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# **N1091..CA Series IEEE 802.3 NRZ Compliance and Debug Application**

# Notices

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# 1 Introduction

Use the instructions in this Guide to install and set up the N1091..CA Series IEEE 802.3 NRZ 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 IEEE 802.3 NRZ Test App and FlexDCA applications. The IEEE 802.3 NRZ Test App license allows you to install the application on either a specific PC or a specific N1000A or 86100D DCA-X instrument. This selection is made at the time you redeem your licenses.

Configuration	DCA-X Supported Configurations	DCA-M Supported Configurations
IEEE 802.3 NRZ Test App on a PC with FlexDCA	A PC attached to an N1000A or 86100D DCA-X oscilloscope (in Legacy configuration) over LAN. The PC has IEEE 802.3 NRZ Test App software application, N1010A FlexDCA, N1010100A (F-AEYE) for N1000A or 86100DU-401 licenses, and IO Connection Expert installed on it.	A PC directly connected to the N109X with a USB cable. The PC has IEEE 802.3 NRZ Test App software application, N1010A FlexDCA, N109x-401 license or F-AEYE license under N1010100A R&D package, and IO Connection Expert installed on it.
IEEE 802.3 NRZ Test App on a PC without FlexDCA	A PC attached to N1000A or 86100D DCA-X oscilloscope (in Standard configuration) over LAN. The PC has IEEE 802.3 NRZ Test App software application, N1010100A (F-AEYE) for N1000A or 86100DU-401 licenses, and IO Connection Expert installed on it.	<p><b>Configuration 1:</b> 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.</p> <p><b>Configuration 2:</b> 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 IEEE 802.3 NRZ Test App installed on it.</p> <p>The PC with IEEE 802.3 NRZ Test App has N109x-401 license or F-AEYE license under N1010100A R&amp;D package and IO Connection Expert installed on it.</p>
IEEE 802.3 NRZ Test App on the oscilloscope	N1000A or 86100D DCA-X oscilloscope in Standard configuration. The oscilloscope has IEEE 802.3 NRZ Test App, 86100DU-401 license or F-AEYE license under N1010100A R&D package, and IO Connection Expert installed on it.	An N1000A or 86100D mainframe connected to the N109X with a USB cable. The 86100D has FlexDCA and IEEE 802.3 NRZ Test App installed on it.

## Installing the N1091..CA Series IEEE 802.3 NRZ 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 N1091..CA Series IEEE 802.3 NRZ 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 N1091..CA Series IEEE 802.3 NRZ Compliance Test Application**

Equipment	Configuration	
	Single Plug-In Module Setup	Multiple Module Setup
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 or F-JIT Enhanced Jitter Analysis option under N1010100A R&D package 86100D-201 or F-EQ Advanced Waveform Analysis 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	
86100D/N1000A Plug-In Module	86108A or 86108B with options LBW/HBW and 216/232. Option JSA provides improved jitter measurement accuracy ( <i>optional</i> ). N1060A.	86112A, 54754A, 86117A, or 86118A-H01. 86107A (any option). N1045A, N1045B, N1055A, N1046A 75/85/100 GHz. N1040A, N1060A
Clock/Data Recovery and Demultiplexer†	N4877A-216/232 Clock Data Recovery & Demultiplexer. N1076 A/B, N1077A, N1078A Clock Data Recovery.	
Software	N1091APCA, N1091BMCA, N1091BACA, and N1091BJCA IEEE 802.3 NRZ Compliance Application. 86100DU-401 Advanced Eye Software (for measuring jitter at PRBS31) or F-AEYE under N1010100A R&D package. Keysight I/O Libraries, 16.3 or higher Option N1010A-SIM or F-SIM InfiniiSim DCA Waveform Transformation Toolset under N1010100A R&D package. Provides InfiniiSim Transform operators to FlexDCA.	
Performance Network Analyzer (PNA) or Economy Network Analyzer (ENA)	Any 4-port model with frequency range of at least 19 GHz (ENA also covers the 1 MHz termination mismatch test) The network analyzer is used to perform return-loss measurements.	
Switching Test Set (optional)	Keysight U3020A S26 DC to 26.5 GHz, or BitifEye BIT 2100	
Matched Cable Set	86108B-CA2 or 86108B-CA3 (quantity 1)	
Phase Trimmers	86108B-PT2 or 86108B-PT3 ( <i>quantity 2</i> )	
DC Blocks	86108B-DC3, N9398C, N9399C, or 11742A ( <i>quantity 2</i> )	
Pick-Off	N/A	N4915A-015 ( <i>quantity 2</i> )
Test Adapters (optional)	Visit <a href="http://shop.wilder-tech.com/category_s/42.htm">http://shop.wilder-tech.com/category_s/42.htm</a>	

\* FlexDCA version A.05.80 or greater

† If you have access to the clock for the device, you can connect the clock to the 86100D's Trigger input *instead of* using the clock recovery

**NOTE**

The IEEE 802.3 NRZ Test App application *cannot* be installed on an 86100A, 86100B, or 86100C.

**Table 2 Available Clauses Versus Installed License**

IEEE 802.3 Designation	Installed License			
	N1091APCA	N1091BMCA	N1091BACA	N1091BJCA
10GBASE-KR	√			
40GBASE-KR4	√			
40GBASE-CR4			√	
100GBASE-CR10			√	
100GBASE-KR4				√
100GBASE-CR4				√
25GBASE-KR				√
XLAUI		√		
CAUI		√		
XLPPi		√		
CPPI		√		

## Installing IEEE 802.3 NRZ Test App 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 IEEE 802.3 NRZ Test App and FlexDCA on a PC”.

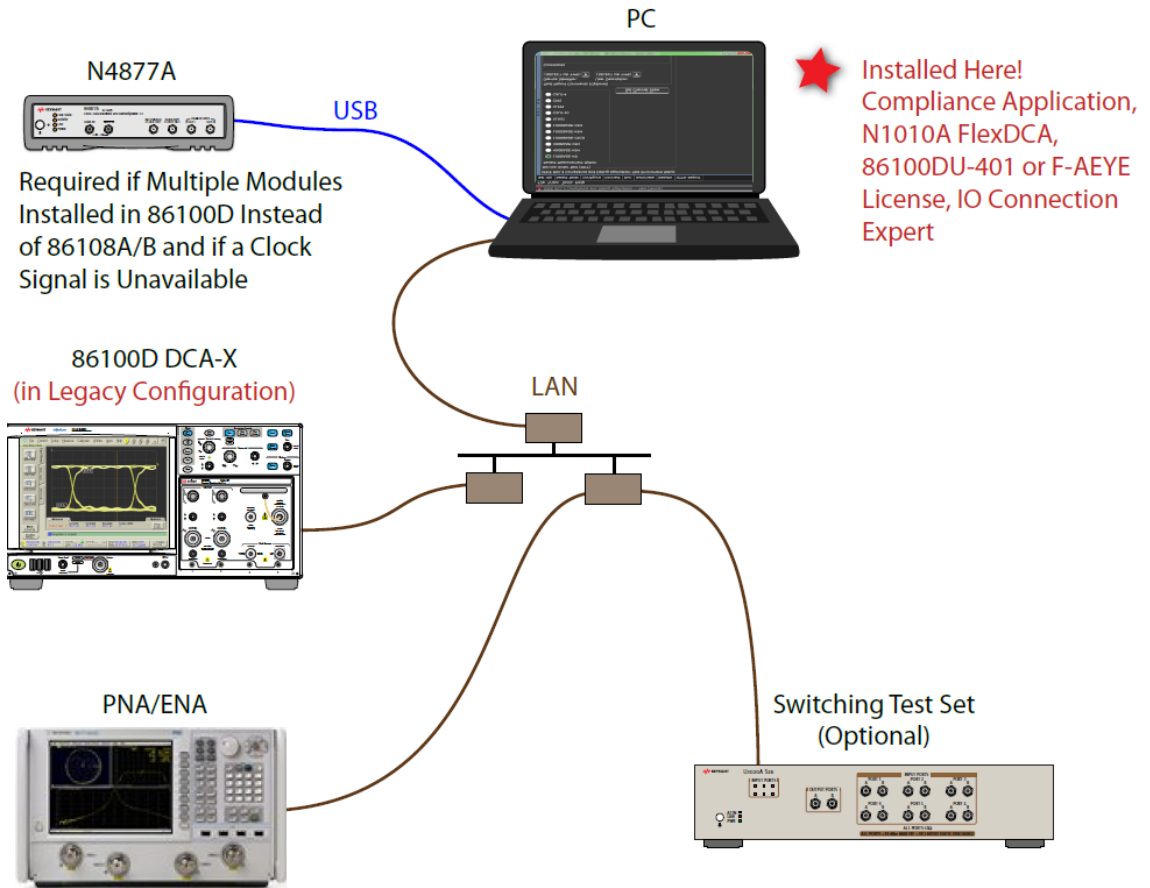


Figure 1 IEEE 802.3 NRZ Test App and N1010A FlexDCA installed on PC connected to 86100D DCA-X Oscilloscope



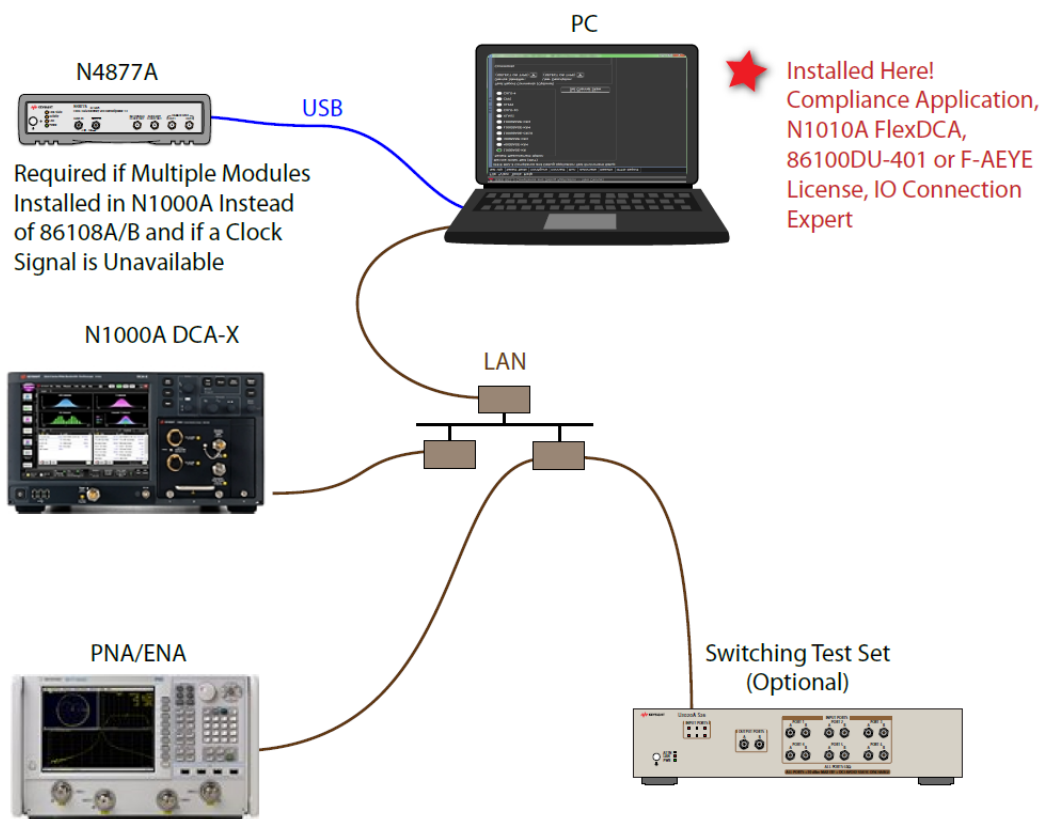


Figure 2 IEEE 802.3 NRZ Test App and N1010A FlexDCA installed on PC connected to N1000A DCA-X Oscilloscope

