Keysight E7515A UXM Wireless Test Set
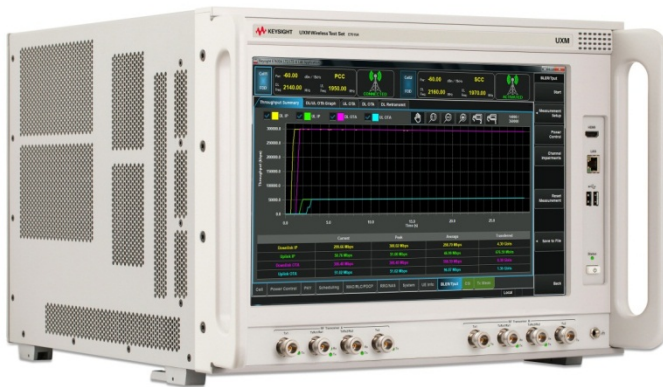
Assess Design Readiness with Greater Confidence

User's and Programmer's Guide

KEYSIGHT
TECHNOLOGIES

Notices

Warranty

Statement of Compliance.

This product has been designed and tested in accordance with accepted industry standards, and has been supplied in a safe condition. The documentation contains information and warnings that must be followed by the user to ensure safe operation and to maintain the product in a safe condition.

Manual Part Number

E7515-90012

Edition

October 27th, 2014
Documents Software Version 1.2.1.x
Documents Platform Version 1.2.1.x

Printed in Malaysia

Keysight Technologies, Inc.

Technology Licenses

Restricted Rights Legend

Safety Notices

The following general safety precautions must be observed during all phases of operation of this instrument.   Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Keysight Technologies, Inc. assumes no liability for the customer's failure to comply with these requirements.

CAUTION

A CAUTION notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

Electrical Rating

Input Voltage Range: 100/120/220/240 V_{AC}

Input Frequency Range: 50/60Hz, nominal

Input Power Rating: 1100 Watts Max

Mains supply voltage fluctuates up to +/- 10% of the nominal voltage.

WARNING	This is a Safety Class 1 Product (provided with a protective earth ground incorporated in the power cord). The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor inside or outside of the product is likely to make the product dangerous. Intentional interruption is prohibited.

WARNING	No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock do not remove covers.

WARNING	This instrument is heavy. Two people are required to lift this instrument.

WARNING	Please consult ergonomic guidelines regarding placement of the external keyboard when using it with the instrument. Using the keyboard in an uncomfortable or awkward environment could result in personal injury.

CAUTION	Before switching on this instrument, make sure: - the rating for the service breaker is correct. - the supply voltage is in the specified range.

CAUTION	This instrument has auto-ranging line voltage input. Be sure the supply voltage is within the specified range and voltage fluctuations do not exceed 10 percent of the nominal supply voltage.

CAUTION	The Mains wiring and connectors shall be compatible with the connector used in the premise electrical system. Failure, to ensure adequate earth grounding by not using the correct components may cause product damage, and serious injury.

CAUTION	This product is designed for use in Installation Category II and Pollution Degree 2 environment.

NOTE	Use the Keysight supplied power cord or one with the same or better electrical rating.

Electrical Safety Compliance

SAFETY

Complies with European Low Voltage Directive 20006/95/EC

- IEC/EN 61010-1, 3rd Edition
- Canada: CAN/CSA C22.2 No. 61010-1-12
- USA: UL std no. 61010-1, 3rd Edition

Acoustic statement (European Machinery Directive 2002/42/EC, 1.7.4.2u)

Acoustic noise emission	Geraeuschemission
LpA <70 dB	LpA <70 dB
Operator position	Am Arbeitsplatz
Normal operation mode	Normaler Betrieb
Per ISO 7779	Nach DIN 45635 t.19

EMI and EMC Compliance

EMC

Complies with European EMC Directive 2004/108EC

- IEC/EN 61326-1
- CISPR Pub 11 Group 1, class A
- AX/NZS CISPR 11
- ICES/NMB-001
  This ISM device complies with Canadian ICES-001
  Cet appareil ISM est conforme a la norme NMB-001 du Canada.
- South Korean Class A EMC declaration: This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

  A 급 기기 (업무용 방송통신기 자재)

  이기기는 업무용(A 급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며,

  가정외의 지역에서 사용하는 것을 목적으로 합니다

Warranty

This Keysight Technologies instrument product is warranted against defects in material and workmanship for a period of three years from the date of shipment. During the warranty period, Keysight Technologies will, at its option, either repair or replace products that prove to be defective. For warranty service or repair, this product must be returned to a service facility designated by Keysight Technologies. Buyer shall prepay shipping charges to Keysight Technologies. Keysight Technologies shall pay shipping charges to return the product to Buyer. However, Buyer shall pay all shipping charges, duties, and taxes for products returned to Keysight Technologies from another country.

