor Software

To ensure you have the latest version, download the E7630A-MTP software from the Keysight software manager web site. On the www.keysight.com/find/softwaremanager download site, locate the E7630A-MTP Message Editor Software, and save it to a location on your PC.
Locate the file on your PC and double-click the setup file to install the software. Follow the on-screen instructions to complete the installation.

| | |
|---|---|
| NOTE | Always check the release notes for the latest information about any known issues and other important information about your product. Release notes are available for download from www.keysight.com/find/softwaremanager. |

## Connecting the Computer and Test Set

Connect the E7630A-MTP LTE Message Editor installation computer to the LAN port on the E7515A UXM rear panel.

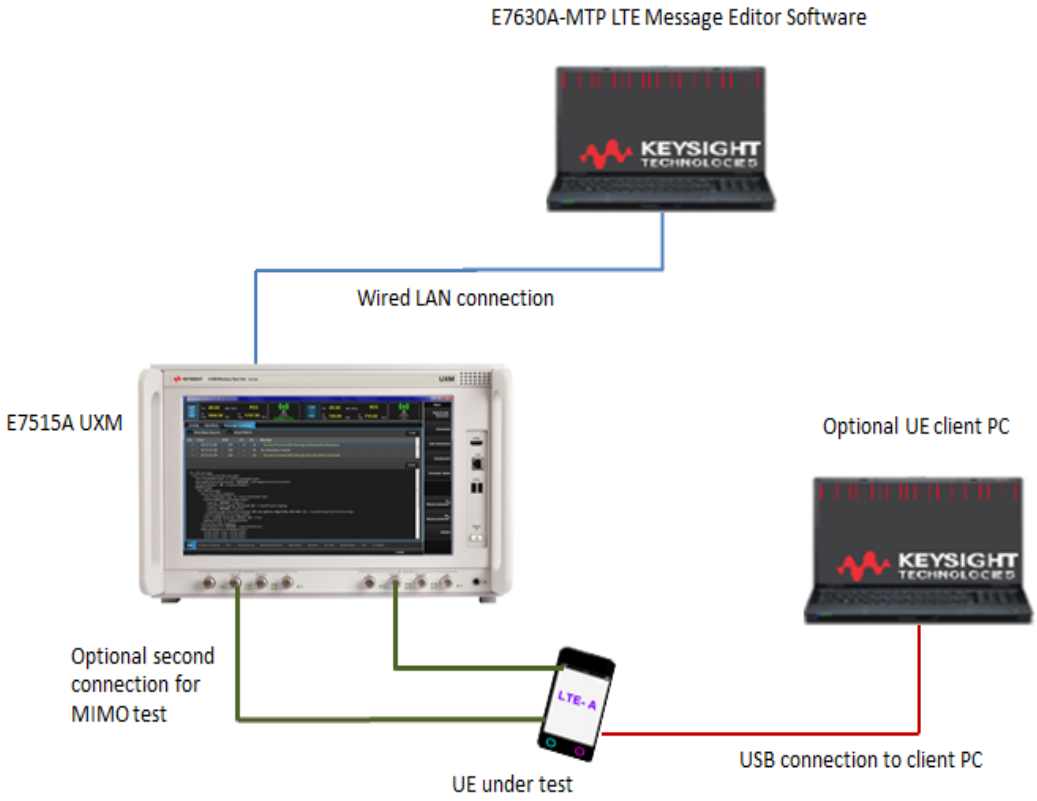



Figure 3-1: System Configuration

## Launch the E7630A-MTP Message Editor Software

Start the E7630A-MTP LTE Message Editor application from the Windows Start menu by selecting Start, All Programs, Keysight UXM, E7630A-MTP Message Editor, E7630A-MTP.

# 4 Menus for E7630A-MTP LTE Message Editor

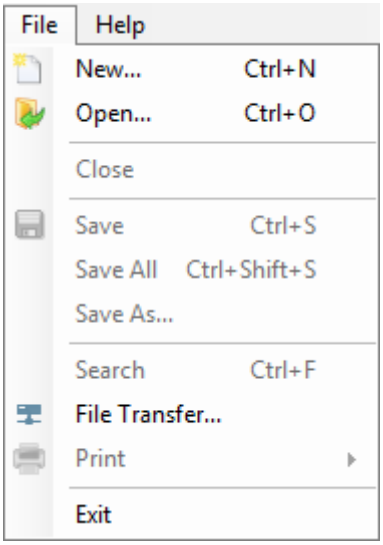
The E7630A-MTP Message Editor is presented in a single window. Some functions are available from the menu bar. Frequently used functions are duplicated in the tool bar.

## The Menu Bar


There are six drop-down menus: File, Edit, Encode, View, Window, and Help. Before any files have been opened, only two menus are displayed: File and Help.
Using your mouse to select the following menu options performs the described task:

### The File Menu

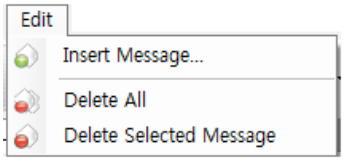
The E7630A-MTP Message Editor works with a file type known as a scenario file which contains message definitions and defines the desired sequence of messages exchanged between the UXM and a UE. These file types have an .LBMF file extension.




| Top Level Menu Option | Drop-Down Menu Options | Task Performed |
|---|---|---|
| File | | Opens the Drop-Down Menu |
| | New... | Creates a new scenario file. |
| | Open... | Opens an existing scenario file. |
| | Close | Closes the active scenario file. |
| | Save | Saves the active scenario file. |
| | Save All | Saves all open scenario files. |
| | Save As | Save a scenario file with a different name or location. |
| | Search | Enables you to search for text phrases or terms within a scenario file. |
| | File Transfer... | • Downloads a scenario file *to* the UXM.<br>• Uploads a scenario file *from* the UXM. |

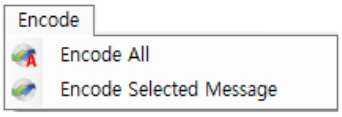
| | | |
|---|---|---|
| | Print | Selects the file for printing. |
| **File** (Continued) | File, Print | Prints selected scenario file. |
| | Tree Print | Print an individual message. |
| | File Preview | Provides a preview of the selected scenario file. |
| | Tree Preview | Prints a preview of the individual message. |
| | Exit | Closes the application. |

## The Edit Menu



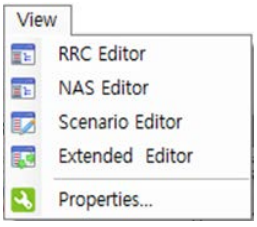

| Top Level Menu Option | Drop-Down Menu Command | Task Performed |
|---|---|---|
| Edit | | |
| | Insert Message | Inserts a new RRC or NAS Message into the scenario file. |
| | Delete All | Deletes All RRC or NAS Messages from a scenario file. |
| | Delete Selected Message | Deletes a selected RRC or NAS Message from a scenario file. |

## The Encode Menu




| Top Level Menu Option | Drop-Down Menu Command | Task Performed |
|---|---|---|
| Encode | | |
| | Encode All | Encodes all RRC or NAS Messages in a scenario file. |
| | Encode Selected Message | Encodes a selected RRC or NAS Message. |

## The View Menu



| Top Level Menu Option | Drop-Down Menu Command | Task Performed |
|---|---|---|
| View | | |
| | RRC Editor | Displays the RRC Editor window. |
| | NAS Editor | Displays the NAS Editor window. |
| | Scenario Editor | Displays the Scenario Editor window. |
| | Extended Editor | Displays the Extended Editor window. |
| | Properties | Displays the properties of the .LBMF file.<br>• File Name<br>• File Path<br>• Spec Version<br>• RRC Version<br>• NAS Version<br>• Description |

## The Help Menu


- Click **About...** to display the About (Version Information) Window.

## The Tool Bars

The Message Editor Tool bar provides quick access to frequently used functions.

- The  icon duplicates the function of File, New (Ctrl+N).
- The  icon duplicates the function of File, Open (Ctrl+O).
- The  icon duplicates the function of File, Save (Ctrl+S).
- The  icon duplicates the function of File, File Transfer (Ctrl+S).
- The  icon duplicates the function of View, LTE BSE ME, NAS Editor, Scenario Editor, Extended Editor
- The  icon enables the function of Search.
- The  icon duplicates the function of View, Properties.

The Scenario File Tool bar provides quick access to frequently used functions.

- The  icon duplicates the function of File, New (Ctrl+N).
- The  icon displays the Hex viewer window.
- The  icon changes Sorting Type.
- The  icon expands All Message List.
- The  icon duplicates the function of Encode, Encode Selected Message.
- The  icon expands All Message List in RRC Message window.
- The  icon duplicates the function of File, Print.
- The  icon duplicates the function of Encode, Encode Selected Message.
- The  icon edits Value in RRC Message window.

# 5 Scenario File Overview

The E7630A-MTP LTE Message Editor provides the ability to create and modify a type of file known as a scenario file. Scenario files contain message definitions and a desired sequence of message exchanges at the RRC level between the UXM and a UE. Since many RRC messages also contain NAS messages, the E7630A-MTP also enables the creation of NAS messages. These can be included as payload in the generated RRC messages.
The content of the RRC messages also determines lower layer behaviour. For example, the Bandwidth of the cell is defined using the dl-Bandwidth parameter in the Master Information Block. Scenario files are downloaded to the UXM via the E7630A-MTP LTE Message Editor, where they are then selected to run from a menu on the UXM.

## Message Editor Fields that can be Overwritten by UXM Front-panel Menu Keys

When a scenario file is loaded on the UXM, the parameters from the scenario file that have UXM menu keys associated with them are updated on the UXM to reflect the values from the scenario file. The table below shows those values from the scenario file that can be changed using the UXM front-panel menu keys without requiring modification of the scenario file using the E7630A-MTP LTE Message Editor.

| Message Editor Field | UXM Menu Key | Key Path |
|---|---|---|
| **freqBandIndicator** controls which frequency band is transmitted in System Information Block 1(SIB1). | ***Band*** | *Cell > Config* |
| **PA** is one of the parameters that control the power boosting applied to the PDSCH. It is signaled in the RRC Connection Setup message. | ***PDSCH PA*** | *Power > Boosting* |
| **PB** is one of the parameters that control the power boosting applied to the PDSCH. It is signaled in the System Information Block 2 message. | ***PDSCH PB*** | *Power > Boosting* |
| **dl-Bandwidth** determines the channel bandwidth defined in the Master Information Block (MIB) message. | ***DL Bandwidth*** | *Cell > Config* |
| **Max-HARQ-Tx** controls the number of times an UL-SCH transmission is transmitted if it does not receive an ACK. (This parameter appears in the RRC Connection Setup message of the scenario file.) | ***Uplink Max HARQ Transmissions*** | *MAC/RLC/PDCP > HARQ* |

| Message Editor Field | UXM Menu Key | Key Path |
|---|---|---|
| **transmissionMode** controls the transmission mode assigned in the RRC Connection Setup message. If this value is set to TM3 or TM4, the codebook subset restriction field is also enabled. | ***Transmission Mode*** | *Scheduling > Subframes Configuration* |
| **p-Max** is carried in SIB1 and provides a value for the maximum power the UE is allowed to transmit. If this value is not present in the scenario file, the p-Max On/Off setting is overwritten, but this setting is not. | ***p-Max*** | *Power > Power Control* |
| **p-Max On/Off** determines whether the p-Max value is present in the scenario file by controlling whether the Information Element (IE) is present or not. | ***p-Max On/Off*** | *Power > Power Control* |
| **p0-NominalPUSCH** contributes towards the power of the PUSCH and is carried in SIB2. | ***p0-NominalPUSCH*** | *Power > Power Control* |
| **p0-UE-PUSCH** contributes towards PUSCH power and is carried in the (RRC Connection) Setup message. | ***p0-UE-PUSCH*** | *Power > Power Control* |
| **defaultPagingCycle** controls how frequently the UE can be paged and is contained in SIB2. | ***Default Paging Cycle*** | *Function > Paging* |
| **nB** controls how frequently the UE can be paged and is contained in SIB2. | ***NB*** | *Function > Paging* |
| **additionalSpectrumEmission** controls how much leakage the UE is allowed into adjacent frequencies and is contained in SIB2. | ***Additional Spectrum Emission*** | *Power > Power Control* |
| **PDNAddressInformation** is the IP Address assigned to the UE in the Activate Default EPS Bearer Context Request message.<br>Since this is #1, it is the IP address that is contained inside the (Non-Access Stratum) NAS Attach Accept message. | ***IP Address Type*** | *RRC/NAS > EPS Bearer Config* |
| **drx-Config** determines if the DRX Config IE in the RRC Connection Reconfiguration message is set to setup or release. | ***Connected Mode DRX*** | *MAC/RLC/PDCP > Connected Mode DRX* |

| Message Editor Field | UXM Menu Key | Key Path |
|---|---|---|
| **longDRX-Cycle** is related to Connected Mode DRX and is present in the RRC Connection Reconfiguration message. | ***Long DRX Cycle Length*** | *MAC/RLC/PDCP > Connected Mode DRX* |
| **longDRX-CycleStartOffset** is present in the RRC Connection Reconfiguration message. | ***DRX Start Offset*** | *MAC/RLC/PDCP > Connected Mode DRX* |
| **onDurationTimer** is related to Connected Mode DRX and is present in the RRC Connection Reconfiguration message. | ***onDurationTimer*** | *MAC/RLC/PDCP > Connected Mode DRX* |
| **drx-InactivityTimer** is related to Connected Mode DRX and is present in the RRC Connection Reconfiguration message. | ***drx-InactivityTimer*** | *MAC/RLC/PDCP > Connected Mode DRX* |
| **shortDRX** is related to Connected Mode DRX and is present in the RRC Connection Reconfiguration message. This field controls whether shortDRX IE is present or not. | ***Short DRX*** | *MAC/RLC/PDCP > Connected Mode DRX* |
| **shortDRX-Cycle** is related to Connected Mode DRX and is present in the RRC Connection Reconfiguration message. | ***shortDRX-Cycle*** | *MAC/RLC/PDCP > Connected Mode DRX* |
| **shortDRX-CycleTimer** is related to Connected Mode DRX and is present in the RRC Connection Reconfiguration message. | ***drxShortCycleTimer*** | *MAC/RLC/PDCP > Connected Mode DRX* |
| **sr-ConfigIndex** controls the frequency and on which subframe scheduling request messages can be sent. (This parameter appears in the RRC Connection Setup message of the scenario file.) | ***Scheduling Request Configuration Index*** | *MAC/RLC/PDCP > General* |
| **UL-DL Configuration,** used only in TDD, controls how many subframes are used for DL transmission, how many for UL transmission and how many are special subframes (used for both). It appears in the SIB1, with the name subframeAssignment. | ***TDD UL-DL Configuration*** | *Cell > Config* |

