Keysight N109228CA OIF CEI 3.1 Compliance Test Application

Getting Started

KEYSIGHT TECHNOLOGIES

Notices

© Keysight Technologies 2014 - 2022

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Keysight Technologies as governed by United States and international copyright laws.

Software Version

Version 5.0.10.0

Edition

August 2022

Available in electronic format only

Keysight Technologies
1900 Garden of the Gods Road
Colorado Springs, CO 80907 USA

Warranty

THE MATERIAL CONTAINED IN THIS DOCUMENT IS PROVIDED "AS IS," AND IS SUBJECT TO BEING CHANGED, WITHOUT NOTICE, IN FUTURE EDITIONS. FURTHER, TO THE MAXIMUM EXTENT PERMITTED BY APPLICABLE LAW, KEYSIGHT DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED WITH REGARD TO THIS MANUAL AND ANY INFORMATION CONTAINED HEREIN, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. KEYSIGHT SHALL NOT BE LIABLE FOR ERRORS OR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN CONNECTION WITH THE FURNISHING, USE, OR PERFORMANCE OF THIS DOCUMENT OR ANY INFORMATION CONTAINED HEREIN. SHOULD KEYSIGHT AND THE USER HAVE A SEPARATE WRITTEN AGREEMENT WITH WARRANTY TERMS COVERING THE MATERIAL IN THIS DOCUMENT THAT CONFLICT WITH THESE TERMS, THE WARRANTY TERMS IN THE SEPARATE AGREEMENT WILL CONTROL.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

U.S. Government Rights

The Software is "commercial computer software," as defined by Federal Acquisition Regulation ("FAR") 2.101. Pursuant to FAR 12.212 and 27.405-3 and Department of Defense FAR Supplement ("DFARS") 227.7202, the U.S. government acquires commercial computer software under the same terms by which the software is customarily provided to the public. Accordingly, Keysight provides the Software to U.S. government customers under its standard commercial license, which is embodied in its End User License Agreement (EULA), a copy of which can be found at http://www.keysight.com/find/sweula. The license set forth in the EULA represents the exclusive authority by which the U.S. government may use, modify, distribute, or disclose the Software. The EULA and the license set forth therein, does not require or permit, among other things, that Keysight: (1) Furnish technical information related to commercial computer software or commercial computer software documentation that is not customarily provided to the public; or (2) Relinquish to, or otherwise provide, the government rights in excess of these rights customarily provided to the public to use, modify, reproduce, release, perform, display, or disclose commercial computer software or commercial computer software documentation. No additional government requirements beyond those set forth in the EULA shall apply, except to the extent that those terms, rights, or licenses are explicitly required from all providers of commercial computer software pursuant to the FAR and the DFARS and are set forth specifically in writing elsewhere in the EULA. Keysight shall be under no obligation to update, revise or otherwise modify the Software. With respect to any technical data as defined by FAR 2.101, pursuant to FAR 12.211 and 27.404.2 and DFARS 227.7102, the U.S. government acquires no greater than Limited Rights as defined in FAR 27.401 or DFAR 227.7103-5 (c), as applicable in any technical data.

Safety Notices

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.

Contents

1 Introduction

Installing the N109228CA OIF CEI 3.1 Compliance Test Application 5

Recommended Equipment 6

Installing N109228CA and N1010A FlexDCA on a PC 8

Installing the N109228CA on a PC without FlexDCA 11

Installing N109228CA on the DCA-X Oscilloscope 16

Starting the N109228CA OIF CEI 3.1 Compliance Test Application 20

Connecting to External Instruments 21

2 Installing N109228CA and FlexDCA on a PC

Connecting the Equipment 36

Installing the I/O Library Suite 37

Installing the N1010A FlexDCA Application 38

Installing the N109228CA OIF CEI 3.1 Compliance Test Application 43

Connecting N1010A FlexDCA to 86100D or N1000A 46

Connecting N1010A FlexDCA to N109X Oscilloscope and N107X 52

Starting the N109228CA OIF CEI 3.1 Compliance Test Application 53

Connecting to the Network Analyzer 55

Connecting to the N4877A 56

3 Installing N109228CA on a PC Without N1010A FlexDCA

Connecting the Equipment 62

Installing the I/O Library Suite 63

Installing the N109228CA OIF CEI 3.1 Compliance Test Application 64

Validating 86100D's or N1000A's SCPI Server Setup 67

Adding 86100D or N1000A to Keysight Connection Expert 68

Connecting N1010A FlexDCA to N109X Oscilloscope and N107X 76

Starting the N109228CA OIF CEI 3.1 Compliance Test Application 77

Connecting to the Network Analyzer 79

Connecting to the N4877A 80

4 Installing N109228CA on the oscilloscope

Connecting the Equipment 85

Installing the I/O Library Suite 86

Installing the N109228CA OIF CEI 3.1 Compliance Test Application 87

Configuring FlexDCA's SCPI Server Setup 90

Connecting N1010A FlexDCA to N109X Oscilloscope and N107X 91

Starting the N109228CA OIF CEI 3.1 Compliance Test Application 92

Connecting to the Network Analyzer 93

Connecting to the N4877A 94

1 Introduction

Use the instructions in this Guide to install and set up the N109228CA OIF CEI 3.1 Compliance Test Application. Once the procedures in this document are completed, you can begin compliance testing. Information on using the application is included in the application's Online Help.

Your licenses determine where you install the N109228CA and FlexDCA applications. The N109228CA license allows you to install the application on either a specific PC or a specific 86100D or N1000A DCA-X instrument. This selection is made at the time you redeem your licenses.

Configuration	DCA-X Supported Configurations	DCA-M Supported Configurations
N109228CA on a PC with FlexDCA	A PC attached to N1000A or 86100D DCA-X oscilloscope (in Legacy configuration) over LAN. The PC has N109228CA OIF CEI 3.1 software application, N1010A FlexDCA, 86100DU-400 for 86100D, N1010100A (F-AEYE) or 86100DU-401 license, and IO Connection Expert installed on it.	A PC directly connected to the N109X with a USB cable. The PC has N109228CA OIF CEI 3.1 software application, N1010A FlexDCA, N109x-401 or N1010100A License, and IO Connection Expert installed on it.
N109228CA on a PC without FlexDCA	A PC attached to N1000A or 86100D DCA-X oscilloscope (in Standard configuration) over LAN. The PC has N109228CA OIF CEI 3.1 software application, 86100DU-400 for 86100D, N1010100A (F-AEYE) or 86100DU-401 licenses, and IO Connection Expert installed on it.	**Configuration 1**: Connect the primary test system PC to a low-cost modern PC via LAN. The FlexDCA interface resides on the second PC. The second PC is then connected to the N109x via USB. This eliminates most issues of compatibility between an existing test system PC and the N109X hardware and can greatly simplify converting an 86100D system to an N109X system. **Configuration 2**: An N1000A or 86100D mainframe connected to the N109X with a USB cable. The N1000A or 86100D has FlexDCA installed on it. The N1000A or 86100D can then be controlled via GPIB or LAN by a PC that has N109228CA installed on it. The PC with N109228CA has N109x-401 or N1010100A License and IO Connection Expert installed on it.
N109228CA on the oscilloscope	N1000A or 86100D DCA-X oscilloscope in Standard configuration. The oscilloscope has N109228CA OIF CEI 3.1, FlexDCA, and IO Connection Expert installed on it.	An N1000A or 86100D mainframe connected to the N109X with a USB cable. The N1000A or 86100D has FlexDCA and N109228CA installed on it.

Installing the N109228CA OIF CEI 3.1 Compliance Test Application

1. Select from one of the three different test-equipment configurations shown in the following pages. The configuration that you select depends on where the N109228CA OIF CEI 3.1 Compliance Test Application is installed, as determined by the licenses, and whether you are using the N1010A FlexDCA application.
2. After locating the figure that matches your setup, follow the recommended procedure.

Recommended Equipment

Table 1 lists the recommended equipment. The equipment you select depends on the supported test equipment that is available to you.

Table 1 Recommended equipment to run tests on the N109228CA OIF CEI 3.1 Compliance Test Application

Equipment	CEI 6G-LR/SR CEI 11G-LR/MR/SR	CEI 6G-LR/SR CEI 11G-LR/MR/SR CEI 25G-LR CEI 28G-SR/VSR	Qty
Oscilloscope	N1000A DCA-X with options: N1000A-LOJ Low jitter timebase N1000A-PLK Pattern lock trigger hardware F-JIT Enhanced Jitter Analysis option under N1010100A R&D package F-EQ Equalizers option under N1010100A R&D package Or 86100D DCA-X with options: 86100D-ETR Extended Trigger 86100D-200 Enhanced Jitter Analysis or F-JIT Enhanced Jitter Analysis option under N1010100A R&D package 86100D-201 Advanced Waveform Analysis or F-EQ Equalizers option under N1010100A R&D package Or any of these N1092 C/E Optical + Two Electrical Channels N1094A Two Electrical Channels N1094B Four Electrical Channels		1
Single Module Solution	86108A or 86108B-LBW/216 N1060A	86108B-HBW/232 N1060A	1
Multiple Module Solution	86112A, 86117A, 86118A-H01, N1045A, N1045B, N1046A 75/85/100 GHz, N1055A, or 54754A	86117A, 86118A-H01, N1045A, N1045B, N1046A 75/85/100 GHz, or N1055A	1
	86107A *(any option)*	86107A *(any option)*	1
Clock/Data Recovery and Demultiplexer *	N4877A-216 or N4877A-232 N1076 A/B, N1077A, N1078A Clock Data Recovery	N4877A-232 N1076 A/B, N1077A, N1078A Clock Data Recovery	1
Software	N109228CA FlexDCA A.05.80 or higher Keysight I/O Libraries, 16.3 or higher 86100DU-400 *(for Jitter Transfer)* † 86100DU-401 or Advanced Eye Analysis option under N1010100A R&D package *(for PRBS31)* ‡ Keysight I/O Libraries, 16.3 or higher, 16.3 if running N1010A on a PC		1 1 1 1
Performance Network Analyzer **	N5221A, N5222A, N5230C-120/125, or N5241A	N5224A, N5222A, N5227A, N5230C-420/425, or N5244A	1
Impedance Analyzer †† ##	–	4294A Precision Impedance Analyzer *(recommended), or* E5061B ENA Series Network Analyzer *(recommended)*	1
Matched Cable Set	86108B-CA3 *(recommended)*	86108B-CA2 *(recommended)*	1
Phase Trimmers	86108B-PT3 *(recommended)*	86108B-PT2 *(recommended)*	2
DC Block	86108B-DC3 *(recommended)*	86108B-DC2 *(recommended)*	2
Pick-Off	N4815A-015 *(recommended)*	N4915A-015 *(recommended)*	2

* Required if using the multiple module solution instead of an 86108A/B.

† The 86100DU-400 software is required *only* for testing the CEI 11G-SR (Short Reach) interface only, when running the Jitter Transfer Bandwidth, 11G-SR and Jitter Transfer Peaking, 11G-SR tests.

‡ The 86100DU-401 software is *only* required for testing the CEI 6G and CEI 11G interfaces, when you select a PRBS31 pattern length when testing jitter.

**Required for return-loss tests. Later PNA models with higher frequency range will also work with the N109228CA.

†† Required for Very Short Reach (VSR) tests. The instrument must be able to measure impedance at 1 MHz.

‡‡ The impedance analyzer is not remotely controlled by the N109228CA.

NOTE The N109228CA OIF CEI 3.1 Compliance Test Application *cannot* be installed on an 86100A, 86100B, or 86100C.

Installing N109228CA and N1010A FlexDCA on a PC

If your licenses allow for installing the software as marked by the red star in the following diagrams, go to Chapter 2, “Installing N109228CA and FlexDCA on a PC”.

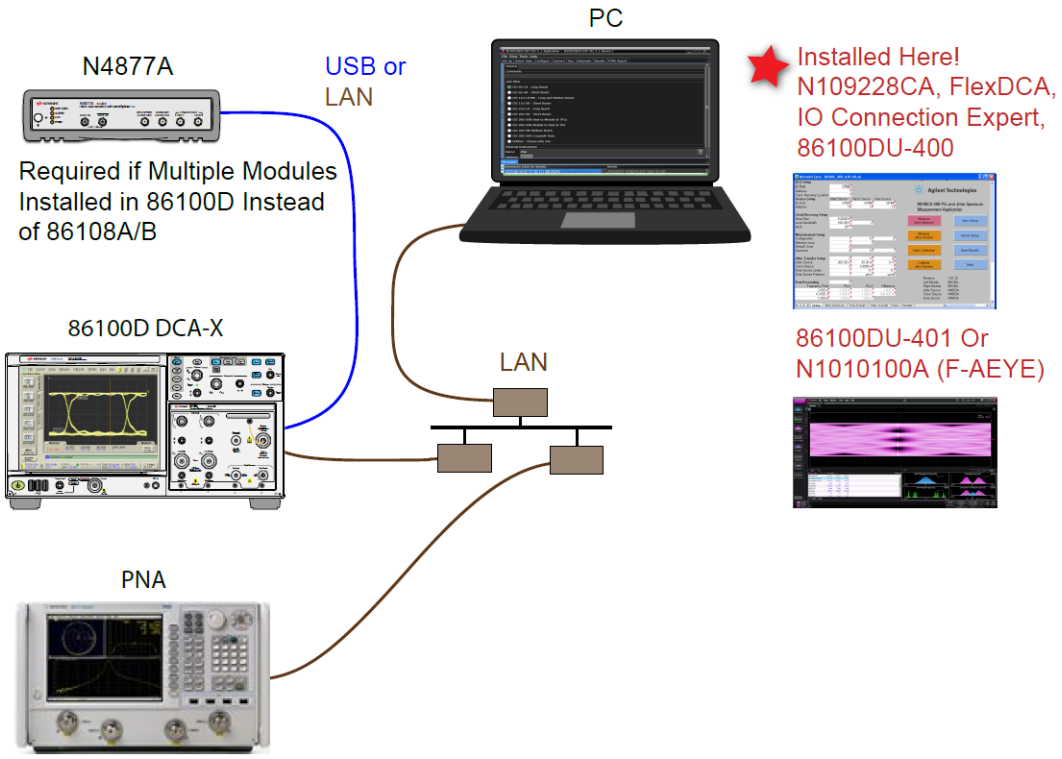

Figure 1 N109228CA and N1010A FlexDCA installed on PC connected to 86100D DCA-X Oscilloscope

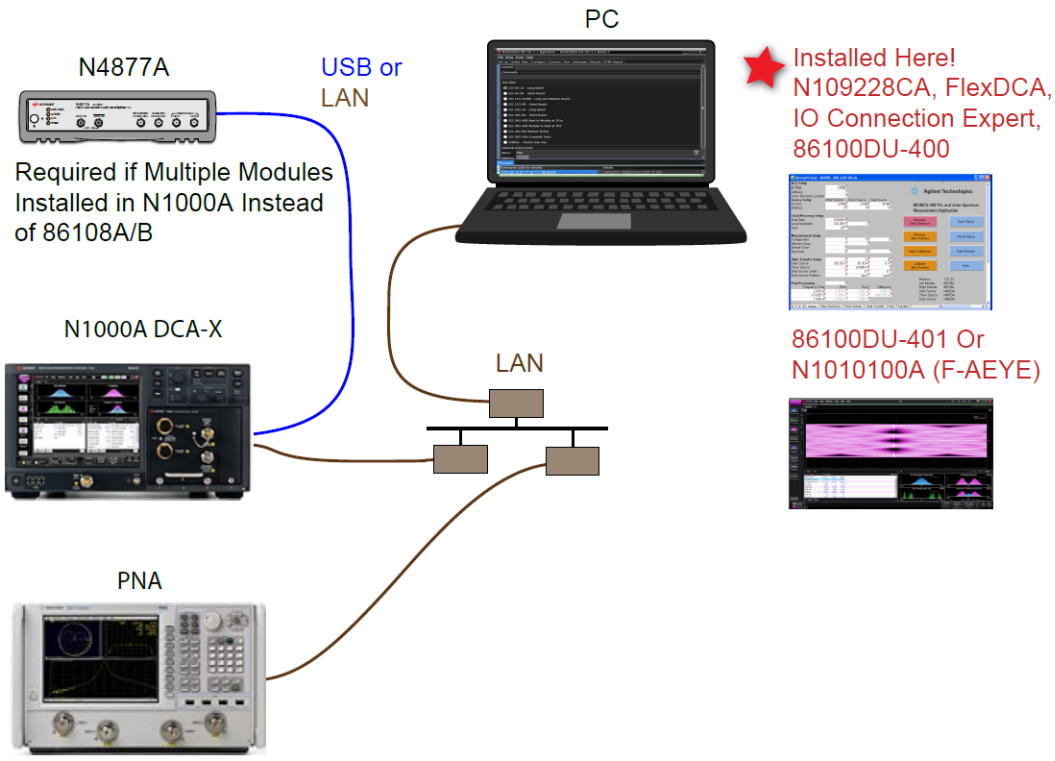

Figure 2 N109228CA and N1010A FlexDCA installed on PC connected to N1000A DCA-X Oscilloscope

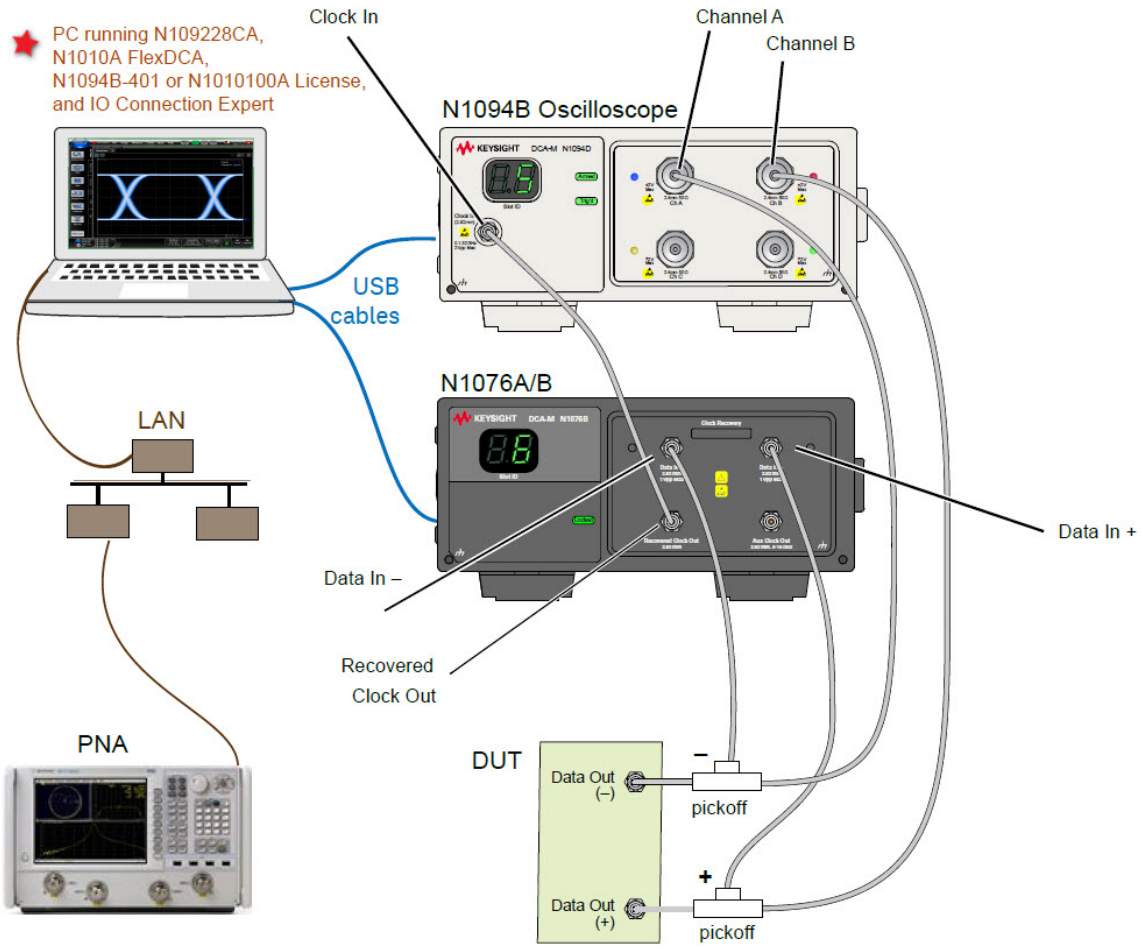

Figure 3 N109228CA *and* N1010A FlexDCA Installed on PC connected to N1094B DCA-M Oscilloscope

Installing the N109228CA on a PC without FlexDCA

If your licenses allow for installing the software as marked by the red star in this diagram, go to Chapter 3, “Installing N109228CA on a PC Without N1010A FlexDCA”.

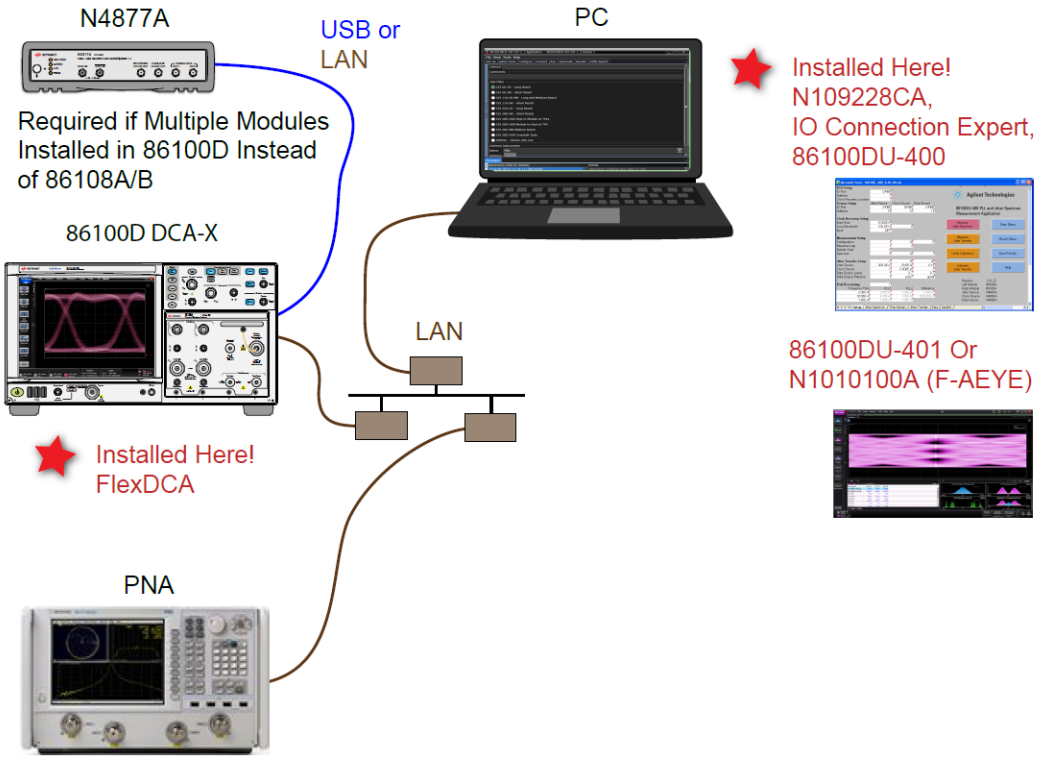

Figure 4 N109228CA Installed on PC connected to 86100D DCA-X Oscilloscope

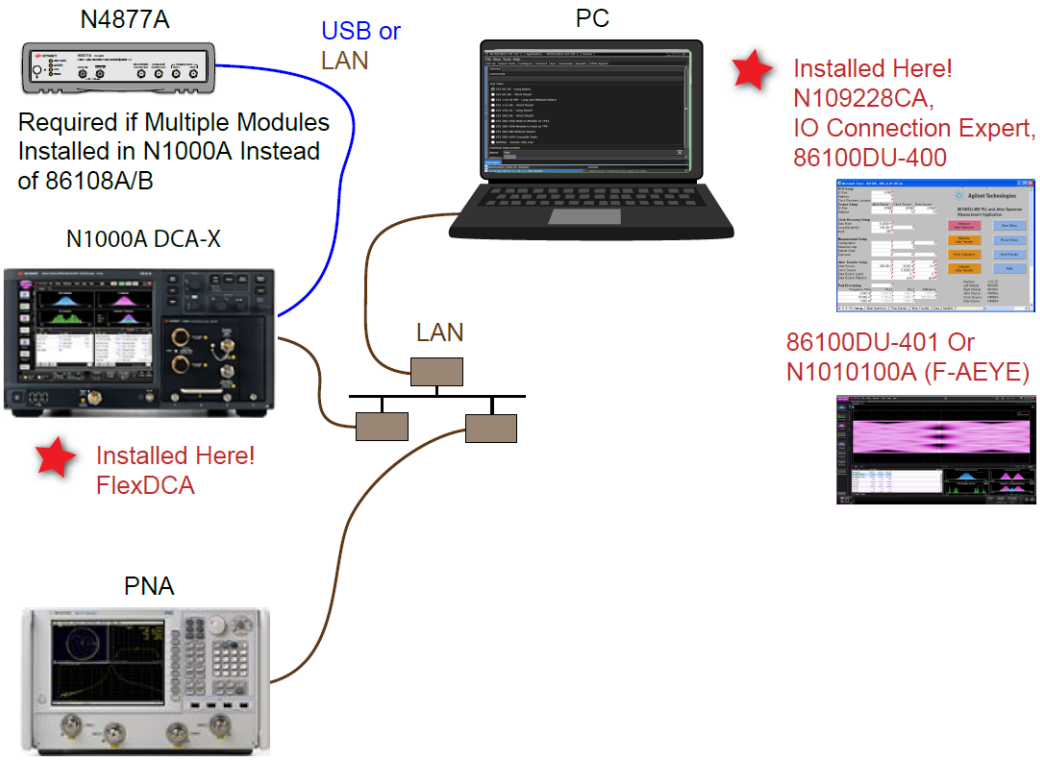

Figure 5 N109228CA Installed on PC connected to N1000A DCA-X Oscilloscope

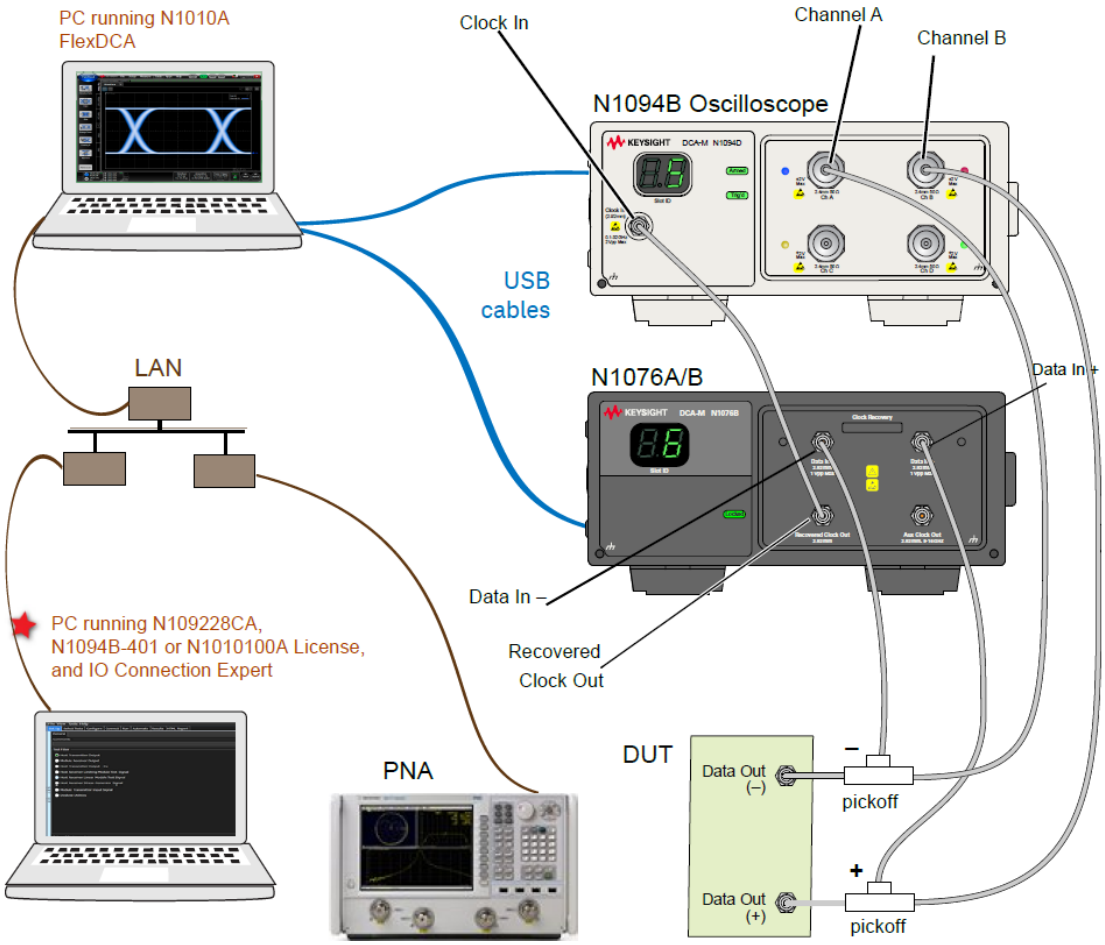

Figure 6 N109228CA Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via another PC