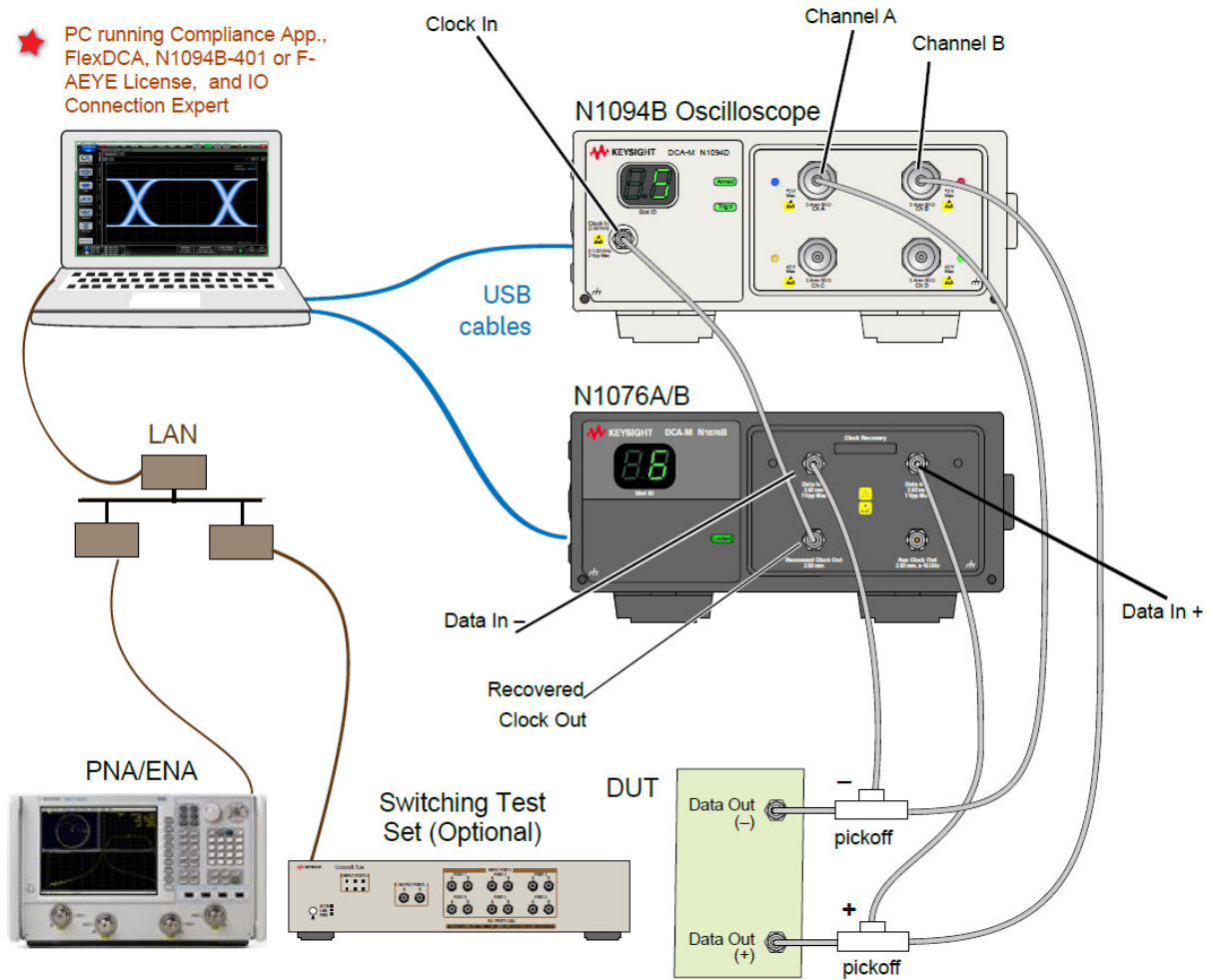


Figure 3 IEEE 802.3 NRZ Test App and N1010A FlexDCA Installed on PC connected to N1094B DCA-M Oscilloscope

## Installing IEEE 802.3 NRZ Test App 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 IEEE 802.3 NRZ Test App on a PC Without N1010A FlexDCA”.

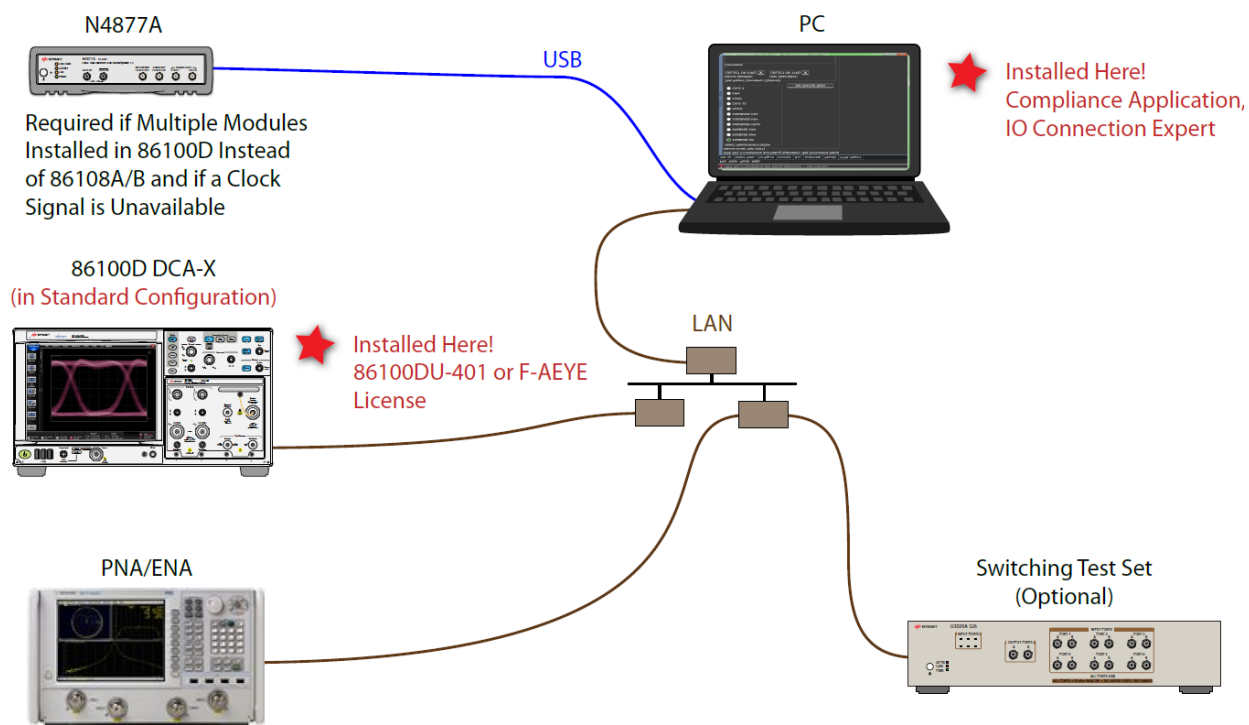


Figure 4 IEEE 802.3 NRZ Test App Installed on PC connected to 86100D DCA-X Oscilloscope

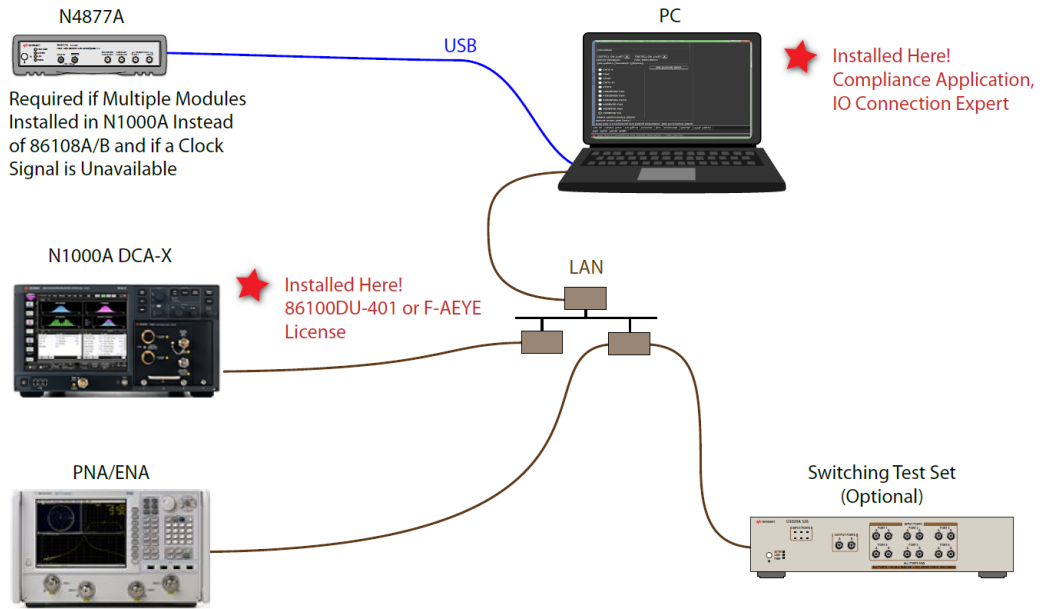


Figure 5 IEEE 802.3 NRZ Test App Installed on PC connected to N1000A DCA-X Oscilloscope

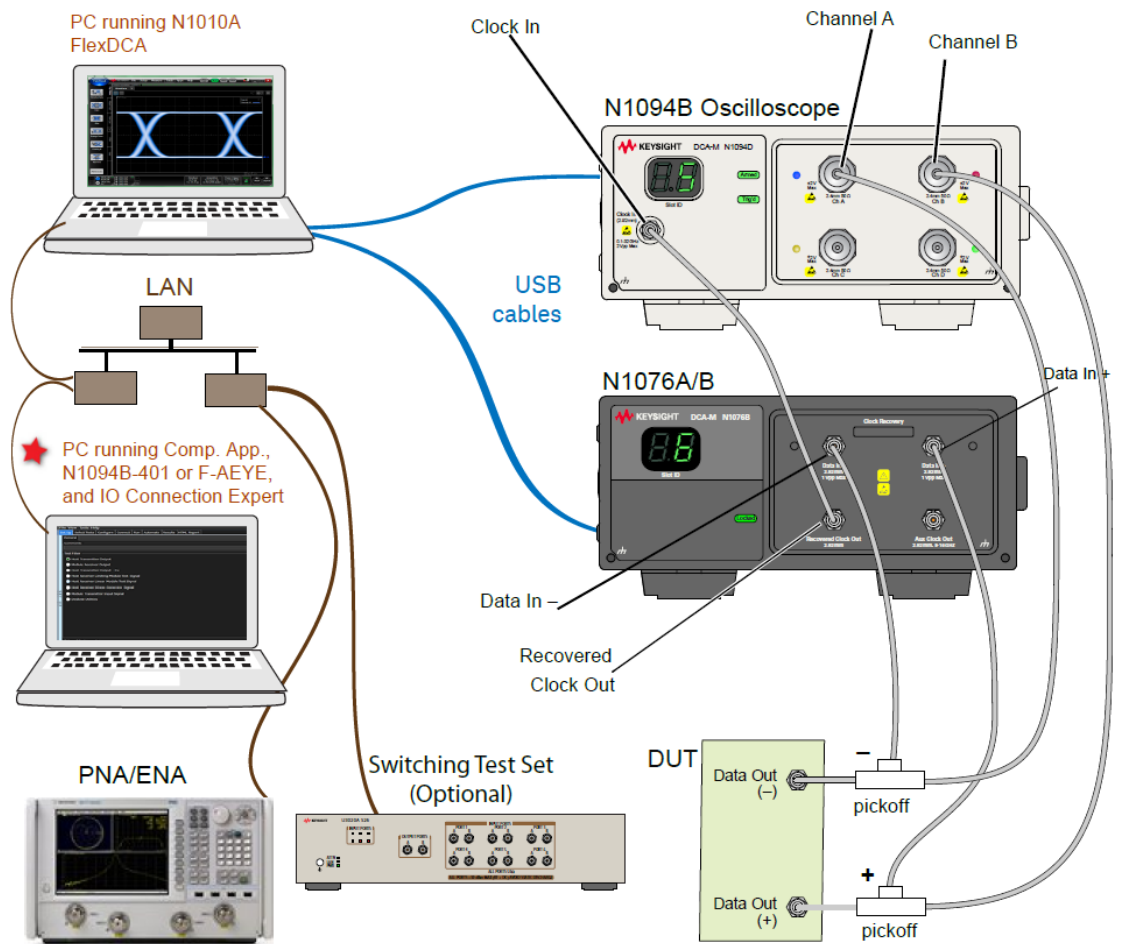


Figure 6 IEEE 802.3 NRZ Test App Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via another PC