| Message Editor Field | UXM Menu Key | Key Path |
|---|---|---|
| **Special Subframe Configuration,** used only in TDD, controls the configuration of the special subframe – how many symbols of the subframe are used for downlink transmission and how many for uplink. It appears in SIB1, with the name specialSubframePatterns. | ***TDD Special Subframe Configuration*** | *Cell > Config* |
| **AS Ciphering Algorithm** controls the Ciphering Algorithm selected for use in the Access Stratum. This is signaled in the RRC layer's Security Mode Command. | ***RRC Security Algorithm*** | *RRC/NAS > Security* |
| **MCC** is carried in SIB1.<br>It also exists in the NAS Attach Accept message:<br>• in the TAIList<br>• in the Globally Unique Temporary Identity (GUTI), if it is present<br>and overwrites both of these values. | ***MCC*** | *Cell > Identities* |
| **MNC** is carried in SIB1.<br>It also exists in the NAS Attach Accept message:<br>• in the TAIList<br>• in the Globally Unique Temporary Identity (GUTI), if it is present<br>and overwrites both of these values. | ***MNC*** | *Cell > Identities* |
| This setting controls the number of digits of MNC. It is carried in SIB1.<br>It also exists in the NAS Attach Accept message:<br>• in the TAIList<br>• in the Globally Unique Temporary Identity (GUTI), if it is present<br>and overwrites both of these values. | ***MNC Length*** | *Cell > Identities* |
| **NAS Ciphering Algorithm** controls the Ciphering Algorithm selected for use in the Non Access Stratum. This is signaled in the EMM layer's Security Mode Command. | ***NAS Security Algorithm*** | *RRC/NAS > Security* |

| Message Editor Field | UXM Menu Key | Key Path |
|---|---|---|
| This enables the EPS Bearer ID associated with each of the configured Default EPS Bearer Contexts in the scenario file to be read back. | ***Default EPS Bearer Config # 1 (-4)*** | *RRC/NAS > EPS Bearer Config* |
| **IP Address Type** controls what type of IP address is assigned to the UE in the Activate Default EPS Bearer Context Request message. You can assign an IPv4 address, an IPv6 address, or both an IPv4 and IPv6 to the UE. | ***IP Address Type*** | *RRC/NAS > EPS Bearer Config* |
| **V4 Address** controls the IPv4 address that is assigned to the UE in the Activate Default EPS Bearer Context Request message, if the IP Address Type selection has enabled this. | ***IPv4 Address*** | *RRC/NAS > EPS Bearer Config* |
| **V6 Address** controls the IPv4 address that is assigned to the UE in the Activate Default EPS Bearer Context Request message, if the IP Address Type selection has enabled this. | ***IPv6 Address IID*** | *RRC/NAS > EPS Bearer Config* |
| **DNS State** controls whether a DNS address will be assigned to the UE in the Activate Default EPS Bearer Context Request message. | ***Number of DNS Server Addresses*** | *RRC/NAS > EPS Bearer Config* |
| **DNS Address Type** controls what type of IP address (IPv4, IPv6 or IPv4v6) is assigned as a DNS address in the Activate Default EPS Bearer Context Request message. | ***DNS Type*** | *RRC/NAS > EPS Bearer Config* |
| **V4 DNS Address** controls the IPv4 address that is assigned as a DNS address in the Activate Default EPS Bearer Context Request message, if the DNS Address Type selection and DNS State have enabled this. | ***IPv4DNS Address*** | *RRC/NAS > EPS Bearer Config* |
| **V6 DNS Address** controls the IPv6 address that is assigned as a DNS address in the Activate Default EPS Bearer Context Request message, if the DNS Address Type selection and DNS State have enabled this. | ***IPv6 DNS Address*** | *RRC/NAS > EPS Bearer Config* |

| Message Editor Field | UXM Menu Key | Key Path |
|---|---|---|
| **APN** selects the value of the APN that is assigned to the UE in the Activate Default EPS Bearer Context Request. Based on the APN Overwrite menu key, it is also used to overwrite the APN in the Communication Scenario. For more information, see Access Point Name on page 30. | ***APN*** | *RRC/NAS > EPS Bearer Config* |
| **APN Overwrite** controls whether the APN is overwritten only in the Default EPS Bearer Context Request message, or whether the value also overwrites the APN in the Communication Scenario. For more information, see Access Point Name on page 30. | ***UE Requested APN*** | *RRC/NAS > EPS Bearer Config* |
| **P-CSCF State** controls whether the IP address of a Proxy-Call Session Control Function server is supplied to the UE in the Activate Default EPS Bearer Context Request message. | ***Number of P-CSCF Server Addresses*** | *RRC/NAS > EPS Bearer Config* |
| **P-CSCF Address Type** controls what type of IP address (IPv4, IPv6 or IPv4v6) is assigned as the IP address of the P-CSCF server. | ***P-CSCF Type*** | *RRC/NAS > EPS Bearer Config* |
| **V4 P-CSCF Address** controls the IPv4 address that is assigned as the IP address of the P-CSCF server – assuming the P-CSCF State has enabled this. | ***IPv4 P-CSCF Address*** | *RRC/NAS > EPS Bearer Config* |
| **V6 P-CSCF Address** controls the IPv6 address that is assigned as the IP address of the P-CSCF server – assuming the P-CSCF State has enabled this. | ***IPv6 P-CSCF Address*** | *RRC/NAS > EPS Bearer Config* |
| **Cause Code State** controls whether the Activate Default EPS Bearer Context Request message will contain a Cause Code (which usually indicates a requested service is not available)<br>**Cause Code** controls the cause code that will be contained in the Activate Default EPS Bearer Context Request message, assuming the Cause Code State has enabled this. | ***Cause Code*** | *RRC/NAS > EPS Bearer Config* |

# 6 Creating a New Scenario File

It is often easiest to start with an existing scenario file as a template and make modifications from that. However, you may want to create a new scenario file to use as a completely blank canvas.

1. Click **New** Insert Icon  or Click **File**, **New**

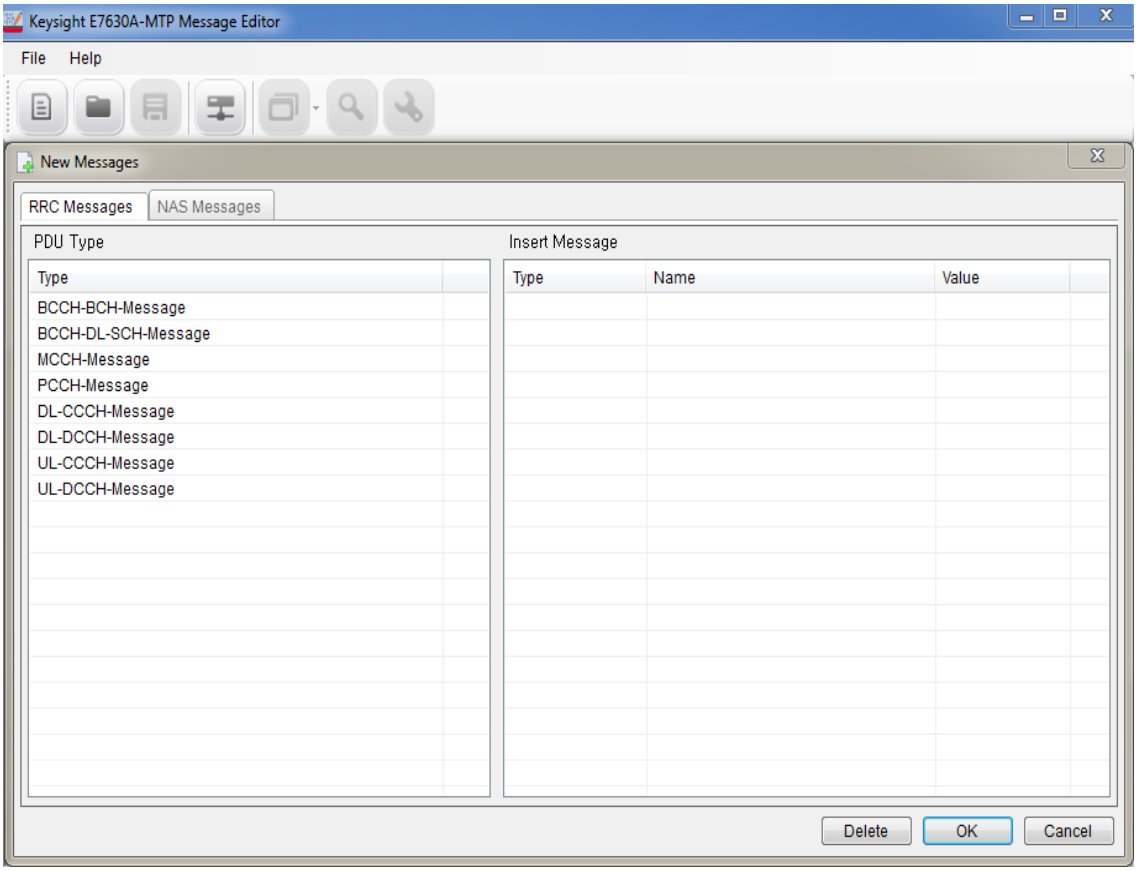



**Figure 6-1: Creating New Scenario File**

2. Click the **OK** button. This creates a new, blank, scenario file.
3. Save this under an appropriate name before making further edits to it.

# 7 Modifying a Scenario File

After you save a new scenario file or open an existing one, you see four tabs at the bottom left of the scenario file window, which enables you to access the various functions of the E7630A-MTP Message Editor. They are described in each of the sections below:

- The RRC Window
- NAS Window
- Scenario Window
- Scenario Window
- Extended Window
- File Transfer
- Examples of Common Changes

## The RRC Window

The E7630A-MTP LTE message editor provides a comprehensive tool for generating and manipulating RRC (Radio Resource Control) messages.

The RRC Message List box displays all the user defined RRC messages. By clicking on the Insert Message button, you can easily insert, delete, and edit RRC messages. You can select an individual message on the list to view its structure and parameters on the Message Structure box to the right of the RRC Message List.

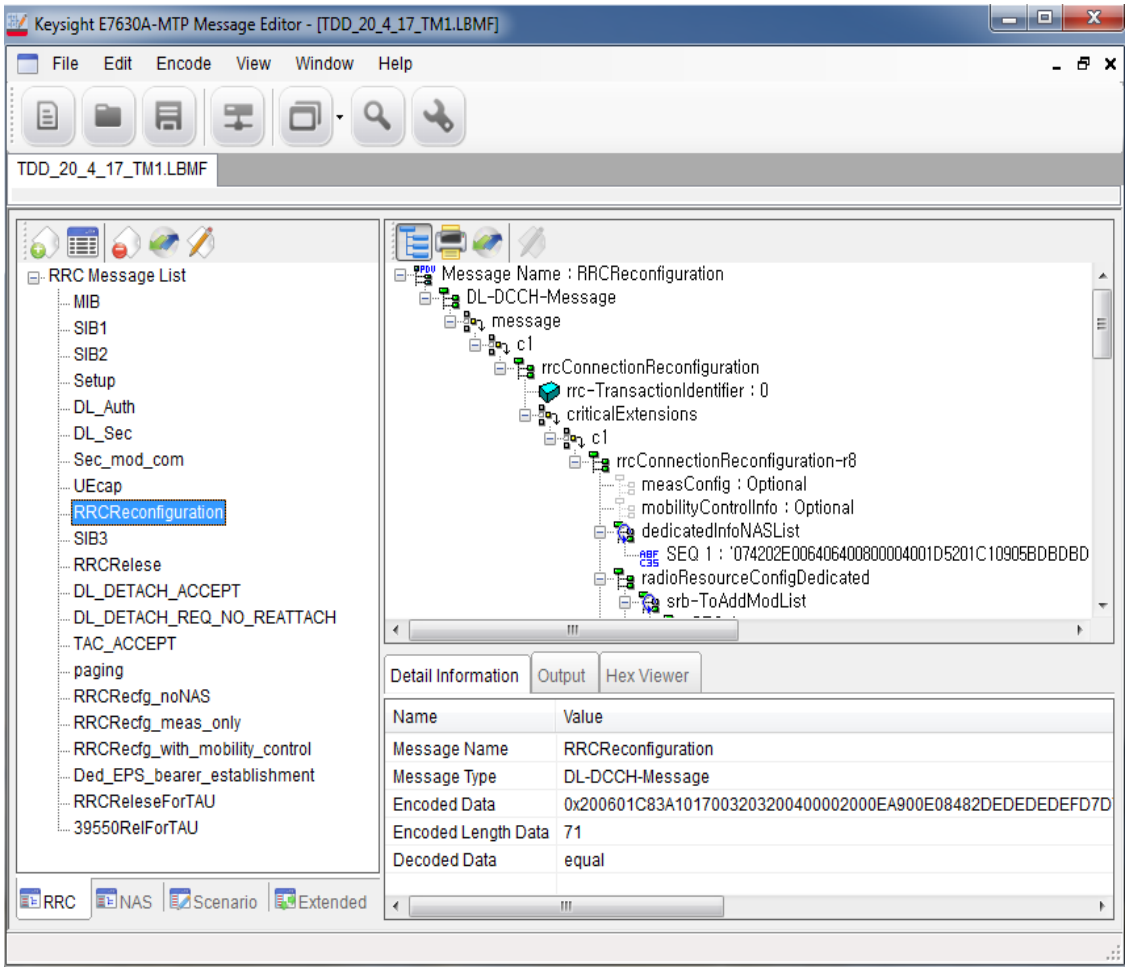



**Figure 7-1:RRC Message Structure**

1. Click on the **Insert Message** icon. The window below is displayed.
2. Select the **PDU Type** (Protocol Data Unit) of message you would like to include.
3. Double-click or drag and drop to insert it into the **Insert Message** window.
4. Name the message by double-clicking in the **Name** column and typing the desired name. (For example: "Master Information Block")

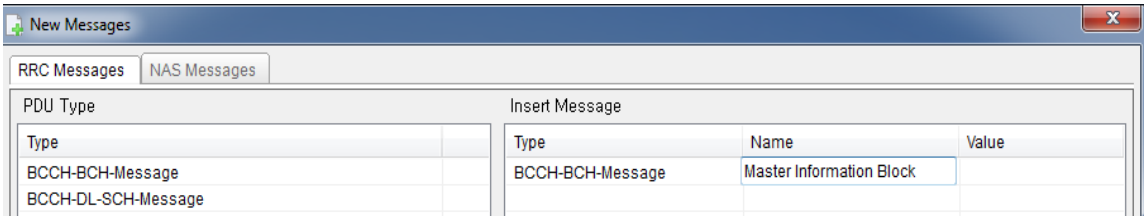



**Figure 7-2: Insert a New Message Type**

5. A message can be created directly by inserting a hex value into the **Value** column or this can be left blank.
6. Click the **OK** button.