Where to Find the Latest Information

Keysight will periodically update product documentation. For the latest information about this wireless test set, including software upgrades, operating and application information, and product and accessory information, see the following URL:
www.keysight.com/find/UXM-Manuals

Is your product software up-to-date?

Keysight will periodically release software updates to fix known defects and incorporate product enhancements. To search for software updates for your product, go to the Keysight Software Manager website at:
www.keysight.com/find/softwaremanager

Table of Contents

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1 Introduction

Welcome to the User's and Programmer's Guide for the Keysight E7515A UXM Wireless Test Set (UXM). The purpose of this guide is to provide you with the information that is needed to use the Application Switch Tool, to remotely control the components of the UXM, and to specify the RF cable compensation loss located on the UXM Control Panel.
The following topics are covered in this manual:

- Application Switch Tool
- Programming the UXM
- Specifying RF Cable Compensation

Refer to the following documentation for more detailed information describing the TA/LA software, the X-Series Measurement applications, the UXM Control Panel, and the UXM Platform software application.

Document Title	Location	Description
E7530A/E7630A LTE/LTE-A Application Help	Embedded in the TA/LA software: Right-click on any setting displayed on front-panel and select **Help**. (Complete SCPI list is displayed by selecting **Programming the TA/LA**, **List of SCPI Commands**.)	TA/LA software application setting descriptions and SCPI commands
	www.keysight.com/find/UXM-Manuals	
T9080B/T9082A LTE/LTE-A FDD/TDD X-Series Measurement Application Help	Embedded in the X-Series software: Select the **Help** menu key from the Virtual Front-panel. (Complete SCPI list is displayed by selecting **Programming the Analyzer**, **List of SCPI Commands**.)	X-Series software application setting descriptions and SCPI commands
	www.keysight.com/find/UXM-Manuals	
E7515A UXM Getting Started Guide	Included in UXM shipment	Information on the Platform and Control Panel components.
	On Keysight.com, click here.	

Overview

The UXM is the most highly-integrated signaling test set created for functional and RF design validation in the 4G era and beyond. It provides the capabilities you need to test the newest designs, delivering LTE-Advanced category 7 now and handling more complex requirements later.
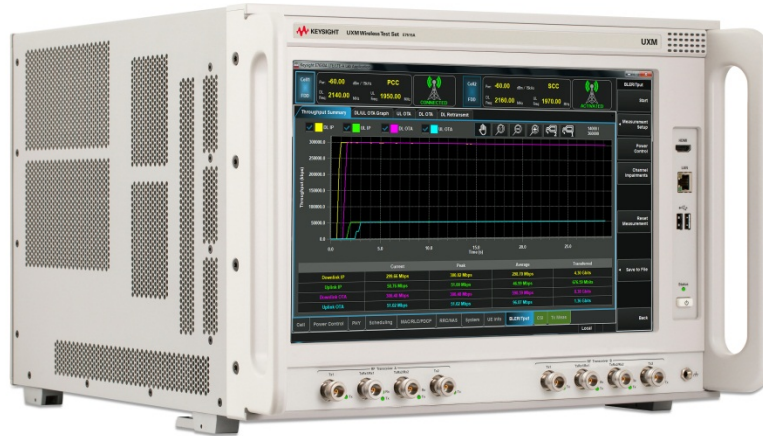

Figure 1-1: Keysight E7515A UXM Wireless Test Set

Capabilities of the UXM

- Stable, bidirectional data throughput at 300 Mbps downlink (DL) / 100 Mbps uplink (UL)
- Category 4/6/7 support with two independent 100 MHz RF transceivers enabling multiple cells, DL/UL carrier aggregation, up to 4x2 DL MIMO, and integrated fading
- Receiver test capabilities including flexible channel definitions and closed-loop testing
- Trusted X-Series measurement applications for transmitter testing
- Wide range of network emulator capabilities including complex handover scenarios (such as CSFB and SRVCC), VoLTE support (including SPS and multi-DRB) and sleep modes for battery drain test
- Frequency Division Duplex (FDD) and Time Division Duplex (TDD) options