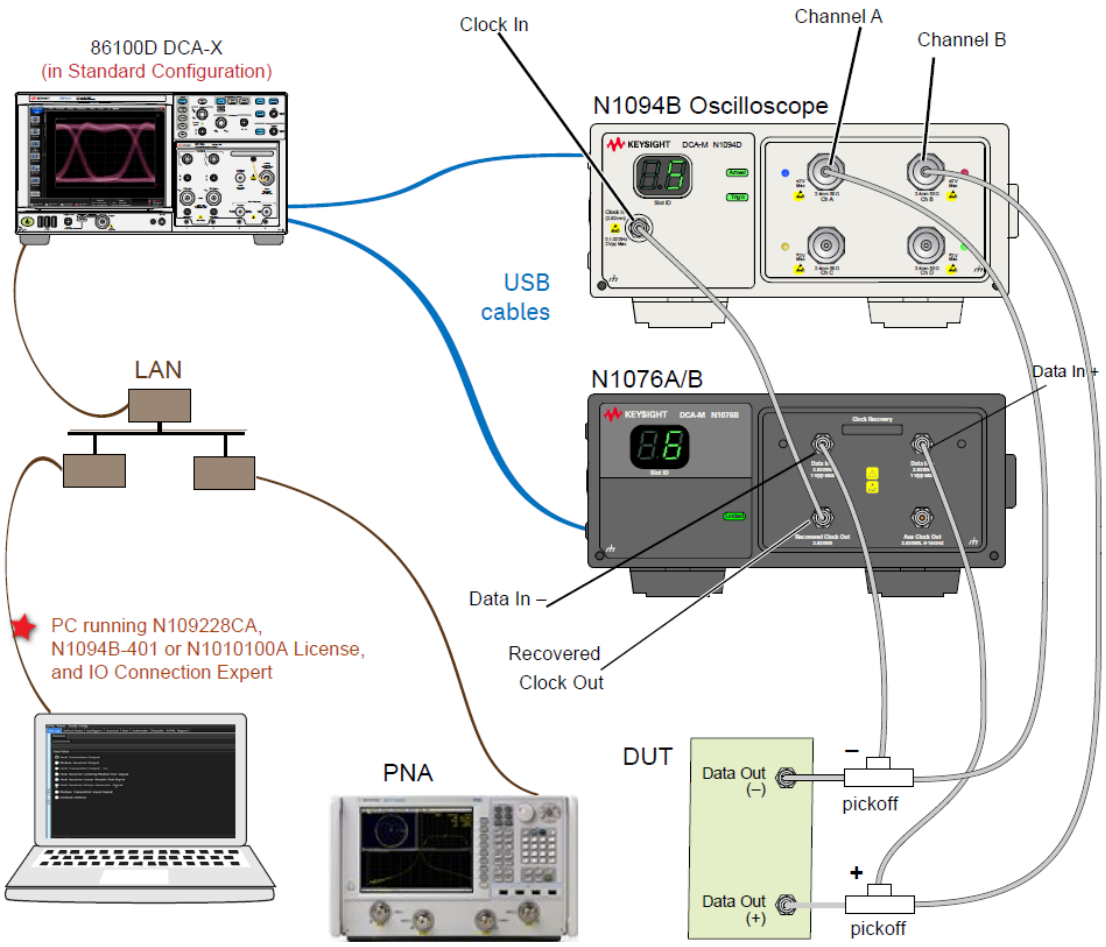

Figure 7 N109228CA Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via 86100 DCA-X Oscilloscope

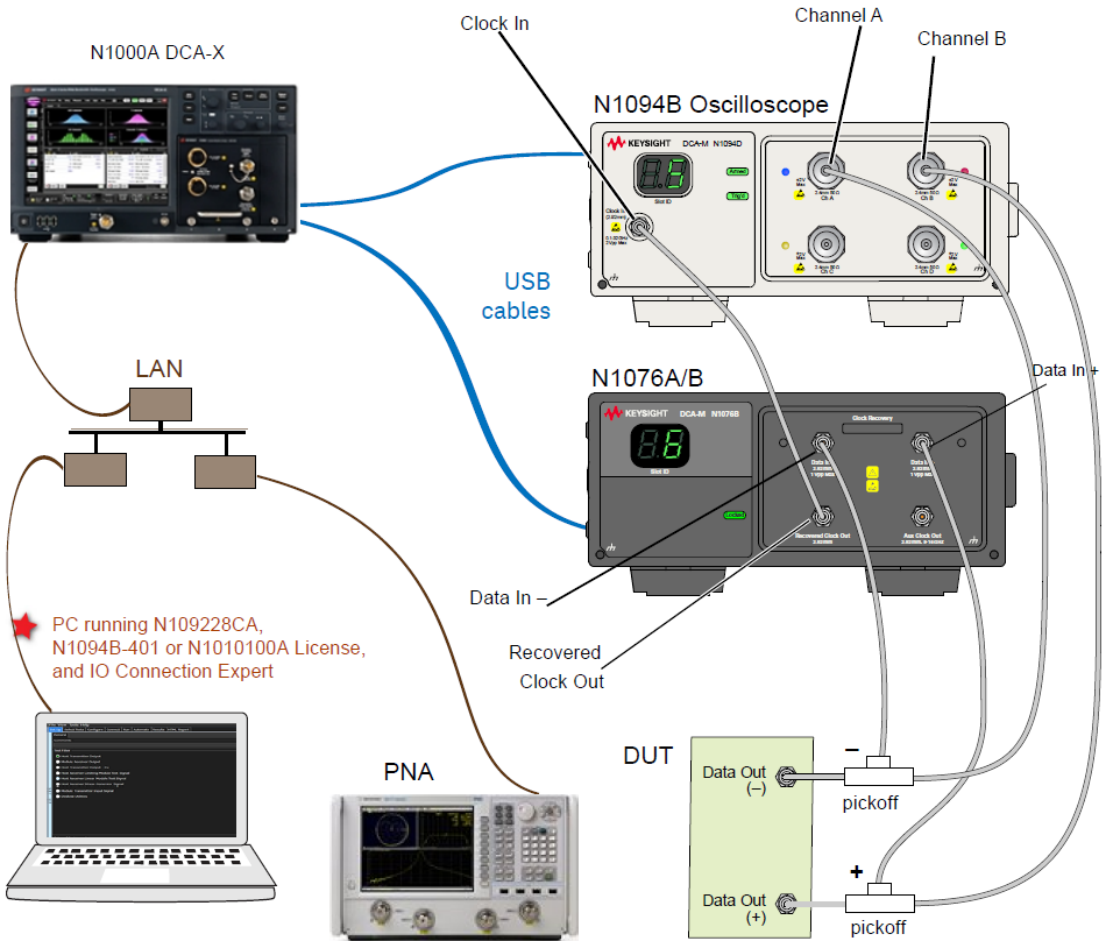

Figure 8 N109228CA Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via N1000A DCA-X Oscilloscope

Installing N109228CA on the DCA-X Oscilloscope

If your licenses allow for installing the software as marked by the red star in this diagram, go to Chapter 4, “Installing N109228CA on the oscilloscope”.

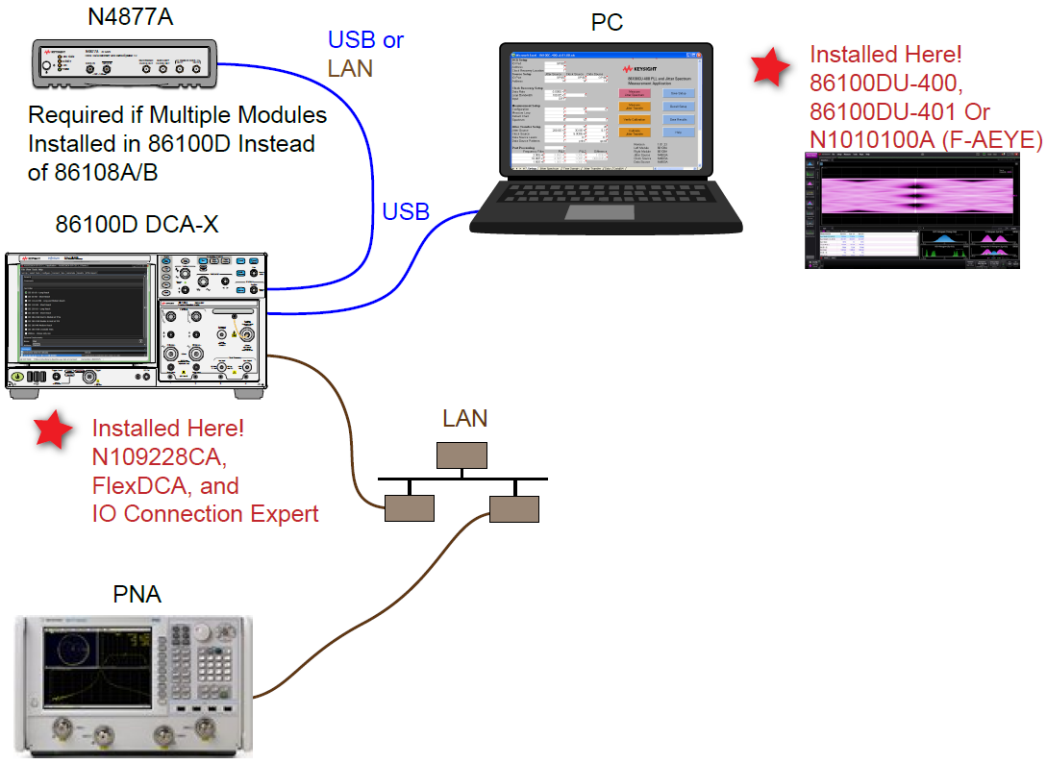

Figure 9 N109228CA Installed on 86100D

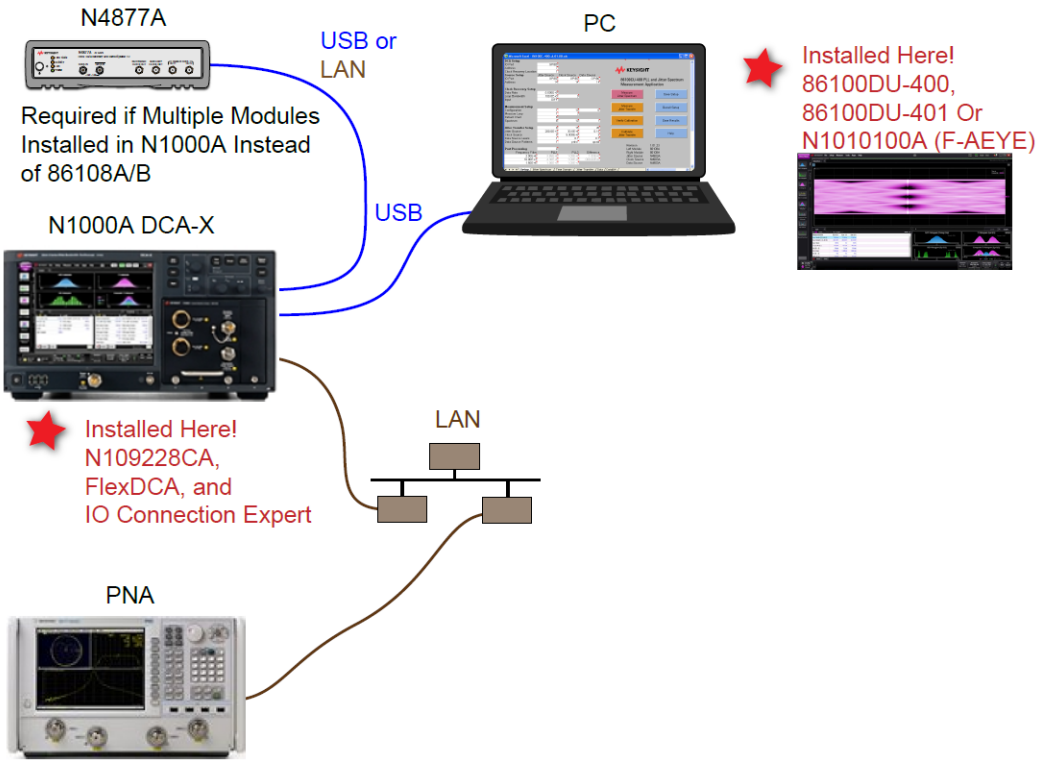

Figure 10 N109228CA Installed on N1000A

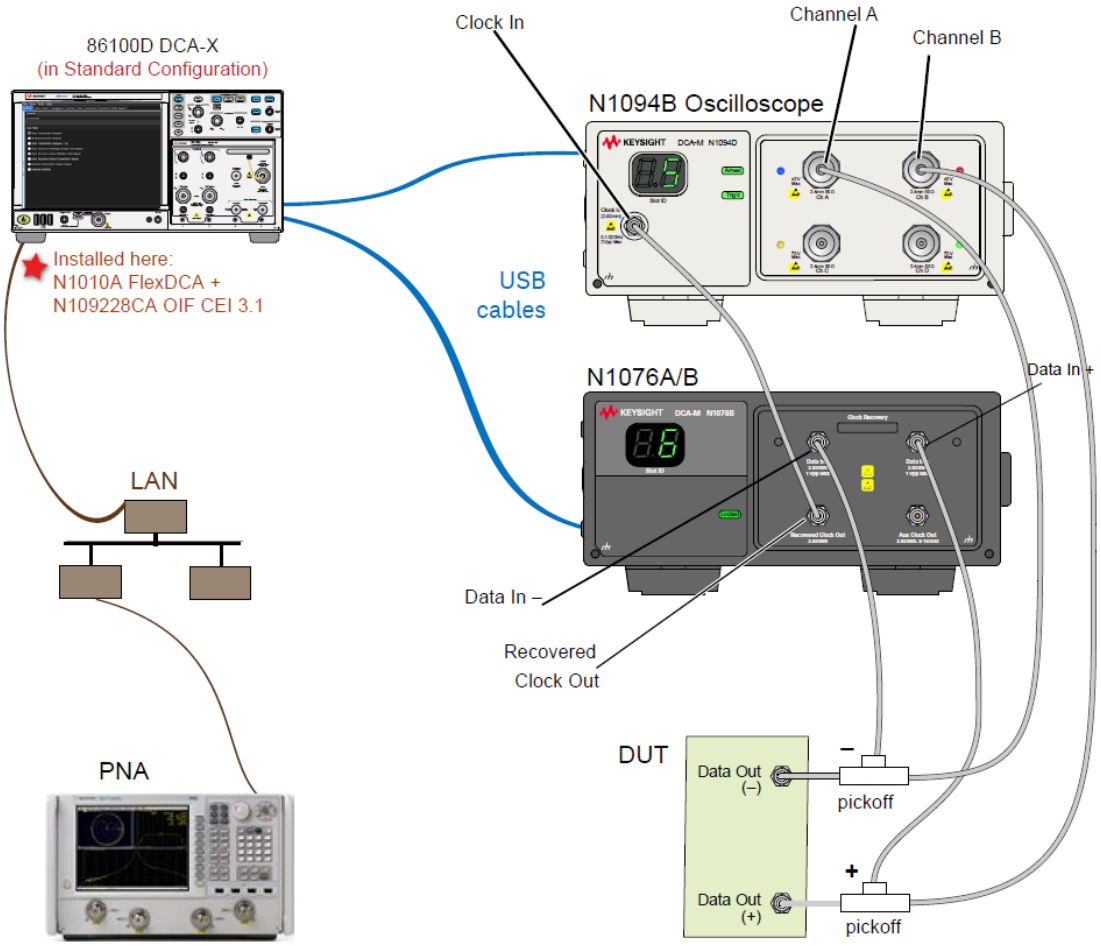

Figure 11 N109228CA Installed on 86100D connected to a DCA-M setup

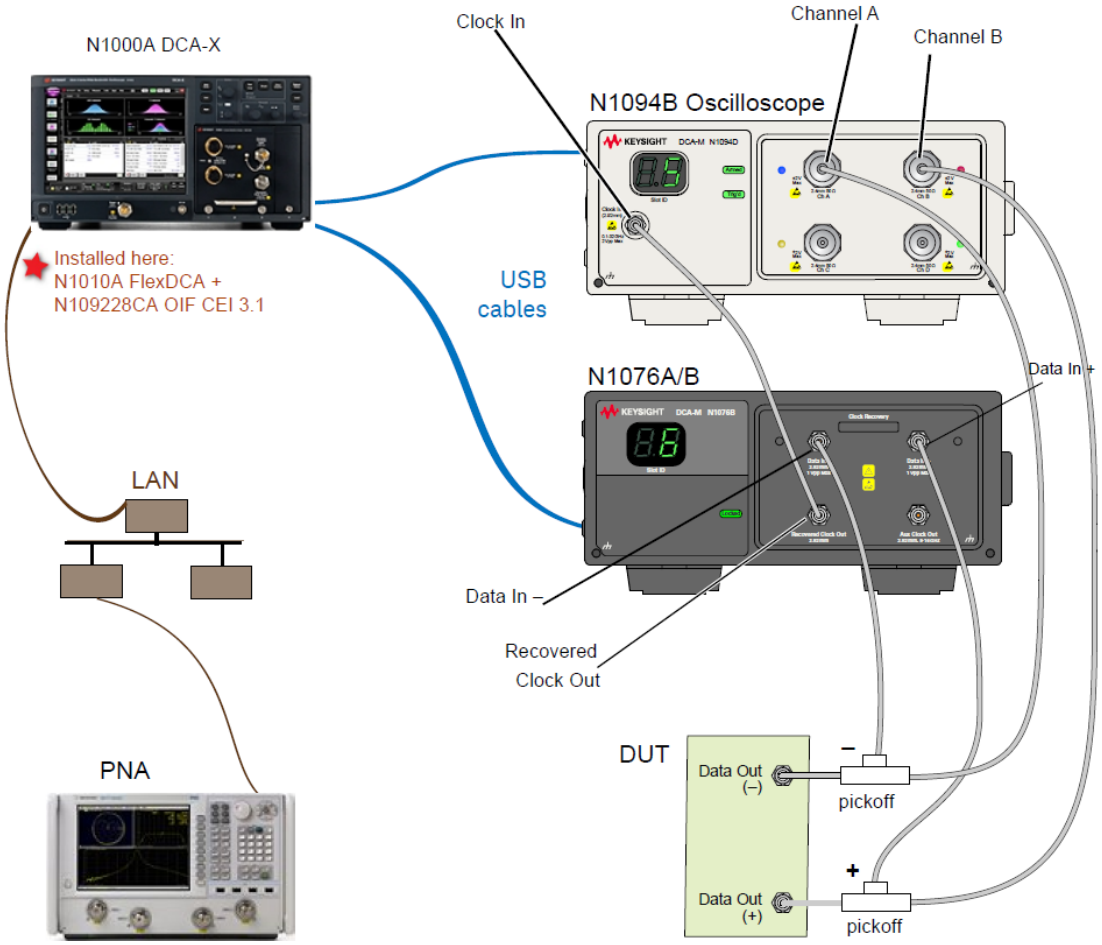

Figure 12 N109228CA Installed on N1000A connected to a DCA-M setup

Starting the N109228CA OIF CEI 3.1 Compliance Test Application

After you install the N109228CA OIF CEI 3.1 Compliance Test Application on a PC (with or without the N1010A FlexDCA interface) or on the N1000A or 86100D Oscilloscope, refer to the following sections to start the N109228CA OIF CEI 3.1 Compliance Test Application:

- If the N109228CA OIF CEI 3.1 Compliance Test Application and the N1010A FlexDCA Software are installed on the same PC and the DCA-X or DCA-M Oscilloscope is being accessed remotely, see "Starting the N109228CA OIF CEI 3.1 Compliance Test Application" on page 53.
- If the N109228CA OIF CEI 3.1 Compliance Test Application is installed on a PC (but the N1010A FlexDCA Software is not installed) and the DCA-X or DCA-M Oscilloscope is being accessed remotely, see "Starting the N109228CA OIF CEI 3.1 Compliance Test Application" on page 77.
- If the N109228CA OIF CEI 3.1 Compliance Test Application is installed on the N1000A or 86100D Oscilloscope, see "Starting the N109228CA OIF CEI 3.1 Compliance Test Application" on page 92.

Connecting to External Instruments

Most of the measurements in the N109228CA OIF CEI 3.1 Compliance Test Application use an N1000A or 86100D DCA-X or a supported DCA-M (N1092C/E, N1094A, N1094B) sampling oscilloscope. However, for return loss compliance tests, a network analyzer is required.

The current version of the N109228CA OIF CEI 3.1 Compliance Test Application requires Socket connections for PNAs.

Note that the Keysight I/O Library Suite must be installed before you proceed with connecting to the network analyzer. The user interface for Keysight Connection Expert 2017 (Version 18.0) and higher is slightly different from its previous versions, such as Version 17.2 or earlier.

Connection using Keysight Connection Expert v17.2 (or earlier)

1 Locate and record the PNA instrument's Hostname (Full Computer Name). Refer to the respective network analyzer's documentation for locating this information.

2 From the Windows **Start** menu, click **All Programs>Keysight Connection Expert** to launch Connection Expert. Refer to Keysight IO Libraries Suite for information on how to install the Keysight Connection Expert.

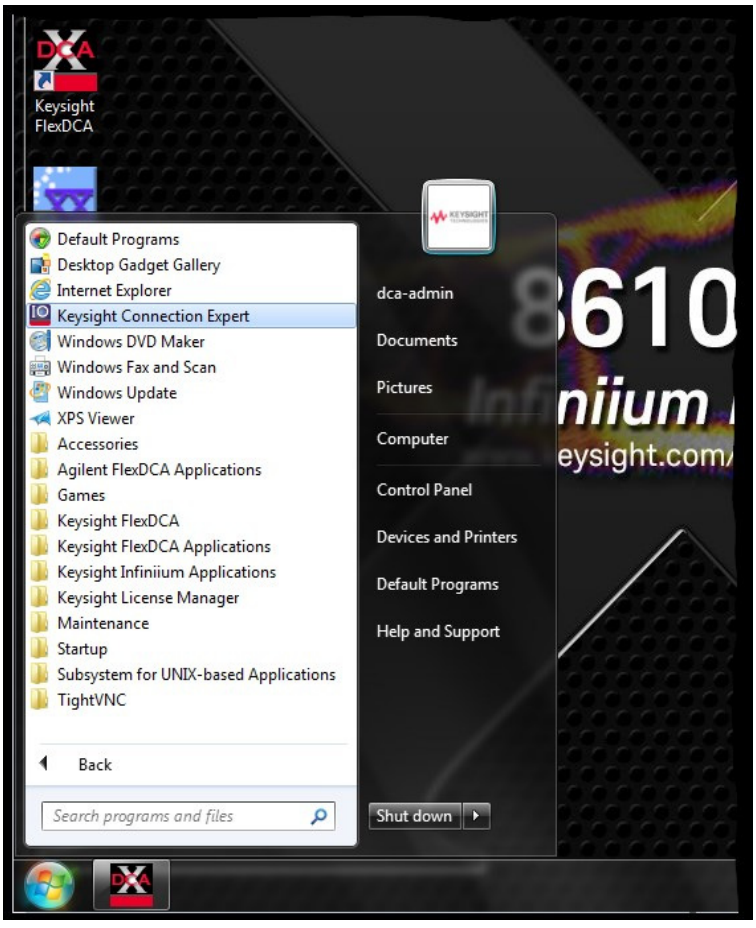

Figure 13 Launching the Keysight Connection Expert

3 In Keysight Connection Expert, click the **Manual Configuration** tab.

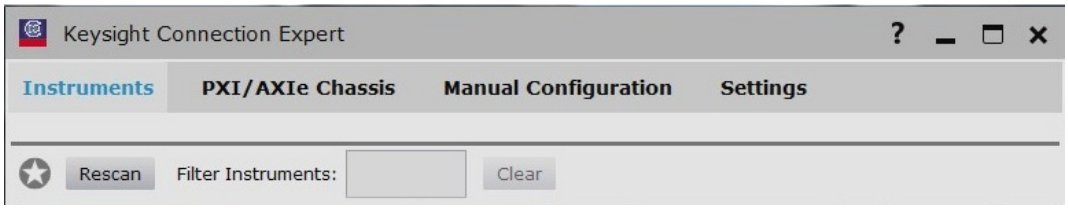

Figure 14 Tabs within Keysight Connection Expert

4 Under **Add New Instruments / Interfaces,** select **LAN instrument**.

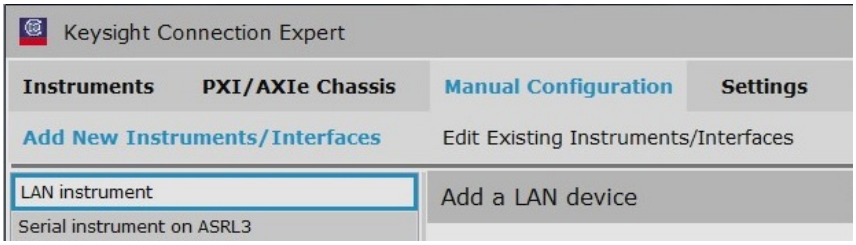

Figure 15 Performing Manual Configuration in Keysight Connection Expert

5 In the **Add a LAN device** pane, perform the following steps:

a Under **Set LAN Address:**, enter the Hostname (recorded in step 1) in the **Hostname or IP Address:** field. Note that your Hostname entry will be different from what is shown in the image.

b Under **Set Protocol:**, select **Socket** and enter the port number.

c Under **Verify Connection:**, click **Test This VISA Address** to verify the connection.