A new message now appears in the RRC Message List.

| NOTE | If the message name appears in red, this indicates that it still needs to be encoded. To encode a message, select either of the  icons at the top of the new message windows. |
|---|---|

If a hex value has been specified for the message, a decoded RRC message corresponding to that hex value appears on the right-hand side, when the message name is highlighted.
If the hex value has not been specified, a blank message corresponding to the selected PDU type appears in the right-hand side.

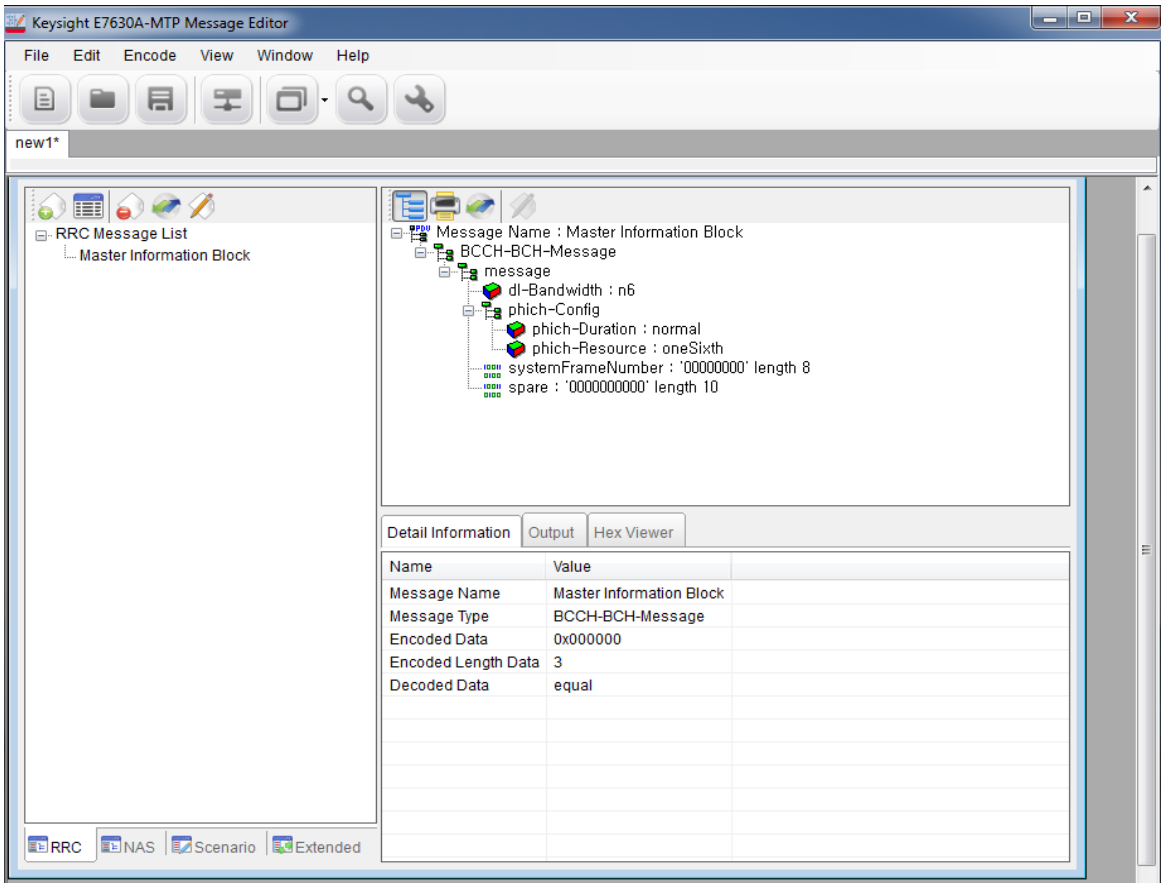



**Figure 7-3: New RRC Message**

The fields of the message can be manipulated by selecting a modifiable parameter on the right-hand side, right-clicking and selecting **Change Value**. Depending on the field type, a value can either be entered directly, or chosen from an enumerated list.

| | |
|---|---|
| NOTE | Any applied changes to an RRC message on the list are not finalized unless the message is encoded again. |


**Figure 7-4: Detail Information - Output - Hex Viewer**

The Input box (the top-right-side window, where you can change values) shows a brief summary of a selected item. Once you encode an item, the result is shown in the **Output** box.

## NAS Window

**Non-Access Stratum (NAS) Editor enables you to easily generate and decode encoded HEX NAS data. These are very important features to create a wide range of UXM scenario files. Generated, encoded HEX NAS data can be used in the E7630A-MTP to generate RRC messages containing NAS data; any received NAS messages on the eNodeB emulator side can be decoded for debugging.**

| | |
|---|---|
| NOTE | It is not sufficient to construct an NAS message for it to be included in a scenario file – the hex content associated with the NAS message must appear inside an RRC message for it to be sent to the UE during a message exchange. This can be easily accomplished from the RRC menu tab, by right-clicking on the NAS field and selecting the NAS message you wish to include from the drop-down list. See step #7 on page 46 as an example. |

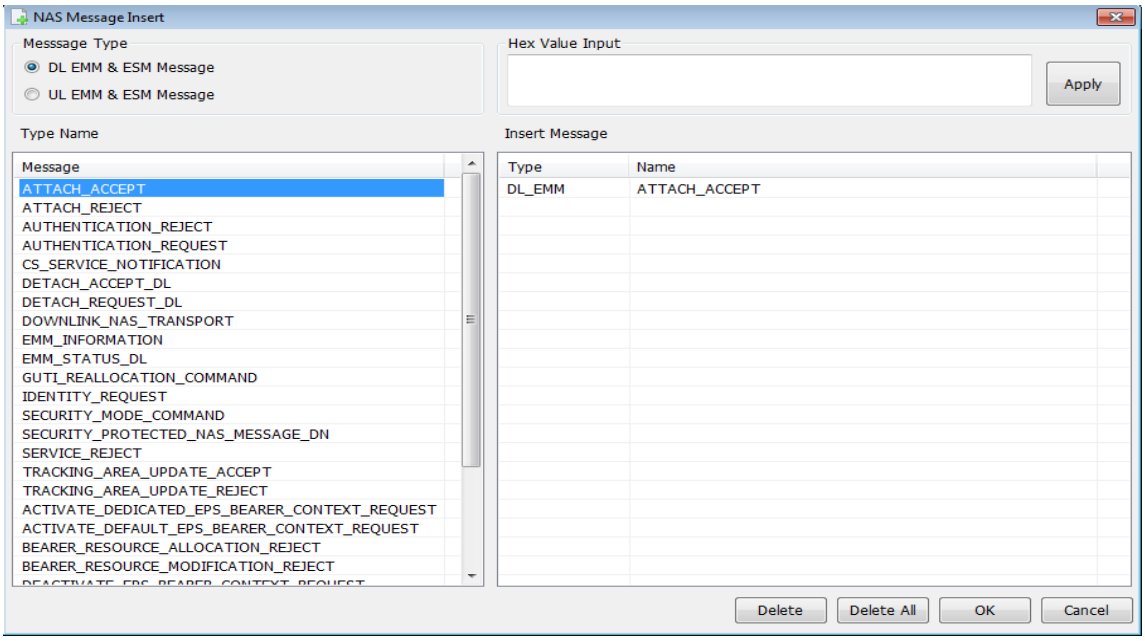
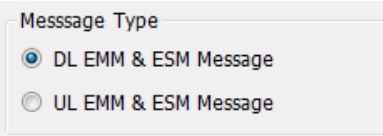



**Figure 7-5: NAS Message Insert Window**

To generate a new message, first select one of the DL/UL radio buttons in the Message Type box.

## NAS Message Insertion Procedure

1. Click the **Insert Message** icon or **Edit**, **Insert Message.**
2. Select **Message Type**.




3. Select **Message.**
4. Double-click or drag and drop to the **Insert Message** window.
5. Click **OK** button.

## Linking a NAS Message to an RRC Message

Linking NAS messages to RRC messages enable you to update the NAS message parameter and automatically update the RRC message containing the NAS message.

1. Select an RRC message that contains a NAS message.
2. Right-click on the parameter you wish to change in the NAS message list. In the example below, RRC Reconfiguration is the RRC message that contains the dedicatedInfoNASList. As shown, right-clicking on SEQ 1 displays a 'Change NAS' choice.

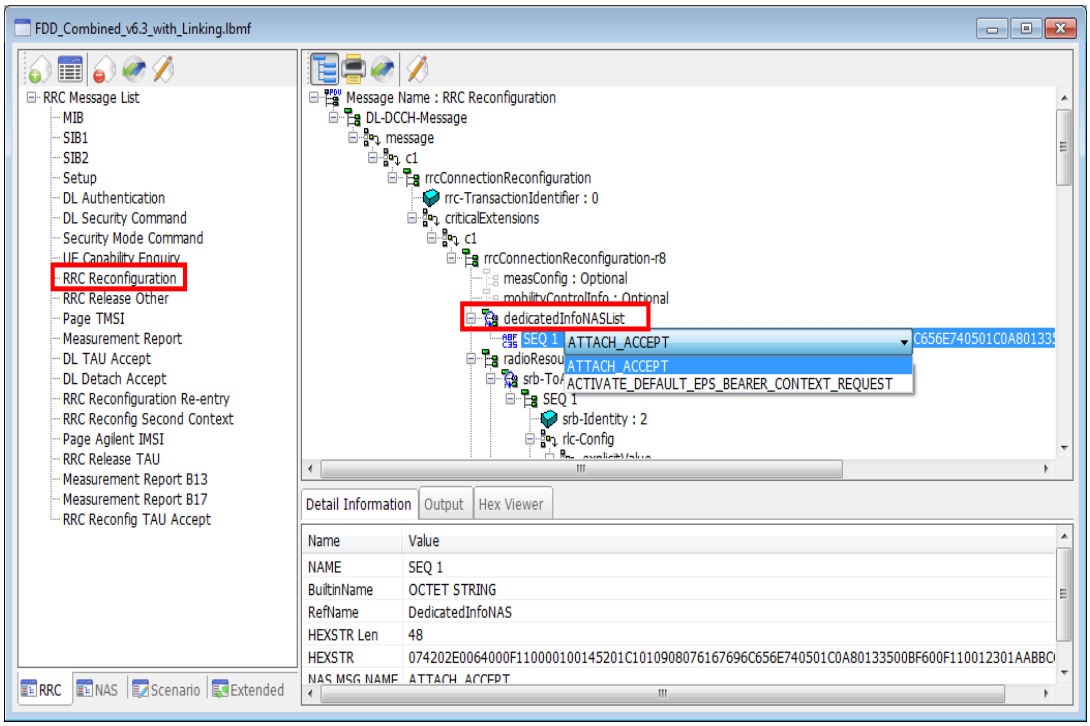



**Figure7-6: Linking ATTACH_ACCEPT to RRC Reconfiguration Message**

3. Selecting 'Change NAS' enables you to choose the NAS Message you wish to link. In this example, ATTACH_ACCEPT is selected.
4. Select 'Enter' on your keyboard or click in any of the white areas of the software user interface. Notice that the value for SEQ 1 has changed.
5. Select the **encode Message** icon at the top of the screen and verify the encoding was successful by the text shown in the Output tab section at the bottom of the display.
6. The NAS message is now linked to the RRC message, so any changes made to the NAS message can be automatically updated in the RRC message if you choose. Refer to a continuation of this example in Changing the Initial DUT IP Address on page 39.

# Scenario Window

The Scenario Editor provides a simple interface for you to create and modify various test scenarios for the eNodeB emulator. Use the DL RRC messages (which may contain NAS data) defined in *E7630A-MTP LTE Message Editor* software as well as those you have pre-defined. Each scenario is divided into two sub-scenarios:

- Start Scenario
- Communication Scenario

## Start Scenario

The Start Scenario window defines master information block and system information block messages that are broadcast by the UXM; you can double-click or drag and drop to place a selected MIB/SIB message in Start Scenario box. The index in the Start Scenario box indicates the order of message transmission from eNodeB. You can define three sets of SI messages with different numbers or types.

| MIB Type | Message | | |
|---|---|---|---|
| Master Information Block | MIB | | |
| | | | |
| SIB Type | MessageName(Set 1) | MessageName(Set 2) | MessageName(Set 3) |
| System Information Block Type 1 | SIB1 | | |
| System Information | SIB2 | | |
| System Information | SIB3 | | |

**Figure 7-7: Start Scenario Window**

## Communication Scenario

The Communication Scenario window defines the desired message exchange between the UXM and a UE. The UL RRC Message contains the name of a standard RRC Message (for example, rrcConnectionRequest). The right-hand DL RRC Message column contains the name of the message that is sent to the UE as a result of receiving the UL RRC Message Type. The messages in the DL RRC column are those that have been constructed by the user and appear in the RRC Window.

Some UL RRC messages can carry NAS messages inside them. For those messages, it is possible to further qualify the DL RRC message that are sent based on the NAS content of an UL RRC message. So, for a received UL Information Transfer message at RRC, different DL RRC messages could be sent to the UE depending on the NAS message that was carried inside the UL RRC Message.

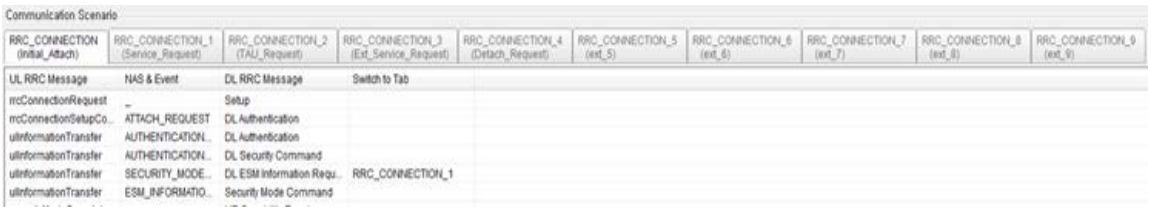



**Figure7-8: Communication Scenario Window**

There are ten tabs in the Communication Scenario window:

- RRC_CONNECTION (Initial Attach) – This tab shows those messages and events related to the initial attach.
- RRC_CONNECTION_1 (Service Request) – This tab shows those messages and events related to the UE requesting service.
- RRC_CONNECTION_2 (TAU Request) – This tab shows those messages and events related to a Tracking Area Update (TAU), required when performing handovers as it updates the UE location to the enodeB.
- RRC_CONNECTION_3 (Ext Service Request) – This tab shows those messages and events related to an extended service request.
- RRC_CONNECTION_4 (Detach Request) – This tab shows those messages and events related to a detach request.
- RRC_CONNECTION_5-9 – These tabs store information inside the ASCII file generated by E7630A-MTP Message Editor in the same way the content from the other tabs is stored. You can switch to these tabs after sending a message by selecting from **Goto Next Tab** or manually select the tabs to use by sending an RUI command.