2 Application Switch Tool

The UXM has many components of software that combine to bring you the most highly-integrated signaling test set available for functional and RF design validation in the 4G era and beyond. The Application Switch Tool enables you to access each of these components easily with just a simple touch.
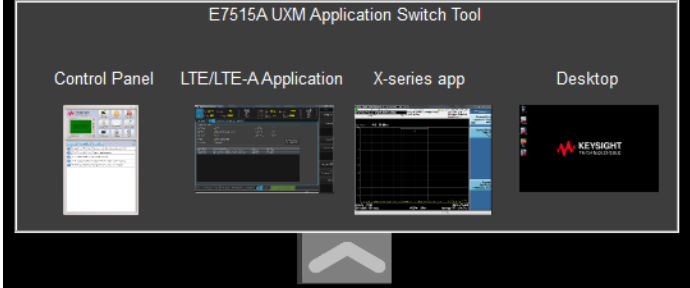

Figure 2-1: Application Switch Tool

This tool is available whenever you launch the E7530A/E7630A LTE/LTE-A Application software. Since the TA/LA also launches the X-Series Measurement application, this tool enables you to easily access and switch between them, as well as the Control Panel and Desktop with just a simple touch.

The Application Switch Tool hides to enable you to view/access the currently viewed software application more easily.

 Just pull this icon down in order to view the complete set of switchable options.

 Touch this icon to hide it again.

3 Programming the UXM

There are three software application components available for remote control. HiSLIP, Socket, or Telnet protocols are available for this purpose. The following Device/Port IDs are already set in your UXM and it is recommended that you do not change them.

IMPORTANT	You must use lower case text for hislip values, as shown in the table entries below.

Component	HiSLIP Device ID	TCP (Socket) Port	Telnet Port
E7530A/E7630A LTE/LTE-A TA/LA Application	hislip2	5125	5124
X-Series Measurement Application	hislip1	5075	5074
Platform Application	hislip0	5025	5024

Figure 4-1: Device/Port IDs for each Component

NOTE	It is recommended that you use the Keysight Connection Expert software to control the UXM components, which is available as a free download at this location: www.keysight.com/find/iosuite.

Using HiSLIP to send SCPI Commands

There are a few steps involved in creating the connection that enables you to send SCPI commands to each of the three UXM software components.

1. Obtain the IP address of the UXM.
2. Viewing the HiSLIP and Ports for each software component
3. Adding software components to the Keysight Connection Expert

IMPORTANT	The E7515A is not auto-discoverable. You need to add it manually to your software environment. For example if using *Keysight Connection Expert* follow the procedure described on page 13 of this document.

Obtain the IP address of the UXM

You can easily access the IP address of the UXM by performing the following steps:

1. Use the App Switcher to view the UXM Control Panel.
2. Select the Configuration icon on the Control Panel.
3. The following window is displayed, providing you with the LAN Configuration details.
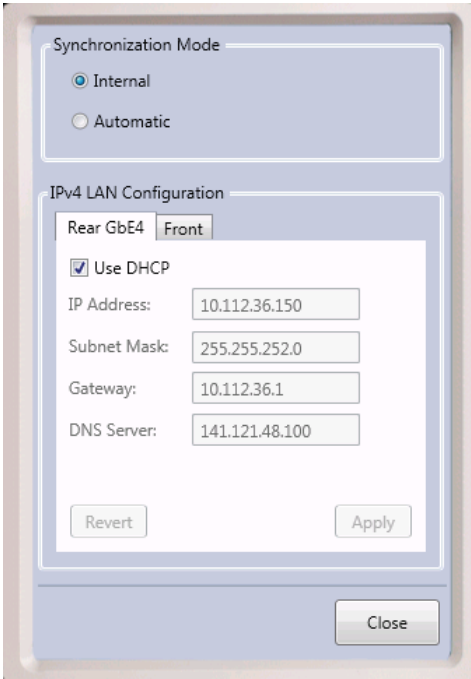
Viewing the HiSLIP and Ports for each software component

(This is for reference only. It is recommended that you do not change these device/port IDs.)