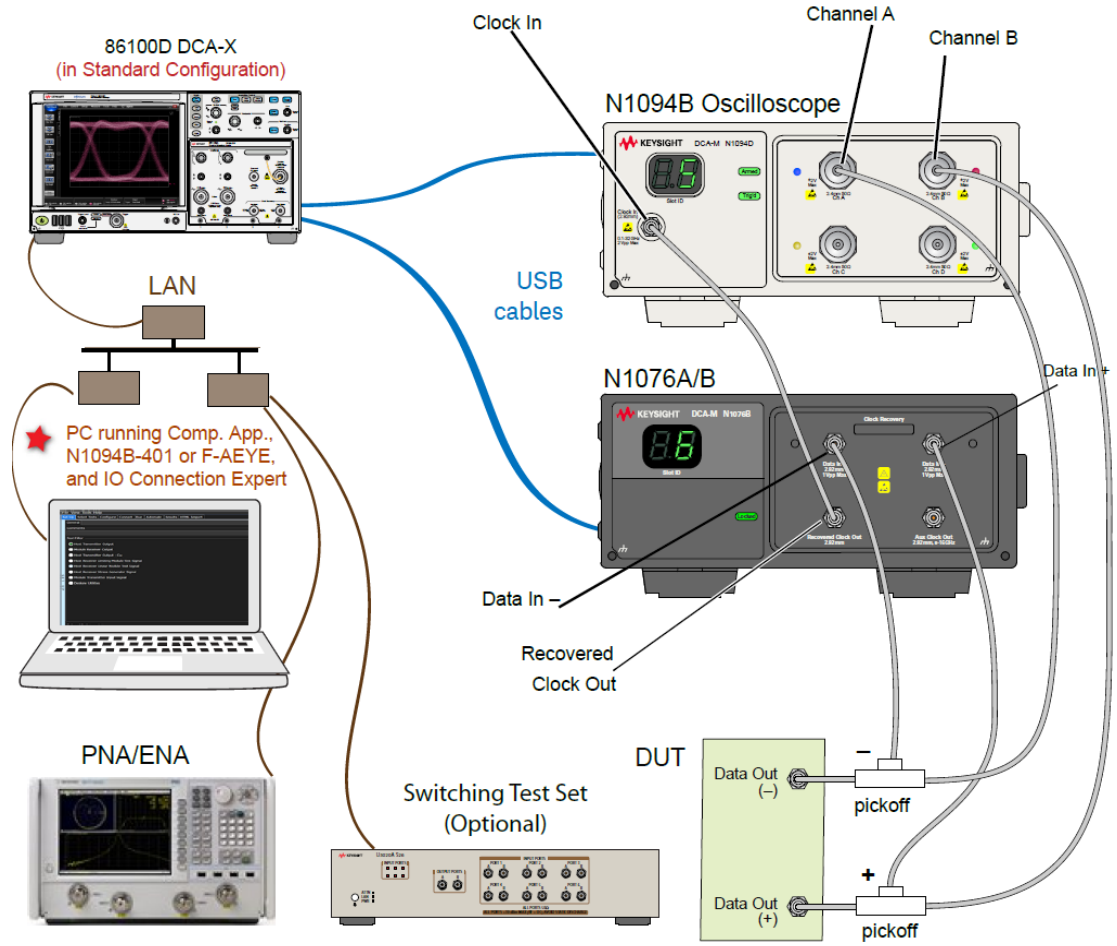


Figure 7 IEEE 802.3 NRZ Test App Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via 86100 DCA-X Oscilloscope

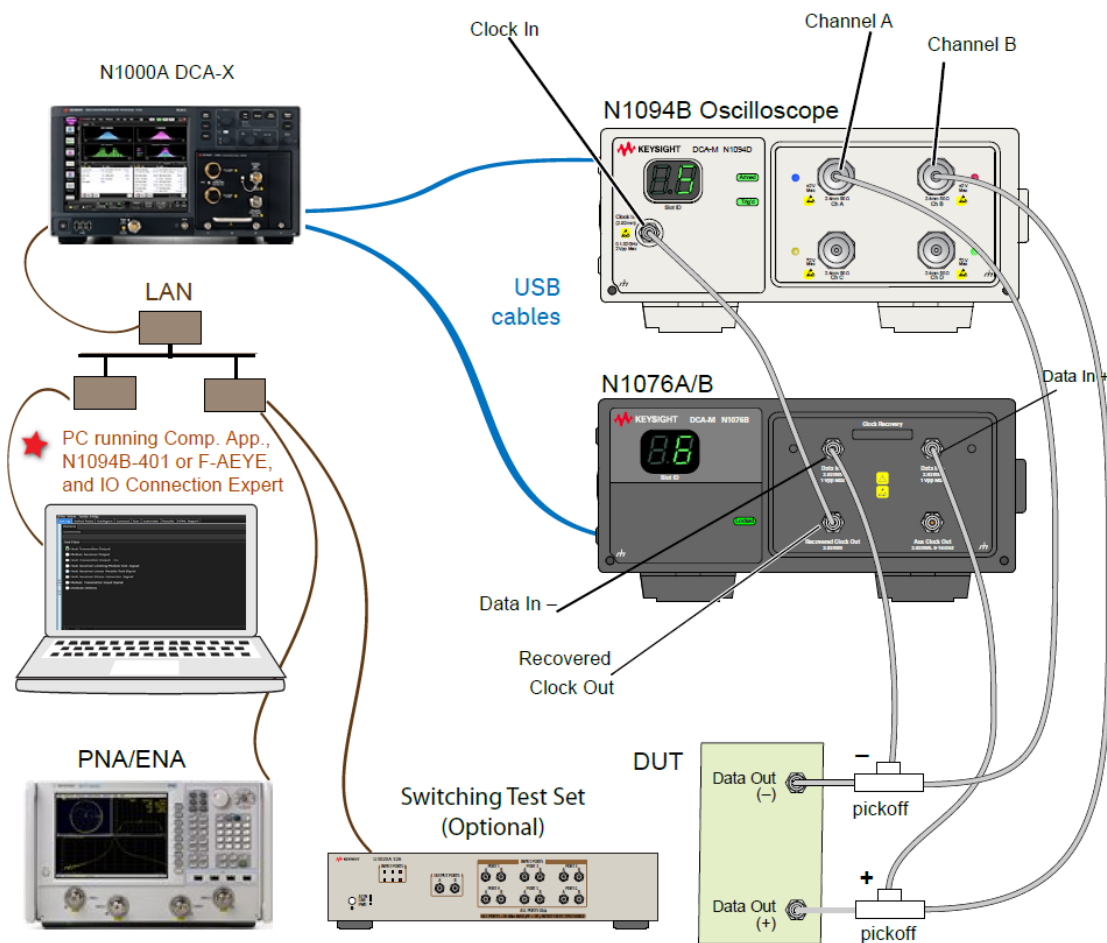


Figure 8 IEEE 802.3 NRZ Test App Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via N1000A DCA-X Oscilloscope

## Installing IEEE 802.3 NRZ Test App on the 86100D Oscilloscope

★ If your licenses allow for installing the software as marked by the red star in this diagram, go to [Chapter 4](#), “Installing IEEE 802.3 NRZ Test App on the oscilloscope”.