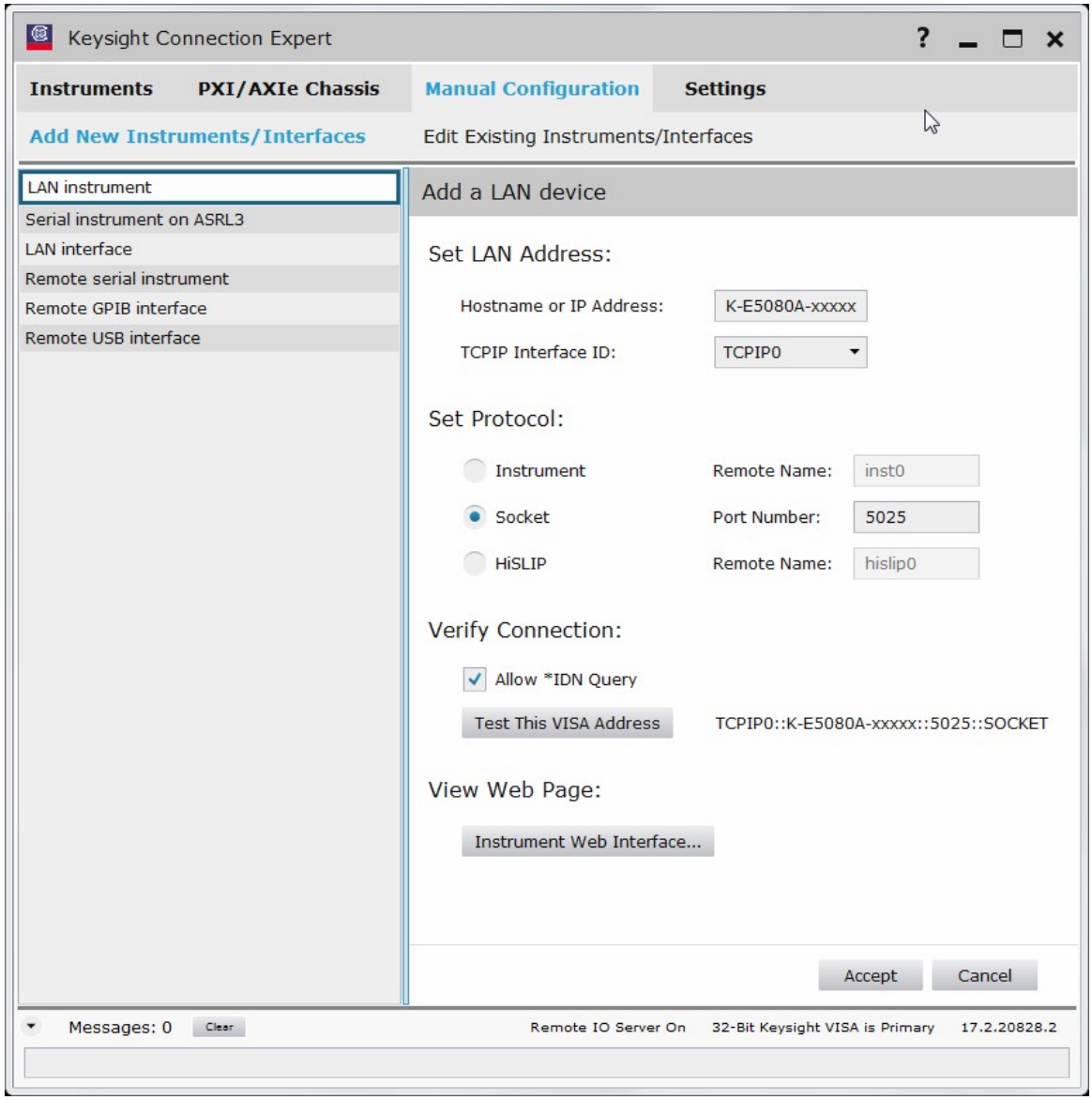

Figure 16 Adding a LAN device information in the Keysight Connection Expert

6 Once you verify the entered data, click **Accept** to complete the process.

7 Copy Network Analyzer SICL Address to the Clipboard:

a Click the **Instruments** tab of the Keysight Connection Expert.

b Click the PNA listing on the left pane, and copy the SICL address using *Ctrl* + *C* keys. Note that the address on your end will be different from what is shown in the image.

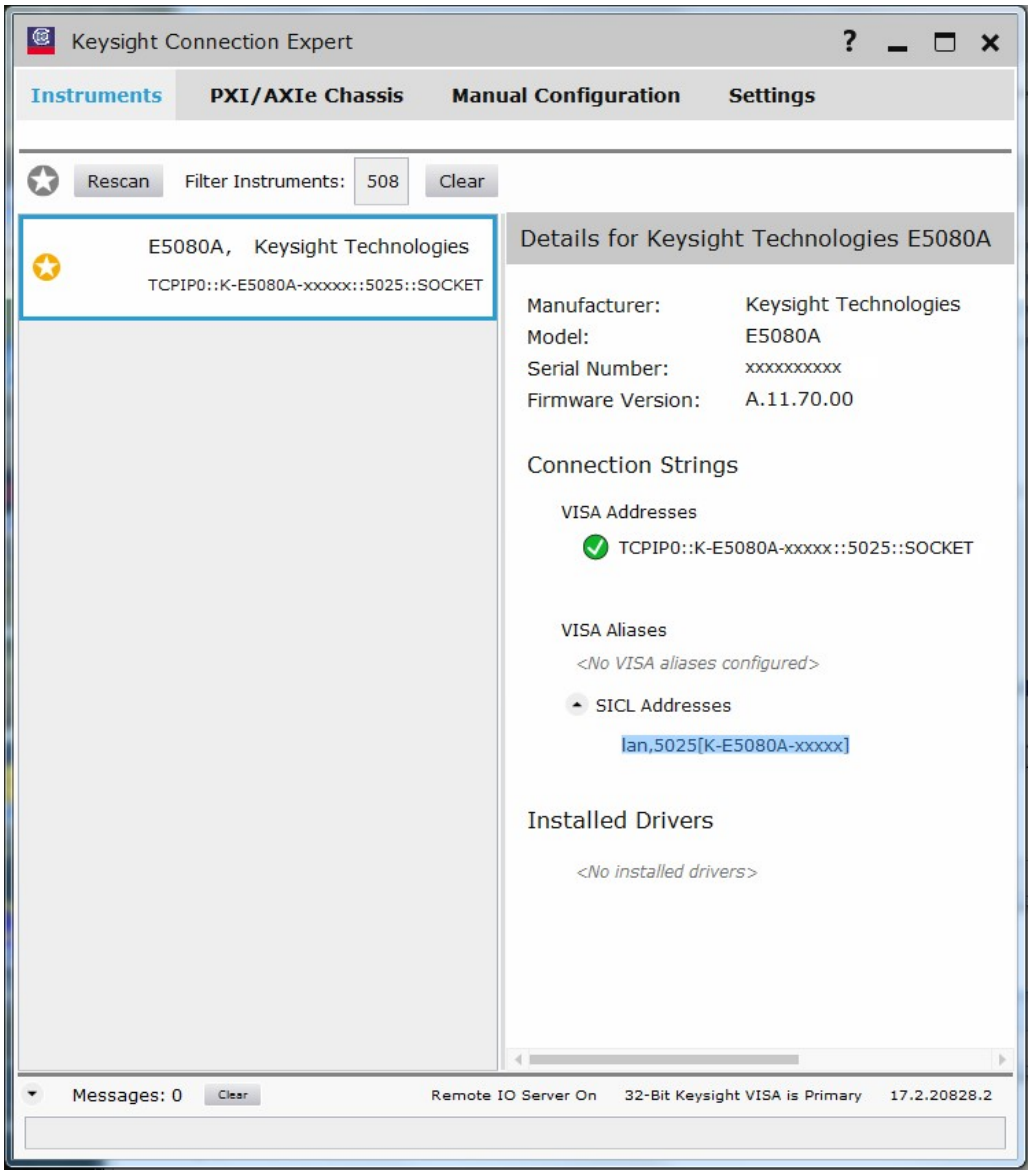

Figure 17 Copying Network Analyzer's SICL Address

8 Start the N109228CA OIF CEI 3.1 Compliance Test Application. Refer to "Starting the N109228CA OIF CEI 3.1 Compliance Test Application" on page 20 for instructions.

9 Connect to the Network Analyzer:

Figure 18 Default view of External Instruments area in the N109228CA OIF CEI 3.1 Application

a In the **Name:** field of the **External Instruments** area at the bottom of the N109228CA OIF CEI application's main window, select **PNA** from the drop-down list.

b Click **Connect**. The **Connect to PNA** window appears.

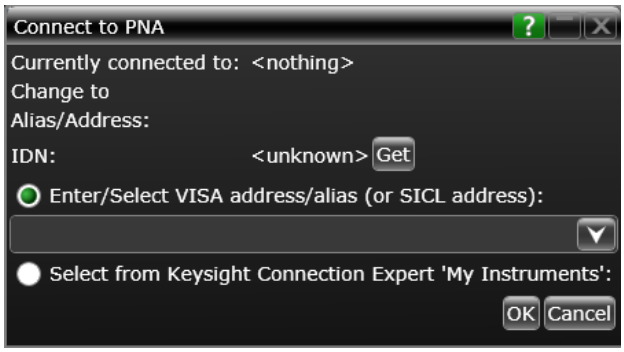

Figure 19 Connecting to the selected Network Analyzer

c In the **Enter/Select VISA address/alias (or SICL address)** field, paste the SICL address using *Ctrl + V* keys.

d Click **Get** to confirm the connection.

e Click **OK** to close the dialog box.

f The **External Instruments** field displays the relevant information once the connection to the selected network analyzer is established.

Connection using Keysight Connection Expert 2017 (v18.0 or higher)

1 Locate and record the PNA instrument's Hostname (Full Computer Name). Refer to the respective network analyzer's documentation for locating this information.

2 From the Windows **Start** menu, click **All Programs>Keysight Connection Expert** to launch Connection Expert. Refer to Keysight IO Libraries Suite for information on how to install the Keysight Connection Expert.

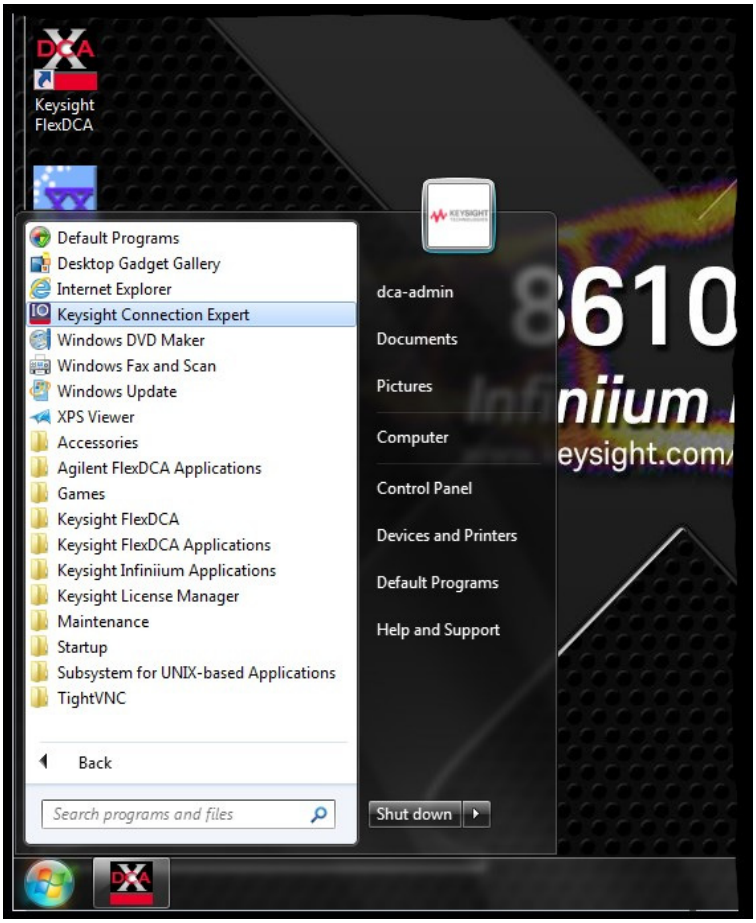

Figure 20 Launching the Keysight Connection Expert

3 In Keysight Connection Expert, click the **+ Add** button to manually add instruments and interfaces.

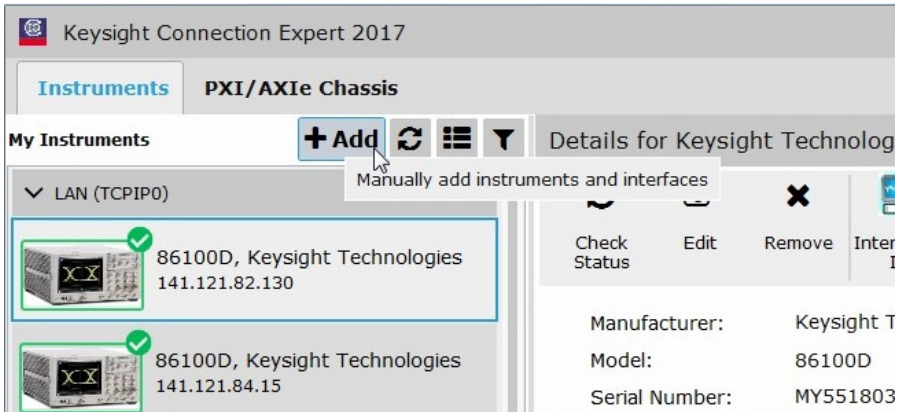

Figure 21 Adding LAN device manually in the Keysight Connection Expert 2017

4 From the drop-down list that appears, select **LAN instrument**.

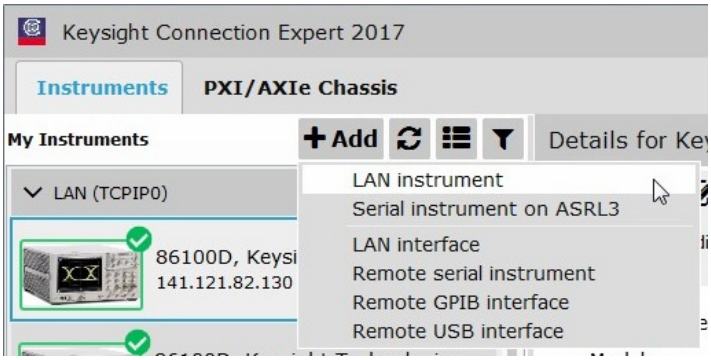

Figure 22 Selecting LAN instrument in the Keysight Connection Expert 2017

5 In the **Add a LAN device** window,

a Select the **Enter Address** tab.

b Under **Set LAN Address:**, enter the Hostname (recorded in step 1) in the **Hostname or IP Address:** field. Note that your Hostname entry will be different from what is shown in the image.

c Under **Set Protocol:**, select **Socket** and enter the port number.

d Under **Verify Connection:**, click **Test This VISA Address** to verify the connection.

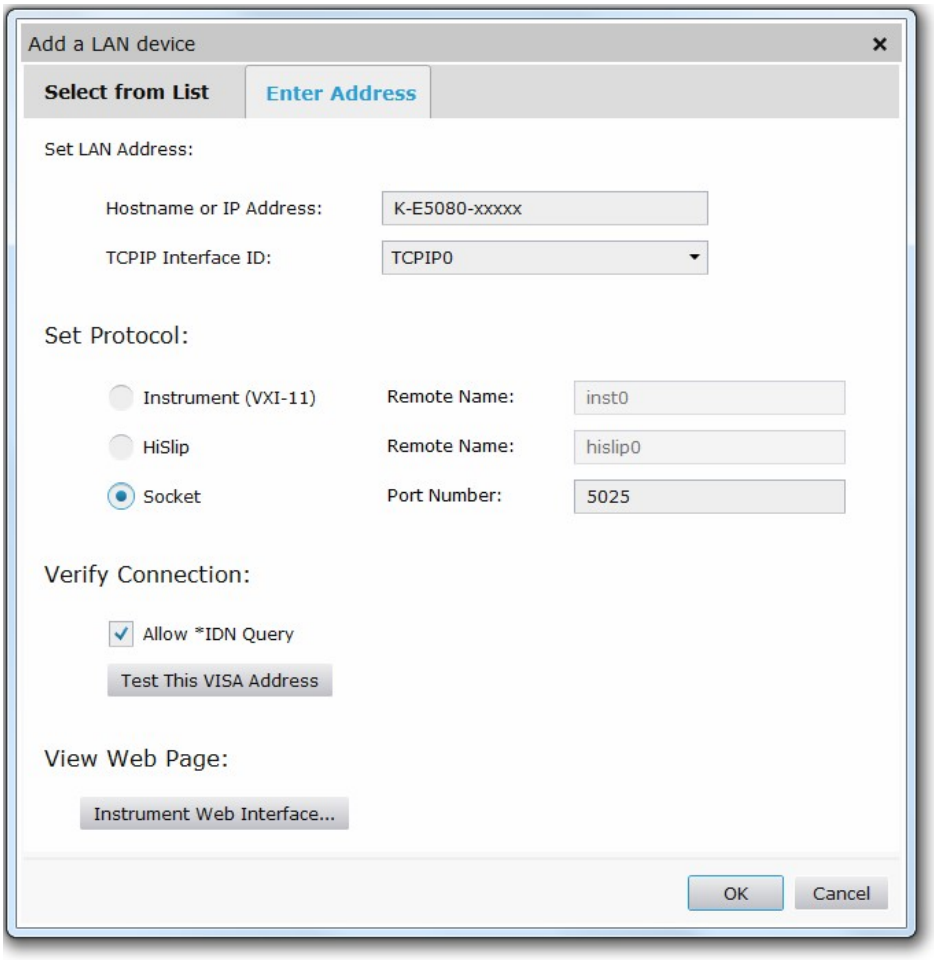

Figure 23 Adding a LAN device information in the Keysight Connection Expert 2017

6 Once you verify the entered data, click **OK** to complete the process.

7 Copy Network Analyzer SICL Address to the Clipboard:

a Click the **Instruments** tab of the Keysight Connection Expert.

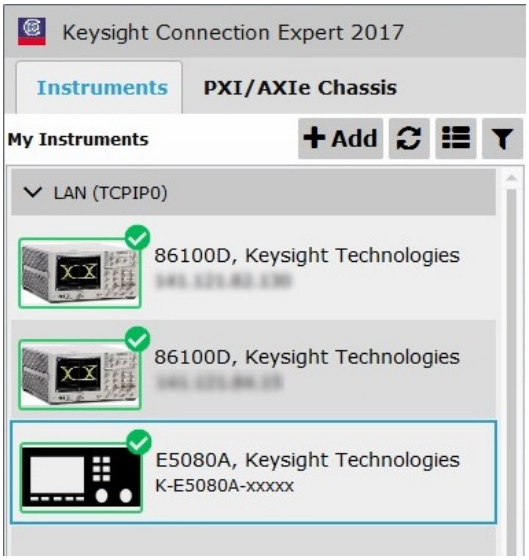

Figure 24 Selecting the connected Network Analyzer for SICL Address information

b Click the PNA listing on the left pane, and copy the SICL address using *Ctrl + C* keys. Note that the address on your end will be different from what is shown in the image.

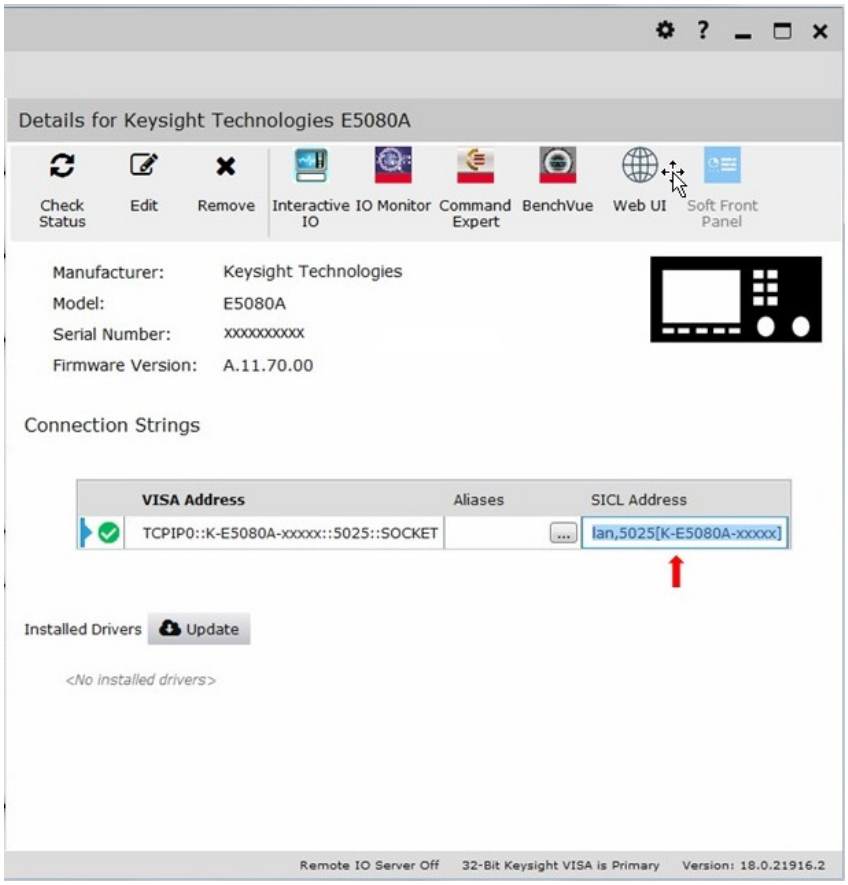

Figure 25 Copying Network Analyzer's SICL Address

8 Start the N109228CA OIF CEI 3.1 Compliance Test Application. Refer to "Starting the N109228CA OIF CEI 3.1 Compliance Test Application" on page 20 for instructions.

9 Connect to the Network Analyzer:

Figure 26 Default view of External Instruments area in the N109228CA OIF CEI 3.1 Application

a In the **Name:** field of the **External Instruments** area at the bottom of the N109228CA OIF CEI 3.1 application's main window, select **PNA** from the drop-down list.

b Click **Connect**. The **Connect to PNA** window appears.

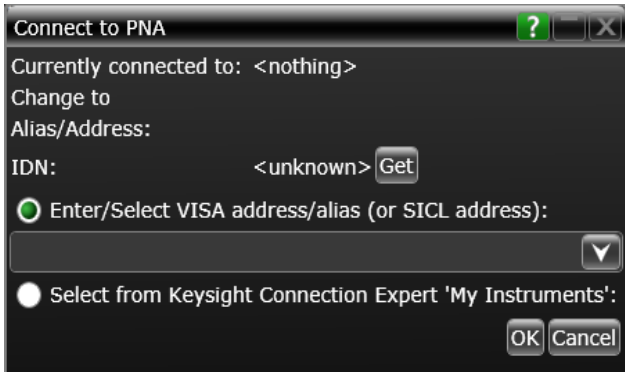

Figure 27 Connecting to the selected Network Analyzer

c In the **Enter/Select VISA address/alias (or SICL address)** field, paste the SICL address using *Ctrl + V* keys.

d Click **Get** to confirm the connection.

e Click **OK** to close the dialog box.

f The **External Instruments** field displays relevant information once the connection to the selected network analyzer is established.

2 Installing N109228CA and FlexDCA on a PC

Follow the instructions in this chapter when you are installing both the N109228CA OIF CEI 3.1 application and the FlexDCA application on the PC. You must purchase and install a license for the 86100DU-401. Once the license is installed, the 86100DU-401 software will be enabled.

NOTE When you redeem an N109228CA OIF CEI 3.1 license, you must select whether to install the application on a specific 86100D or N1000A oscilloscope or a specific PC.

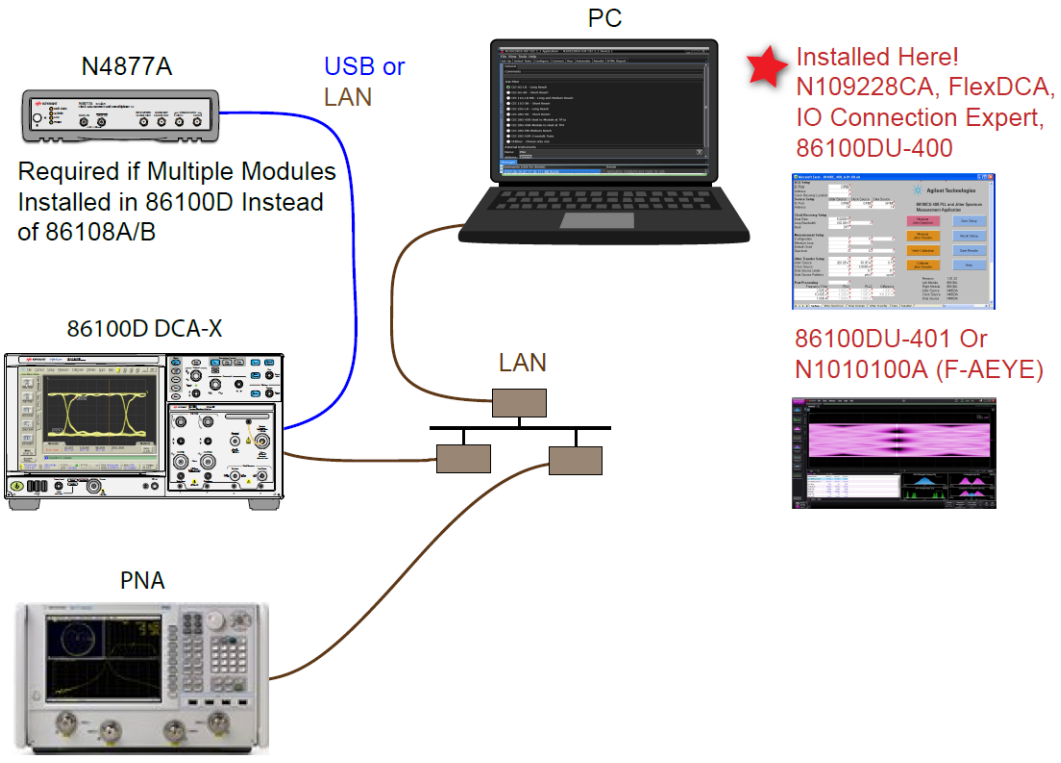

Figure 28 N109228CA *and* N1010A FlexDCA Installed on PC (with 86100D DCA-X oscilloscope)

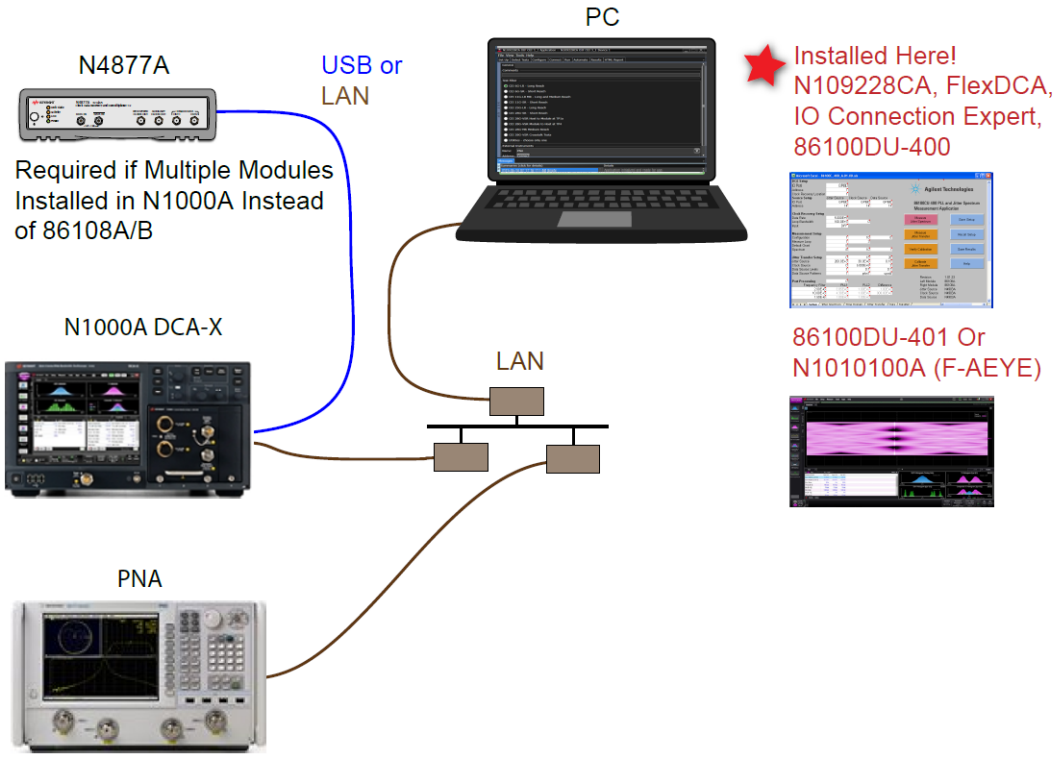

Figure 29 N109228CA *and* N1010A FlexDCA Installed on PC (with N1000A DCA-X oscilloscope)

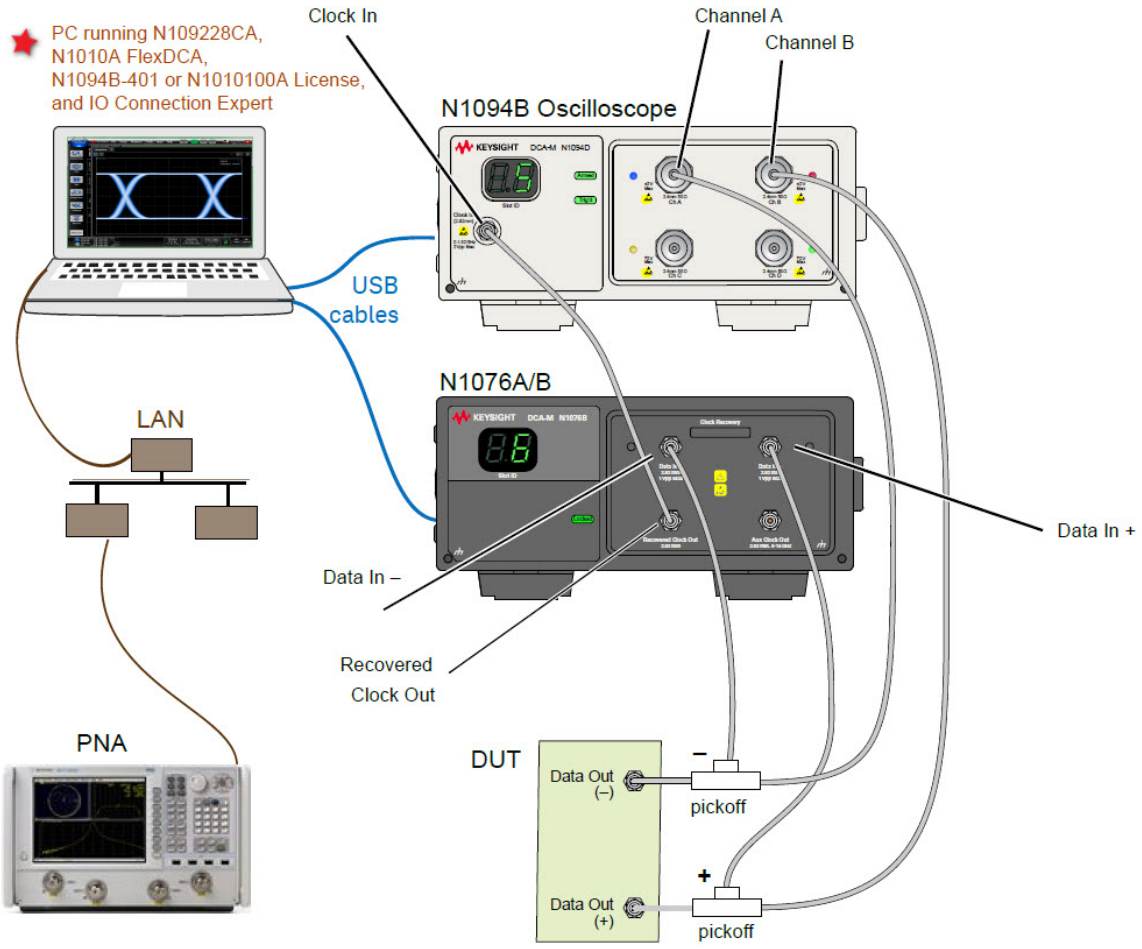

Figure 30 N109228CA *and* N1010A FlexDCA Installed on PC connected to N1094B DCA-M Oscilloscope

NOTE If you do not connect a network analyzer, you will not be able to perform the return loss compliance tests.