E7530A/E7630A LTE/LTE-A TA/LA Application

Navigate to the **Systems** lower tab, **App Info** upper tab and view the HiSLIP/Port IDs as shown:

Figure 4-2: TA/LA HiSLIP Device ID

X-Series Measurement Application

Use the App Switcher to open the X-Series application. The HiSLIP, Port, and Socket IDs can be viewed at the following location: **System**, **I/O Config**, **SCPI LAN**.
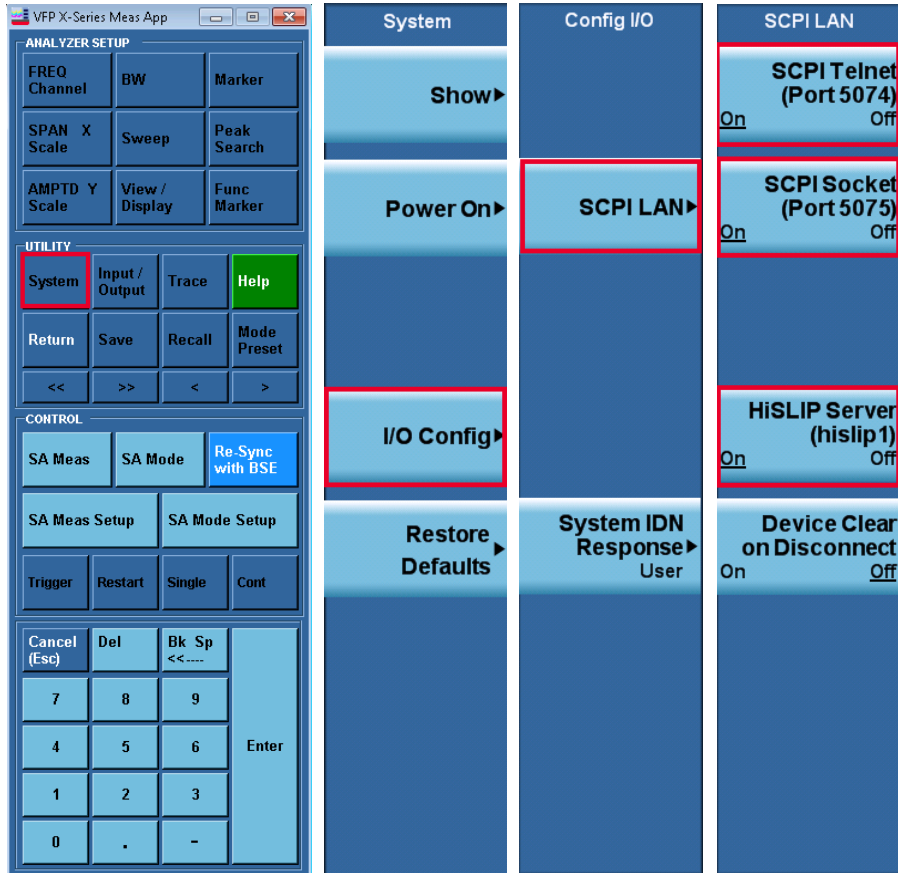

Figure 4-3: X-Series HiSLIP, Socket, and Telnet Device/Port IDs

Platform Application

This application is always set at HiSLIP0, Socket port: 5025, and Telnet port: 5024 . They are not available to view.

NOTE	RF compensation is set via this port. Refer to Specifying RF Cable Compensation.

Adding software components to the Keysight Connection Expert

For this example, only the HiSLIP connection is presented. Adding each component using their port IDs is handled similarly.