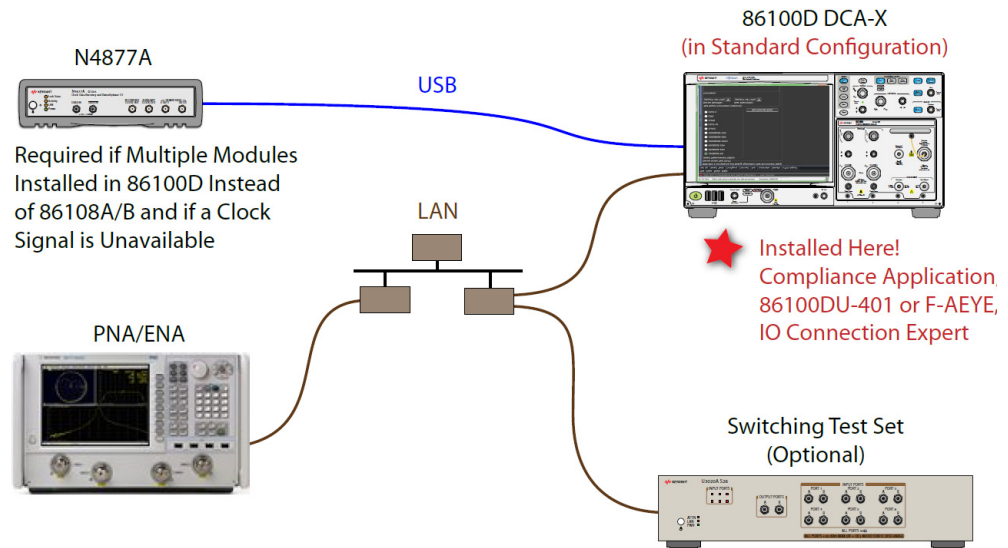


Figure 9 IEEE 802.3 NRZ Test App Installed on 86100D

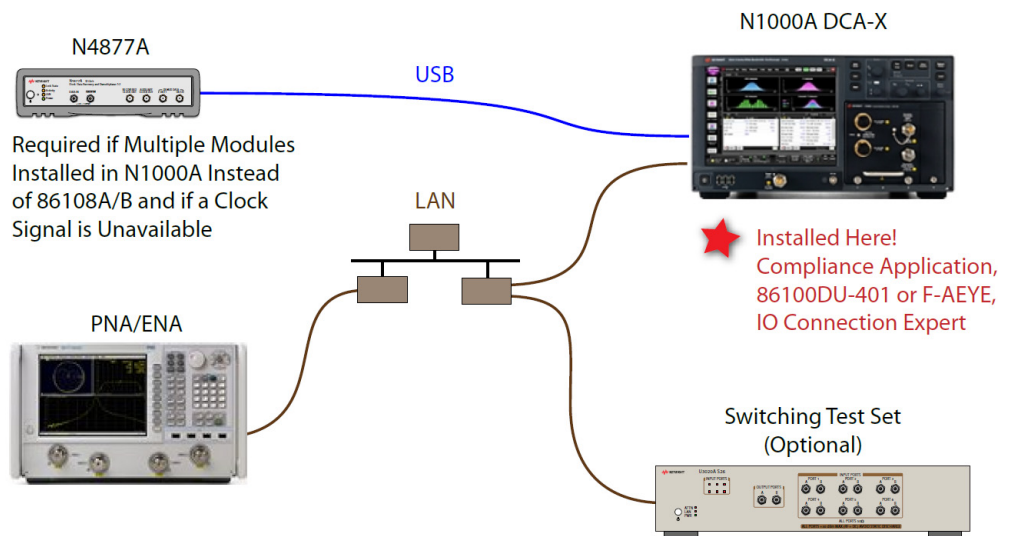


Figure 10 IEEE 802.3 NRZ Test App Installed on N1000A



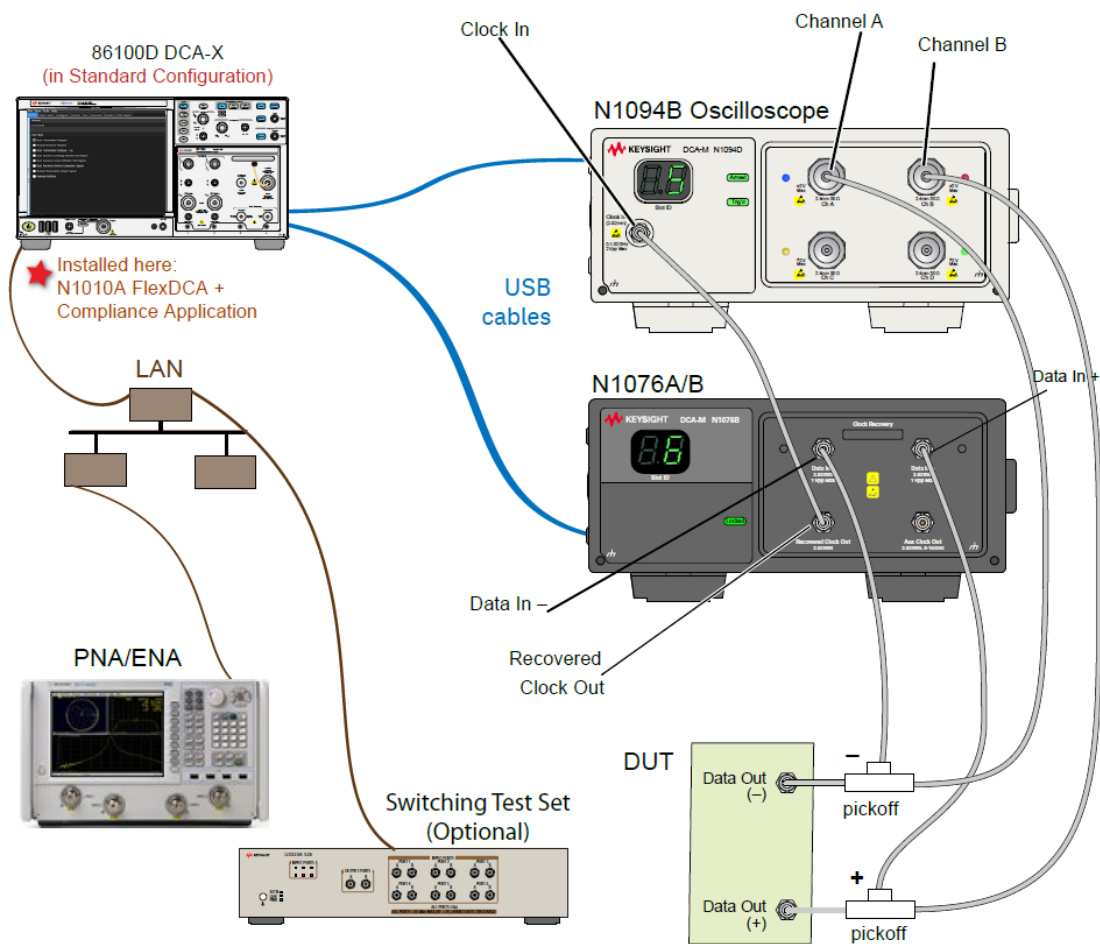


Figure 11 IEEE 802.3 NRZ Test App Installed on 86100D connected to a DCA-M setup

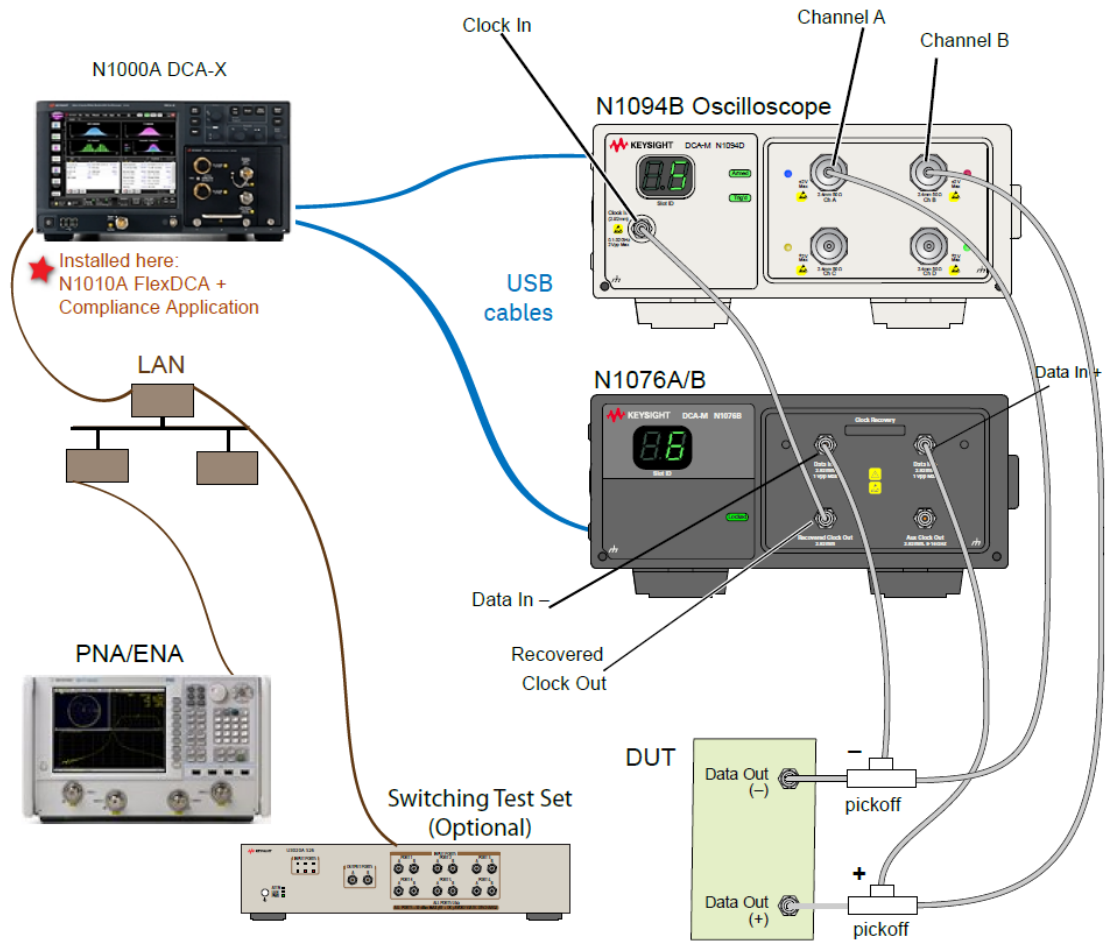


Figure 12 IEEE 802.3 NRZ Test App Installed on N1000A connected to a DCA-M setup

## Starting the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application

After you install the N1091..CA Series IEEE 802.3 NRZ 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 N1091..CA Series IEEE 802.3 NRZ Compliance Test Application:

- If the N1091..CA Series IEEE 802.3 NRZ 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 N1091..CA Series IEEE 802.3 NRZ Compliance Test Application”](#) on page 50.
- If the N1091..CA Series IEEE 802.3 NRZ 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 N1091..CA Series IEEE 802.3 NRZ Compliance Test Application”](#) on page 75.
- If the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application is installed on the N1000A or 86100D Oscilloscope, see [“Starting the IEEE 802.3 NRZ Test App-Series Compliance Test Application”](#) on page 92.

## Connecting to External Instruments

Most of the measurements in the N1091..CA Series IEEE 802.3 NRZ 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 N1091..CA Series IEEE 802.3 NRZ Compliance Test Application requires Socket connections for ENAs as well as 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 ENA/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.

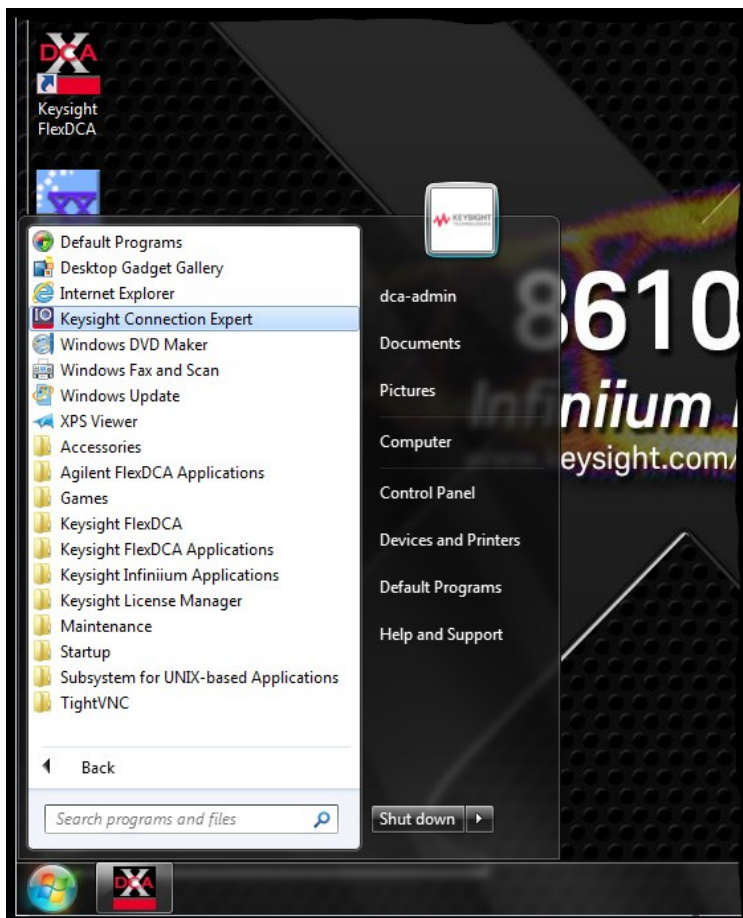


Figure 13 Launching the Keysight Connection Expert

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

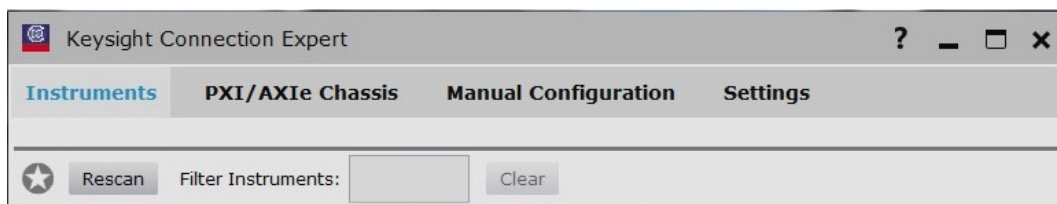


Figure 14 Tabs within Keysight Connection Expert

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

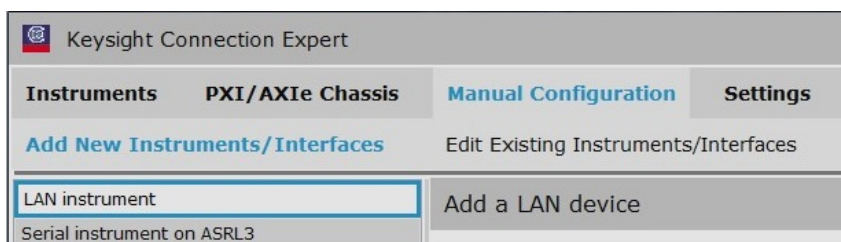


Figure 15 Performing Manual Configuration in Keysight Connection Expert

- 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.

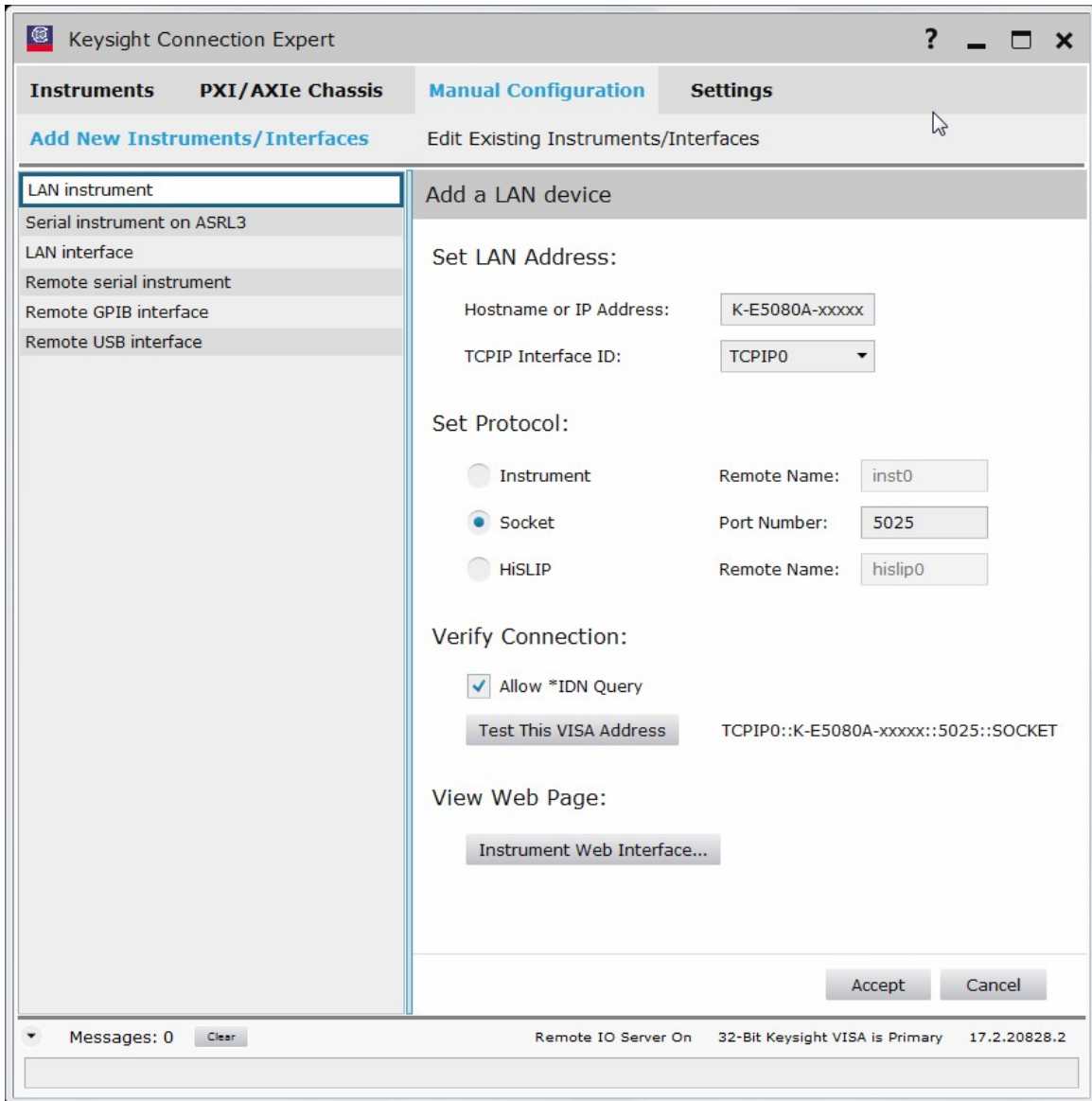


Figure 16 Adding a LAN device information in the Keysight Connection Expert

- 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 ENA/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.