NOTE The 86100DU-400 software is required only for testing the CEI 11G-SR (Short Reach) interface, when running the Jitter Transfer Bandwidth, 11G-SR and Jitter Transfer Peaking, 11G-SR tests.

NOTE The 86100DU-401 or N109X-401 software is required only for testing the CEI 6G and CEI 11G interfaces, when you select a PRBS31 pattern length when testing jitter.

Connecting the Equipment

1 For a DCA-X oscilloscope, install one of the module combinations listed in Table 2 into the 86100D or N1000A.

Table 2 Module combinations for DCA-X Oscilloscope

Installed Module Configurations	Requires N4877A	Limited to CEI 6G-LR/SR and CEI 11G-LR/MR/SR Testing Only
86108A		√
86108B-LBW/216		√
86108B-HBW/232		
86112A and 86107A	√ (N4877A-216)	√
54754A and 86107A	√ (N4877A-216)	√
86117A and 86107A	√ (N4877A-232)	
86118A-H01 and 86107A	√ (N4877A-232)	
N1045A and 86107A	√ (N4877A-232)	
N1045B and 86107A	√ (N4877A-232)	
N1055A and 86107A	√ (N4877A-232)	
54754A and 86107A	√ (N4877A-232)	
N1046A and 86107A	√ (N4877A-232)	
N1060A		

2 For a DCA-M oscilloscope, keep in mind the information in the following table.

Table 3 Supported configurations for DCA-M Oscilloscope

Configurations for DCA-M	Requires N107x
N1094A	√ (N107xA-232)
N1094B	√ (N107xA-232)
N1092 C/E	√ (N107xA-232)

3 Connect the equipment as shown in Figure 28 or Figure 30 and power on all of the instruments.

Installing the I/O Library Suite

1 Navigate to www.keysight.com/find/iosuite and download the Keysight I/O Library Suite.

NOTE Keysight's I/O Library Suite is free software that automatically detects instruments connected to your PC and configures the interfaces. It reduces the overall setup and configuration time. The N109228CA OIF CEI 3.1 Compliance Test Application requires I/O Libraries Suite 16.3 or higher.

2 Install the I/O Library Suite on the PC.

Installing the N1010A FlexDCA Application

Follow the steps below to install the N1010A FlexDCA Software and its license as well as the license for the 86100DU-401.

1 Search for the N1010A FlexDCA Software on Keysight website.

2 Download the installer file and install the application on the PC for which you have redeemed the license.

NOTE **When you redeem an N1010A FlexDCA Software license, you must specify the information for the PC, where the software will be installed for remotely accessing the Oscilloscope.**

3 Save the license file that you received from Keysight in a folder on the local disk or in an accessible memory device.

4 From the Windows **Start** menu, click **All Programs>Keysight License Manager** to launch the Keysight License Manager.

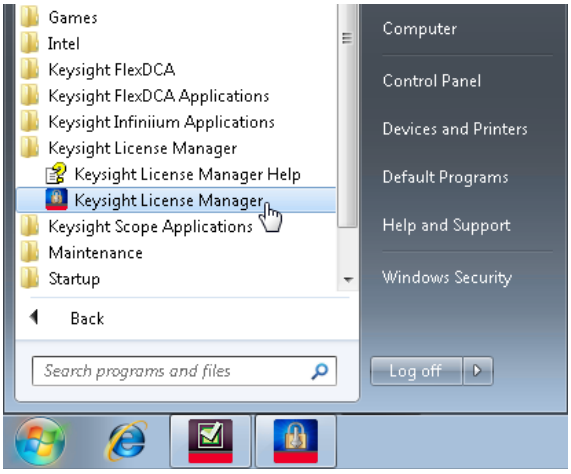

Figure 31 Launching Keysight Connection Expert from the Start menu

NOTE **Keysight License Manager version 5.1 (and higher) have a different user interface than version 5.0 (or earlier). Even though the path to launch the Keysight License Manager is the same for both versions, refer to the *Keysight License Manager Online Help* for the respective versions to find more information about the functionality of the application.**

To install the N1010A FlexDCA Software license using Keysight License Manager version 5.1 or higher

1 Click the **Tools** icon on the top-right corner of the Keysight License Manager window.

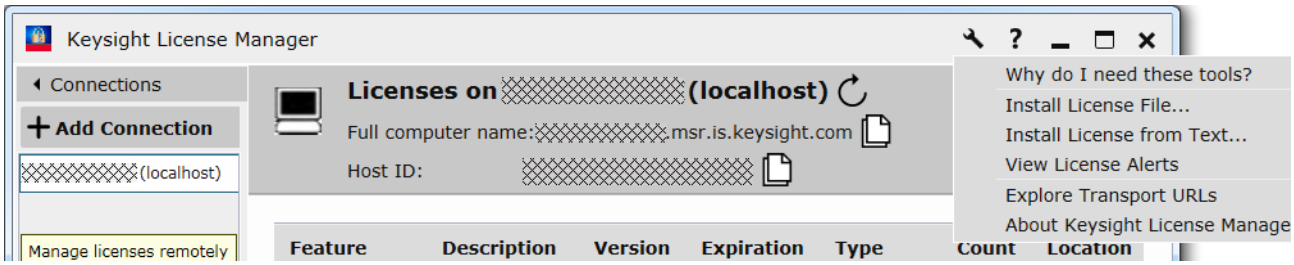

Figure 32 Installing license file on Keysight License Manager version 5.1 & above

2 Click **Install License File...**. The **Select License File(s) to Install on <PC Hostname>** appears.

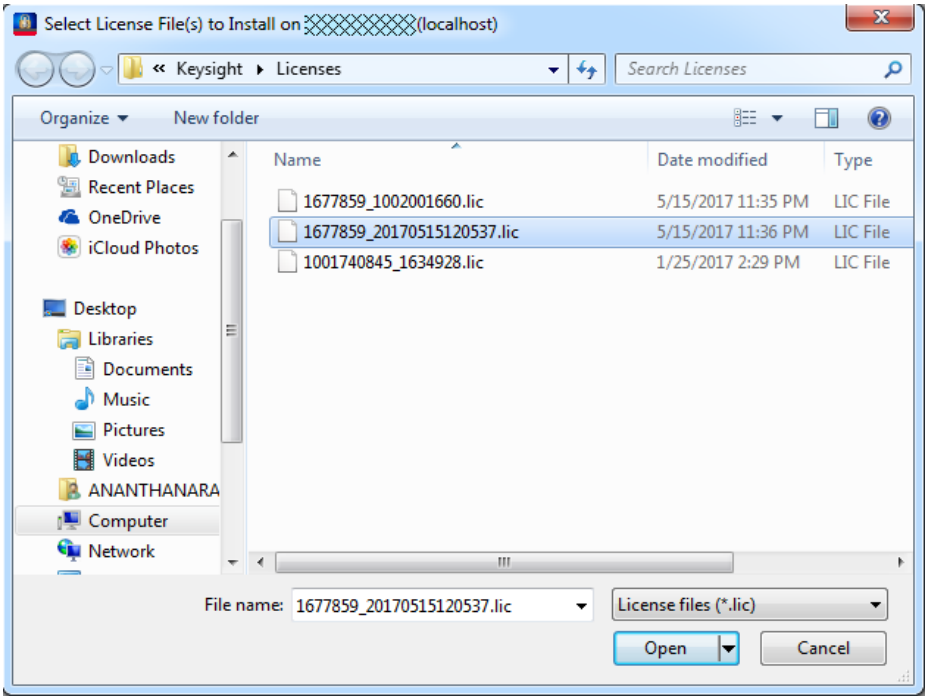

Figure 33 Selecting license file from the folder

3 Navigate to the folder where the N1010A FlexDCA Software licenses are saved.

4 Select the license and click **Open**. The license files are installed and an entry is displayed in the Keysight License Manager.

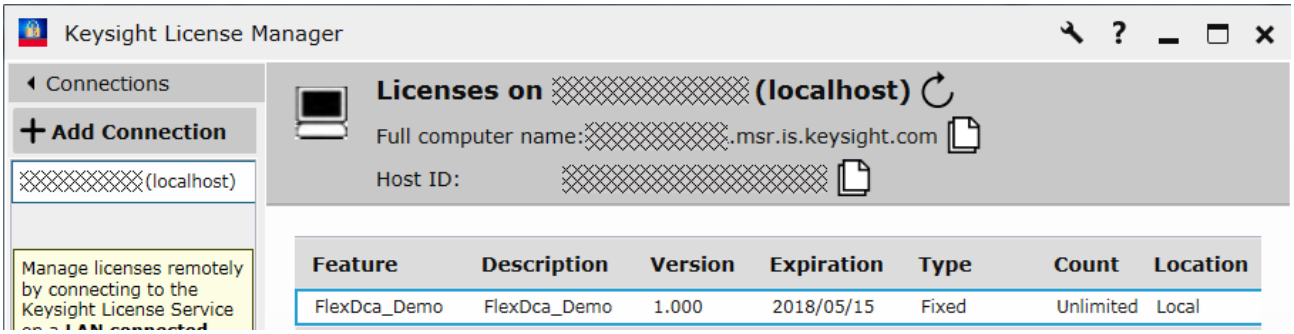

Figure 34 Licenses displayed in Keysight License Manager version 5.1 & above

5 Close the Keysight License Manager.

To install the N1010A FlexDCA's license using Keysight License Manager version 5.0 or earlier

1 From the Keysight License Manager window's main menu, click **File>Install...** or right-click within the left pane of the Keysight License Manager window and select **Install...**.

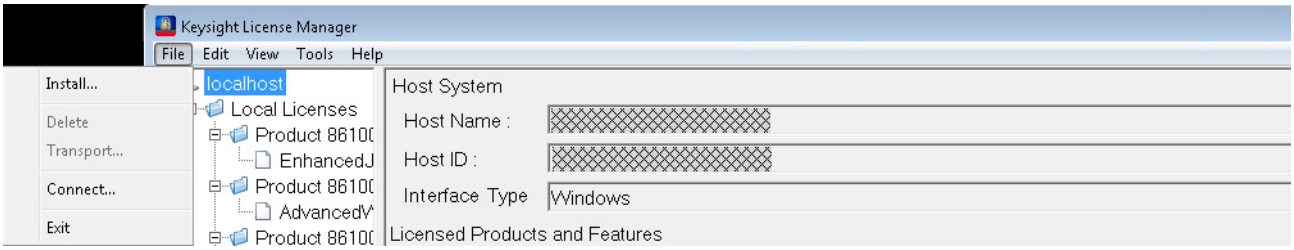

Figure 35 Installing license file on Keysight License Manager version 5.0 or earlier

2 The **Install License File(s)** dialog box appears.

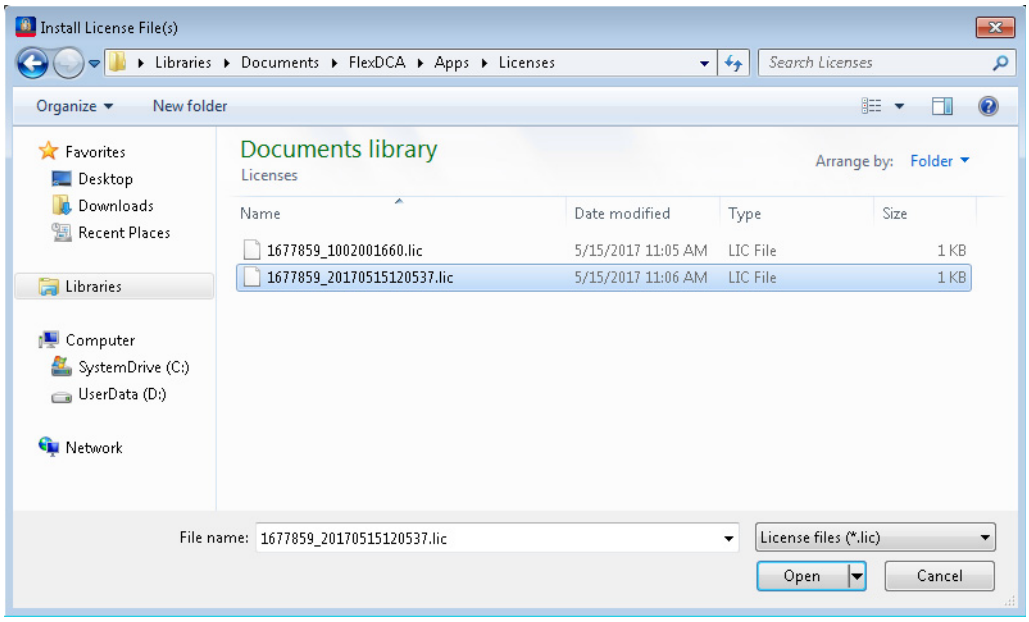

Figure 36 Selecting license file from the folder

3 Navigate to the folder where the N1010A FlexDCA Software licenses are saved.

4 Select the license and click **Open**. The license files are installed and an entry is displayed in the Keysight License Manager.

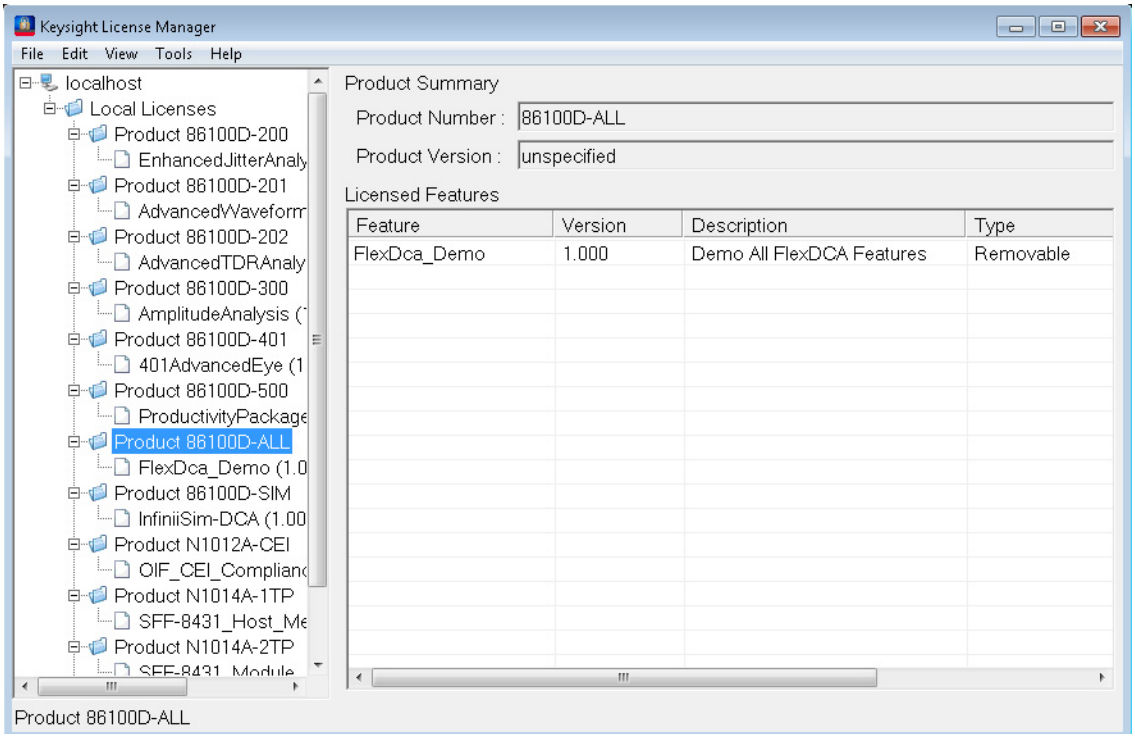

Figure 37 Licenses displayed in Keysight License Manager version 5.0 or earlier

5 Close the Keysight License Manager.

Installing the N109228CA OIF CEI 3.1 Compliance Test Application

Follow the steps below to install the N109228CA OIF CEI 3.1 Compliance Test Application and its license as well as the license for the 86100DU-401.

1 Search for the N109228CA OIF CEI 3.1 Compliance Test Application on Keysight website.

2 Download the installer file and install the application on the PC for which you have redeemed the license.

NOTE **When you redeem an N109228CA OIF CEI 3.1 license, you must select whether to install the application on the Oscilloscope or a specific PC.**

3 Save the license file that you received from Keysight in a folder on the local disk or in an accessible memory device.

4 If not already done, purchase an 86100DU-401 or N109x-401 license. Save the license file that you received from Keysight in a folder on the local disk or in an accessible memory device.

5 If the FlexDCA is running on your PC, close FlexDCA.

6 From the Windows **Start** menu, click **All Programs>Keysight License Manager** to launch the Keysight License Manager.

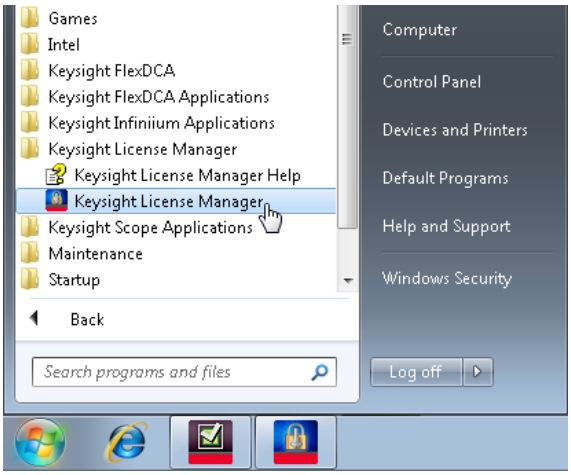

Figure 38 Launching Keysight Connection Expert from the Start menu

NOTE **Keysight License Manager version 5.1 (and higher) have a different user interface than version 5.0 (or earlier). Even though the path to launch the Keysight License Manager is the same for both versions, refer to the *Keysight License Manager Online Help* for the respective versions to find more information about the functionality of the application.**

To install the N109228CA OIF CEI 3.1 Compliance Test Application's license using Keysight License Manager version 5.1 or higher

1 Click the **Tools** icon on the top-right corner of the Keysight License Manager window.

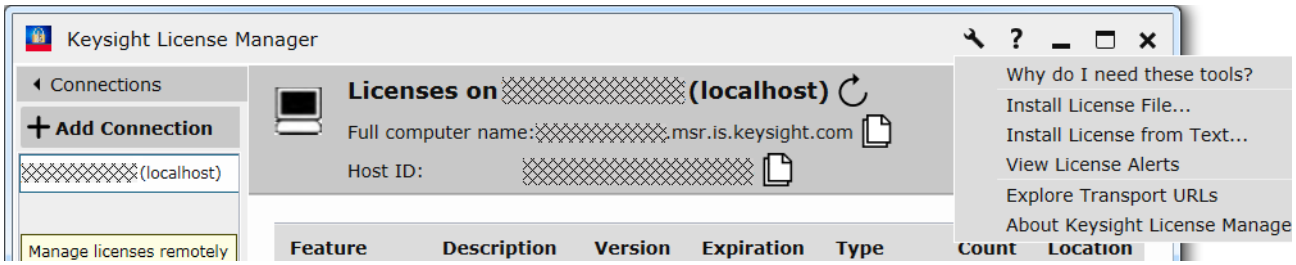

Figure 39 Installing license file on Keysight License Manager version 5.1 & above

2 Click **Install License File...**. The **Select License File(s) to Install on <PC Hostname>** appears.

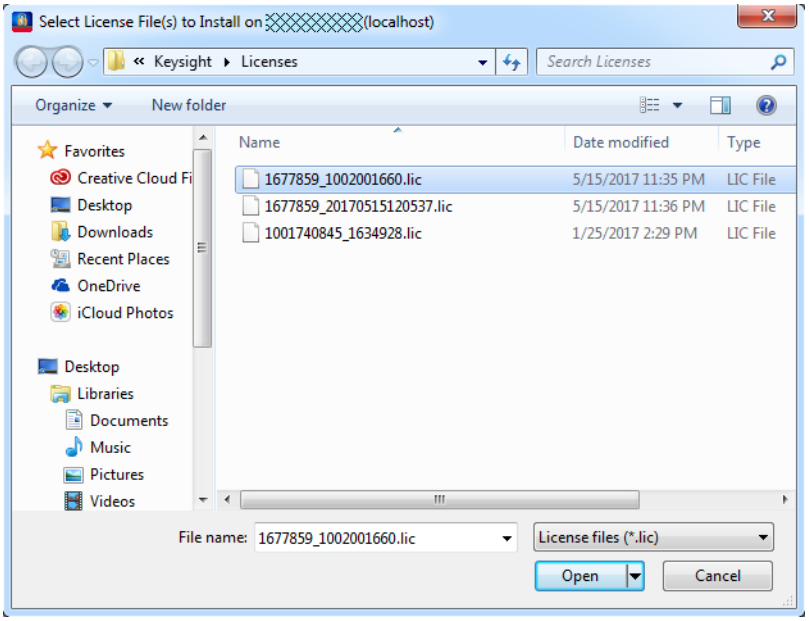

Figure 40 Selecting license file from the folder

3 Navigate to the folder where the N109228CA OIF CEI 3.1 licenses are saved.

4 Select the license and click **Open**. The license files are installed and an entry is displayed in the Keysight License Manager.

5 Close the Keysight License Manager.

To install the N109228CA OIF CEI 3.1 Compliance Test Application's license using Keysight License Manager version 5.0 or earlier

1 From the Keysight License Manager window's main menu, click **File>Install...** or right-click within the left pane of the Keysight License Manager window and select **Install...**.

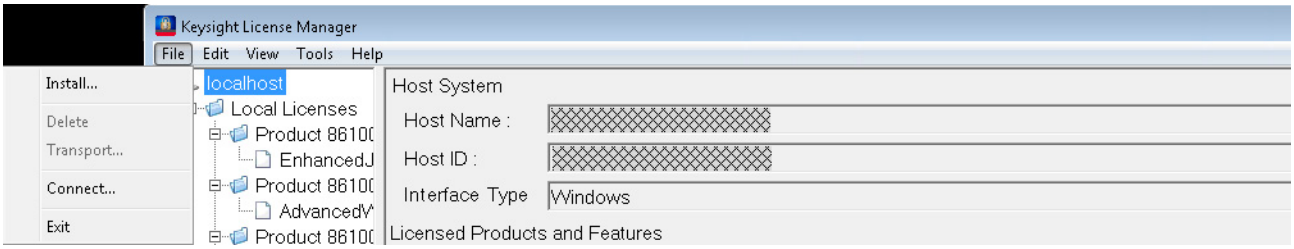

Figure 41 Installing license file on Keysight License Manager version 5.0 or earlier

2 The **Install License File(s)** dialog box appears.

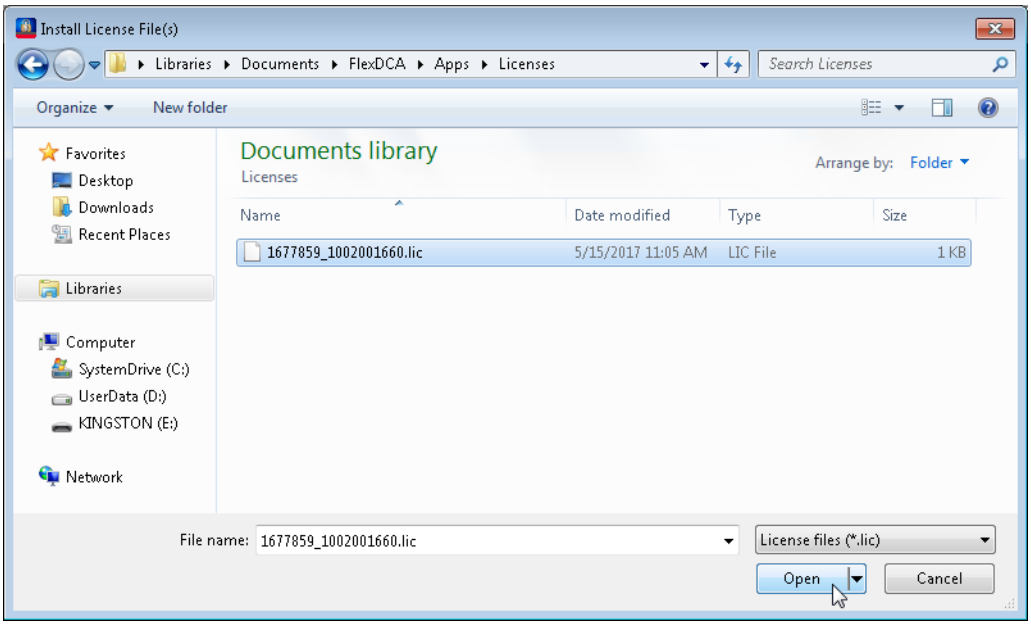

Figure 42 Selecting license file from the folder

3 Navigate to the folder where the N109228CA OIF CEI 3.1 licenses are saved.

4 Select the license and click **Open**. The license files are installed and an entry is displayed in the Keysight License Manager.

5 Close the Keysight License Manager.

Connecting N1010A FlexDCA to 86100D or N1000A

NOTE If you are using the N1010A FlexDCA Software on your PC to launch the N109228CA OIF CEI 3.1 Compliance Test Application, make sure that the Oscilloscope and your PC are connected to the LAN.

NOTE This section lists the steps for 86100D DCA-X oscilloscope. Perform similar steps for the N1000A DCA-X oscilloscope.

1 On the 86100D Oscilloscope, launch the Keysight FlexDCA application.

2 From the FlexDCA's main menu, click **Help** > **About FlexDCA...**. The **About 86100D** dialog box appears.

3 In the **System Information** area, scroll down to view the **Computer Name** entry.

Alternatively, you can obtain the computer name from the Windows **System** properties.