1. Open the Keysight Connection Expert.
2. Add the TA/LA component using the IP Address and HiSLIP2 Device ID.
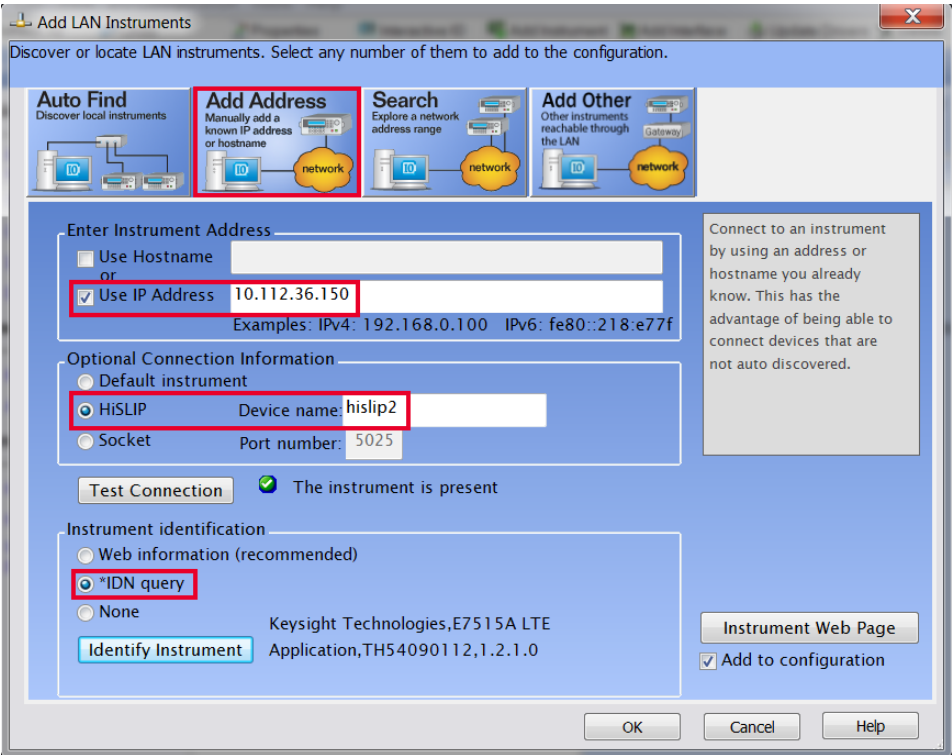
3. Verify the device has been added:
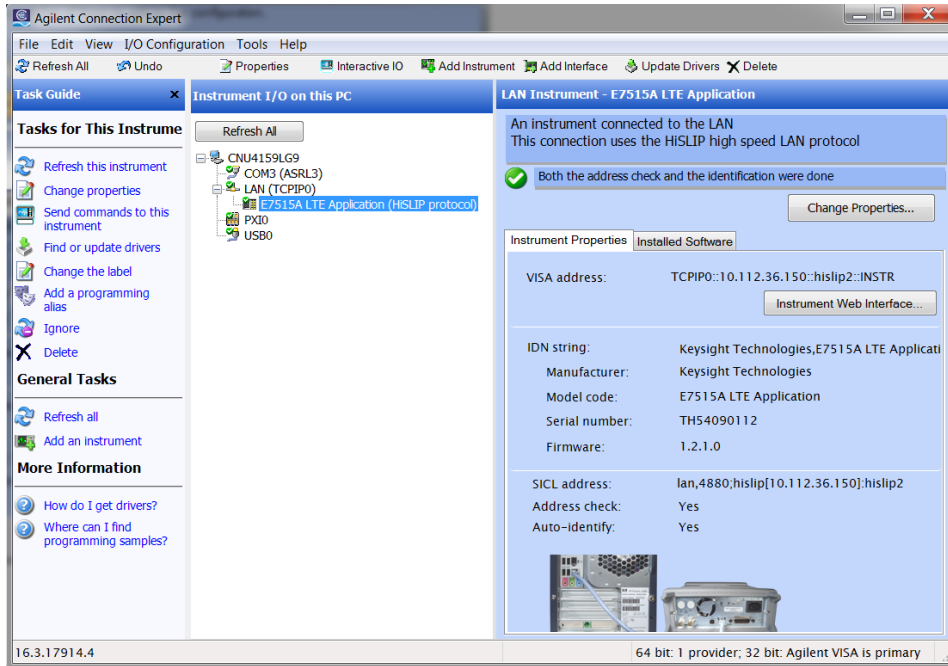
4. Similarly add the X-Series and the Platform applications.
5. Verify they are added.

At this point you can now use your existing programming environment to send SCPI commands to these software components.

4 Specifying RF Cable Compensation

You can specify compensation using the front-panel or via the remote command interface described in Chapter 3.
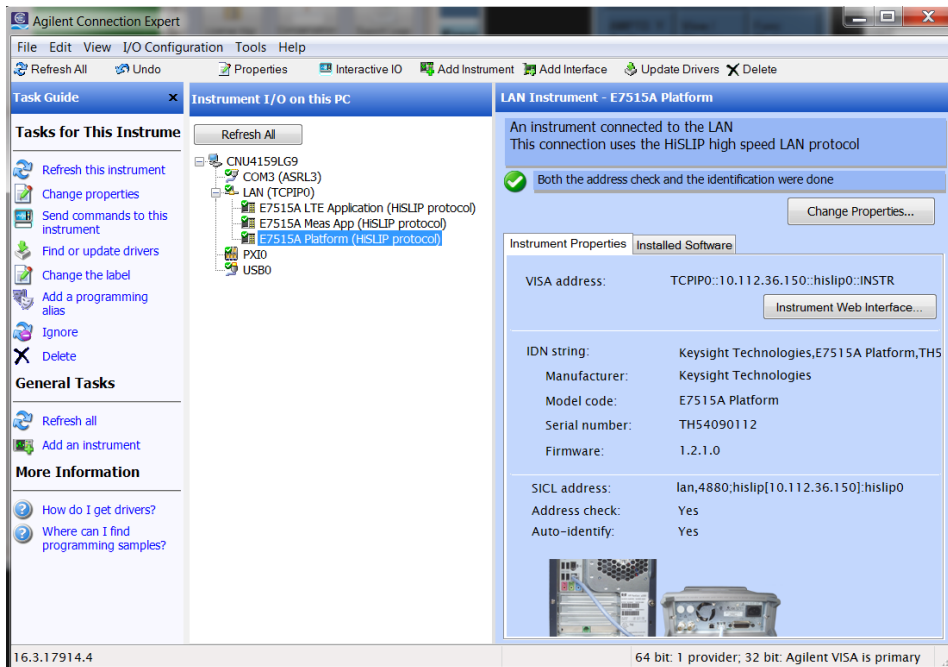
Using the Front-panel