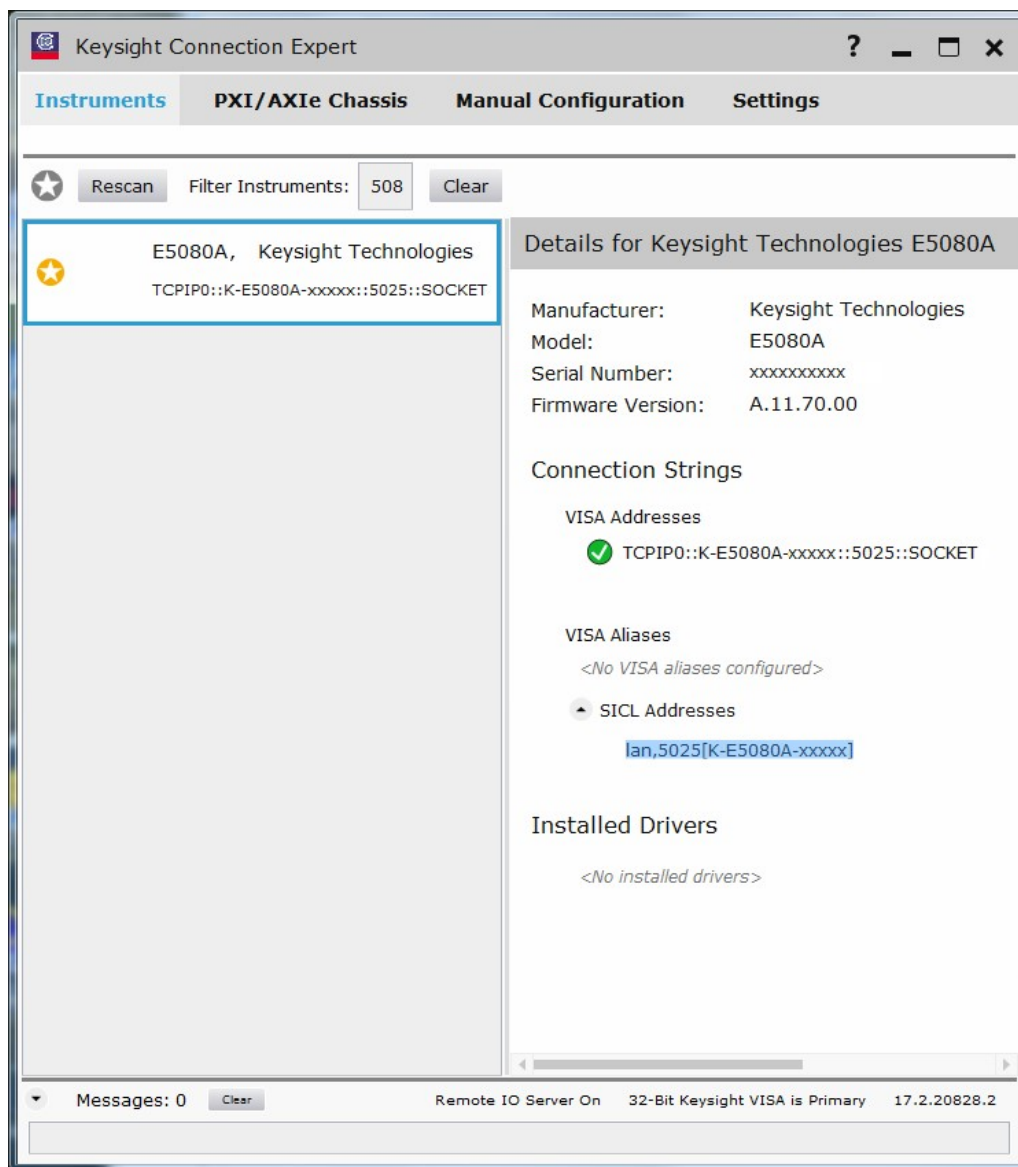


Figure 17 Copying Network Analyzer's SICL Address

- 8 Start the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application. Refer to [“Starting the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application”](#) on page 19 for instructions.

## 9 Connect to the Network Analyzer:

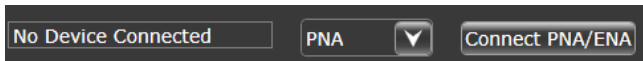


Figure 18 Default view of External Instruments area in the N1091..CA Series IEEE 802.3 NRZ Application

- a In the drop-down list at the bottom of the N1091..CA Series IEEE 802.3 NRZ application's main window, select **PNA** or **ENA** or **N1055A**.
- b Click **Connect PNA/ENA**. If you select PNA, the **Connect to PNA** window appears.

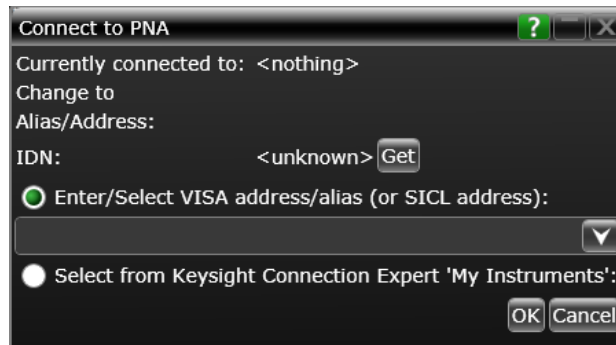


Figure 19 Connecting to the selected Network Analyzer

- 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 Relevant information is displayed once the connection to the selected instrument is established.

**Connection using Keysight Connection Expert 2017 (v18.0) and higher**

- 1 Locate and record the ENA/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 2017. Refer to [Keysight IO Libraries Suite](#) for information on how to install the Keysight Connection Expert 2017.



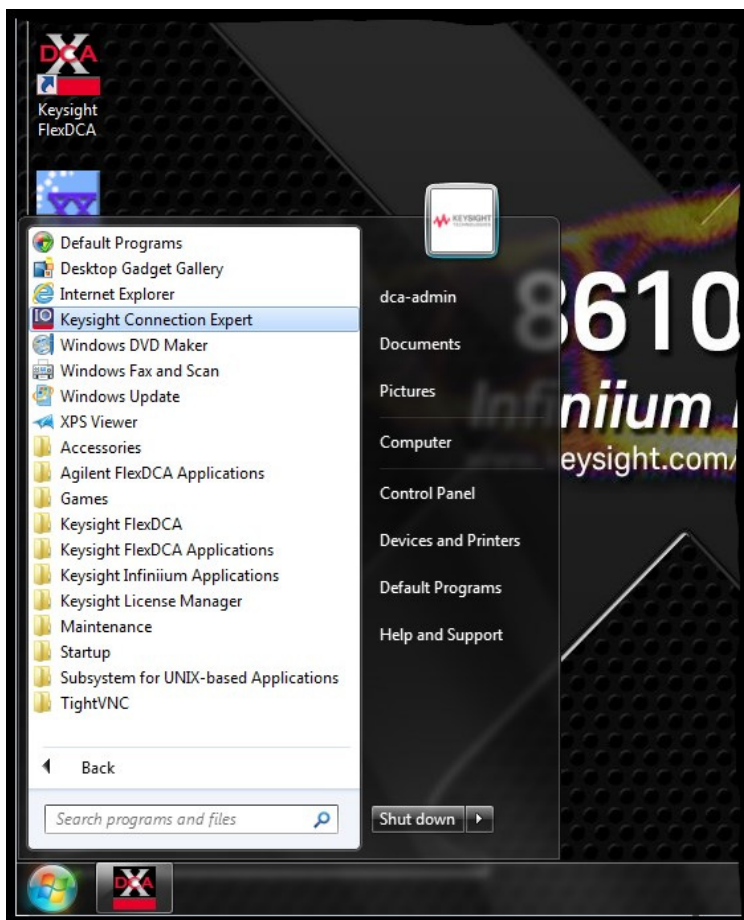


Figure 20 Launching the Keysight Connection Expert 2017

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

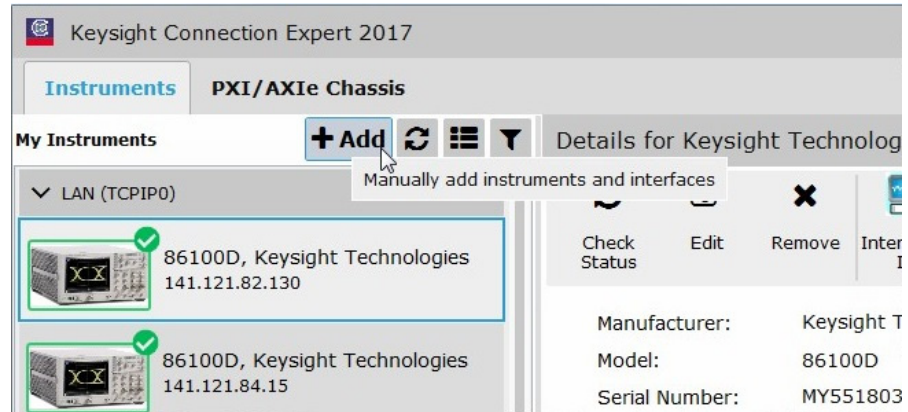


Figure 21 Adding LAN device manually in the Keysight Connection Expert 2017

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

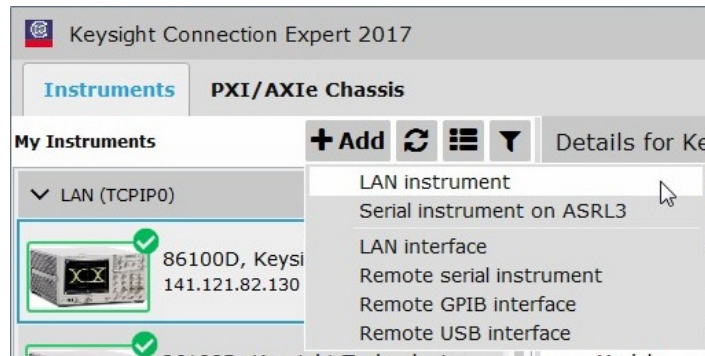


Figure 22 Selecting LAN instrument in the Keysight Connection Expert 2017

- 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.

The screenshot shows a dialog box titled "Add a LAN device" with a close button (X) in the top right corner. It has two tabs: "Select from List" and "Enter Address". The "Enter Address" tab is selected. The dialog is divided into several sections:

- Set LAN Address:**
  - Hostname or IP Address: K-E5080-xxxxx
  - TCPIP Interface ID: TCPIP0 (dropdown menu)
- Set Protocol:**
  - Instrument (VXI-11) (radio button, unselected)
  - HiSlip (radio button, unselected)
  - Socket (radio button, selected)
  - Remote Name: inst0
  - Remote Name: hislip0
  - Port Number: 5025
- Verify Connection:**
  - Allow \*IDN Query (checkbox, checked)
  - Test This VISA Address (button)
- View Web Page:**
  - Instrument Web Interface... (button)

At the bottom right, there are "OK" and "Cancel" buttons.

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 2017.

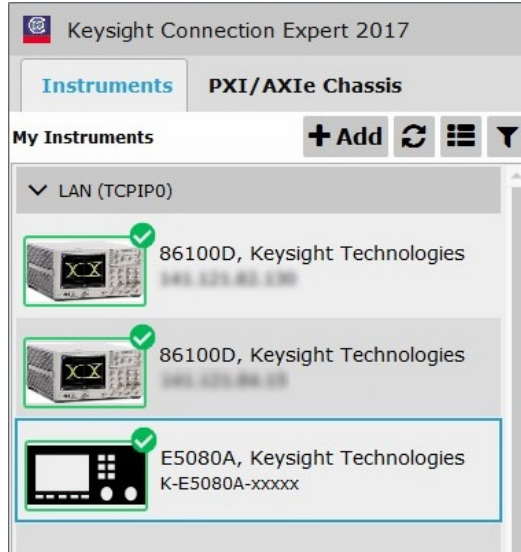


Figure 24 Selecting the connected Network Analyzer for SICL Address information

- b Click the ENA/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.