You can change the NAS message from this view by double-clicking the message and then making your selection from a drop-down list, as shown below.

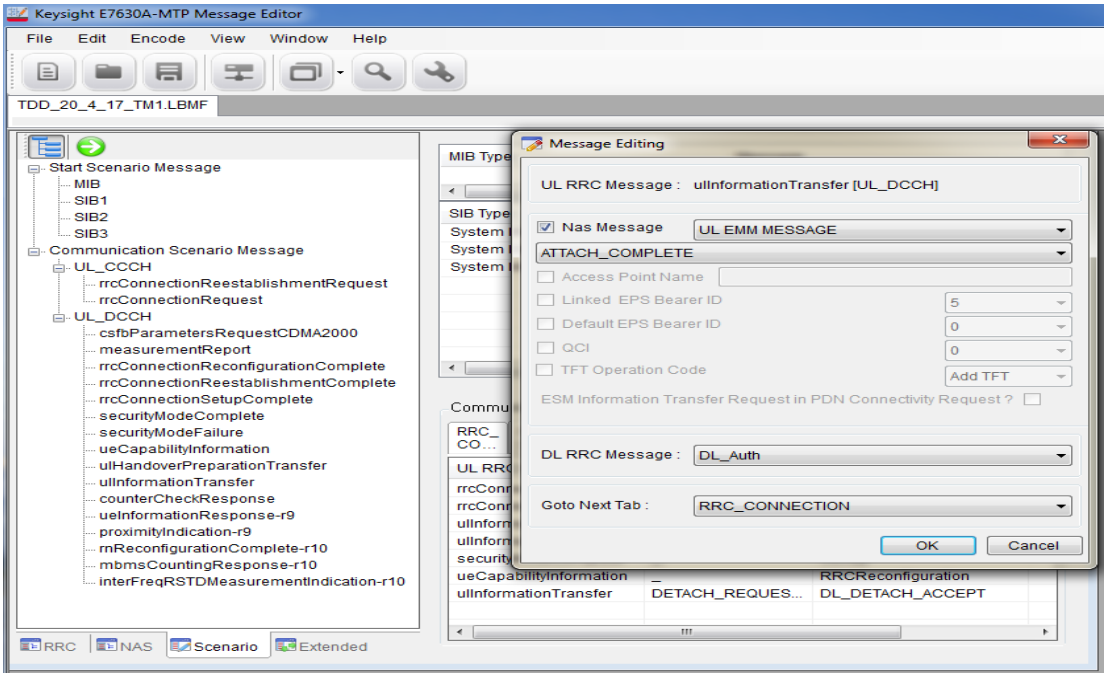



**Figure 7-9: Changing NAS Messages**

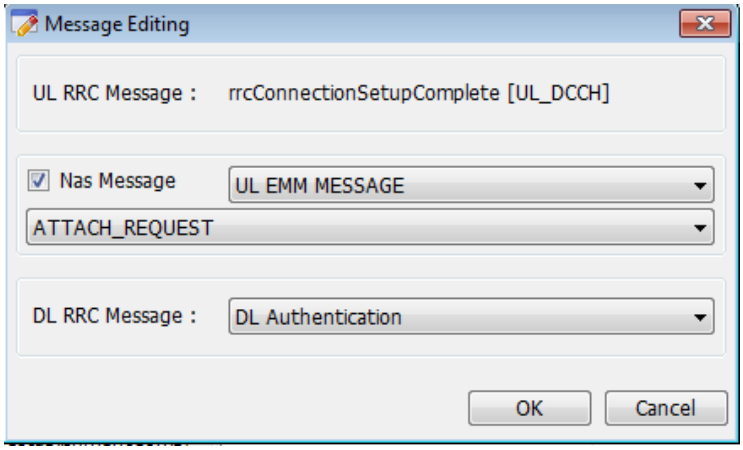



**Figure 7-10: Qualifying Message Response to UL NAS Message**

As well as qualifying a message response based on the UL NAS message that is being carried, there is the option to further qualify the response to certain messages based on message content.

### Access Point Name

The PDN Connectivity Request message can carry information on the Access Point Name. It is possible to determine the response needed to be sent, based on the Access Point Name carried inside the message. This means that different responses can be sent in response to different PDN Connectivity Request messages.
The UXM front-panel menu-key, ***UE Requested APN***, represents the Access Point Name that the UE is requesting a connection to in the PDN Connectivity Request.

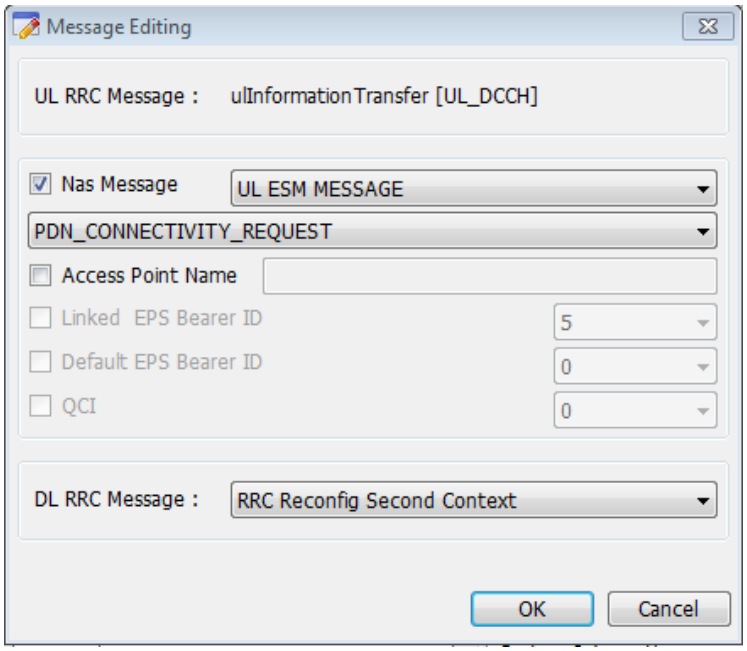



**Figure 7-11: Different Responses Available to PDN Connectivity Request Message**

The PDN Disconnect Request message specifies an EPS Bearer Identity associated with the PDN that the UE is requesting to disconnect from. Specifying a value in the Linked EPS Bearer ID field

enables precise specification of the Deactivate EPS Bearer Context Request message that the UXM should send to the UE.

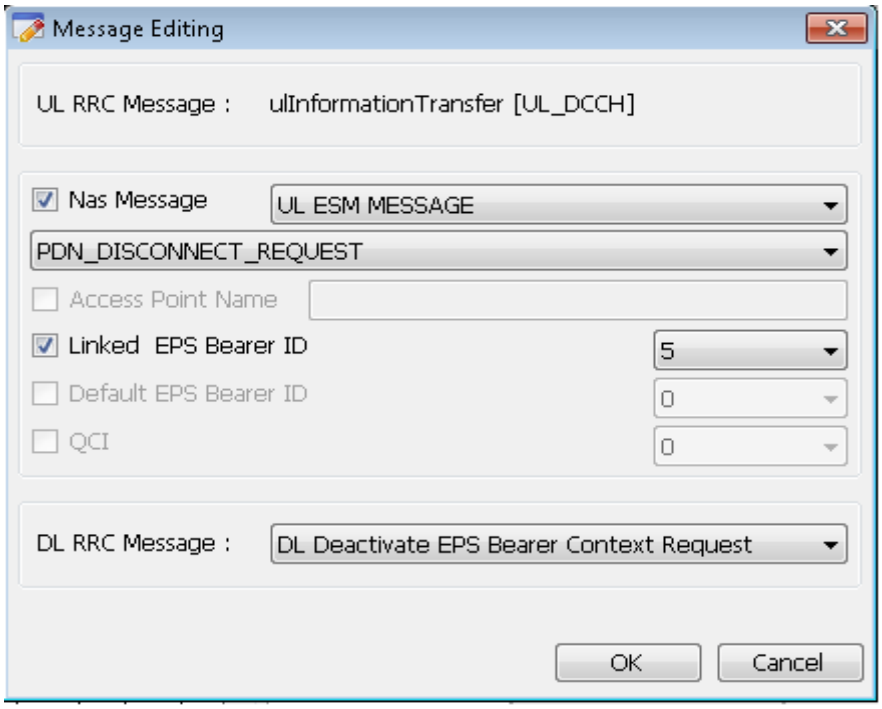



**Figure 7-12: Specifying a Value in the Linked EPS Bearer ID Field**

The Bearer Resource Allocation Request is a request from the UE that a Dedicated Bearer is established. The message can include different EPS Bearer Identities and different QCI values inside it. The Linked EPS Bearer Identity represents the Default Bearer with which the UE would like the Dedicated Bearer to be associated. The QCI value corresponds to the requested quality of the Dedicated Bearer. This provides the flexibility of choosing different DL RRC Messages that can be sent in response to combinations of these two parameters. These different messages can activate different Dedicated EPS Bearer Contexts.

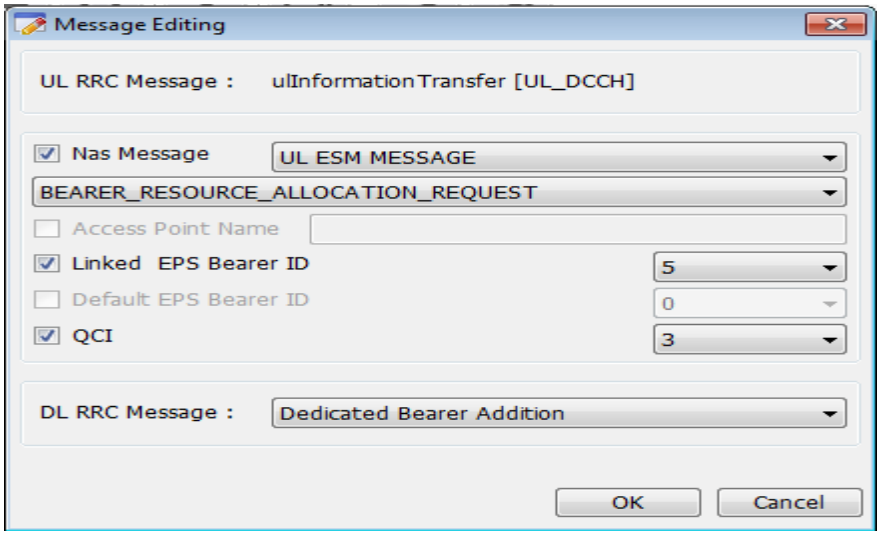



**Figure 7-13: Selecting Default EPS Bearer IDs and QCI Values**

The ESM Information Request is a request from the UE that the APN information is transferred after the NAS Security Mode procedure is completed. You can perform the ESM Information Request/Response procedure by checking the **ESM Information Transfer Request in PDN Connectivity Request?** box,

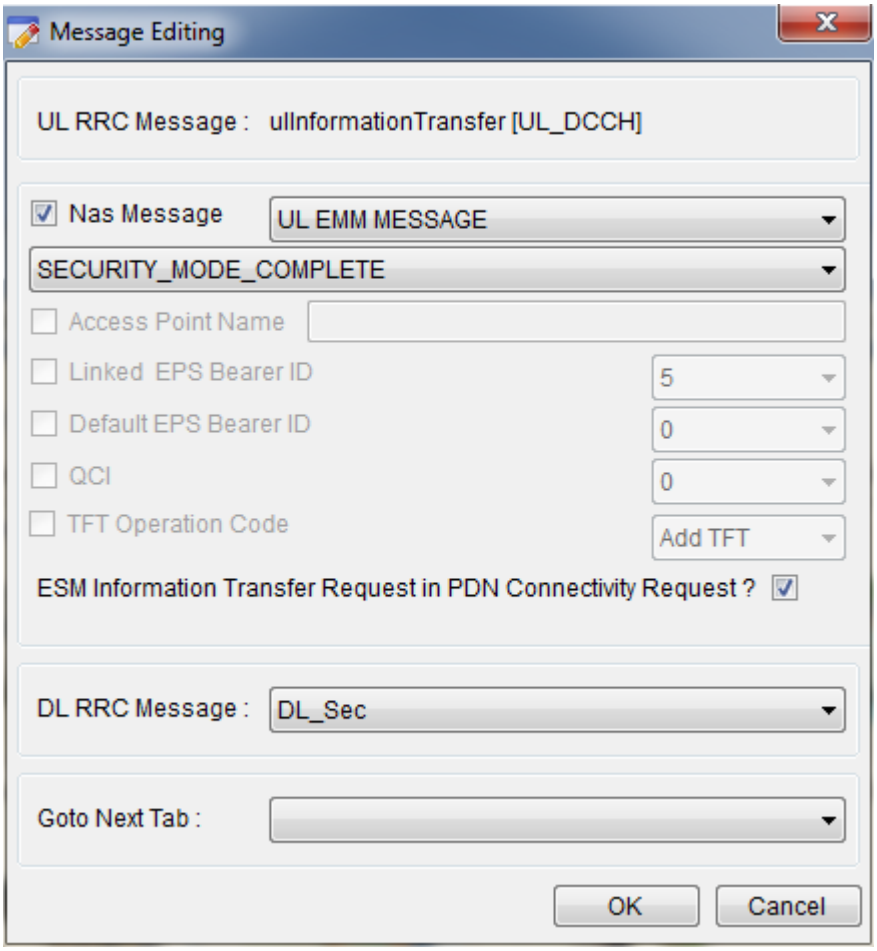



**Figure 7-14: Selecting ESM Information Transfer Request in PDN Connectivity Request?**

## Measurement Report

The Measurement Report message can carry a different measurement identity (or MeasID). A different response can be sent to measurement reports containing different measurement identities – allowing a certain report to trigger an automatic redirection to another cell, for example.