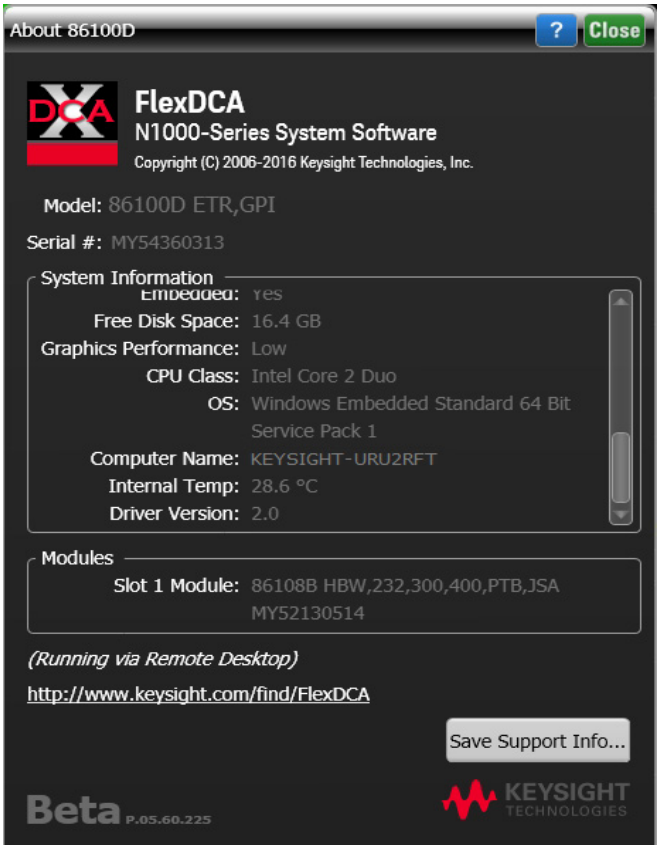

Figure 43 86100D Oscilloscope's hostname

4 Record the Computer Name (corresponds to hostname) as you will need this name later in this procedure.

86100D Computer Name: _____

5 Close the **About 86100D** dialog box.

NOTE If you are accessing the 86100D Oscilloscope's FlexDCA interface remotely on your PC using any remote connectivity applications, Keysight recommends closing the remote-connection application before you try establishing connectivity between FlexDCA Software and the remote 86100D Oscilloscope.

6 On the Windows **Start** menu on your PC, click **All Programs>Keysight FlexDCA>Keysight FlexDCA** to launch the N1010A FlexDCA Software.

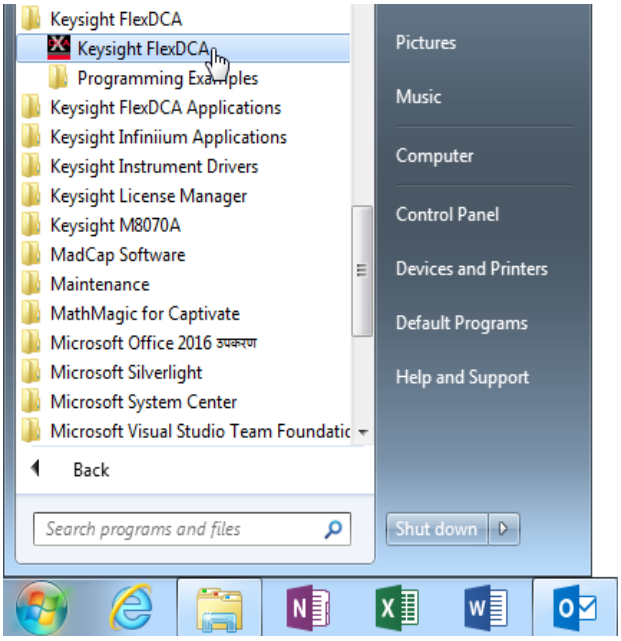

Figure 44 Launching the N1010A FlexDCA Software on PC

7 When FlexDCA starts, the **Extended Module Configuration** window is displayed automatically. Click **Connect** if the 86100D Oscilloscope's Hostname is already displayed else click **Setup**.

Figure 45 Extended Module Configuration dialog box for connecting N1010A FlexDCA to 86100D

If the **Extended Module Configuration** window does not appear, from the FlexDCA interface's main menu, click **Setup>DCA Connection Setup**.

8 On the **FlexDCA Connection Setup** dialog box,

a Ensure that **LAN** is selected in the **Connect Using:** area.

b Enter the 86100D's **Hostname** that you recorded in step 4.

Alternatively, you may also enter the IP Address of the remote 86100D Oscilloscope.

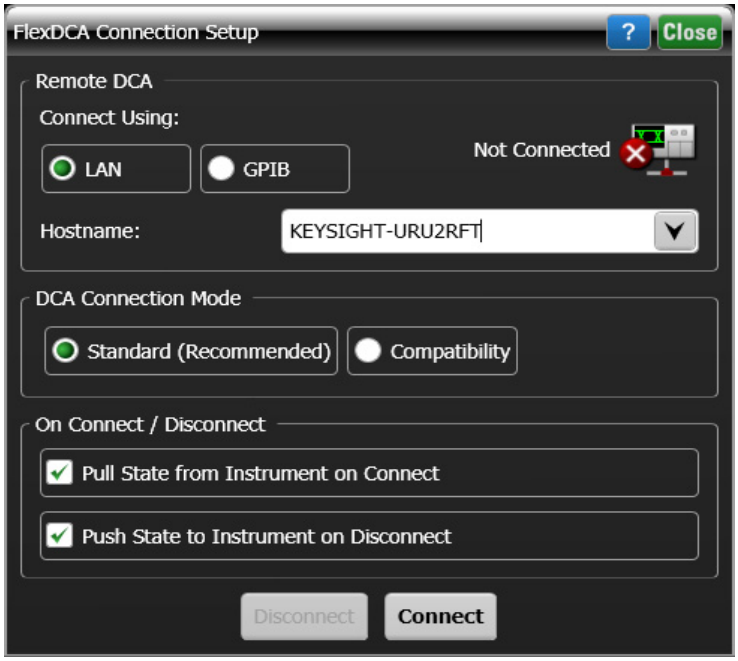

Figure 46 N1010A FlexDCA Connection Setup to connect to 86100D Oscilloscope

9 Click **Connect**.

If connection is established successfully, the **FlexDCA Connection Setup** dialog box displays status as **Connected**.

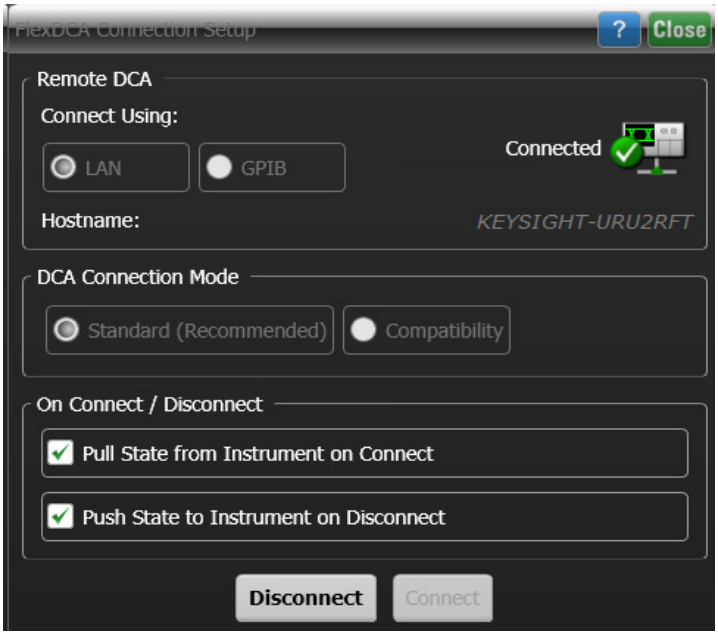

Figure 47 86100D Oscilloscope connection status on the FlexDCA Connection Setup

10 Click **Close** to exit the **FlexDCA Connection Setup** dialog box.

11 Click **Close** to exit the **Extended Module Configuration** window.

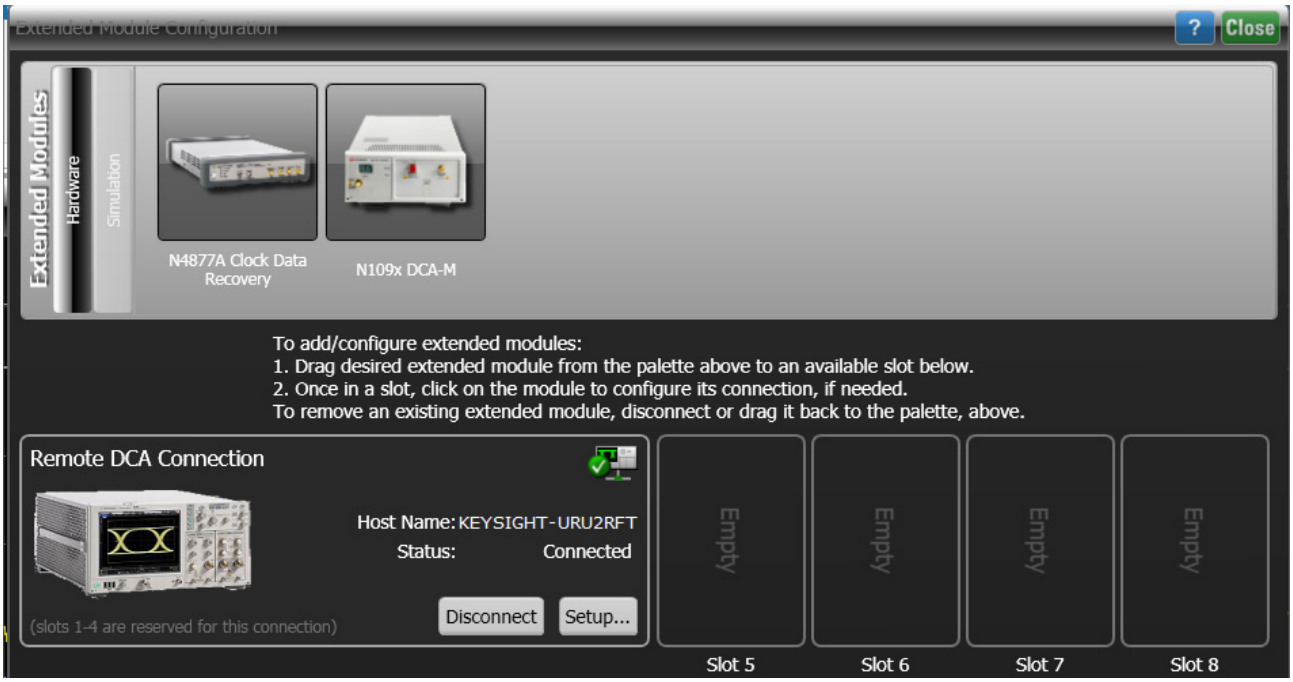

Figure 48 86100D Oscilloscope connection status on the Extended Module Configuration window

12 In FlexDCA, click **Tools** > **SCPI Programming Tools** > **SCPI Server Setup** to open the dialog box.

13 Confirm that the **Sockets** and **HiSLIP** interfaces are selected (Enabled) as shown in Figure 49.

14 Close the dialog box.

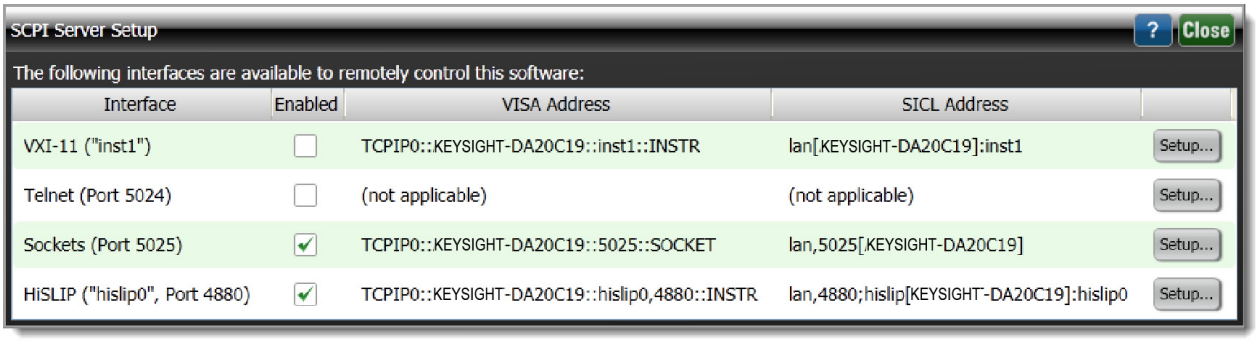

Figure 49 FlexDCA's SCPI Server Setup Dialog Box

15 Once the connection is established, you may proceed to launch the N109228CA OIF CEI 3.1 Compliance Test Application on your PC.

Connecting N1010A FlexDCA to N109X Oscilloscope and N107X

Perform the following steps to connect your N109X oscilloscope with N107X clock data recovery using FlexDCA:

1 Launch FlexDCA.

2 When FlexDCA starts, the **Extended Module Configuration** window is displayed automatically. If the **Extended Module Configuration** window does not appear, from the FlexDCA interface's main menu, click **Setup>Configure Extended Modules...**.

3 Configure Slot 7 to be the N109X module.

4 Configure Slot 8 to be the N107X module.

5 Remove any other N109X/N107X that is configured for Slot 5 and Slot 6.

6 Click **Close** to exit the **Extended Module Configuration** window.

7 Once the connection is established, you may proceed to launch the N109228CA Compliance Test Application on your PC.

Starting the N109228CA OIF CEI 3.1 Compliance Test Application

After you install the N109228CA OIF CEI 3.1 Compliance Test Application on a PC along with the N1010A FlexDCA interface, start the N109228CA OIF CEI 3.1 Compliance Test Application in one of the following ways:

Access the N109228CA OIF CEI 3.1 Compliance Test Application directly from the Start menu

Refer to "Starting the N109228CA OIF CEI 3.1 Compliance Test Application" on page 77, where the procedure to start the application directly (that is, without launching the N1010A FlexDCA Software) is described.

Access the N109228CA OIF CEI 3.1 Compliance Test Application using the N1010A FlexDCA Software on your PC

1 Ensure that the N1010A FlexDCA Software is connected to the Oscilloscope. Refer to the earlier sections for steps.

2 After a connection between the N1010A FlexDCA Software and the Oscilloscope is established, the N1010A FlexDCA Software on your PC may indicate that it is remotely controlled, as shown in Figure 50.

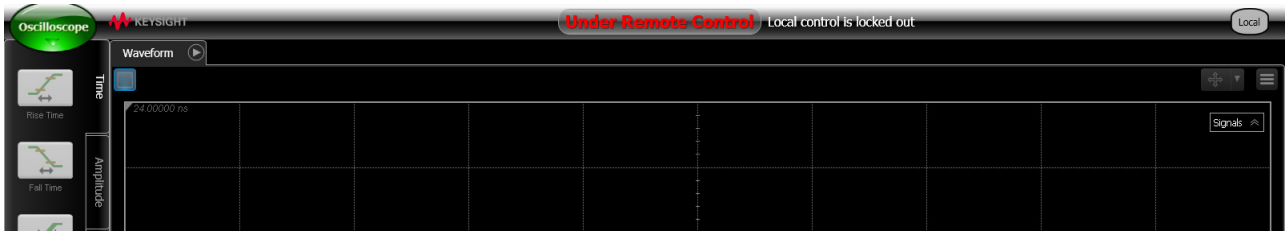

Figure 50 N1010A FlexDCA Remote App under Remote Control

To view the N1010A FlexDCA's main menu, click the **Local** button (towards the upper right corner).

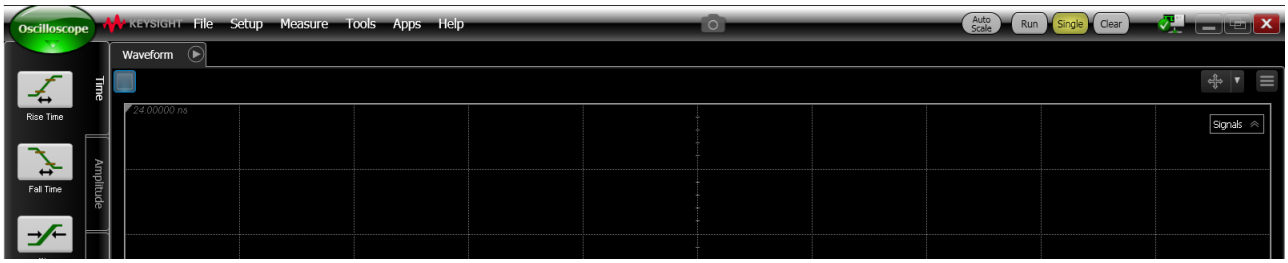

Figure 51 N1010A FlexDCA under Remote Control

3 From the FlexDCA's main menu, click **Apps>Automated Test Apps>N109228CA OIF CEI 31**.

4 The N109228CA OIF CEI 3.1 Compliance Test Application banner appears.
Afterwards. the default view of the N109228CA OIF CEI 3.1 Compliance Test Application appears.

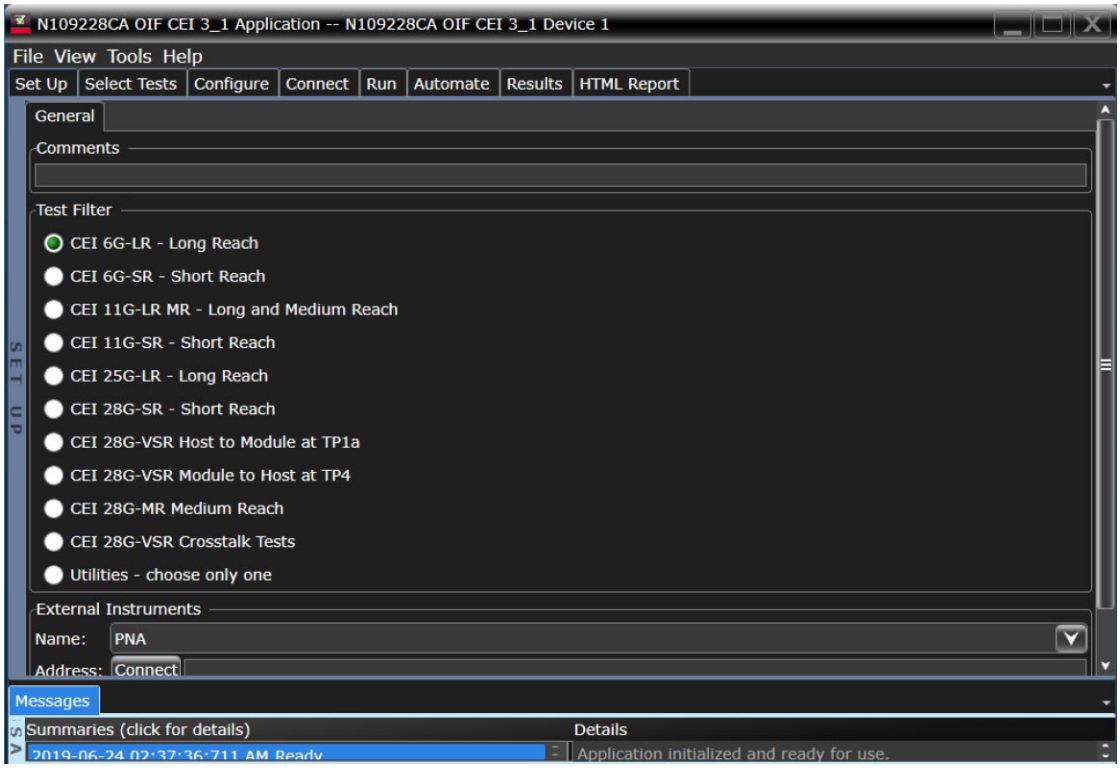

Figure 52 Default window of the N109228CA OIF CEI 3.1 Compliance Test Application

Connecting to the Network Analyzer

Refer to "Connecting to External Instruments" on page 21 for connecting to the network analyzer you are using.

Connecting to the N4877A

The N4877A is used whenever multiple 86100D or N1000A modules are used in the test setup rather than an 86108A/B module. Refer to Table 2 on page 36.

On the 86100D, click **Setup** > **Configure Extended Modules**. In the dialog box, perform the following two steps:

1 Configure **Slot 8** to be the N4877A.

2 Remove any other N4877A that is configured for **Slot 5**, **Slot 6**, or **Slot 7**.

For more information, click the Help button that is in the title bar of the Extended Module Configuration dialog box.

Figure 53 The Extended Module Configuration with the N4877A in Slot 8

3 Installing N109228CA on a PC Without N1010A FlexDCA

Follow the instructions in this chapter when you are installing the N109228CA OIF CEI 3.1 application on a PC, but you are *not* installing the N1010A FlexDCA application on the same PC. You must purchase and install a license for the 86100DU-401. Once the license is installed, the 86100DU-401 software will be enabled.

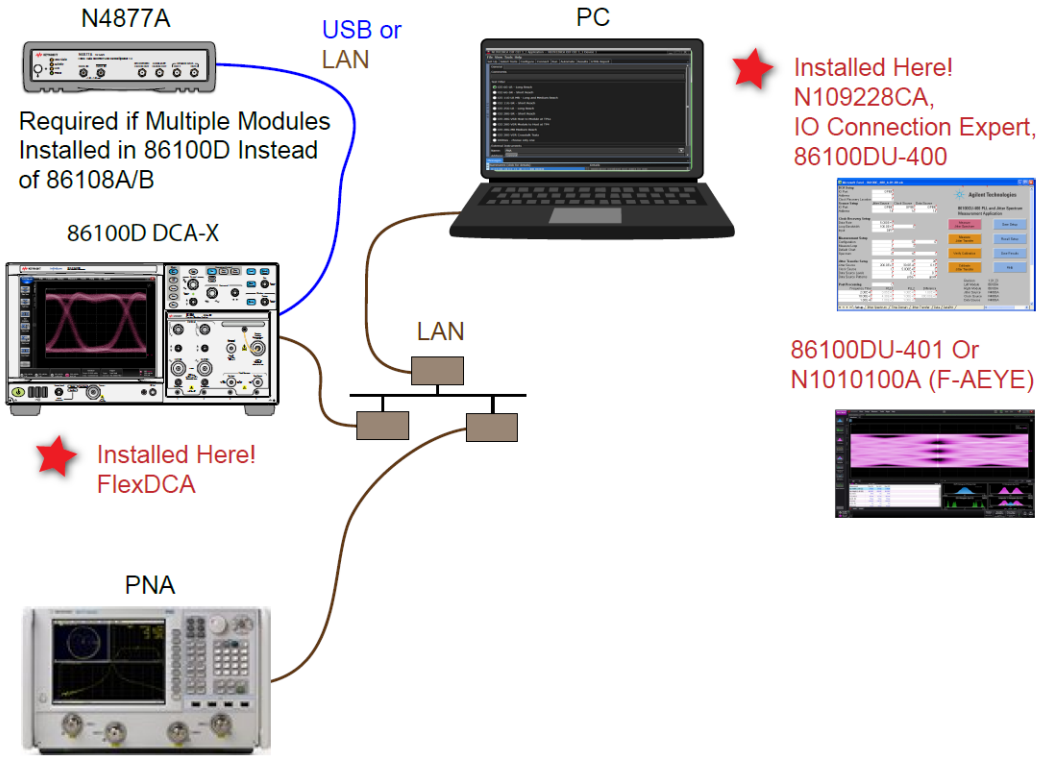

Figure 54 N109228CA Installed on PC Without N1010A FlexDCA connected to 86100D DCA-X Oscilloscope

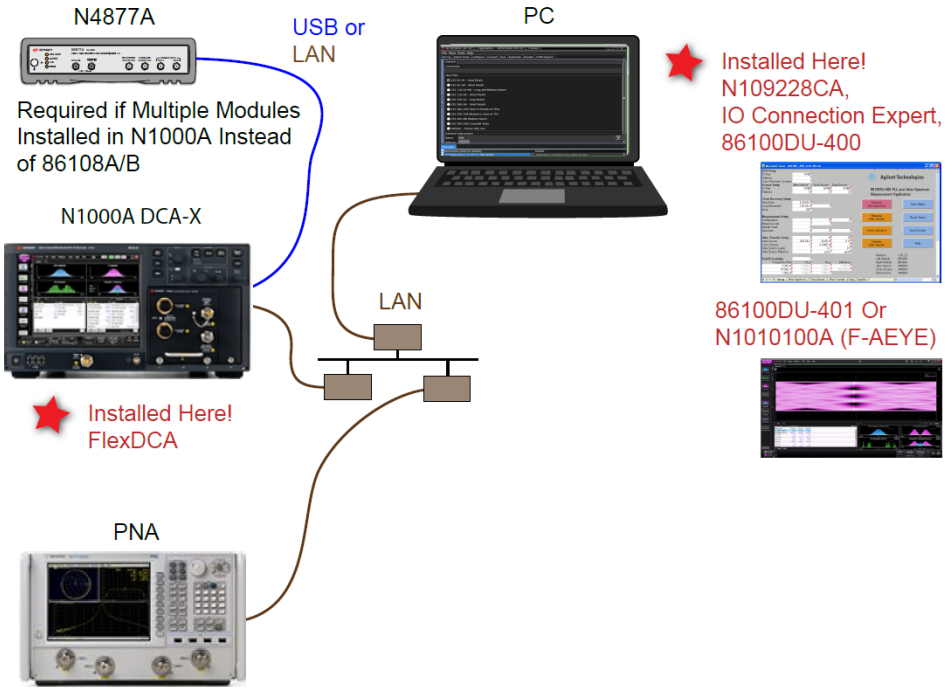

Figure 55 N109228CA Installed on PC Without N1010A FlexDCA connected to N1000A DCA-X Oscilloscope

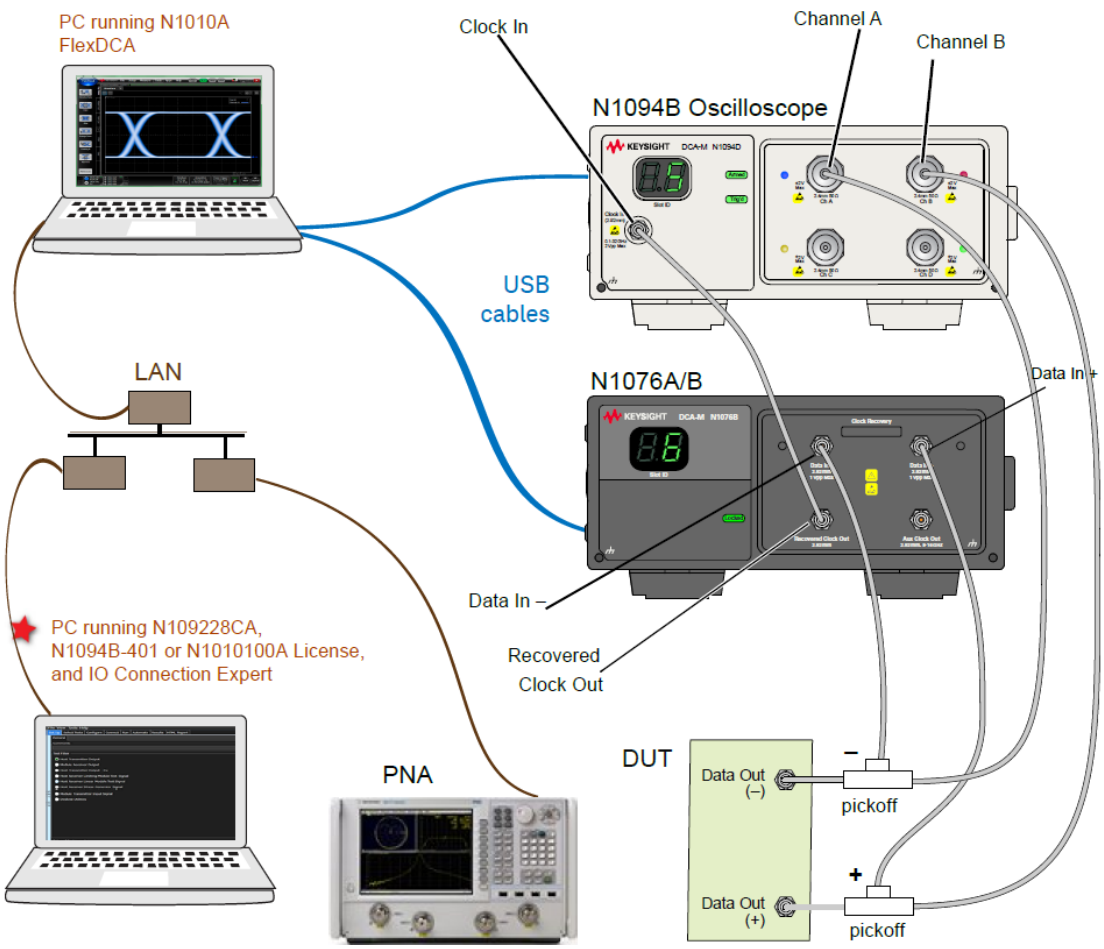

Figure 56 N109228CA Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via another PC