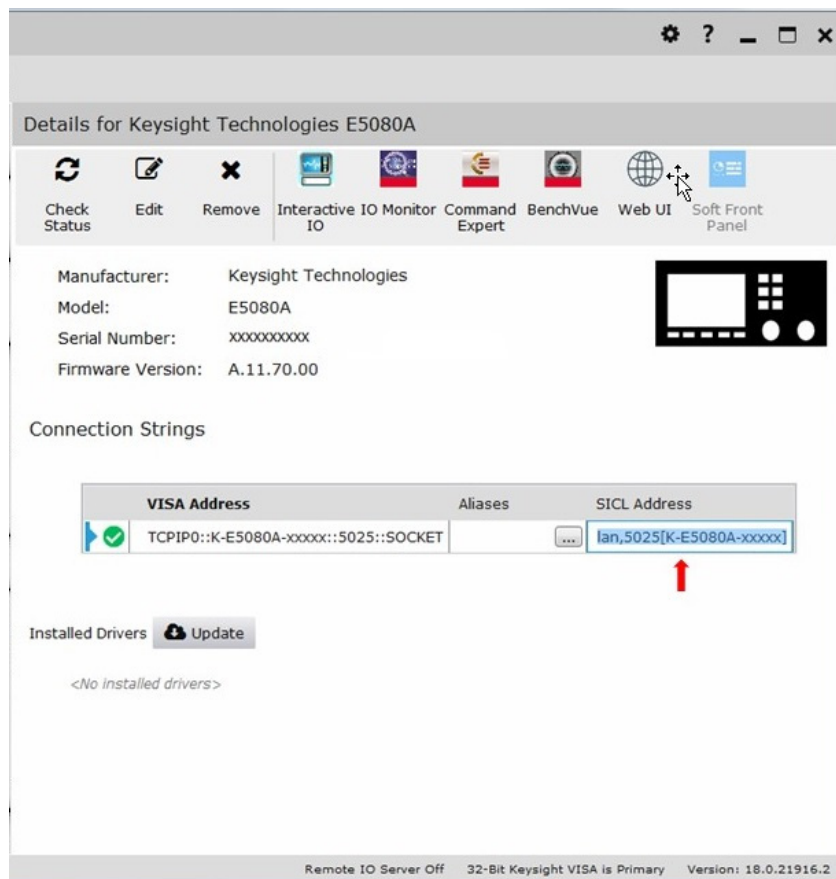


Figure 25 Copying Network Analyzer's SICL Address

- 8 Start the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application. Refer to "Starting the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application" on page 19 for instructions.

## 9 Connect to the Network Analyzer:

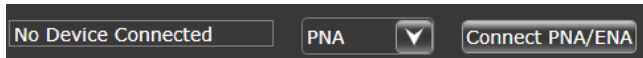


Figure 26 Default view of External Instruments area in the N1091..CA Series IEEE 802.3 NRZ Application

- a In the drop-down list at the bottom of the N1091..CA Series IEEE 802.3 NRZ application's main window, select **PNA** or **ENA** or **N1055A**.
- b Click **Connect PNA/ENA**. If you select PNA, the **Connect to PNA** window appears.

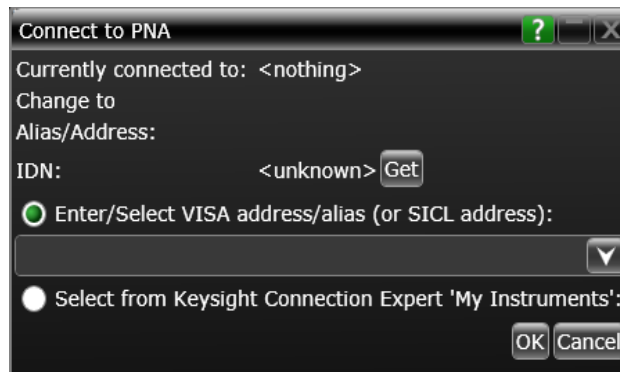


Figure 27 Connecting to the selected Network Analyzer

- 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 Relevant information is displayed once the connection to the selected instrument is established.

**NOTE**

For instructions on connecting to the Switch Matrix, refer to the Online Help for this application.

## 2 Installing IEEE 802.3 NRZ Test App and FlexDCA on a PC

Follow the instructions in this chapter when you are installing both the N1091..CA Series IEEE 802.3 NRZ application and the FlexDCA application on the PC. You must purchase and install a license for the 86100DU-401 (for DCA-X oscilloscopes) or N109x-401 (for DCA-M oscilloscopes). Once the license is installed, the 86100DU-401 or N109x-401 software will be enabled.

### NOTE

When you redeem an N1091..CA Series IEEE 802.3 NRZ license, you must select whether to install the application on a specific 86100D Oscilloscope or a specific PC.

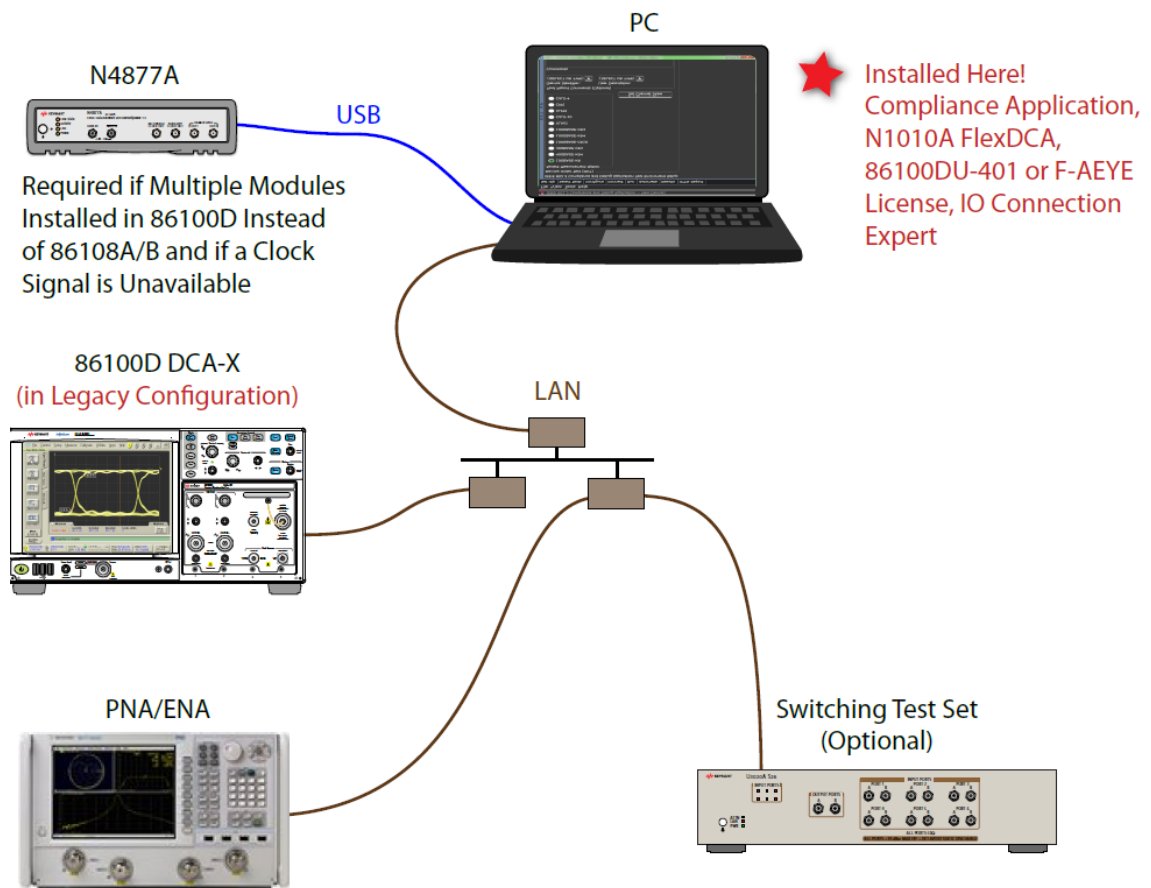


Figure 28 IEEE 802.3 NRZ Test App and N1010A FlexDCA Installed on PC (using 86100D oscilloscope)

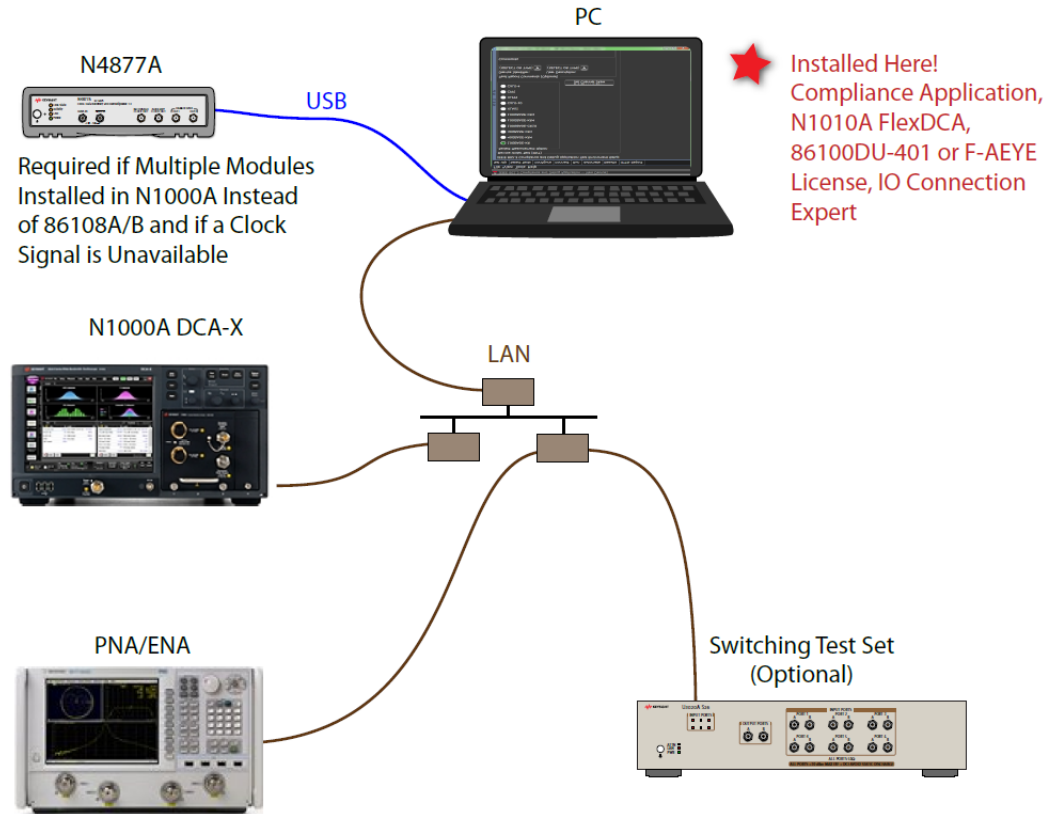


Figure 29 IEEE 802.3 NRZ Test App and N1010A FlexDCA Installed on PC (using N1000A oscilloscope)



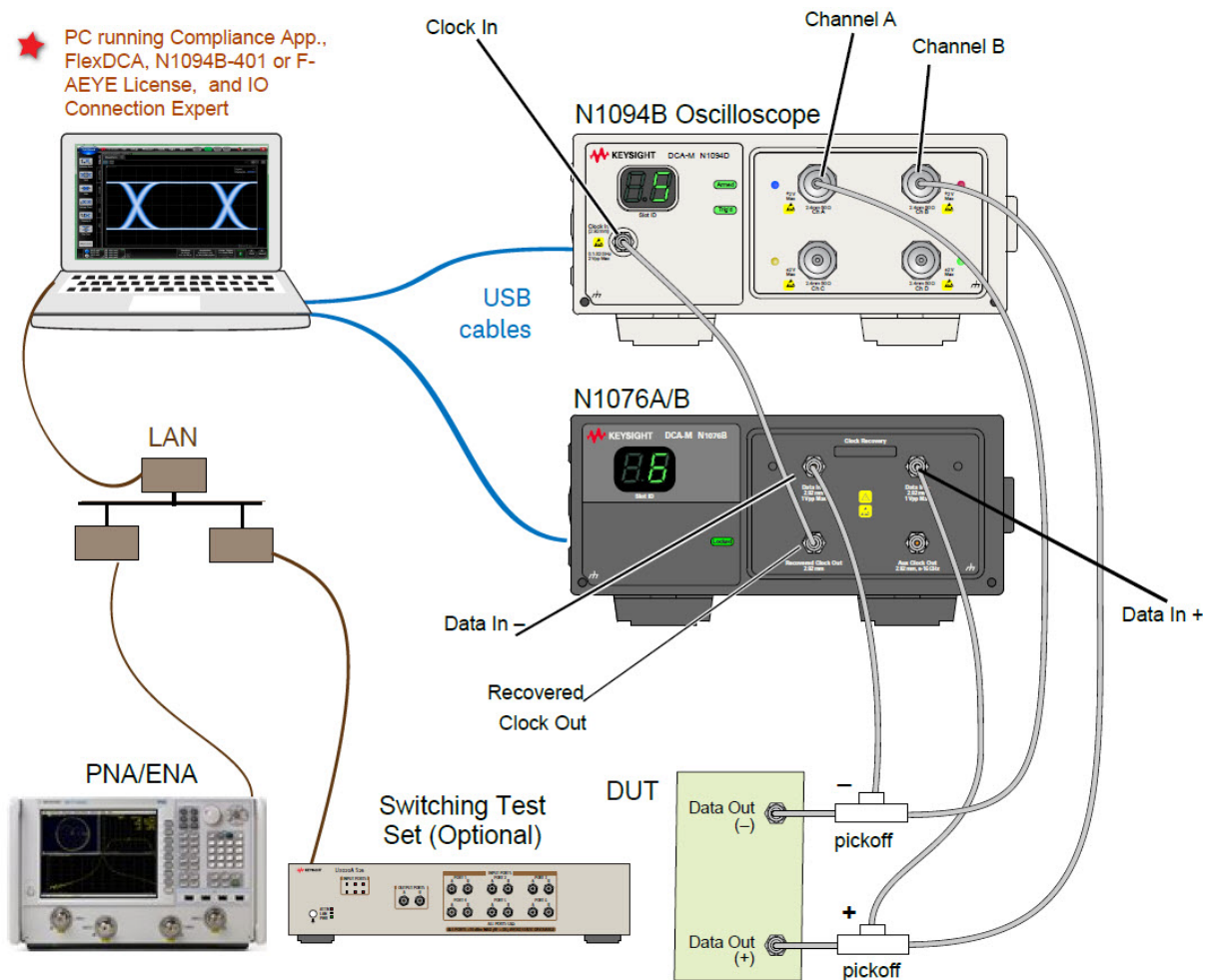


Figure 30 IEEE 802.3 NRZ Test App and N1010A FlexDCA Installed on PC connected to N1094B DCA-M Oscilloscope

**NOTE**

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

## Connecting the Equipment

- 1 For a DCA-X oscilloscope, install one of the module combinations listed in [Table 3](#) into the 86100D or N1000A.