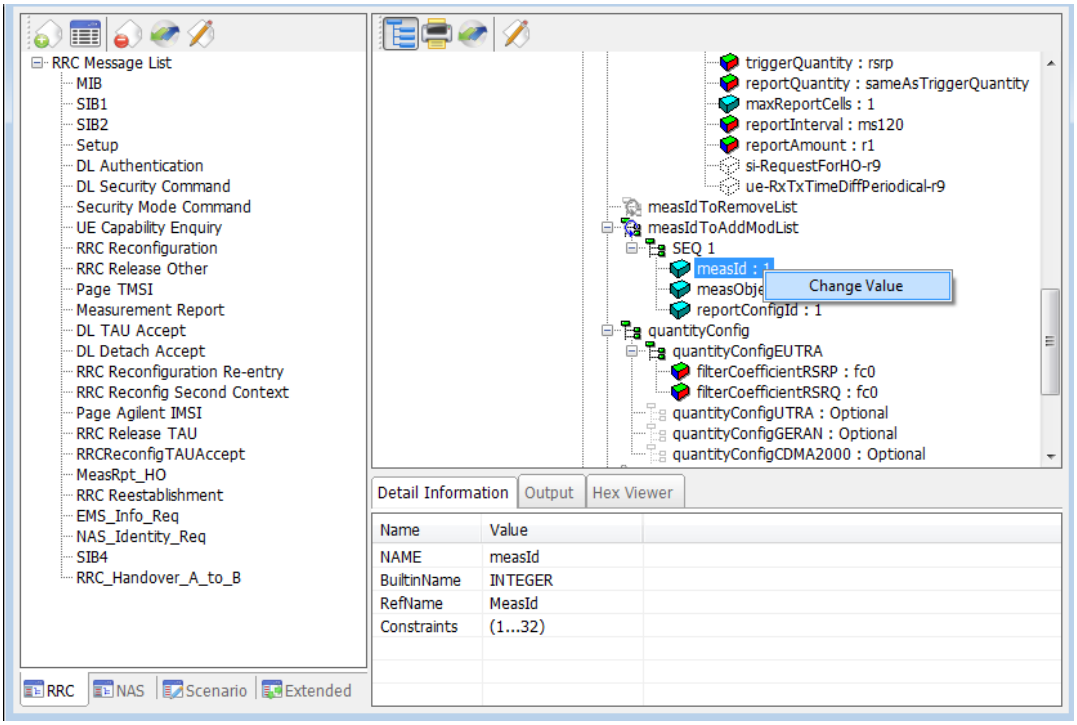



**Figure 7-15: Different Measurement Identity Available for Message Report Message**

## Extended Window

Using Extended Window, you can add a message that has been defined in the RRC message window to the Custom Message, Page Message, Release Message, or Handover Message pane.

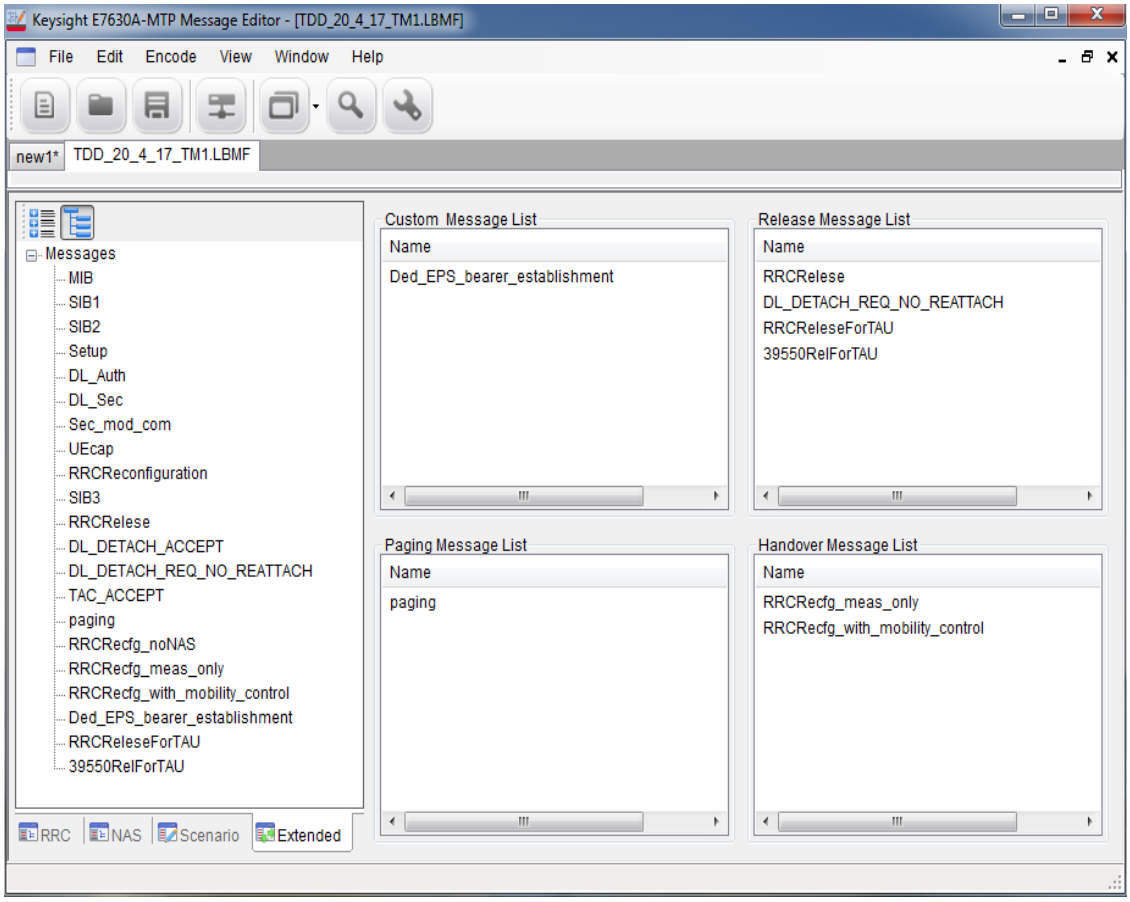
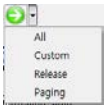



**Figure 7-16: Extended Window**

### Extended Message Insertion Procedure

1. Select a message in the All Message View.
2. Select message and click the 

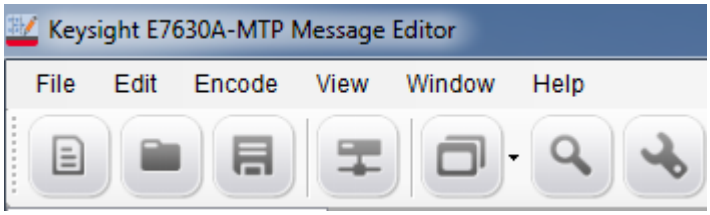
icon (**All/Custom/Release/Paging/Handover**.)

# File Transfer

A scenario file must be transferred to the UXM before it can be run. This is done using the procedure below.

## File Transfer Procedure

1. Click  icon from the main tool bar or select **File**, **File Transfer.**




2. Check the IP Address (for example: 192.168.1.60).


3. Click **Connect** Button.
4. Click the check box from the **File Name** list.
5. Click  icon
6. The file is transferred to the scenario file directory D:\ProgramData\Keysight\E7515A\E7530A_E7630A\Scenario Files\User

   in the UXM. A message indicates whether the message has been successfully transferred.
7. On the UXM, select **Call Scenario** > **Load** to see the list of available scenario files, and check that the file you downloaded is listed.

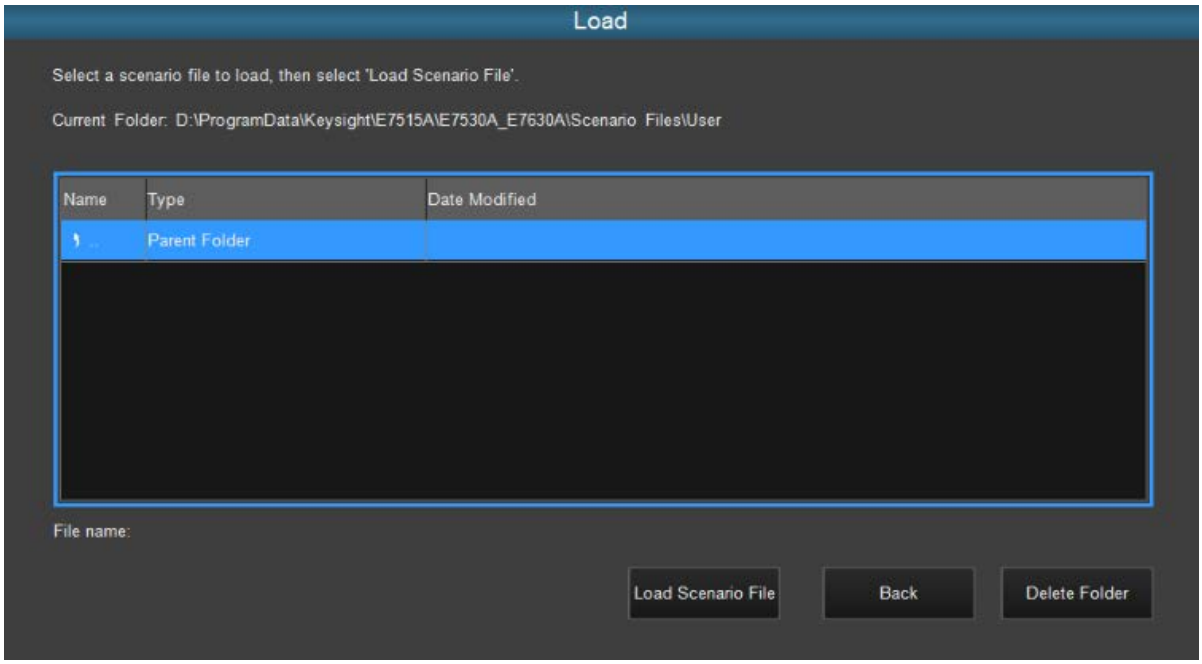



**Figure 7-17: Verifying a Successful Download**

# Examples of Common Changes

## Setting the Channel Quality Indicator (CQI) Value

1. Locate the rrcConnectionSetup message on the RRC message tab. The cqi-ReportConfig Information Element is near the bottom of this message.

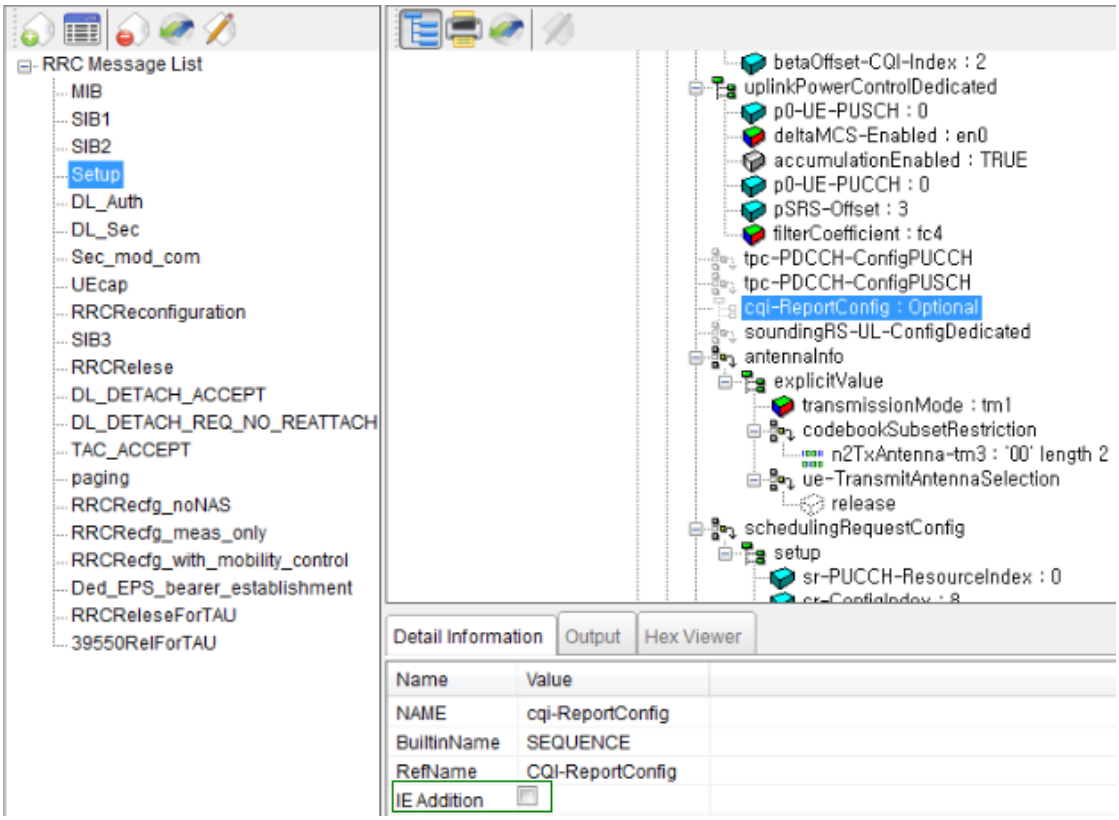



**Figure 7-18: Accessing CQI Reporting**

2. The Information Element (IE) may not be present in the message – which indicates to the UE that CQI reporting is not being configured in this message. To include the IE, highlight the cqi-ReportingConfig field as shown above and notice that an IE Addition box becomes available under the Detail Information tab. Select the box marked IE Addition. This enables the cqi-ReportConfig information to become visible as shown below.

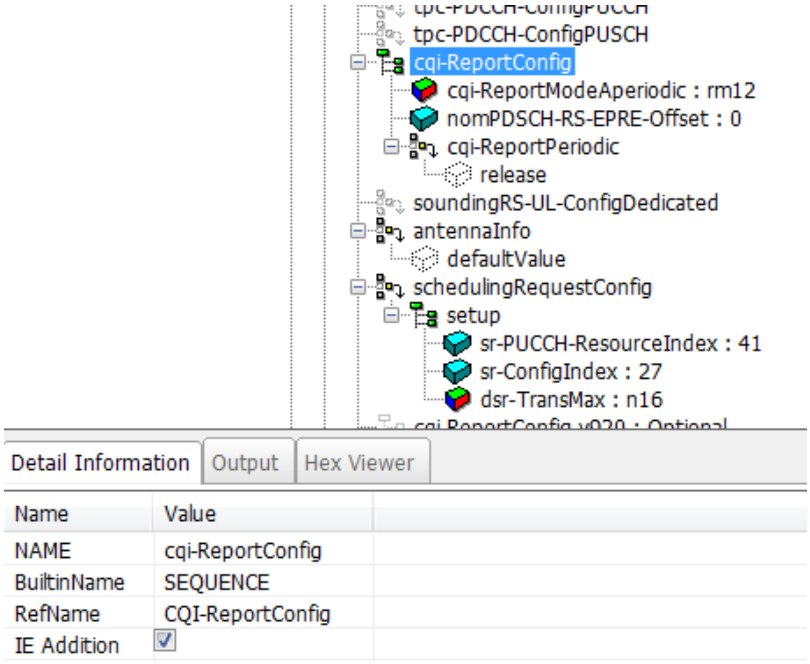



**Figure 7-19: Enabling CQI Report Configuration**

3. Disable Aperiodic CQI reporting, by highlighting the cqi-ReportModeAperiodic field and de-selecting the **IE Addition** box.