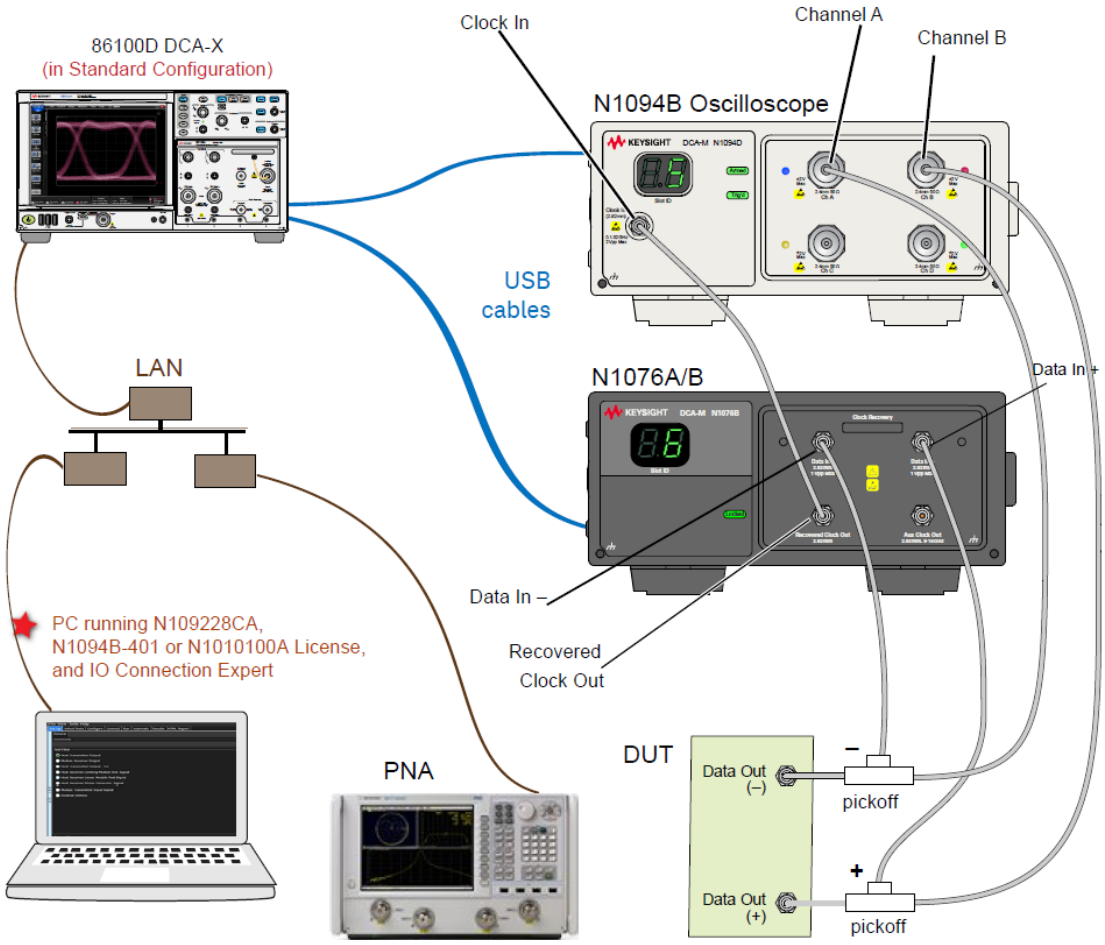

Figure 57 N109228CA Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via 86100 DCA-X Oscilloscope

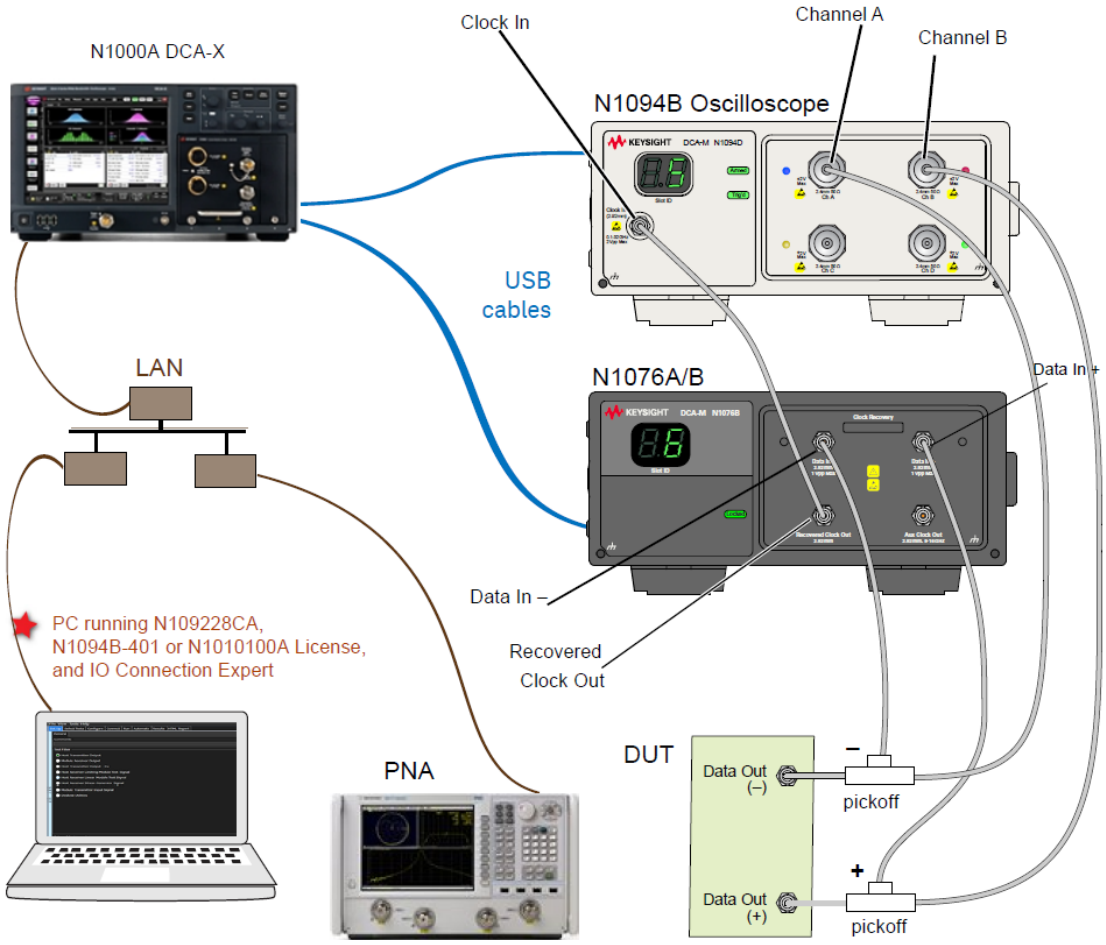

Figure 58 N109228CA Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via N1000A DCA-X Oscilloscope

NOTE If you do not connect a network analyzer, you will not be able to perform the return loss compliance tests.

NOTE The 86100DU-400 software is required only for testing the CEI 11G-SR (Short Reach) interface, when running the Jitter Transfer Bandwidth, 11G-SR and Jitter Transfer Peaking, 11G-SR tests.

NOTE The 86100DU-401 or N109X-401 software is required only for testing the CEI 6G and CEI 11G interfaces, when you select a PRBS31 pattern length when testing jitter.

Connecting the Equipment

1 For a DCA-X oscilloscope, install one of the module combinations listed in Table 4 into the 86100D or N1000A.

Table 4 Module combinations for DCA-X Oscilloscope

Installed Module Configurations	Requires N4877A	Limited to CEI 6G-LR/SR and CEI 11G-LR/MR/SR Testing Only
86108A		√
86108B-LBW/216		√
86108B-HBW/232		
86112A and 86107A	√ (N4877A-216)	√
54754A and 86107A	√ (N4877A-216)	√
86117A and 86107A	√ (N4877A-232)	
86118A-H01 and 86107A	√ (N4877A-232)	
N1045A and 86107A	√ (N4877A-232)	
N1045B and 86107A	√ (N4877A-232)	
N1055A and 86107A	√ (N4877A-232)	
54754A and 86107A	√ (N4877A-232)	
N1046A and 86107A	√ (N4877A-232)	
N1060A		

2 For a DCA-M oscilloscope, keep in mind the information in the following table.

Table 5 Supported configurations for DCA-M Oscilloscope

Configurations for DCA-M	Requires N107x
N1094A	√ (N107xA-232)
N1094B	√ (N107xA-232)
N1092 C/E	√ (N107xA-232)

3 Connect the equipment as shown in the connection diagrams above and power on all of the instruments.

Installing the I/O Library Suite

1 Navigate to www.keysight.com/find/iosuite and download the Keysight I/O Library Suite.

NOTE Keysight's I/O Library Suite is free software that automatically detects instruments connected to your PC and configures the interfaces. It reduces the overall setup and configuration time. The OIF CEI 3.1 Compliance Test Application requires I/O Libraries Suite 16.3 or higher.

2 Install the I/O Library Suite on the PC.

Installing the N109228CA OIF CEI 3.1 Compliance Test Application

Follow the steps below to install the N109228CA OIF CEI 3.1 Compliance Test Application and its license as well as the license for the 86100DU-401. When the license for 86100DU-401 is installed, the 86100DU-401 software is enabled.

1 Search for the N109228CA OIF CEI 3.1 Compliance Test Application on the Keysight website. Download and install the application on the PC for which you have redeemed the license.

NOTE **When you redeem an N109228CA OIF CEI 3.1 license, you must select whether to install the application on the Oscilloscope or a specific PC.**

2 Save the license file that you received from Keysight in a folder on the local disk or in an accessible memory device.

3 If not already done, purchase an 86100DU-401 or N109X-401 license. Save the license file that you received from Keysight in a folder on the local disk or in an accessible memory device.

4 If the N1010A FlexDCA is running on your PC, close FlexDCA.

5 From the Windows **Start** menu, click **All Programs>Keysight License Manager** to launch the Keysight License Manager.

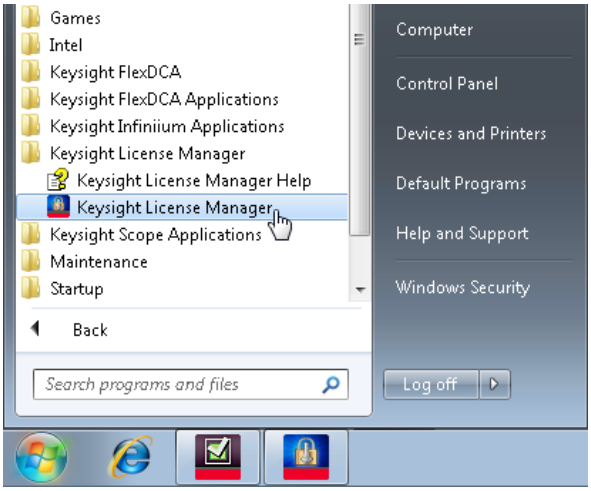

Figure 59 Launching Keysight Connection Expert from the Start menu

NOTE **Keysight License Manager version 5.1 (and higher) have a different user interface than version 5.0 (or earlier). Even though the path to launch the Keysight License Manager is the same for both versions, refer to the *Keysight License Manager Online Help* for the respective versions to find more information about the functionality of the application.**

To install the N109228CA OIF CEI 3.1 Compliance Test Application's license using Keysight License Manager version 5.1 or higher

1 Click the **Tools** icon on the top-right corner of the Keysight License Manager window.

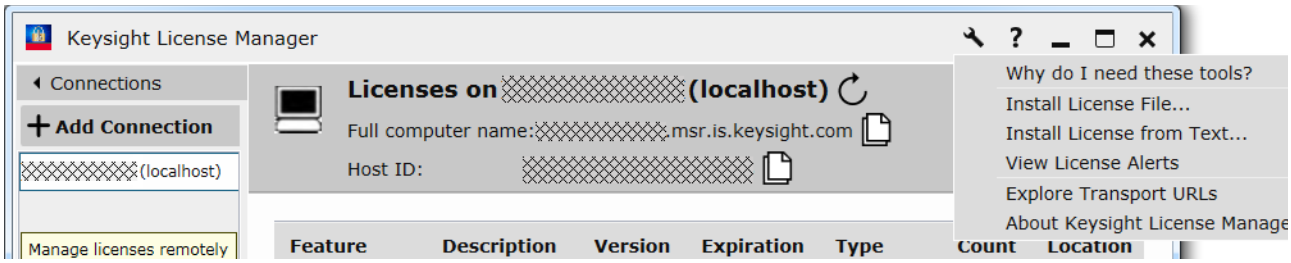

Figure 60 Installing license file on Keysight License Manager version 5.1 & above

2 Click **Install License File...**. The **Select License File(s) to Install on <PC Hostname>** appears.

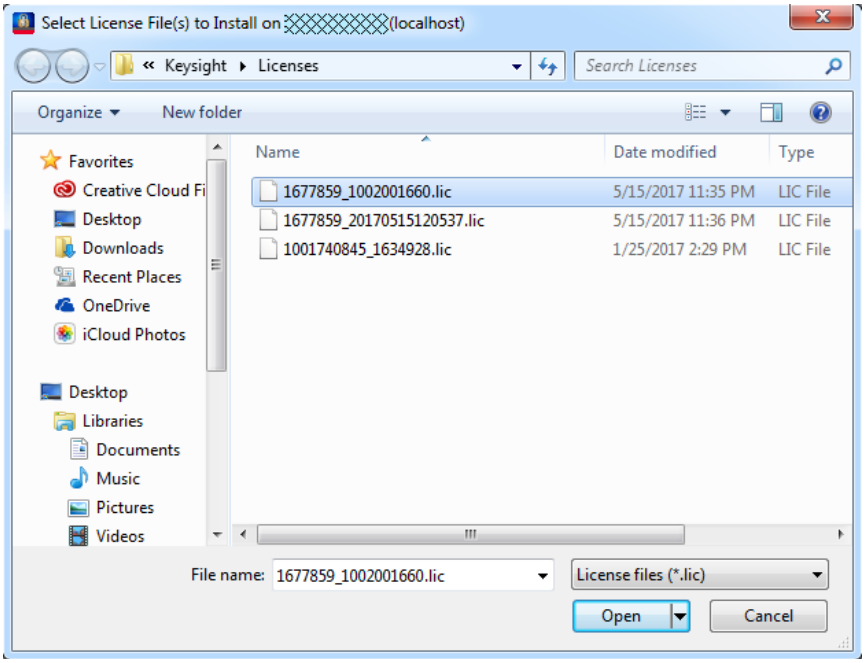

Figure 61 Selecting license file from the folder

3 Navigate to the folder where the N109228CA OIF CEI 3.1 licenses are saved.

4 Select the license and click **Open**. The license files are installed and an entry is displayed in the Keysight License Manager.

5 Close the Keysight License Manager.

To install the N109228CA OIF CEI 3.1 Compliance Test Application's license using Keysight License Manager version 5.0 or earlier

1 From the Keysight License Manager window's main menu, click **File>Install...** or right-click within the left pane of the Keysight License Manager window and select **Install...**.

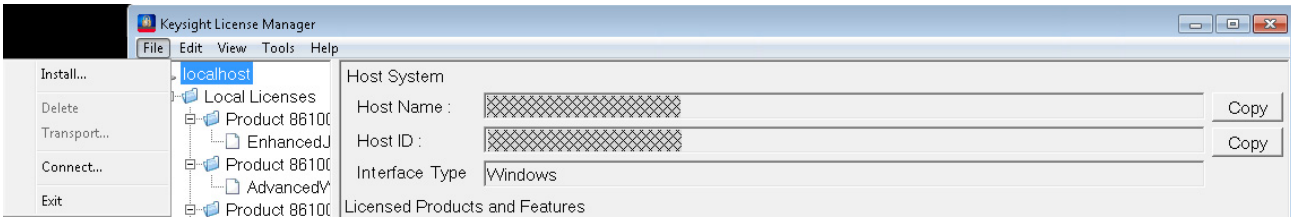

Figure 62 Installing license file on Keysight License Manager version 5.0 or earlier

2 The **Install License File(s)** dialog box appears.

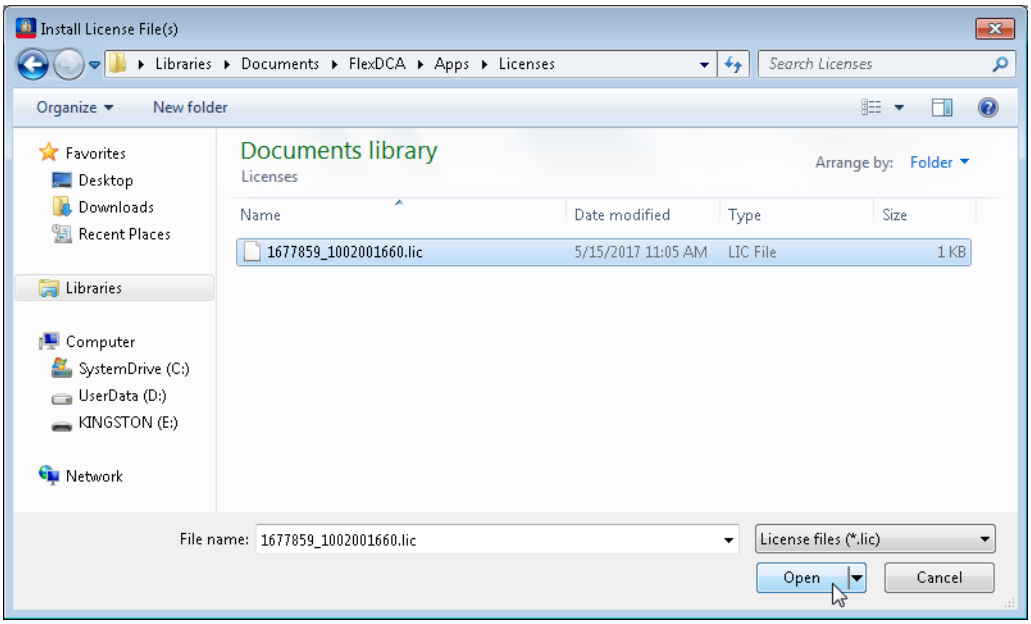

Figure 63 Selecting license file from the folder

3 Navigate to the folder where the N109228CA OIF CEI 3.1 licenses are saved.

4 Select the license and click **Open**. The license files are installed and an entry is displayed in the Keysight License Manager.

5 Close the Keysight License Manager.

Validating 86100D's or N1000A's SCPI Server Setup

1 On the 86100D/N1000A Oscilloscope or the PC hosting the FlexDCA software, launch the Keysight FlexDCA application.

2 Click **Tools** > **SCPI Programming Tools** > **SCPI Server Setup**.

3 In the **SCPI Server Setup** dialog, confirm that the **Sockets** and **HiSLIP** interfaces are selected and enabled as shown in Figure 64.

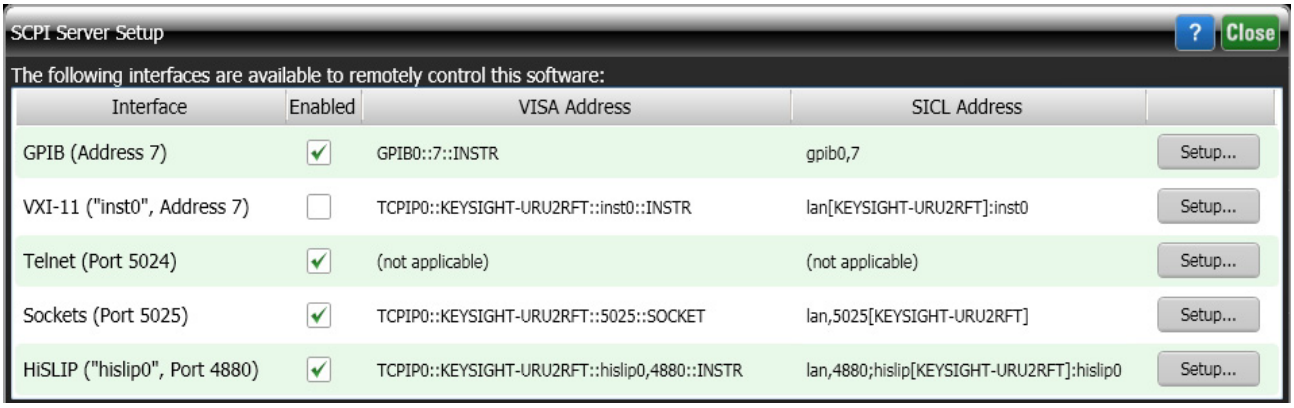

Figure 64 86100D's SCPI Server Setup Dialog Box

4 Close the **SCPI Server Setup** dialog box.

Adding 86100D or N1000A to Keysight Connection Expert

Most of the measurements in the N109228CA OIF CEI 3.1 Compliance Test Application use a supported DCA-X or DCA-M sampling oscilloscope.

Note that the Keysight I/O Library Suite must be installed before you proceed with connecting to the network analyzer. The user interface for Keysight Connection Expert 2017 (Version 18.0 or higher) is slightly different from its previous versions, such as Version 17.2 or earlier.

NOTE This section lists the steps for 86100D DCA-X oscilloscope. Perform similar steps for the N1000A DCA-X oscilloscope.

Connection using Keysight Connection Expert v17.2 (or earlier)

1 On the 86100D Oscilloscope, launch the Keysight FlexDCA application.

2 From the FlexDCA's main menu, click **Help** > **About FlexDCA...**. The **About 86100D** dialog box appears.

3 In the **System Information** area, scroll down to view the **Computer Name** entry.

Alternatively, you can obtain the computer name from the Windows **System** properties.

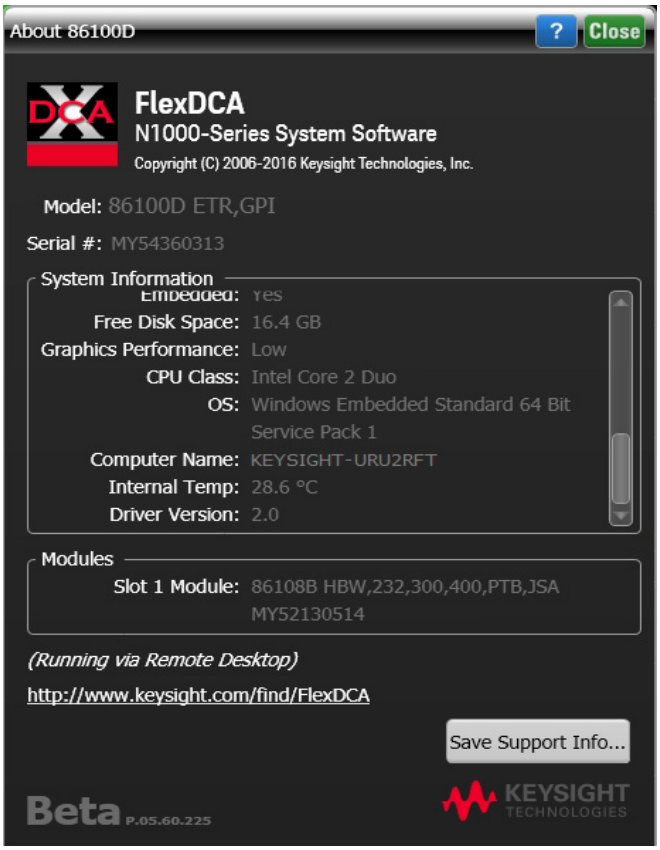

Figure 65 86100D Oscilloscope's hostname

4 Record the Computer Name (corresponds to hostname) as you will need this name later in this procedure.

86100D Computer Name: _____

5 Close the **About 86100D** dialog box.

6 On the Windows **Start** menu of your PC, click **All Programs>Keysight Connection Expert** to launch Connection Expert. Refer to Keysight IO Libraries Suite for information on how to install the Keysight Connection Expert.

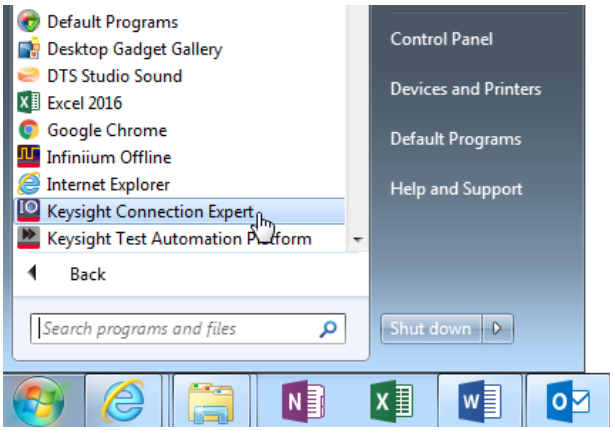

Figure 66 Launching the Keysight Connection Expert

7 In Keysight Connection Expert, click the **Manual Configuration** tab.

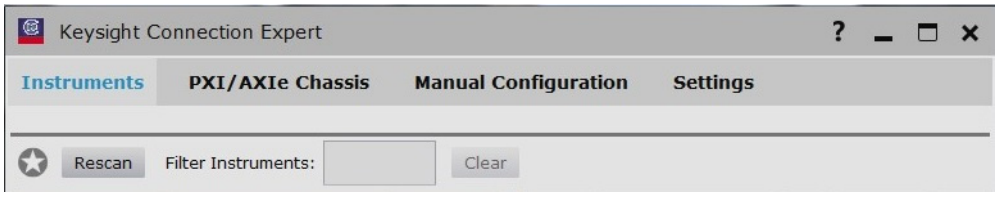

Figure 67 Tabs within Keysight Connection Expert

8 Under **Add New Instruments / Interfaces,** select **LAN instrument**.

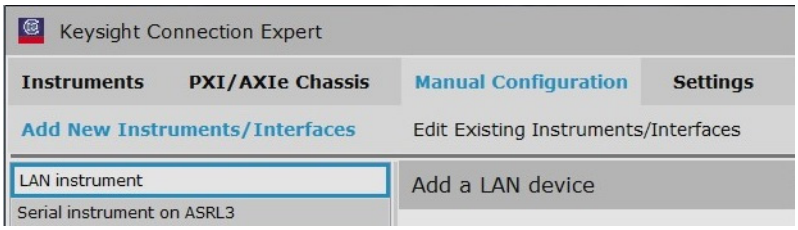

Figure 68 Performing Manual Configuration in Keysight Connection Expert

9 In the **Add a LAN device** pane,

a Under **Set LAN Address:**, enter the Hostname (recorded in step 1) in the **Hostname or IP Address:** field. Note that your Hostname entry will be different from what is shown in the image.

b Under **Set Protocol:**, select **Socket** and enter the port number.

c Under **Verify Connection:**, click **Test This VISA Address** to verify the connection.