**Table 3** Module combinations for DCA-X Oscilloscope

Installed Module Configurations	Single Plug-In Module Setup	Multiple Plug-In Module Setup	Description
86108A/B N1060A	Available		The 86108B can have either options LBW or HBW plus 216 or 232.
86112A, 54754A, 86117A, or 86118A-H01 86107A (any option) N4877A, N1076 A/B, N1077A, N1078A Clock Data Recovery Options 216/232* N1040A N1045A, N1045B, and N1055A, N1046A 75/85/100 GHz		Available	Option 216 provides a maximum data rate of 16 Gb/s. Option 232 provides a maximum data rate of 32 Gb/s.

\* If you have access to the clock for the device, you can connect the clock to the 86100D's or N1000A's **Trigger** input *instead* of using the CDR.

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

**Table 4** 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 any of the above figures and power on all of the instruments.

## Installing the I/O Library Suite

- 1 Navigate to [www.keysight.com/find/iosuite](http://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 N1091..CA Series IEEE 802.3 NRZ 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.

- 1 Locate the N1010A FlexDCA Software's product page on the 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.

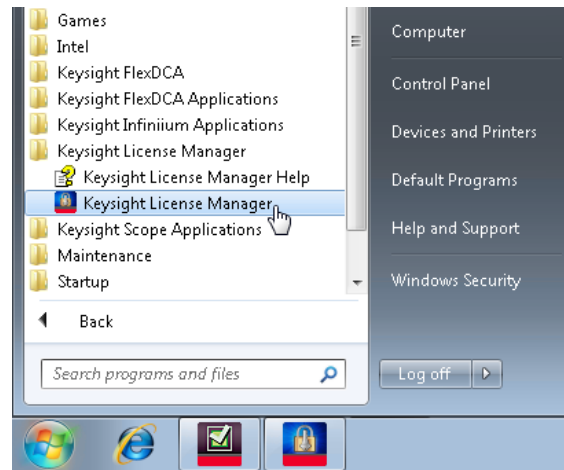


Figure 31 Launching Keysight Connection Expert from the Start menu

### 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.

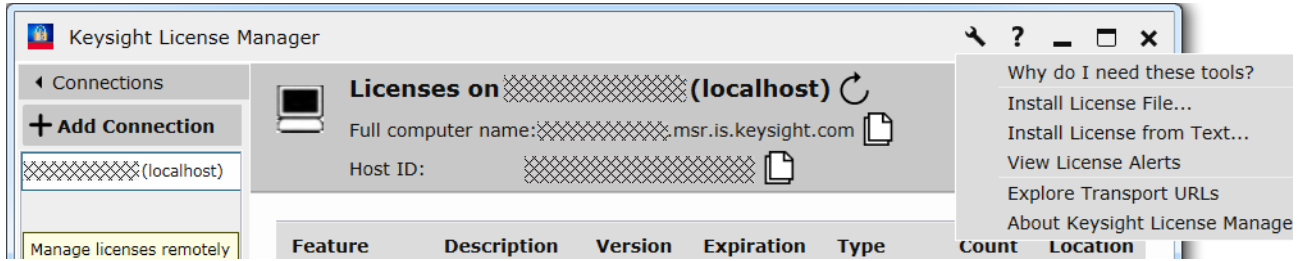


Figure 32 Installing license file on Keysight License Manager version 5.1 & above

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

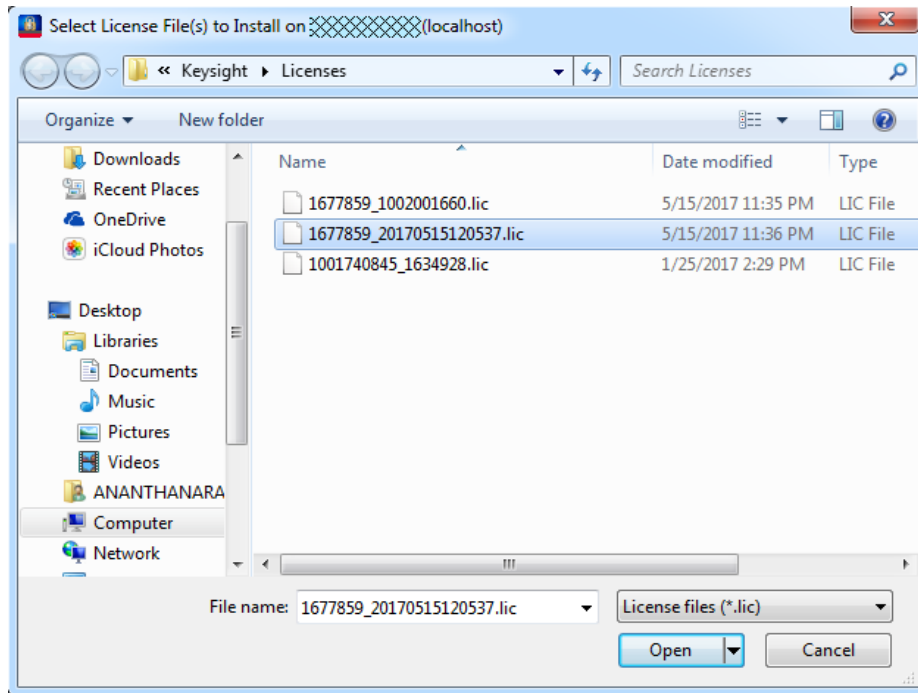


Figure 33 Selecting license file from the folder

- 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.

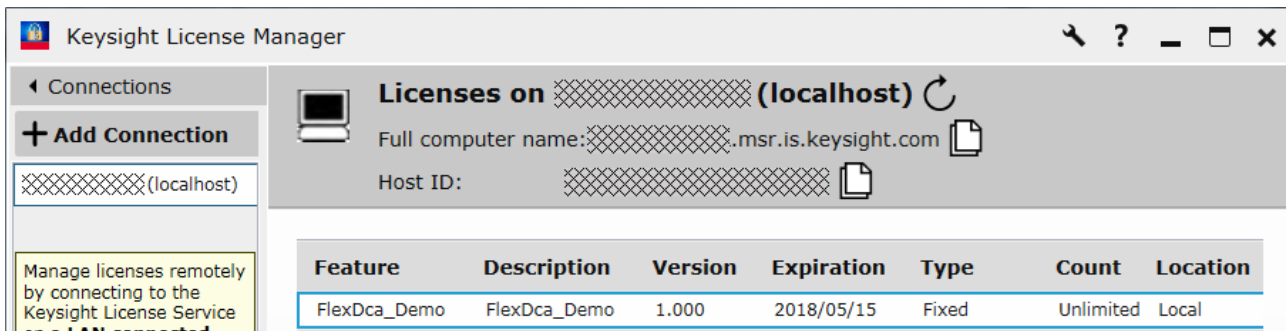


Figure 34 Licenses displayed in Keysight License Manager version 5.1 & above

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...**

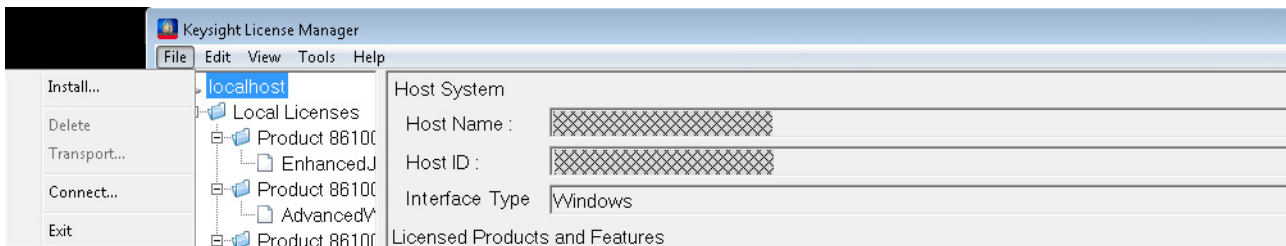


Figure 35 Installing license file on Keysight License Manager version 5.0 or earlier

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

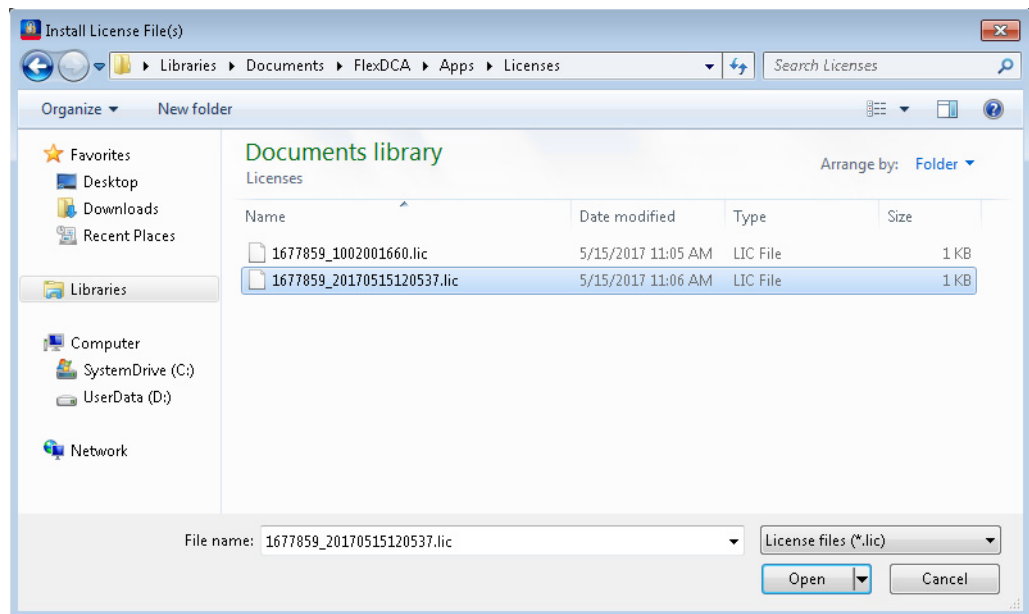


Figure 36 Selecting license file from the folder

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.