The RF cable compensation has two parts:

1. **Cable Loss Correction:** This setting enables/disables use of the Compensation Table (described below) within the E7530A/E7630A applications.
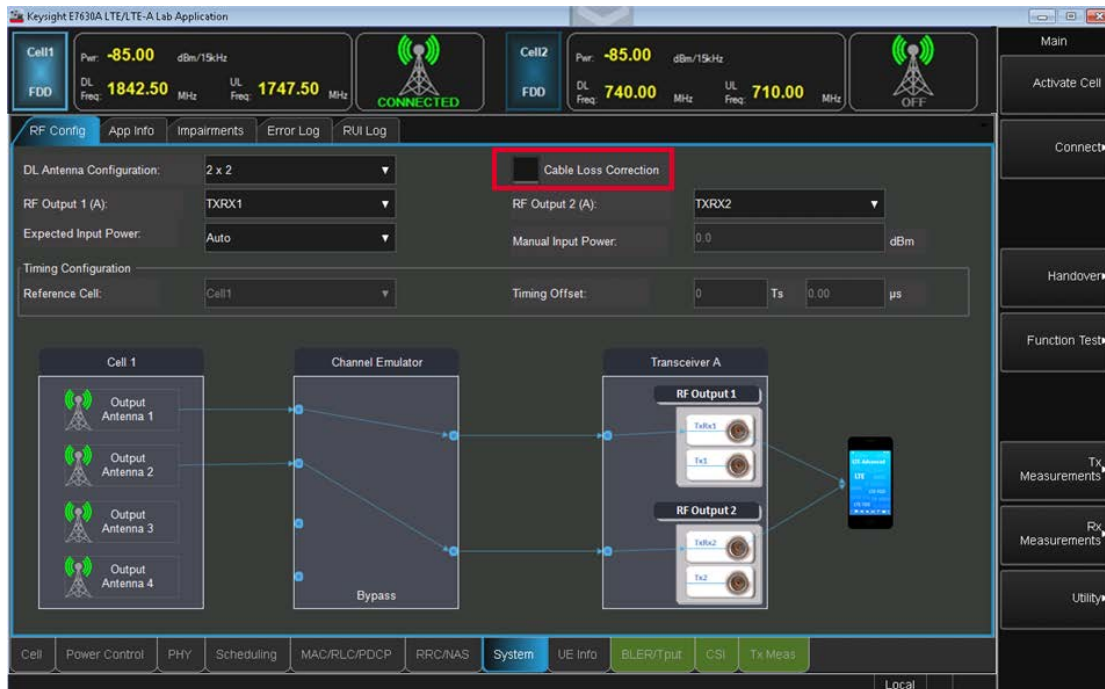   Remote command: `SYSTem:CORRection[:STATe]` < ON | 1 | OFF | 0 >

Figure 5-1: Cable Loss Correction setting

2. **Compensation:** The icon located on the UXM Control Panel enables you to specify RF cable loss/gain at specific frequencies.