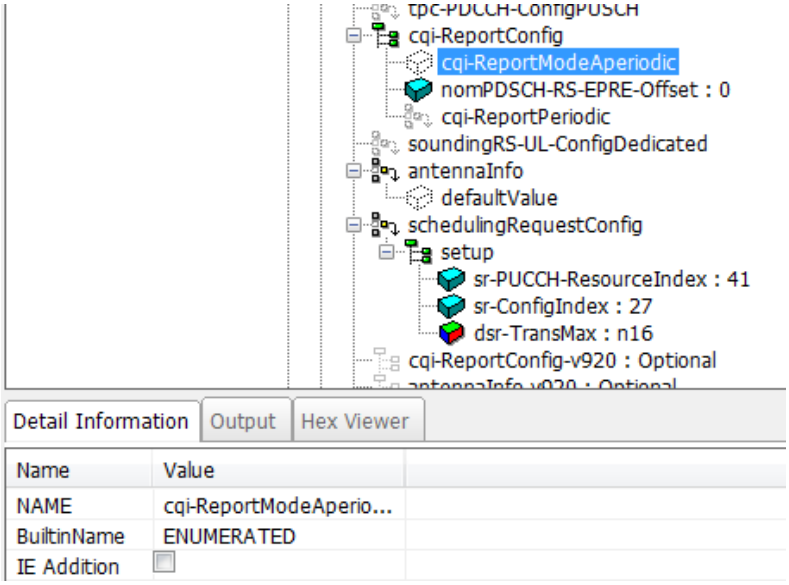



**Figure 7- 20: Disabling Aperiodic CQI Reporting**

4. Enable Periodic CQI reporting, by right-clicking the cqi-ReportPeriodic IE and selecting 'setup' from the drop-down list of possible options.

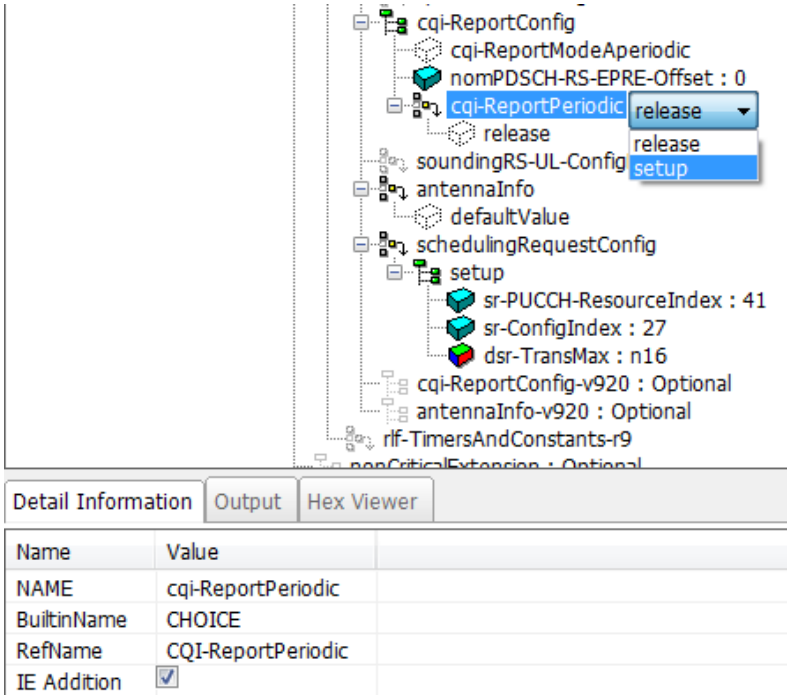



**Figure 7-21: Enabling Periodic CQI Reporting**

5. The most basic type of CQI reporting is Periodic Wideband CQI reporting. Setting the values shown in the diagram below enable this.

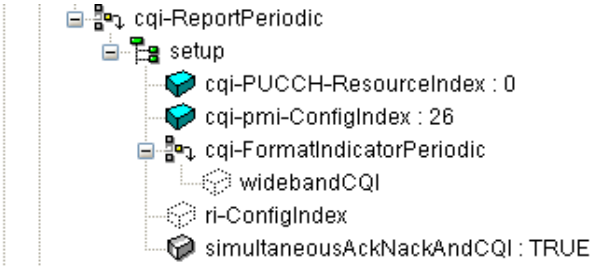



**Figure 7-22: Settings for Periodic Wideband CQI Reporting**

6. Make sure you encode the message by clicking the **encode Message** button. The Setup message in the **RRC Message List** changes its color, from red to black, indicating the message is encoded.

| NOTE | If you navigate away from the message before pressing the **encode Message** button, your changes are lost. |
|---|---|

7. Select **File**, **Save As...** , and save the file with a new name, retaining the .LBMF extension.

## Changing the Initial DUT IP Address

In this example, you will change the Initial DUT IP Address in the ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_REQUEST message and automatically update the RRC Reconfiguration message with this new value.

1. You should already have an ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_REQUEST message in your **NAS Message List**. If not, refer to the "NAS Message Insertion Procedure" on page 26 to include one.
2. If you have not already done so, use the "Linking a NAS Message to an RRC Message" on page 26 to link the ATTACH_ACCEPT message to the RRC Reconfiguration message.

| | |
|---|---|
| NOTE | It is best to link NAS messages to the RRC messages because this enables all NAS message value changes to be automatically updated in the RRC messages to which they are linked. |

For this example we are also going to link the ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_REQUEST NAS message to the ATTACH_ACCEPT message.

3. On the NAS window tab, select the ATTACH_ACCEPT message. Notice the ESMMessageContainer parameter in the Input window on the right-hand side.
4. Right-click on NasMessageDnData and select 'Change NAS ESM'.

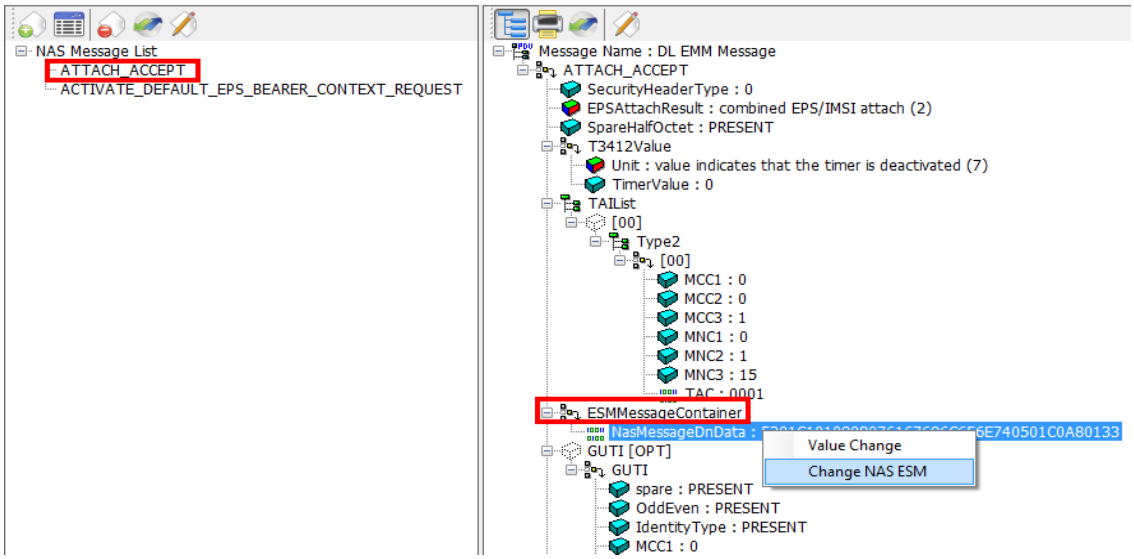



**Figure 7-23: Settings for Periodic Wideband CQI Reporting**

5. Select the ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_REQUEST message.
6. Encode the new NAS ESM message by selecting the **encode Message** icon at the top of the window. The following information message pops-up:

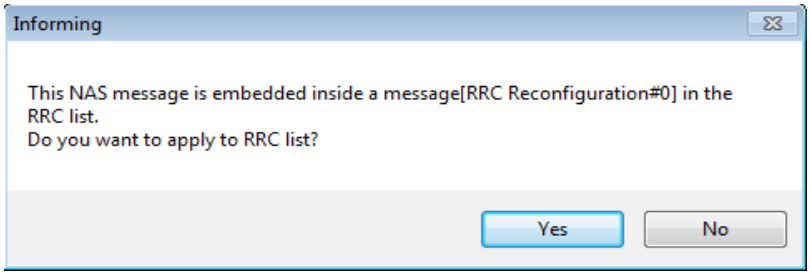



**Figure 7-24: Applying NAS Message Update to RRC Message**

| | |
|---|---|
| NOTE | If you do not see the above message, then this NAS message is not linked to any RRC message and you will have to go back to the RRC window and perform the linking procedure as described above or copy and paste the hex values as required in previous versions of *E7630A-MTP Message Editor* software. |

7. Select 'Yes' because you want this new value to be applied in the RRC message. Notice the "Encode Success" message is now displayed in the Output tab window. You now have linked the ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_REQUEST NAS message to the ATTACH_ACCEPT message, so any changes to either of these messages are reflected in the RRC Reconfiguration message.
8. Right-click the PDNAddressInformation entry and select 'Value Change' when it pops up. The IP address field is now available to be changed.

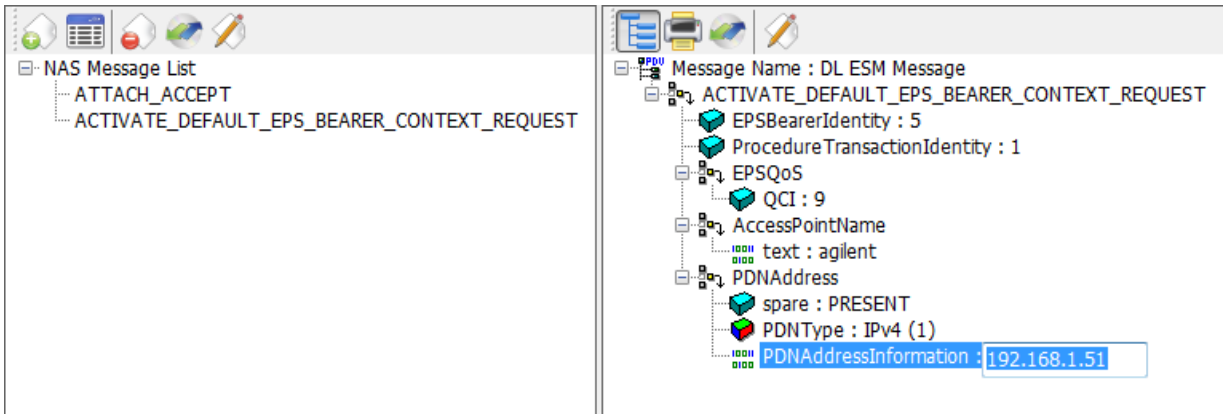
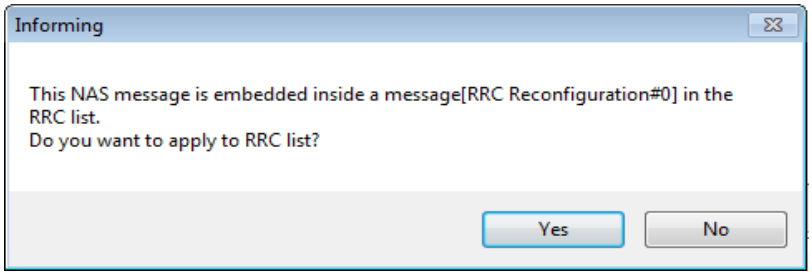



**Figure 7-25: Changing the IP Address**

9. Enter the new IP address you wish to use.
10. Encode the new IP address by selecting the **encode Message** icon at the top of the window. The following information message pops-up:



11. Select 'Yes' because you want this new value to be applied in the RRC message. Notice the "Encode Success" message is displayed in the Output tab window.
12. Go to the RRC window and notice the RRC Reconfiguration message has turned red. When you select this RRC message you can see that the value for SEQ 1 has changed. Select the **encode Message** icon. The Output tab window now displays "Message is Encoded!". The RRC Reconfiguration message is now black, which also verifies encoding is successful.

## Signaling Other Addressing Options

The ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_REQUEST message is also the method for signaling other addressing options.

- Right-clicking on the message header displays a list of these options.
- Left-clicking on each of these options adds additional fields to the message.

It is possible to enter a list of separate addressing options within a single message. In the example below, ContainerCfgs is set to 3, enabling you to provide 3 addresses to the UE when the ACTIVATE_DEFAULT_EPS_BEARER_CONTEXT_REQUEST message is transmitted to the UE. This example sets one P-CSCF and two DNS addresses.