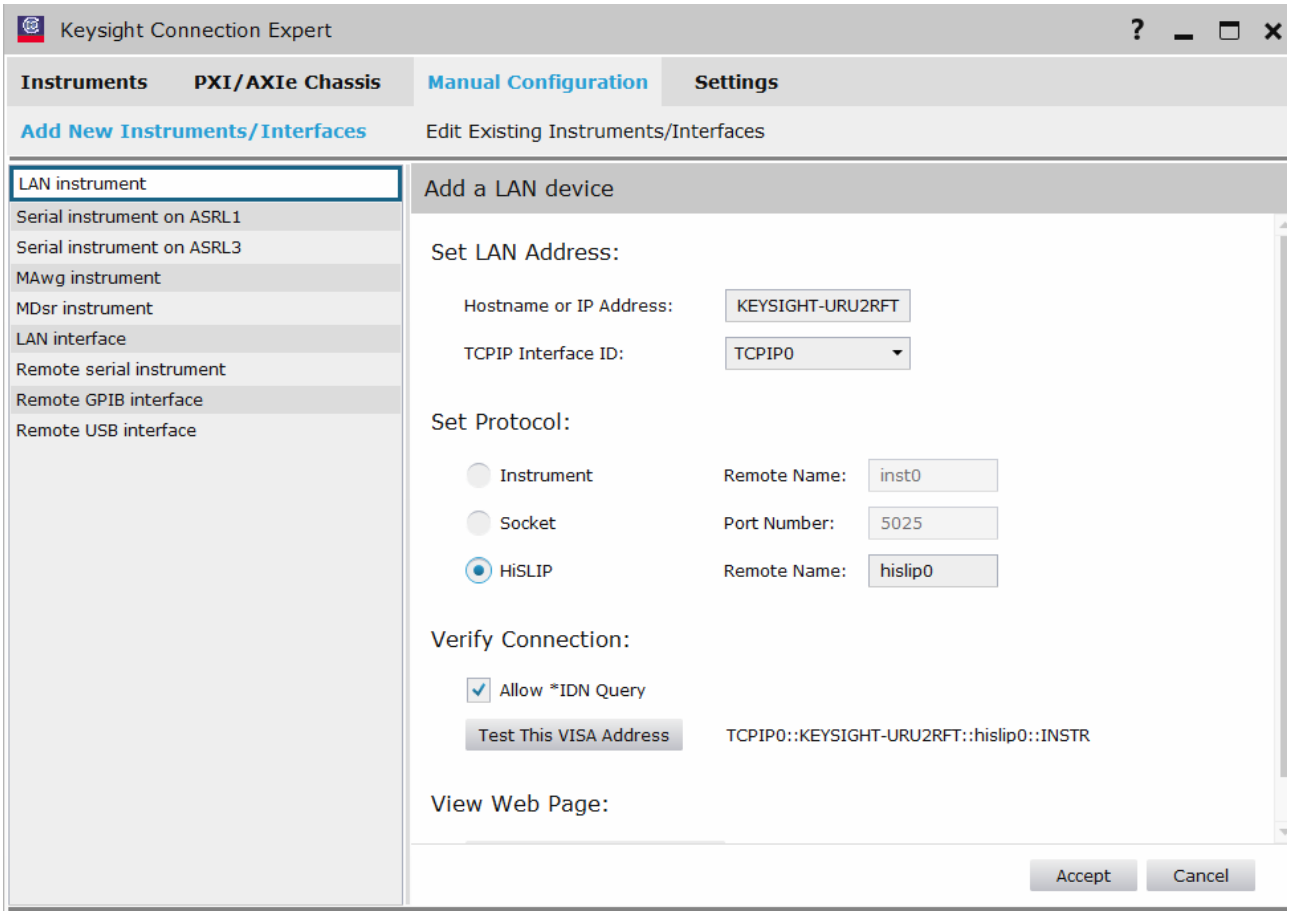

Figure 69 Adding the 86100D device information in the Keysight Connection Expert

10 Once you verify the entered data, click **Accept** to complete the process.

11 To verify that the 86100D Oscilloscope is connected, click the **Instruments** tab of the Keysight Connection Expert.

12 Click the 86100D Oscilloscope's listing on the left pane. A check mark encircled in green indicates that the Oscilloscope is connected to your PC remotely on the LAN. Note that the address on your end will be different from what is shown in the image.

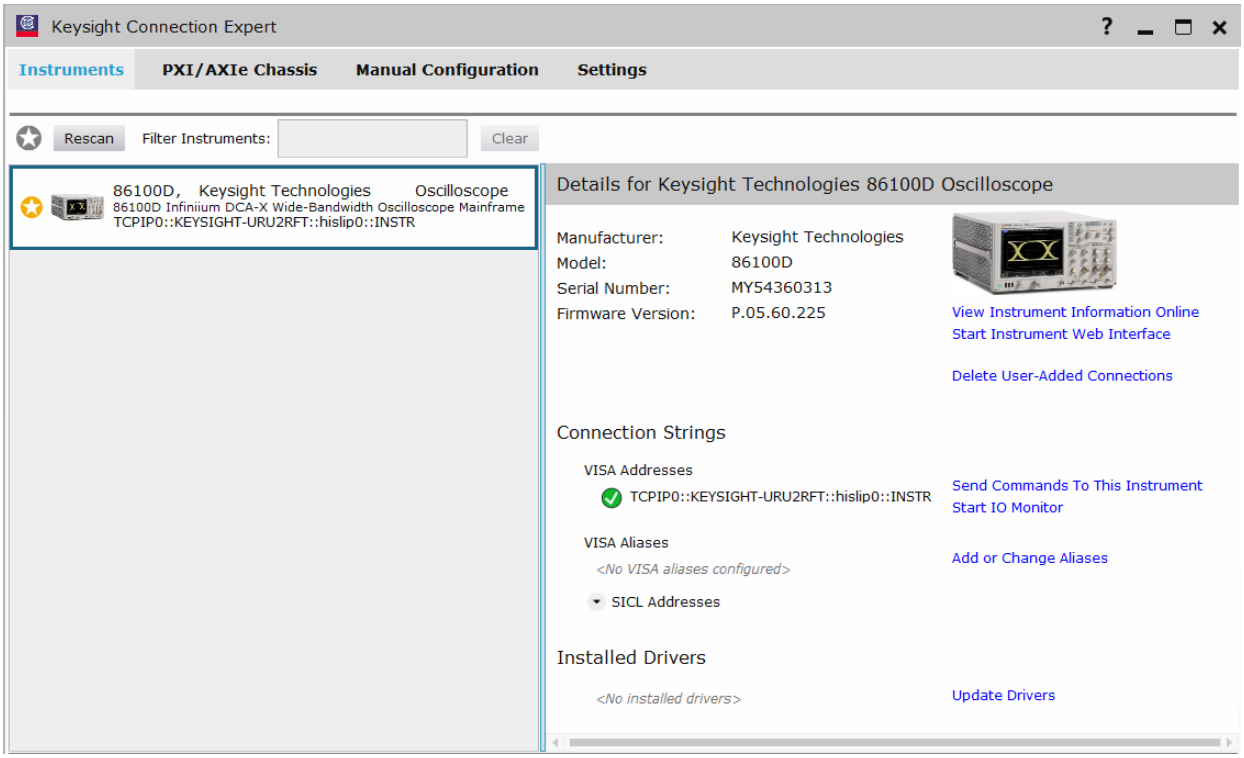

Figure 70 Validating 86100D Oscilloscope's connection

13 Close the Keysight Connection Expert window.

Connection using Keysight Connection Expert 2017 (v18.0 or higher)

1 On the 86100D Oscilloscope, launch the Keysight FlexDCA application.

2 From the FlexDCA's main menu, click **Help** > **About FlexDCA...**. The **About 86100D** dialog box appears.

3 In the **System Information** area, scroll down to view the **Computer Name** entry.

Alternatively, you can obtain the computer name from the Windows **System** properties.

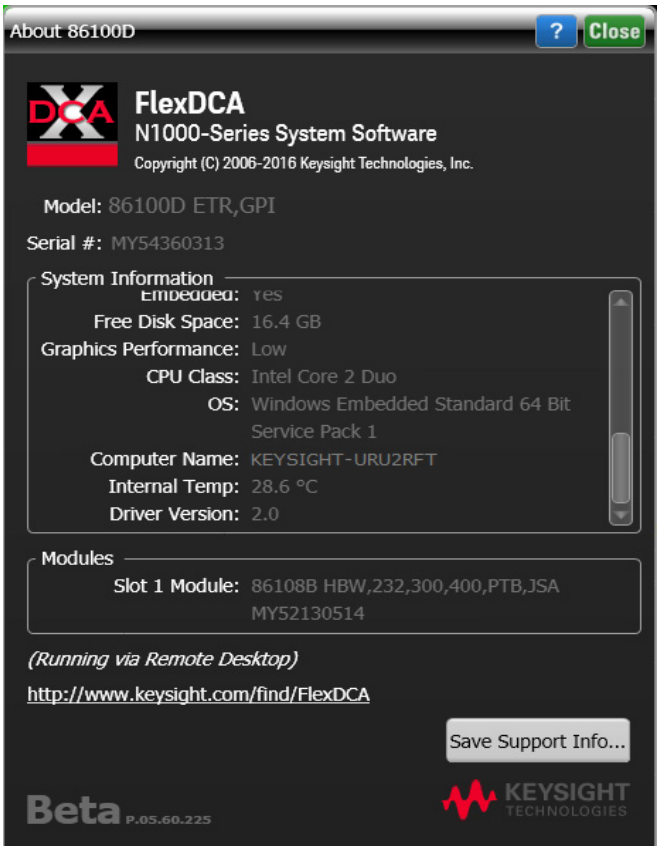

Figure 71 86100D Oscilloscope's hostname

4 Record the Computer Name (corresponds to hostname) as you will need this name later in this procedure.

86100D Computer Name: _____

5 Close the **About 86100D** dialog box.

6 On the Windows **Start** menu of your PC, click **All Programs>Keysight Connection Expert** to launch Connection Expert 2017. Refer to Keysight IO Libraries Suite for information on how to install the Keysight Connection Expert 2017.

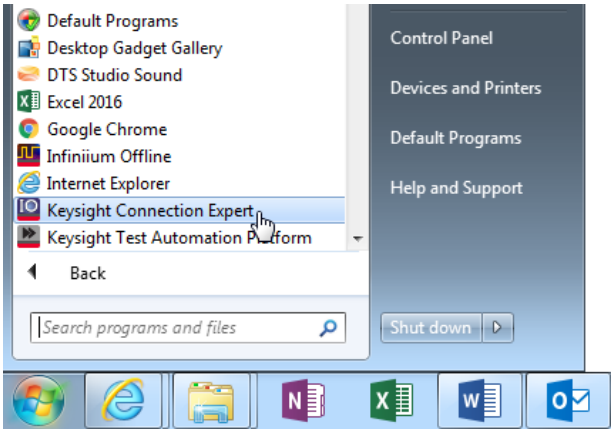

Figure 72 Launching the Keysight Connection Expert 2017

7 In Keysight Connection Expert 2017, click the **+ Add** button to manually add instruments and interfaces.

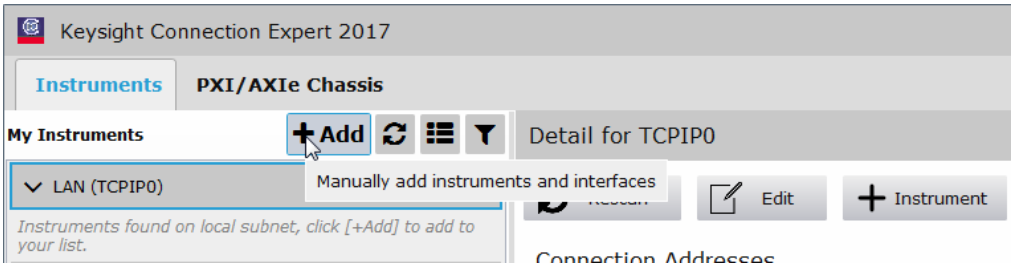

Figure 73 Adding 86100D Oscilloscope manually in the Keysight Connection Expert 2017

8 From the drop-down list that appears, select **LAN instrument**.

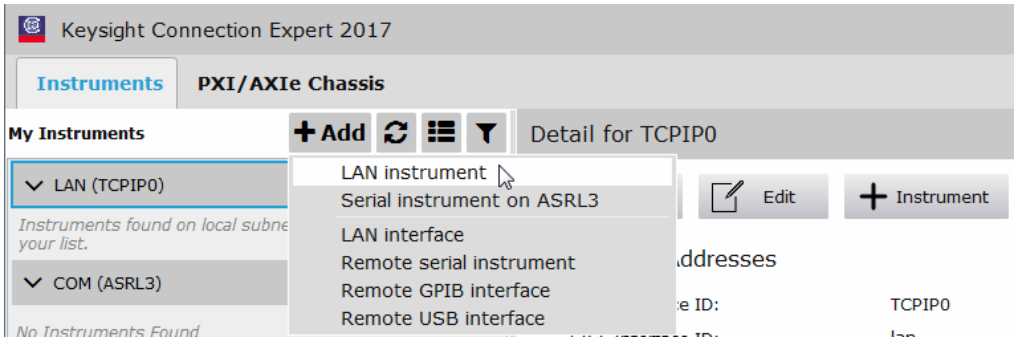

Figure 74 Selecting LAN instrument in the Keysight Connection Expert 2017

9 In the **Add a LAN device** window,

a Select the **Enter Address** tab.

b Under **Set LAN Address:**, enter the Hostname (recorded in step 1) in the **Hostname or IP Address:** field. Note that your Hostname entry will be different from what is shown in the image.

c Under **Set Protocol:**, select **Socket** and enter the port number.

d Under **Verify Connection:**, click **Test This VISA Address** to verify the connection.

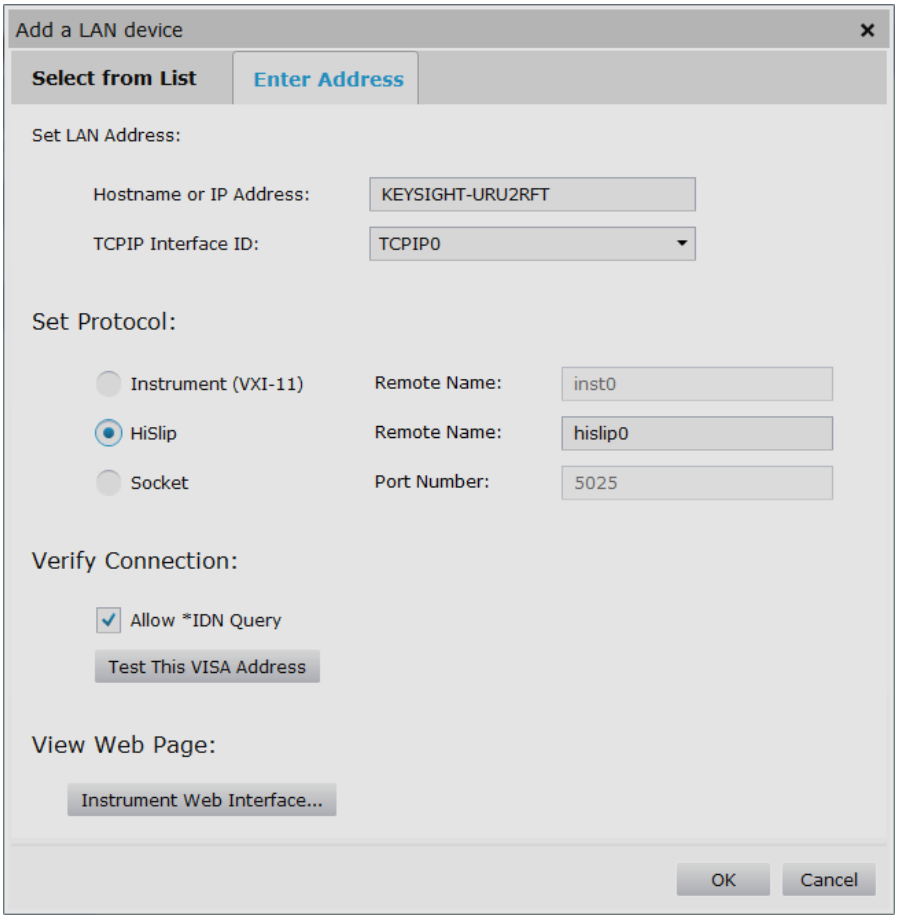

Figure 75 Adding 86100D Oscilloscope's device information in the Keysight Connection Expert 2017

10 Once you verify the entered data, click **OK** to complete the process.

11 To verify that the 86100D Oscilloscope is connected, click the **Instruments** tab of the Keysight Connection Expert.

12 Click the 86100D Oscilloscope's listing on the left pane. A check mark encircled in green indicates that the Oscilloscope is connected to your PC remotely on the LAN. Note that the address on your end will be different from what is shown in the image.

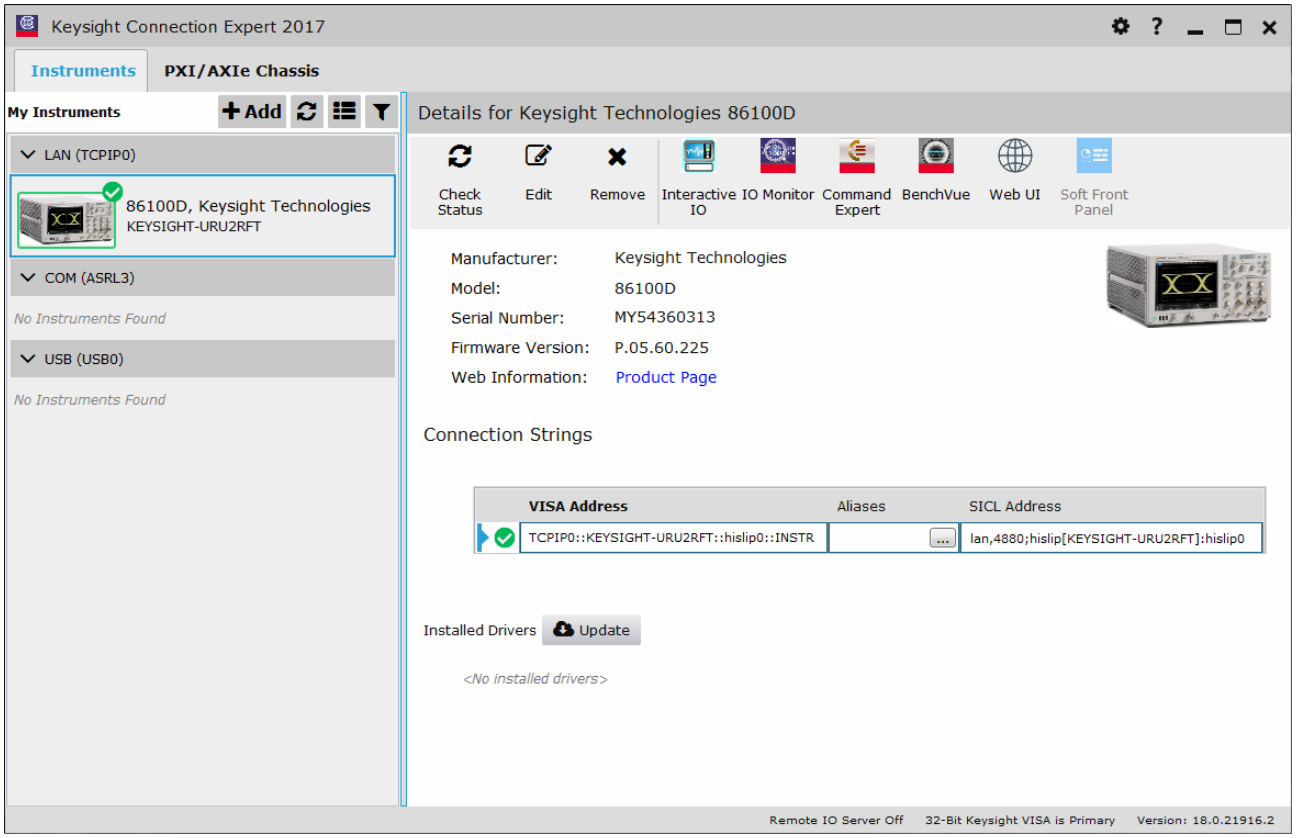

Figure 76 Validating 86100D Oscilloscope's connection

13 Close the Keysight Connection Expert window.

Connecting N1010A FlexDCA to N109X Oscilloscope and N107X

Perform the following steps to connect your N109X oscilloscope with N107X clock data recovery using FlexDCA:

1 Launch FlexDCA.

2 When FlexDCA starts, the **Extended Module Configuration** window is displayed automatically. If the **Extended Module Configuration** window does not appear, from the FlexDCA interface's main menu, click **Setup>Configure Extended Modules...**.

3 Configure Slot 7 to be the N109X module.

4 Configure Slot 8 to be the N107X module.

5 Remove any other N109X/N107X that is configured for Slot 5 and Slot 6.

6 Click **Close** to exit the **Extended Module Configuration** window.

7 Once the connection is established, you may proceed to launch the N109228CA Compliance Test Application on your PC.

Starting the N109228CA OIF CEI 3.1 Compliance Test Application

After you install the N109228CA OIF CEI Compliance Test Application on a PC without the N1010A FlexDCA interface, follow the steps below to start the N109228CA OIF CEI 3.1 Compliance Test Application:

1 Ensure that the 86100D or N1000A Oscilloscope is added to the Keysight Connection Expert and that the connection is active. Refer to "Adding 86100D or N1000A to Keysight Connection Expert" on page 68.

2 From the Windows **Start** menu, navigate to **Start>All Programs>Keysight FlexDCA Applications>N109228CA OIF CEI 3_1**and click **Launch 'N109228CA OIF CEI 3_1'**.

3 The N109228CA OIF CEI 3.1 Compliance Test Application banner appears followed by the **Connect to FlexDCA** dialog.

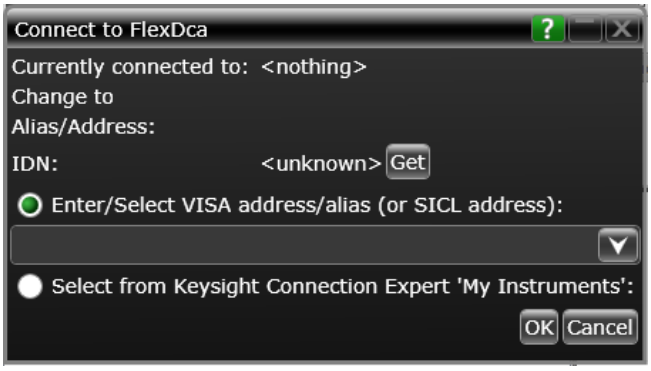

Figure 77 N109228CA OIF CEI 3.1 Application launching banner

4 Enter the SICL address or VISA alias, if known, else select the **Select from Keysight Connection Expert** option to find the SICL Address/VISA alias.

5 Click **OK** to connect.
The default view of the N109228CA OIF CEI 3.1 Compliance Test Application appears.

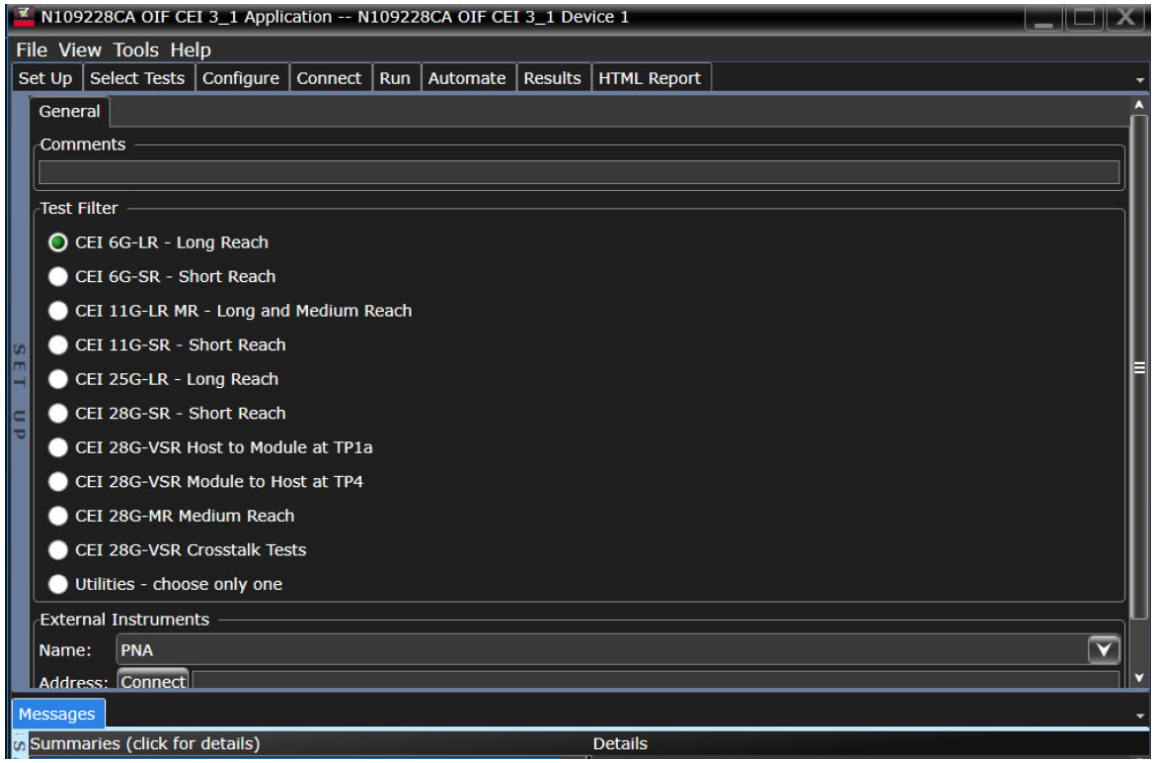

Figure 78 Default window of the N109228CA OIF CEI 3.1 Compliance Test Application

NOTE If you click the **View 'N109228CA OIF CEI 3_1' in Demo Mode** option under **Start>All Programs>Keysight FlexDCA Applications>N109228CA OIF CEI 3_1**, click **File>Connect to Scope...** to access the **Connect to FlexDCA** dialog. However, since it is a demo application, it has limited features.

Connecting to the Network Analyzer

Refer to "Connecting to External Instruments" on page 21 for connecting to the network analyzer you are using.

Connecting to the N4877A

The N4877A is used whenever multiple 86100D or N1000A modules are used in the test setup rather than an 86108A/B module. Refer to Table 4 on page 62.

On the 86100D, click **Setup** > **Configure Extended Modules**. In the dialog box, perform the following two steps:

1 Configure **Slot 8** to be the N4877A.

2 Remove any other N4877A that is configured for **Slot 5**, **Slot 6**, or **Slot 7**.

For more information, click the Help button that is in the title bar of the Extended Module Configuration dialog box.

Figure 79 The Extended Module Configuration with the N4877A in Slot 8

4 Installing N109228CA on the oscilloscope

Follow the instructions in this chapter when you are installing both the N109228CA application and the FlexDCA application on the 86100D or N1000A oscilloscope. You must purchase and install a license for the 86100DU-401. Once the license is installed, the 86100DU-401 software will be enabled.