Figure 5-2: Compensation

To do this, select the **Compensation** icon to open the table shown below.
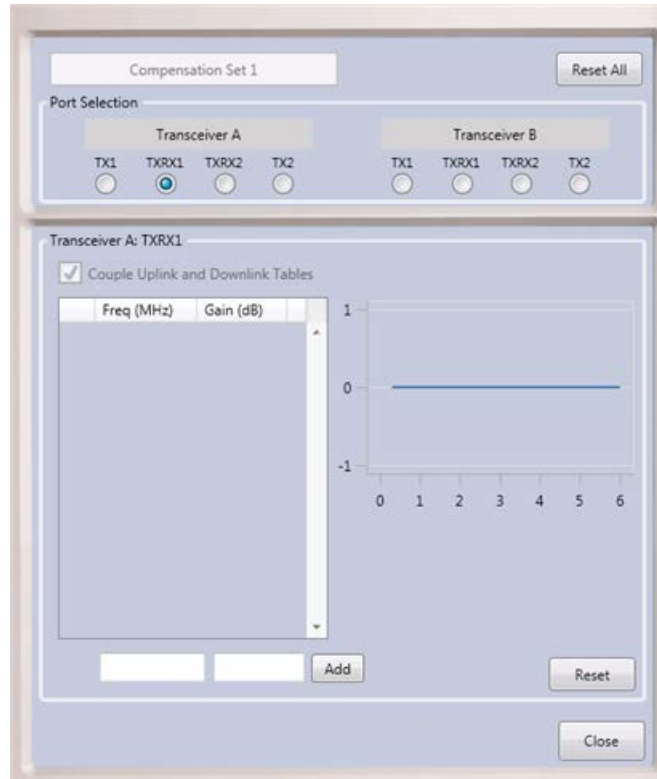

Figure 5-3: Compensation Table

To specify gain or loss, perform the following steps:

1. Select the Transceiver A/B port for which you wish to specify compensation.
2. Enter the Frequency value (MHz) and Gain (dB) in the two boxes to the left of **Add:** Freq (left box) Gain (right box).[a]
3. Select **Add**.[b,c]
4. The box above now displays the values you entered and the graph on the right plots the value.[d]

Notes:
a. Gain values are positive and loss values are negative. You do not need to enter plus sign (+) for gain, but you do need to enter negative sign (-) for loss.
b. If the values are invalid, they are highlighted with a red border around the boxes.
c. If the table contains only one entry then that loss compensation value is applied to all frequency points.
d. The X-axis represents GHz and is dependent upon the frequency range option of your UXM (option: 504 or 506). The Y-axis depends upon the range of values entered.
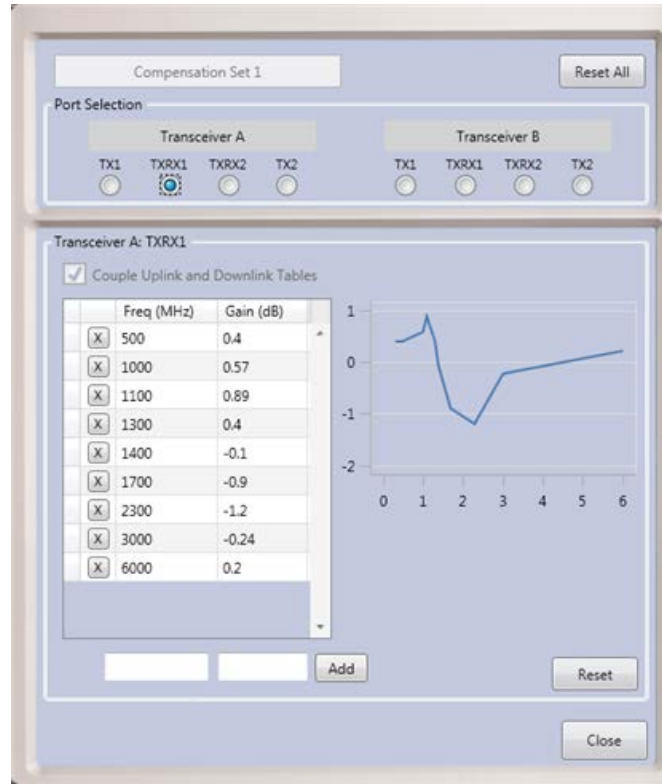
An example table is shown below.

Figure 5-4: Example of Populated Compensation Table

Using Remote Command Interface to Specify Compensation

Use one of the connection protocols (HiSLIP0, Socket port 5025, or Telnet port: 5024) to connect to the Platform software application as described in the section entitled, *Programming the UXM*, above.