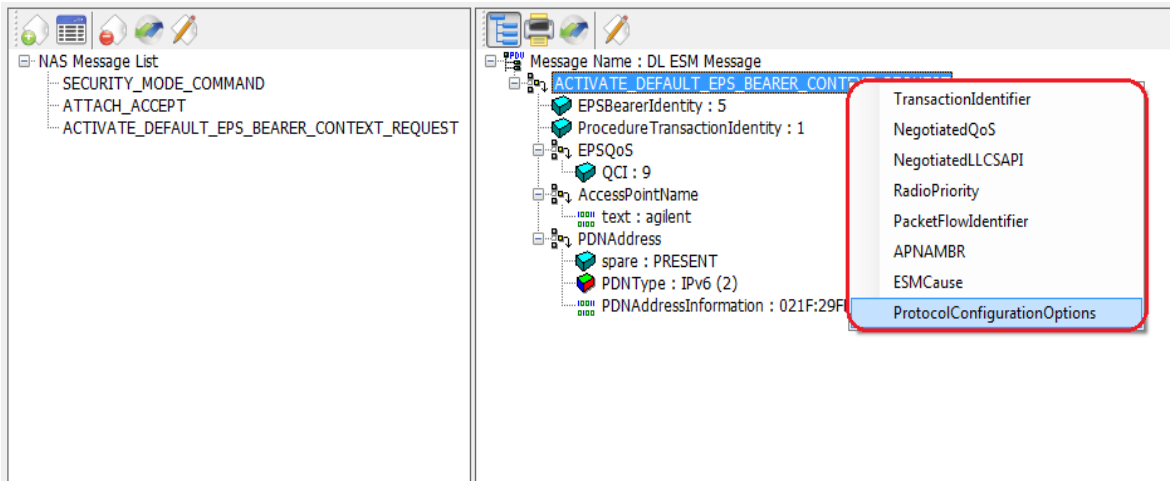



**Figure 7-26: DUT IP Address Additional Information Options**

1. Select the ProtocolConfigurationOptions line. Right-click on ContainerCfgs and change the content to 3.

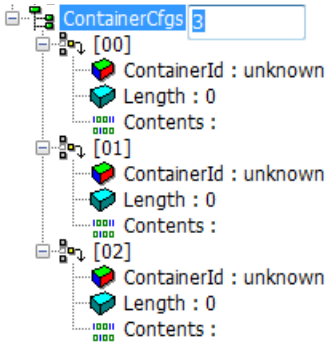



**Figure 7-27: Creating ContainerIds for IP Addresses**

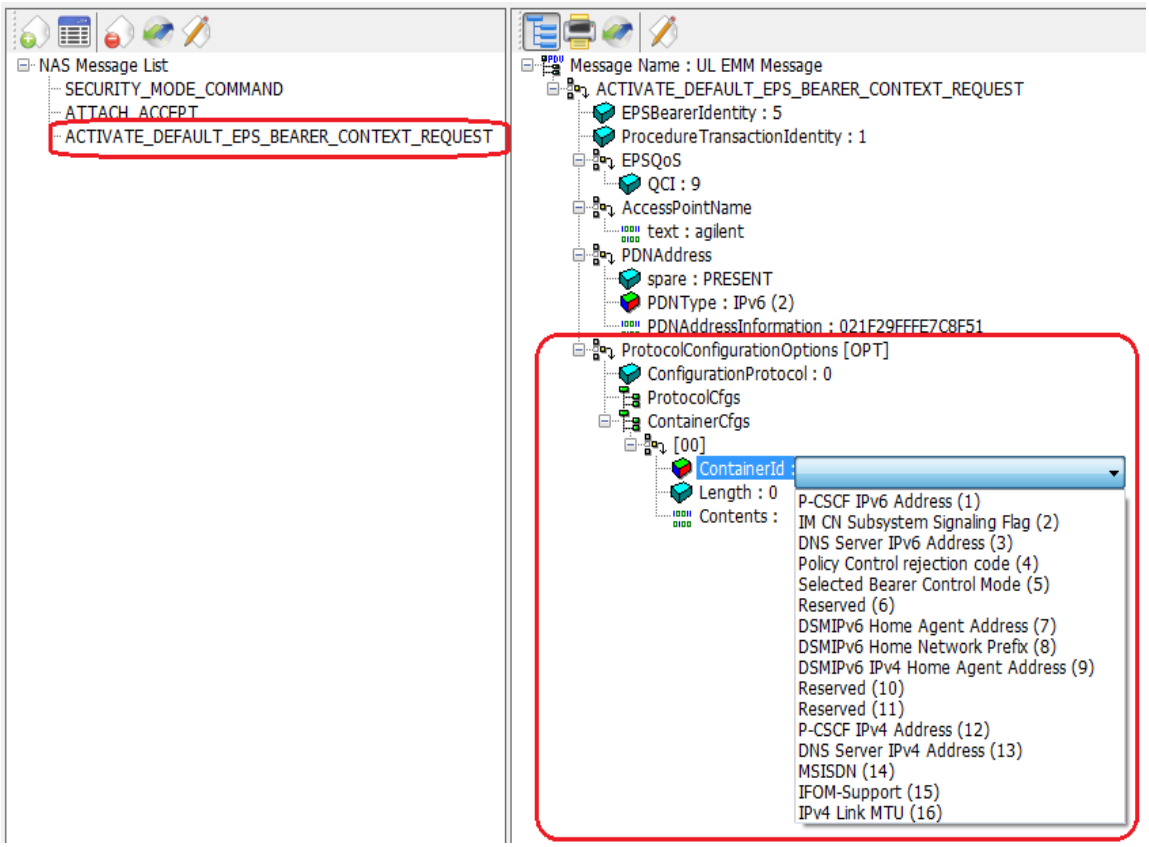



**Figure 7-28: DUT IP Address Additional Information Options**

2. Right-click on ContainerId, select "Value Change" and then access the additional information element options shown in figure 7-26 by selecting the drop-down list.
3. Use the three containerId fields to select and populate each address for the information elements:
    - P-CSCF IPv6 Address
    - DNS Server IPv4 Address
    - DNS Server IPv6 Address

    The resulting contents are shown in figure 7-29.

    .

| NOTE | The UE IP address is entered in the form 021F:29FF:FE7C:8F51.<br>The server addresses also include the header information (resulting in 32 characters), and the colon separators must be omitted.<br>The UE IPv4 address is entered in dot separated decimal.<br>The server IPv4 addresses are entered in HEX with no separators. |
|---|---|

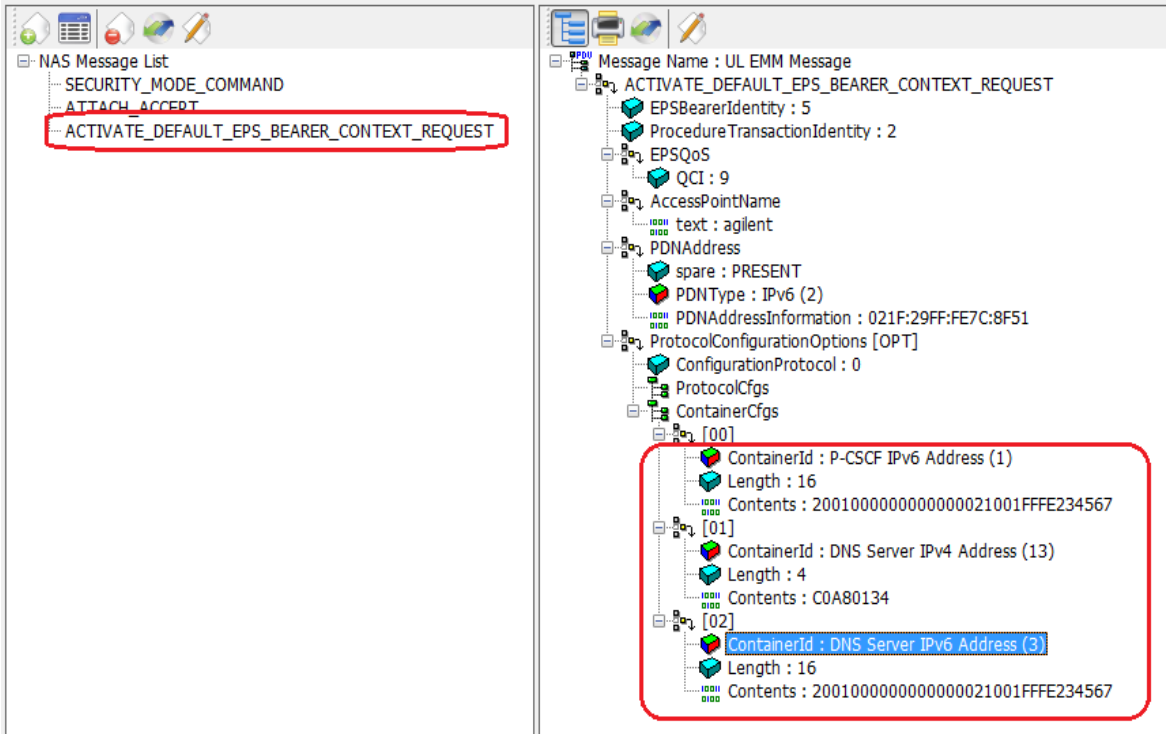
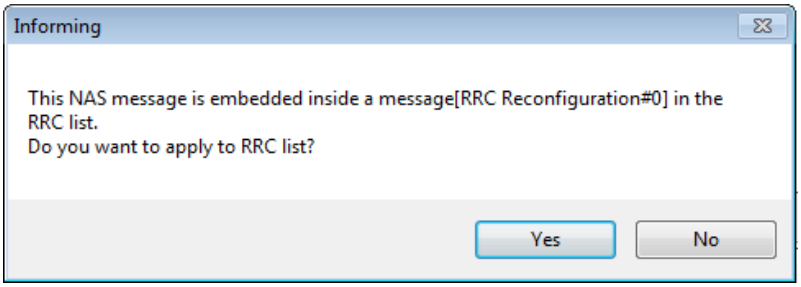



**Figure 7-29: DUT IP Address Additional Information Options Final Content**

4. Make sure you encode the message by clicking the **encode Message** button.

| NOTE | If you navigate away from the message before pressing the **encode Message** button, your changes will be lost. |
|---|---|

The following information message pops-up:




5. Select 'Yes' because you want this new value to be applied in the RRC message. Notice the "Encode Success" message is displayed in the Output tab window.
6. Go to the RRC window and notice the RRC Reconfiguration message has turned red. When you select this RRC message you can see that the value for SEQ 1 has changed. Select the **encode Message** icon. The Output tab window now displays "Message is Encoded!" The RRC Reconfiguration message is now black, which also verifies encoding is successful.

## Rejecting an Incoming AttachRequest

The basic steps to complete this process are as follows. If you already know how to do any of the steps, they can be skipped and you can focus only on those for which you need help.

- Creating a New NAS Message
- Creating a New RRC Message
- Wrapping it in an RRC Message
- Modifying Communication Scenario response to incoming AttachRequest

### Creating a New NAS Message

1. Create a new NAS message by following the NAS Message Insertion Procedure on page 26.
2. Select ATTACH_REJECT from the **Type Name** list, and drag it over to the **Insert message** area.
3. Click **OK**. Notice that the new message is added to the **NAS Message List**.

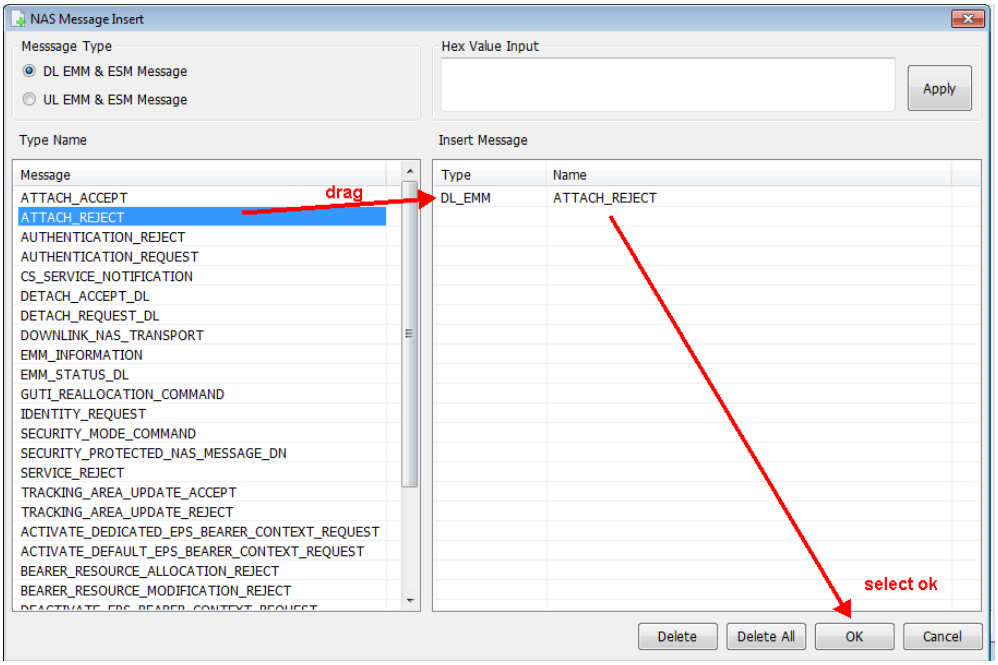



**Figure 7-30: Creating New NAS Message**

### Creating a New RRC Message

1. Select the RRC tab.
2. Then add a new RRC message by selecting the Insert Message icon or **Edit**, **Insert Message**.
3. Select message type as DL-DCCH-Message.
4. Drag it to the Insert Message area.
5. Double-click the Name field and rename it to, Attach_Reject.

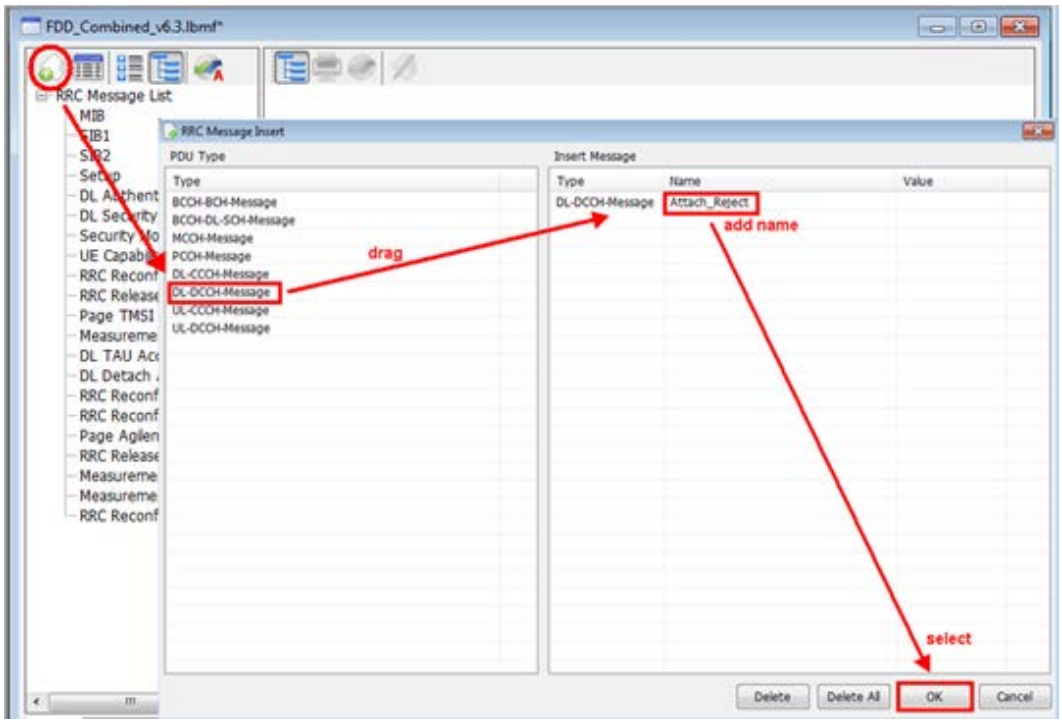
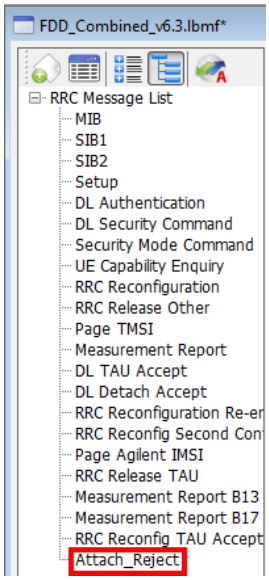



**Figure 7-31: Inserting New RRC Message**

6. Click **OK**. Notice that the new message is added to the **RRC Message List**.




### Wrapping it in an RRC Message

1. Select the new Attach_Reject message.
2. Note that the generic properties of the message you created is csfb to CDMA2000... This must be replaced.
3. Right-click in the **c1** field. Select 'Type Choice' when it pops up.
4. From the drop-down list, select dlInformation Transfer.