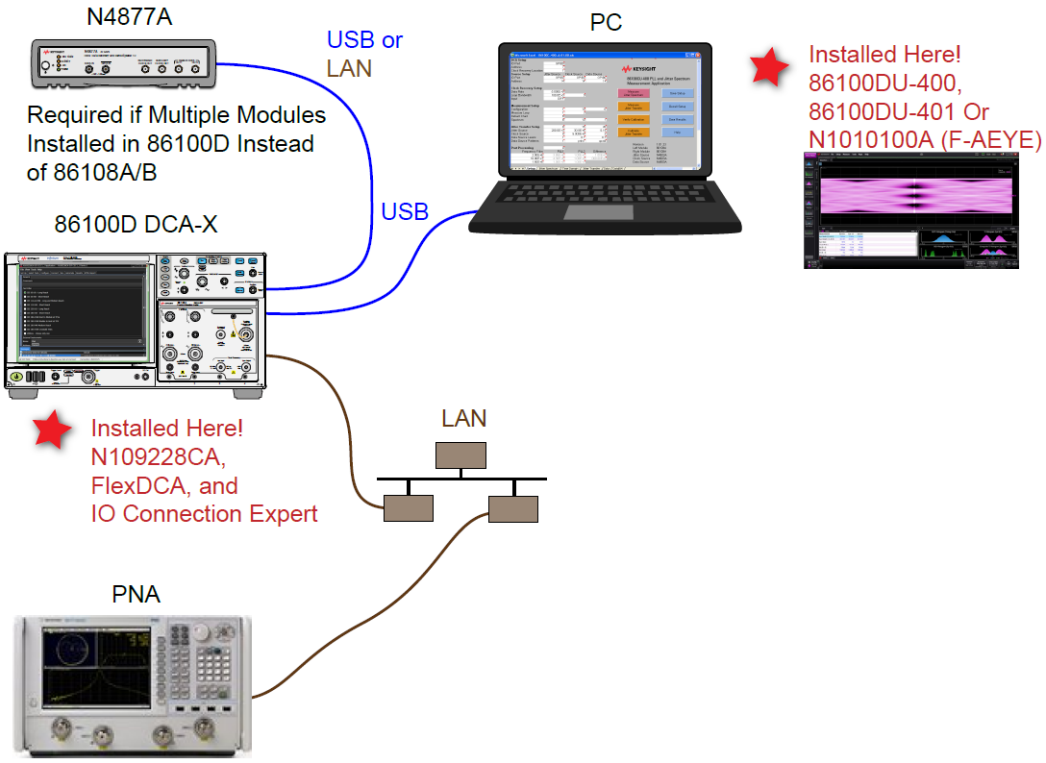

Figure 80 N109228CA Installed on 86100D

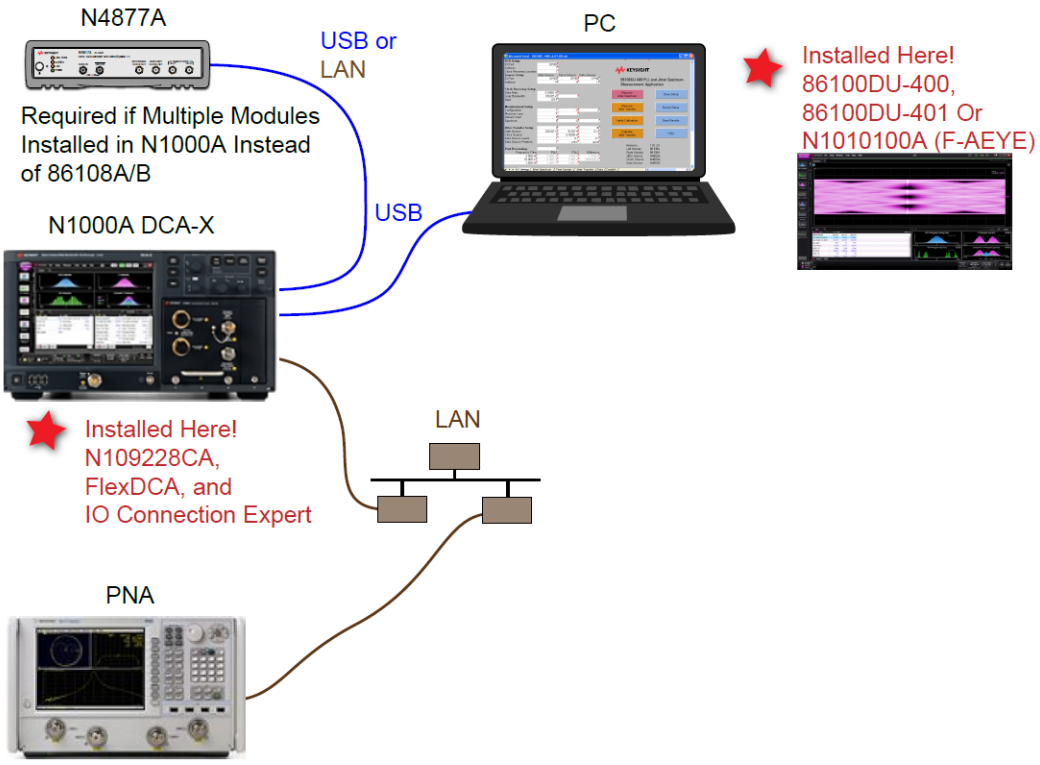

Figure 81 N109228CA Installed on N1000A

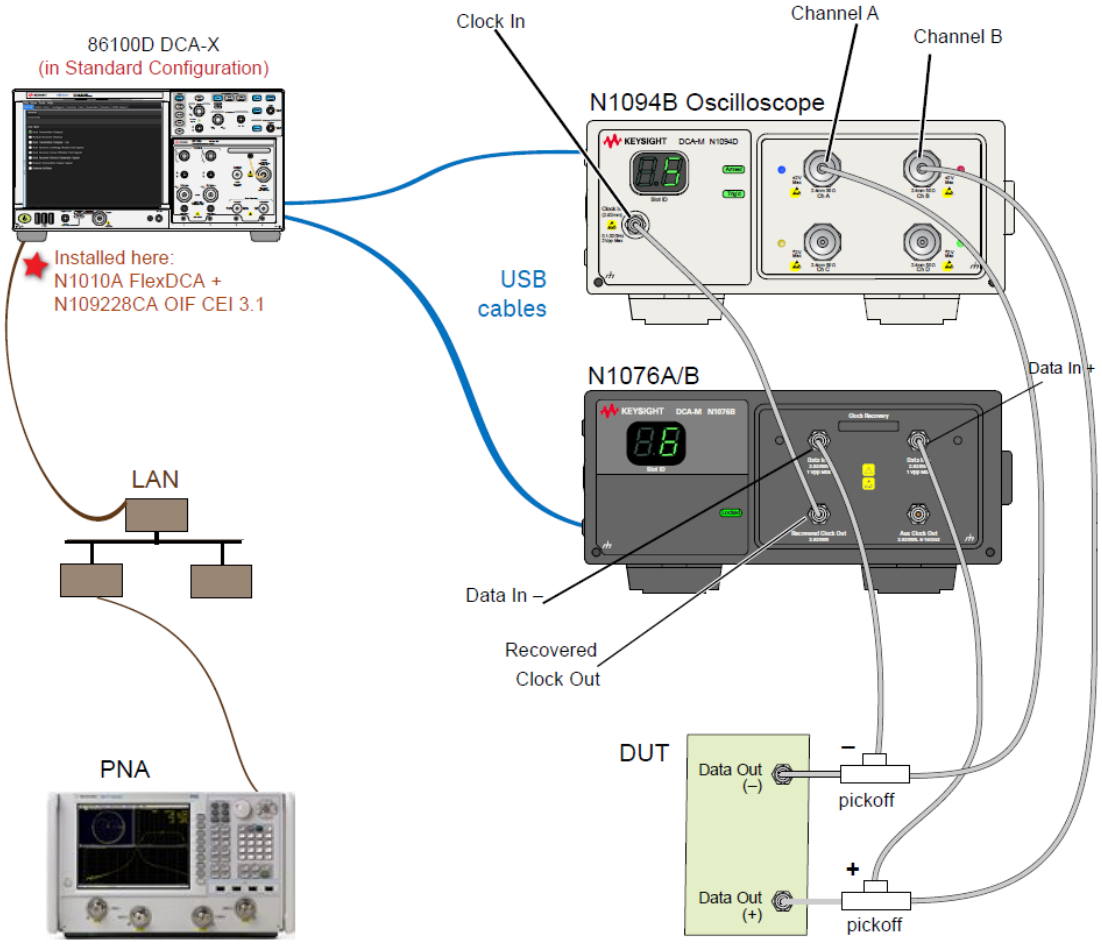

Figure 82 N109228CA Installed on 86100D connected to a DCA-M setup

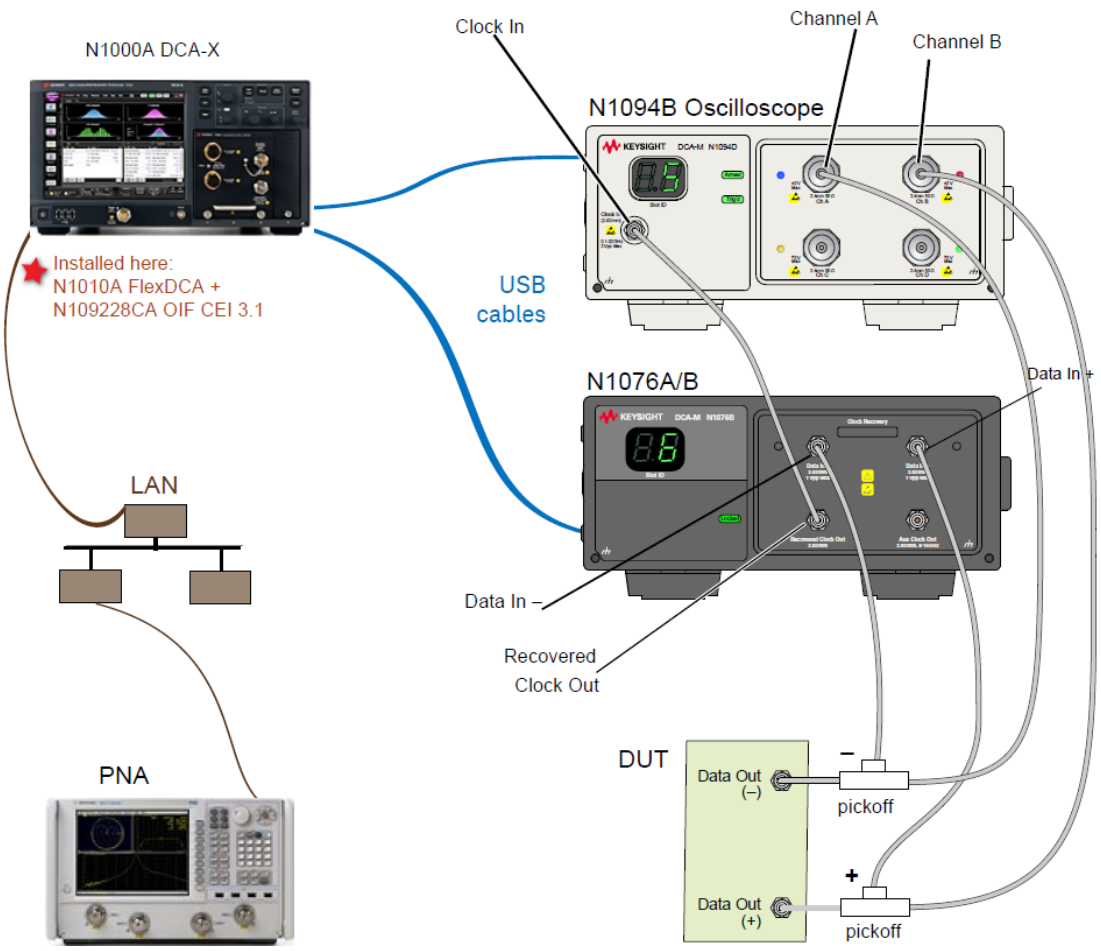

Figure 83 N109228CA Installed on N1000A connected to a DCA-M setup

NOTE If you do not connect a network analyzer, you will not be able to perform the return loss compliance tests.

NOTE The 86100DU-400 software is required only for testing the CEI 11G-SR (Short Reach) interface, when running the Jitter Transfer Bandwidth, 11G-SR and Jitter Transfer Peaking, 11G-SR tests.

NOTE The 86100DU-401 or N109X-401 software is required only for testing the CEI 6G and CEI 11G interfaces, when you select a PRBS31 pattern length when testing jitter.

Connecting the Equipment

1 For a DCA-X oscilloscope, install one of the module combinations listed in Table 6 into the oscilloscope.

Table 6 Module combinations for 86100D Oscilloscope

Installed Module Configurations	Requires N4877A	Limited to CEI 6G-LR/SR and CEI 11G-LR/MR/SR Testing Only
86108A		√
86108B-LBW/216		√
86108B-HBW/232		
86112A and 86107A	√ (N4877A-216)	√
54754A and 86107A	√ (N4877A-216)	√
86117A and 86107A	√ (N4877A-232)	
86118A-H01 and 86107A	√ (N4877A-232)	
N1045A and 86107A	√ (N4877A-232)	
N1045B and 86107A	√ (N4877A-232)	
N1055A and 86107A	√ (N4877A-232)	
54754A and 86107A	√ (N4877A-232)	
N1046A and 86107A	√ (N4877A-232)	
N1060A		

2 For a DCA-M oscilloscope, keep in mind the information in the following table.

Table 7 Supported configurations for DCA-M Oscilloscope

Configurations for DCA-M	Requires N107x
N1094A	√ (N107xA-232)
N1094B	√ (N107xA-232)
N1092 C/E	√ (N107xA-232)

3 Connect the equipment as shown in the relevant diagrams above and turn on all of the instruments.

Installing the I/O Library Suite

1 Navigate to www.keysight.com/find/iosuite and download the Keysight I/O Library Suite.

NOTE **Keysight's I/O Library Suite is free software that automatically detects instruments connected to your PC and configures the interfaces. It reduces the overall setup and configuration time. The N109228CA OIF CEI 3.1 Compliance Test Application requires I/O Libraries Suite 16.3 or higher.**

2 Install the I/O Library Suite on the same 86100D or N1000A where you will install the N109228CA.

Installing the N109228CA OIF CEI 3.1 Compliance Test Application

Follow the steps below to install the N109228CA OIF CEI 3.1 Compliance Test Application and its license as well as the license for the 86100DU-401. A version of the 86100DU-401 is automatically installed for use with the N109228CA. When the license for 86100DU-401 is installed, the 86100DU-401 software is enabled.

1 Search for the N109228CA OIF CEI 3.1 Compliance Test Application on the Keysight website. Download the application and install it on the Oscilloscope for which you have redeemed the license.

NOTE **When you redeem an N109228CA OIF CEI 3.1 license, you must select whether to install the application on the Oscilloscope or a specific PC.**

2 Save the license file that you received from Keysight in a folder on the local disk or in an accessible memory device.

3 If not already done, purchase an 86100DU-401 or N1010100A license. Save the license file that you received from Keysight in a folder on the local disk or in an accessible memory device.

4 If the FlexDCA software is running on the Oscilloscope, close FlexDCA.

5 From the Windows **Start** menu, click **All Programs>Keysight License Manager** to launch the Keysight License Manager.

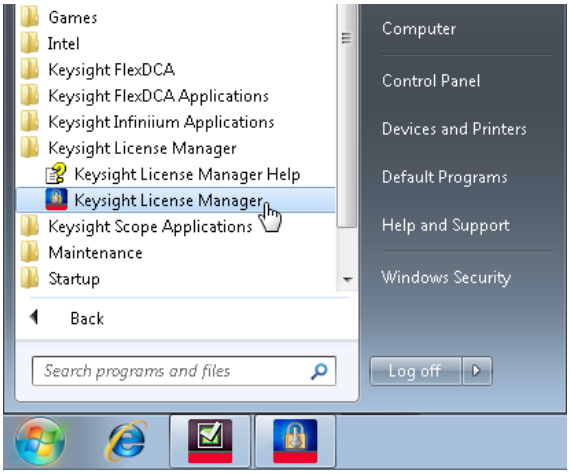

Figure 84 Launching Keysight Connection Expert from the Start menu

NOTE **Keysight License Manager version 5.1 (and higher) have a different user interface than version 5.0 (or earlier). Even though the path to launch the Keysight License Manager is the same for both versions, refer to the *Keysight License Manager Online Help* for the respective versions to find more information about the functionality of the application.**

To install the N109228CA OIF CEI 3.1 Compliance Test Application's license using Keysight License Manager version 5.1 or higher

1 Click the **Tools** icon on the top-right corner of the Keysight License Manager window.

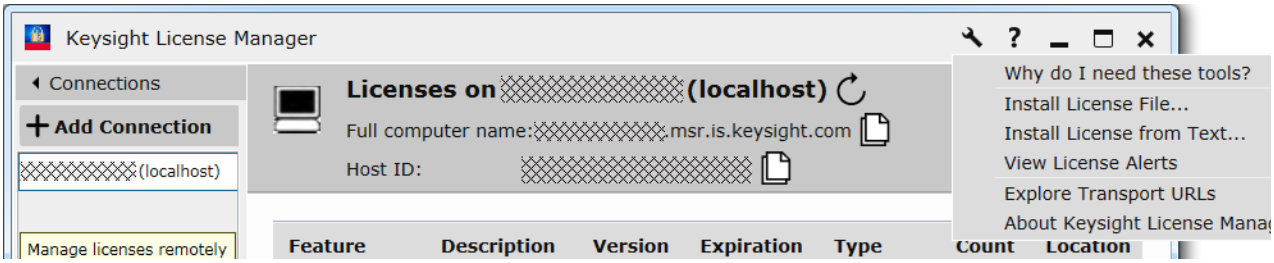

Figure 85 Installing license file on Keysight License Manager version 5.1 & above

2 Click **Install License File...**. The **Select License File(s) to Install on <PC Hostname>** appears.

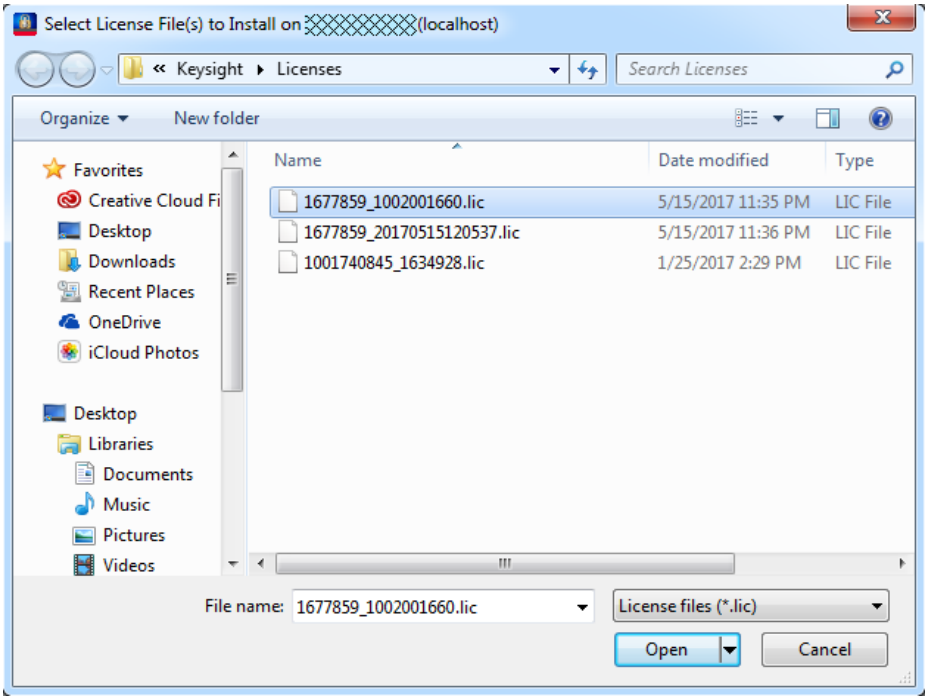

Figure 86 Selecting license file from the folder

3 Navigate to the folder where the N109228CA OIF CEI 3.1 licenses are saved.

4 Select the license and click **Open**. The license files are installed and an entry is displayed in the Keysight License Manager.

5 Close the Keysight License Manager.

To install the N109228CA OIF CEI 3.1 Compliance Test Application's license using Keysight License Manager version 5.0 or earlier

1 From the Keysight License Manager window's main menu, click **File>Install...** or right-click within the left pane of the Keysight License Manager window and select **Install...**.

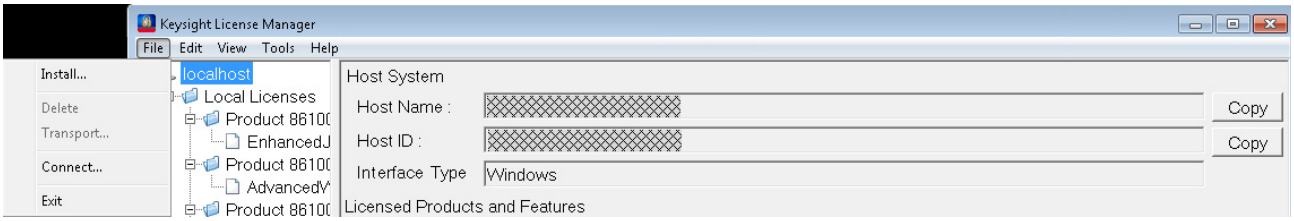

Figure 87 Installing license file on Keysight License Manager version 5.0 or earlier

2 The **Install License File(s)** dialog box appears.

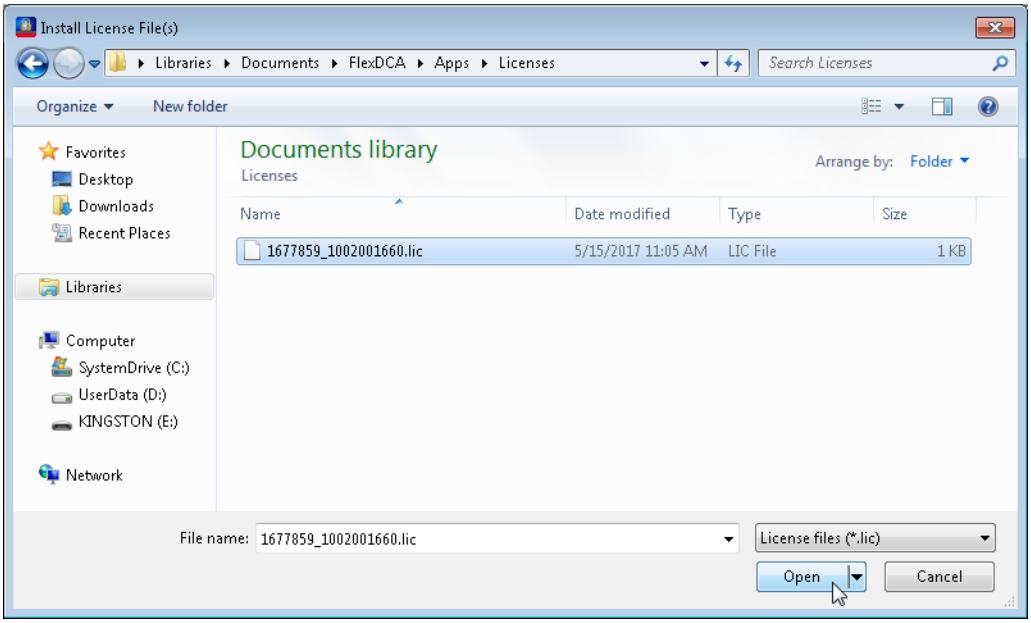

Figure 88 Selecting license file from the folder

3 Navigate to the folder where the N109228CA OIF CEI 3.1 licenses are saved.

4 Select the license and click **Open**. The license files are installed and an entry is displayed in the Keysight License Manager.

5 Close the Keysight License Manager.

Configuring FlexDCA's SCPI Server Setup

1 On the 86100D or N1000A, click **Apps** > **FlexDCA** to start FlexDCA.
2 In FlexDCA, click **Tools** > **SCPI Programming Tools** > **SCPI Server Setup** to open the dialog box.
3 Confirm that the **Sockets** and **HiSLIP** interfaces are selected (Enabled) as shown in Figure 89.
4 Close the dialog box.

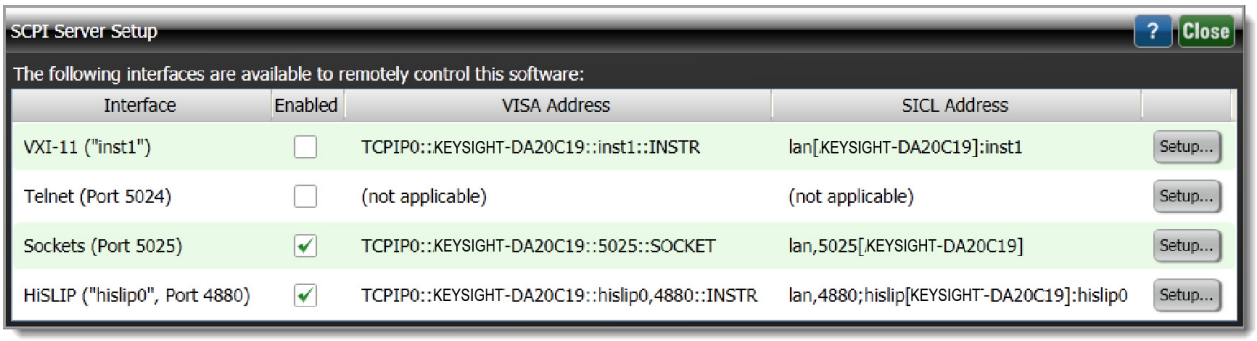

Figure 89 FlexDCA's SCPI Server Setup Dialog Box

5 Minimize the FlexDCA application *and* the 86100D application so that you can view the Windows desktop.

Connecting N1010A FlexDCA to N109X Oscilloscope and N107X

Perform the following steps to connect your N109X oscilloscope with N107X clock data recovery using FlexDCA:

1 Launch FlexDCA.

2 When FlexDCA starts, the **Extended Module Configuration** window is displayed automatically. If the **Extended Module Configuration** window does not appear, from the FlexDCA interface's main menu, click **Setup>Configure Extended Modules...**.

3 Configure Slot 7 to be the N109X module.

4 Configure Slot 8 to be the N107X module.

5 Remove any other N109X/N107X that is configured for Slot 5 and Slot 6.

6 Click **Close** to exit the **Extended Module Configuration** window.

7 Once the connection is established, you may proceed to launch the N109228CA Compliance Test Application on your PC.

Starting the N109228CA OIF CEI 3.1 Compliance Test Application

After you install the N109228CA OIF CEI 3.1 Compliance Test Application on the 86100D or N1000A Oscilloscope, follow the steps below to start the N109228CA OIF CEI 3.1 Compliance Test Application:

1 On the Oscilloscope, launch the Keysight FlexDCA application.

2 From the FlexDCA's main menu, click **Apps>Automated Test Apps>N109228CA OIF CEI 3_1**.

3 The N109228CA OIF CEI 3.1 Compliance Test Application banner appears.
Afterwards, the default view of the N109228CA OIF CEI 3.1 Compliance Test Application appears.

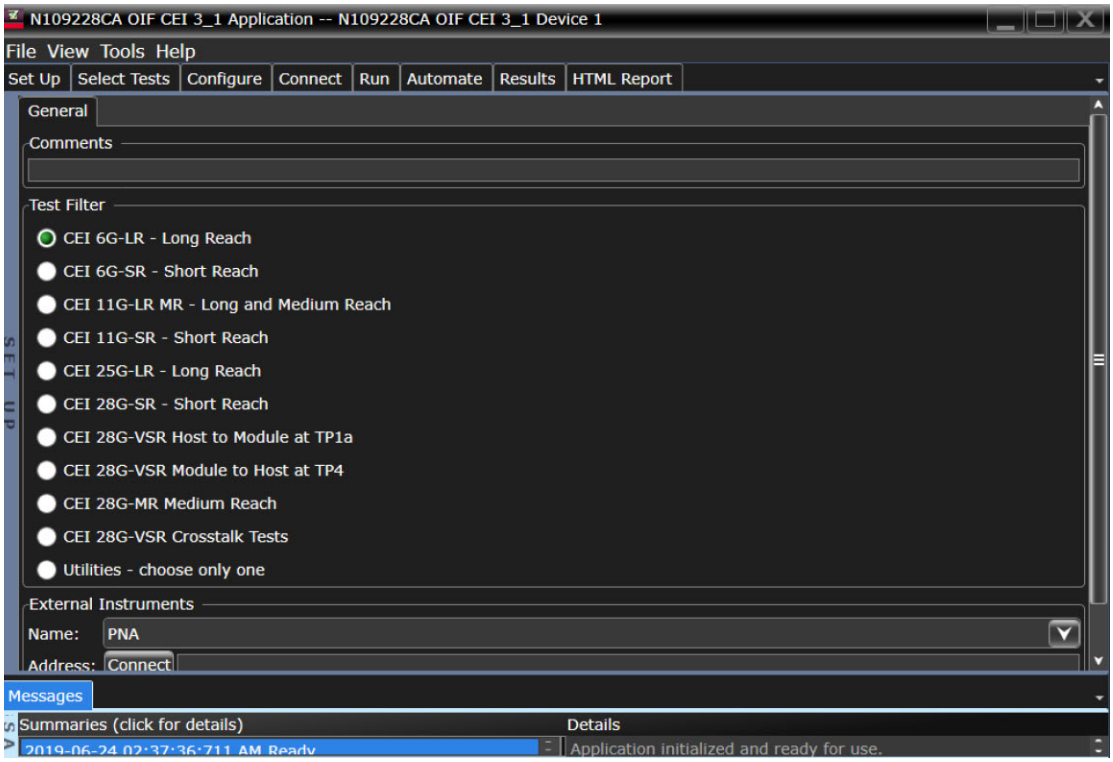

Figure 90 Default window of the N109228CA OIF CEI 3.1 Compliance Test Application

Connecting to the Network Analyzer

Refer to "Connecting to External Instruments" on page 21 for connecting to the network analyzer you are using.

Connecting to the N4877A

The N4877A is used whenever multiple 86100D or N1000A modules are used in the test setup rather than an 86108A/B module. Refer to Table 6 on page 85.

On the 86100D or N1000A, click **Setup** > **Configure Extended Modules**. In the dialog box, perform the following two steps:

1 Configure **Slot 8** to be the N4877A.

2 Remove any other N4877A that is configured for **Slot 5**, **Slot 6**, or **Slot 7**.

For more information, click the Help button that is in the title bar of the Extended Module Configuration dialog box.

Figure 91 The Extended Module Configuration with the N4877A in Slot 8