The following remote commands are available for this purpose:

```
:SYSTem:CORRection:CSET:RESet
:SYSTem:CORRection:CSET[:TRXA]:TX1|TX:DATA[:GAIN]
:SYSTem:CORRection:CSET[:TRXA]:TX1|TX:POINts?
:SYSTem:CORRection:CSET[:TRXA]:TX1|TX:RESet
:SYSTem:CORRection:CSET[:TRXA]:TX2:DATA[:GAIN]
:SYSTem:CORRection:CSET[:TRXA]:TX2:POINts?
:SYSTem:CORRection:CSET[:TRXA]:TX2:RESet
:SYSTem:CORRection:CSET[:TRXA]:TXRX1|TXRX[:ULDL]:DATA[:GAIN]
:SYSTem:CORRection:CSET[:TRXA]:TXRX1|TXRX[:ULDL]:POINts?
:SYSTem:CORRection:CSET[:TRXA]:TXRX1|TXRX[:ULDL]:RESet
:SYSTem:CORRection:CSET[:TRXA]:TXRX2[:ULDL]:DATA[:GAIN]
:SYSTem:CORRection:CSET[:TRXA]:TXRX2[:ULDL]:POINts?
:SYSTem:CORRection:CSET[:TRXA]:TXRX2[:ULDL]:RESet
:SYSTem:CORRection:CSET:TRXB:TX1|TX:DATA[:GAIN]
:SYSTem:CORRection:CSET:TRXB:TX1|TX:POINts?
:SYSTem:CORRection:CSET:TRXB:TX1|TX:RESet
```

```
:SYSTem:CORRection:CSET:TRXB:TX2:DATA[:GAIN]
:SYSTem:CORRection:CSET:TRXB:TX2:POINts?
:SYSTem:CORRection:CSET:TRXB:TX2:RESet
:SYSTem:CORRection:CSET:TRXB:TXRX1|TXRX[:ULDL]:DATA[:GAIN]
:SYSTem:CORRection:CSET:TRXB:TXRX1|TXRX[:ULDL]:POINts?
:SYSTem:CORRection:CSET:TRXB:TXRX1|TXRX[:ULDL]:RESet
:SYSTem:CORRection:CSET:TRXB:TXRX2[:ULDL]:DATA[:GAIN]
:SYSTem:CORRection:CSET:TRXB:TXRX2[:ULDL]:POINts?
:SYSTem:CORRection:CSET:TRXB:TXRX2[:ULDL]:RESet
```

```
:SYSTem:CORRection:CSET:TRXB:TX2:DATA[:GAIN]
```

5 Returning Your Test Set for Service

Calling Keysight Technologies

Keysight Technologies has offices around the world to provide you with complete support for your wireless test set. To obtain servicing information or to order replacement parts, contact the nearest Keysight Technologies office listed below. In any correspondence or telephone conversations, refer to your test set by its product number, full serial number, and software revision.

To access your product information, select this icon in the E7515A Control Panel view after switching to the E7515A Control Panel via the Application Switch tool or after performing both or only the second action described below:

1. If you are inside the TA/LA software application, press the windows icon key on your USB connected keyboard to enable you to view your windows task bar.
2. Once you have access to the windows task bar, double-click the E7515A Control Panel icon: to maximize the E7515A Control Panel view.

Locations for Keysight Technologies

Online assistance: http://www.keysight.com/find/assist

If you do not have access to the Internet, one of these centers can direct you to your nearest representative:
Should the Declaration of Conformity be required, please contact a Keysight Sales Representative, or the closest Keysight Sales Office. Alternately, contact Keysight at:
www.keysight.com.

Service and Support

Americas

Brazil	Canada	Mexico
55 11 3351 7010	(877) 894 4414	001 800 254 2440
United States		
(800) 829 4444		

Asia Pacific

Australia	India	Malaysia
1 800 629 485	1 800 112 929	1 800 888 848
China	Japan	Singapore
800 810 0189	0120 (421) 345	1 800 375 8100
Hong Kong	Korea	Taiwan
800 938 693	080 769 0800	0800 047 866

Other Asian Countries:
(65) 6375 8100
www.keysight.com/find/contactus

Europe & Middle East

Austria	Ireland	Russia
0800 00 11 22	1800 832 700	8800 5009 286
Belgium	Israel	Spain
0800 58 580	1 809 343 051	0800 00 01 54
Finland	Italy	Sweden
0800 523 252	800 599 100	0200 88 22 55
France	Luxembourg	Switzerland
0805 980 333	+32 800 58580	0800 80 53 53
*0.125 €/minute	Netherlands	United Kingdom
Germany	0800 0233 200	0800 0260 637
0800 6270 999		

Other Unlisted Countries:
www.keysight.com/find/contactus

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