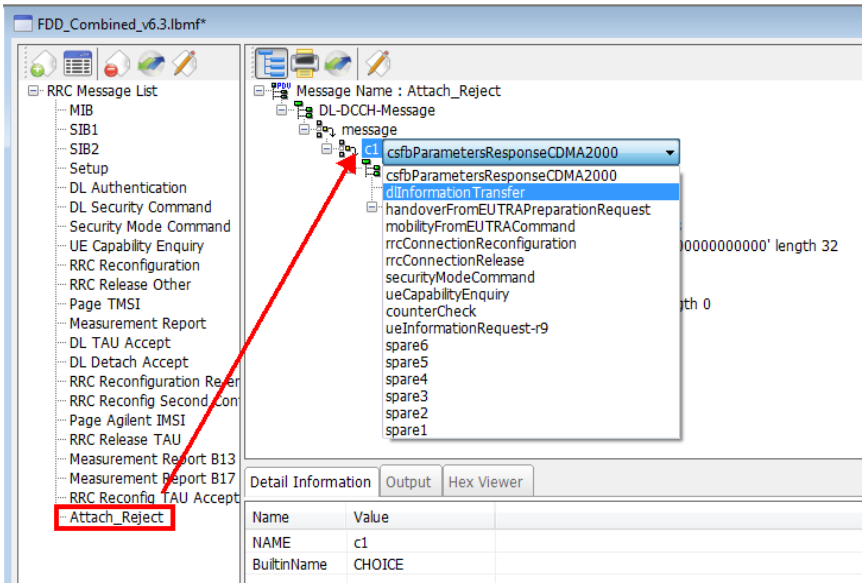



**Figure 7-32: Selecting Message Properties as dlInformation Transfer**

5. Select the nonCriticalExtension field. Then de-select the **IE Addition** box (at the foot of the screen) – this removes it from the message.

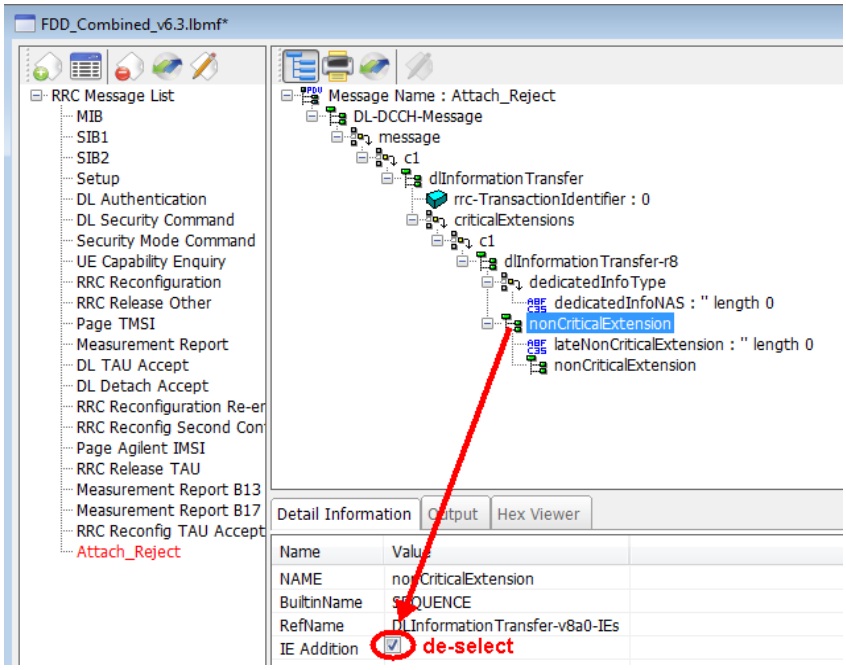



**Figure 7-33: De-selecting IE Addition**

6. Right-click the dedicatedInfoNAS field and select 'Change NAS'.
7. Select the Attach_Reject NAS message from the drop-down list.

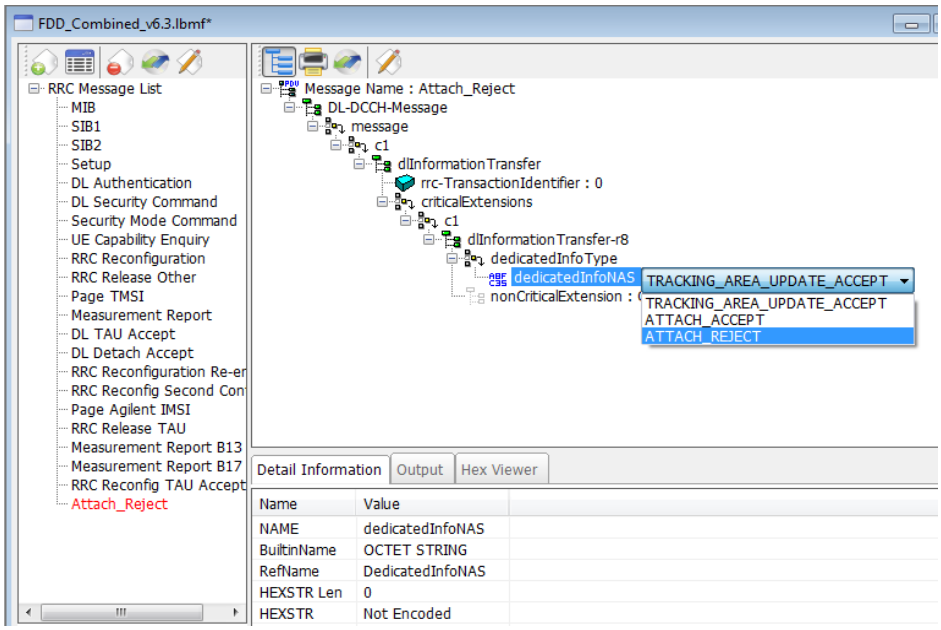



**Figure 7-34: Selecting ATTACH_REJECT NAS Message**

8. Notice that the RRC name of Attach_Reject has turned red in the left hand **RRC Message List** column. This indicates that you have edited the contents of this RRC message and you must now encode the message. (If you don't encode the message now, you will lose your changes.)
9. Select the **encode Message** button at the top of the window to encode the message. Verify that the RRC Attach_Reject message name has turned from red to black (left-hand window) and that the **Output** tab text at the bottom of the right-hand window states success. These both indicate that your encoding was successful.

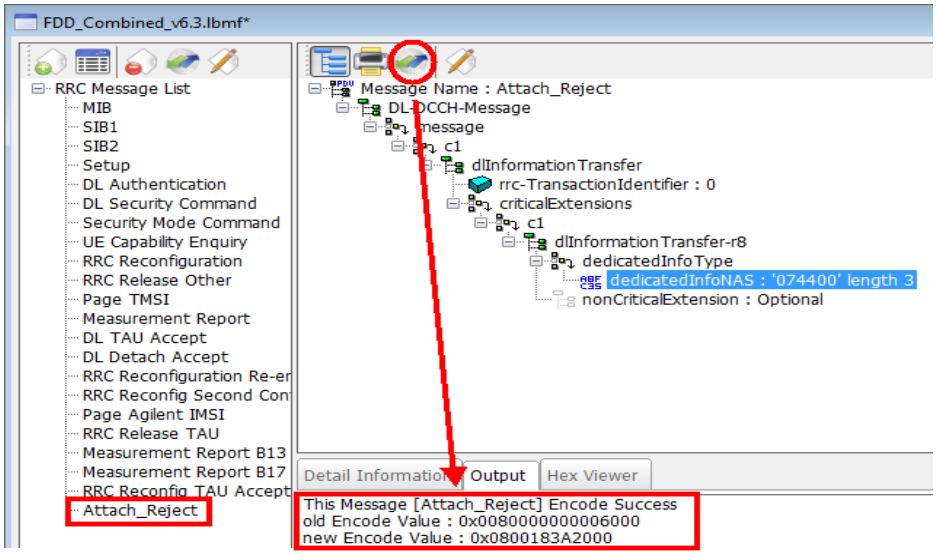



**Figure 7-35: Verifying Successful Message Encoding**

10. Now save the modified scenario file and transfer it to your UXM.

## Modifying Communication Scenario response to incoming AttachRequest

These steps below modify the scenario file to send an Attach_Reject in response to an Attach_Request.

1. Click on the **Scenario** tab
2. From the Communication Scenario area select the 'RRC_Connection (Initial Attach)'
3. Locate the transaction containing the incoming ATTACH_REQUEST. (In this example the UXM has been set to respond with a DL Authentication message. That must be replaced with the Attach_Reject message that was created above.)
4. Double-click on the transaction containing the **ATTACH_REQUEST** (a message editing window will pop up)

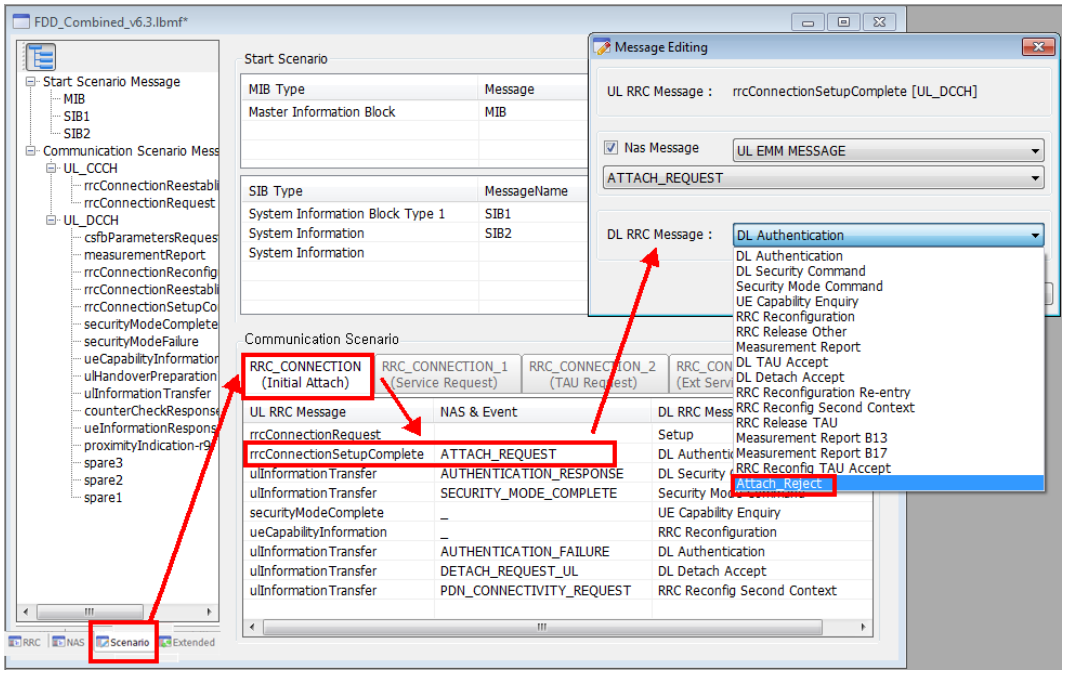



**Figure 7-36: Modifying Response to Incoming AttachRequest**

5. From the DL RRC MESSAGE drop-down list select Attach_Reject
6. Click OK.
7. The transaction should now show Attach_Reject in response to the ATTACH_REQUEST.

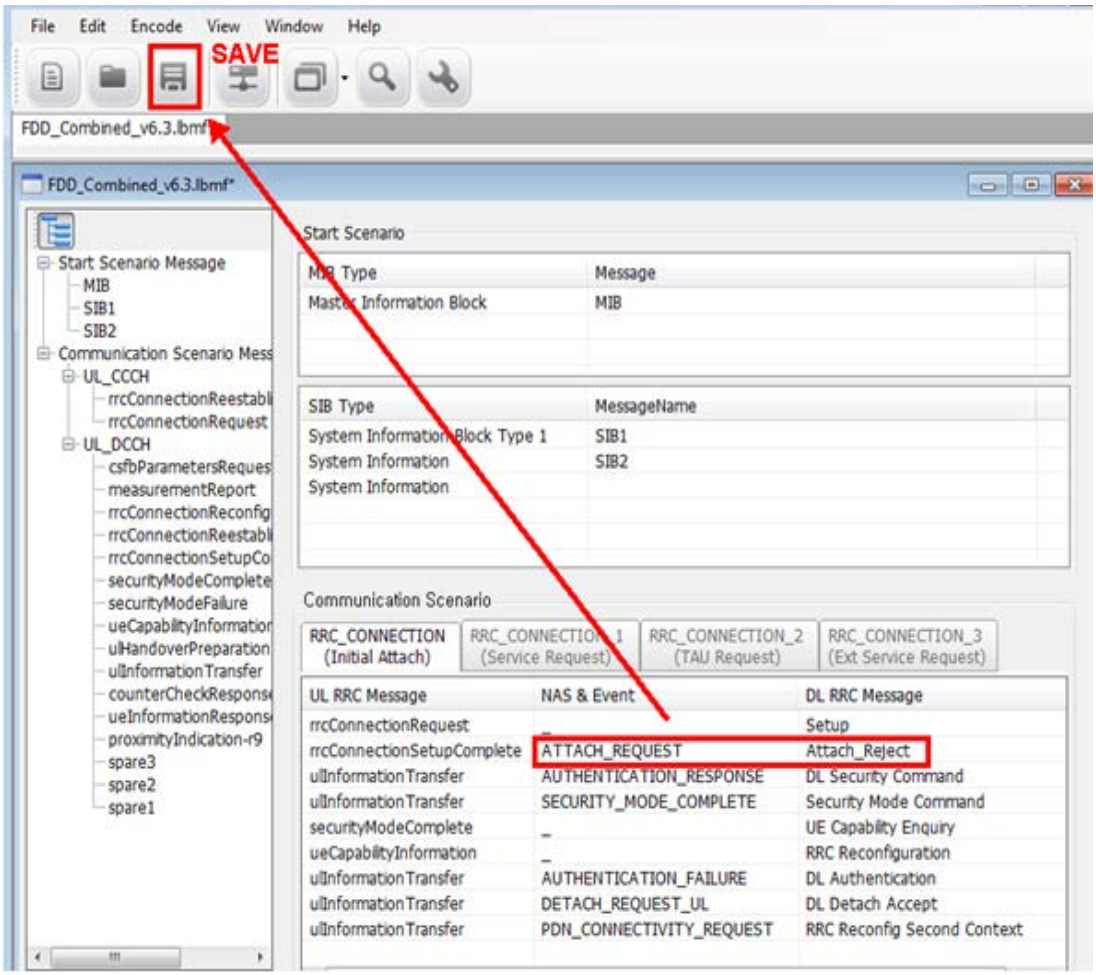



**Figure 7-37: Saving Attach_Reject Response to Incoming AttachRequest**

8. Now save the scenario and transfer it to your UXM.

# 8 Service and Support

## Calling Keysight Technologies

Keysight Technologies has offices around the world to provide you with complete support for your products. For help, to obtain servicing information or to order replacement parts, contact the nearest Keysight Technologies office listed below. In any correspondence or telephone conversations, you will need the product number, full serial number, and software revision details. Press the System>App Info front panel key to view the product number (E7515A), serial number, and software revision information.

## Locations for Keysight Technologies

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