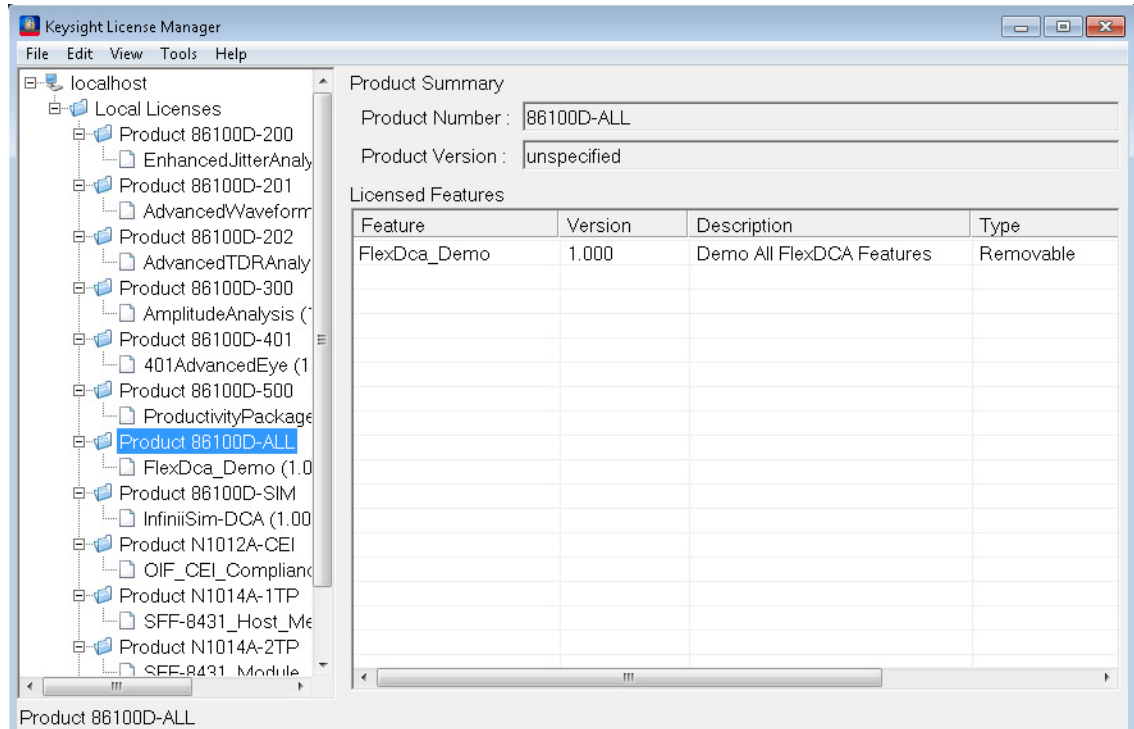


Figure 37 Licenses displayed in Keysight License Manager version 5.0 or earlier

- 5 Close the Keysight License Manager.

## Installing the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application

Follow the steps below to install the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application and its license as well as the license for the 86100DU-401 or N109x-401.

- 1 Go to [www.keysight.com](http://www.keysight.com) and search for and download the compliance application.
- 2 Download the installer file and install the application on the PC for which you have redeemed the license.

### NOTE

When you redeem an N1091..CA Series IEEE 802.3 NRZ 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, F-AEYE, 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.

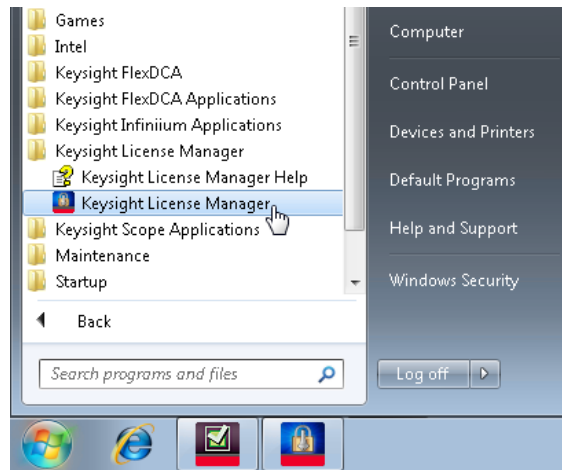


Figure 38 Launching Keysight Connection Expert from the Start menu

### 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 N1091..CA Series IEEE 802.3 NRZ 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.

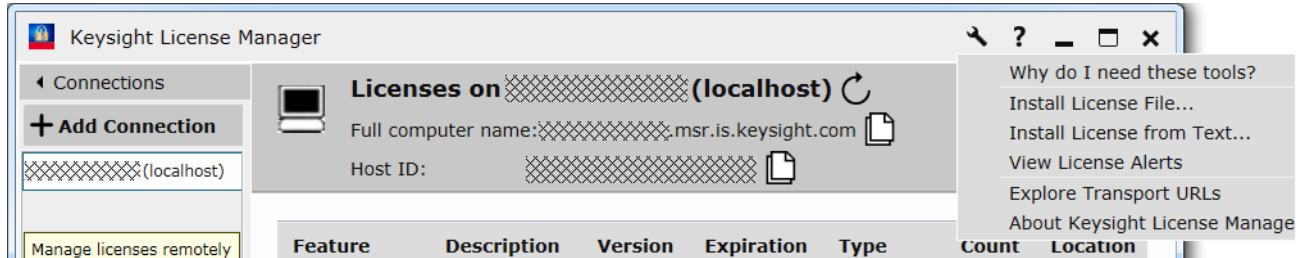


Figure 39 Installing license file on Keysight License Manager version 5.1 & above

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

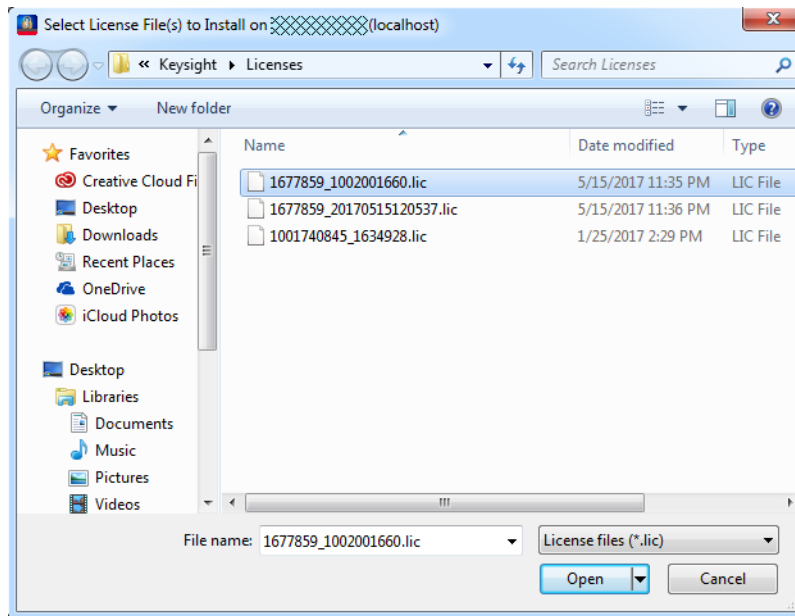


Figure 40 Selecting license file from the folder

- 3 Navigate to the folder where the N1091..CA Series IEEE 802.3 NRZ 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 N1091..CA Series IEEE 802.3 NRZ 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...**

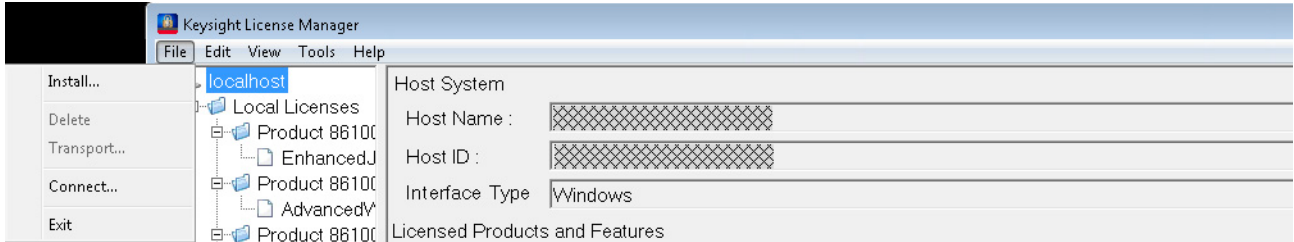


Figure 41 Installing license file on Keysight License Manager version 5.0 or earlier

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

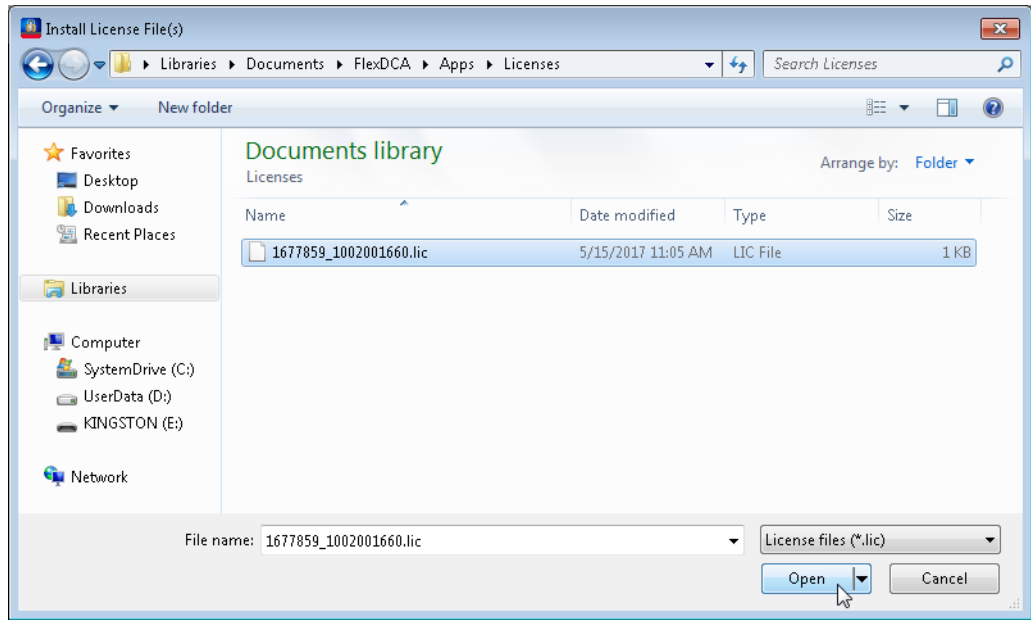


Figure 42 Selecting license file from the folder

- 3 Navigate to the folder where the N1091..CA Series IEEE 802.3 NRZ 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.

Using same procedure, you can install the 86100DU-401 license.

## Connecting N1010A FlexDCA to 86100D or N1000A

**NOTE**

If you are using the N1010A FlexDCA Software on your PC to launch the N1091..CA Series IEEE 802.3 NRZ 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.

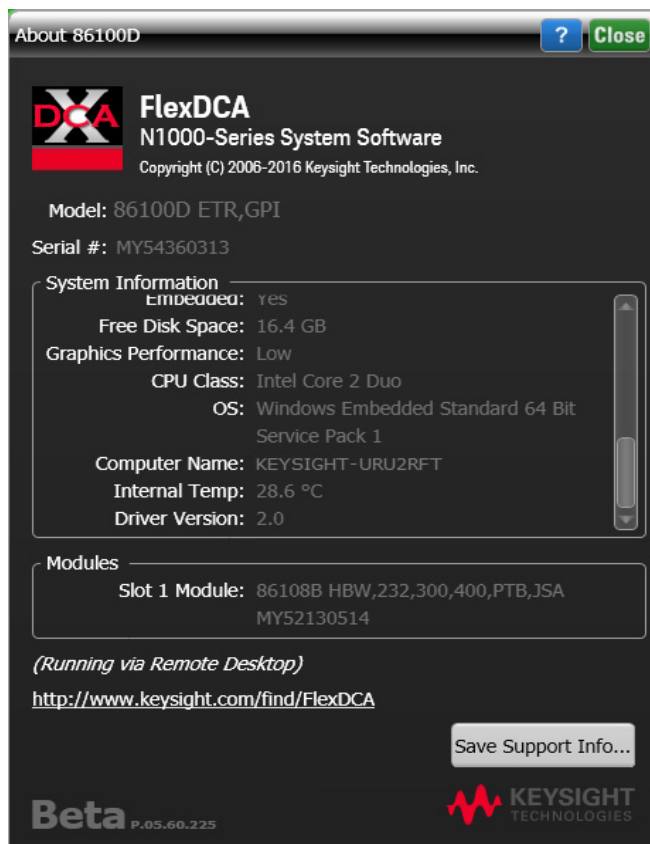


Figure 43 86100D Oscilloscope's hostname

- 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.

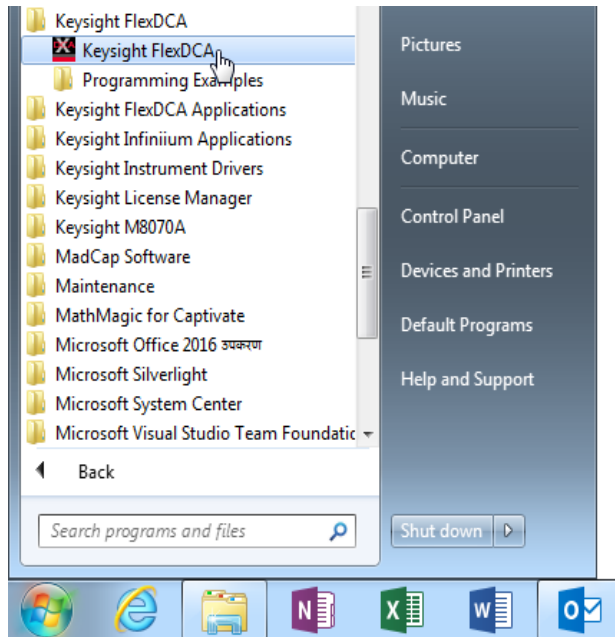


Figure 44 Launching the N1010A FlexDCA Software on PC

- 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**.

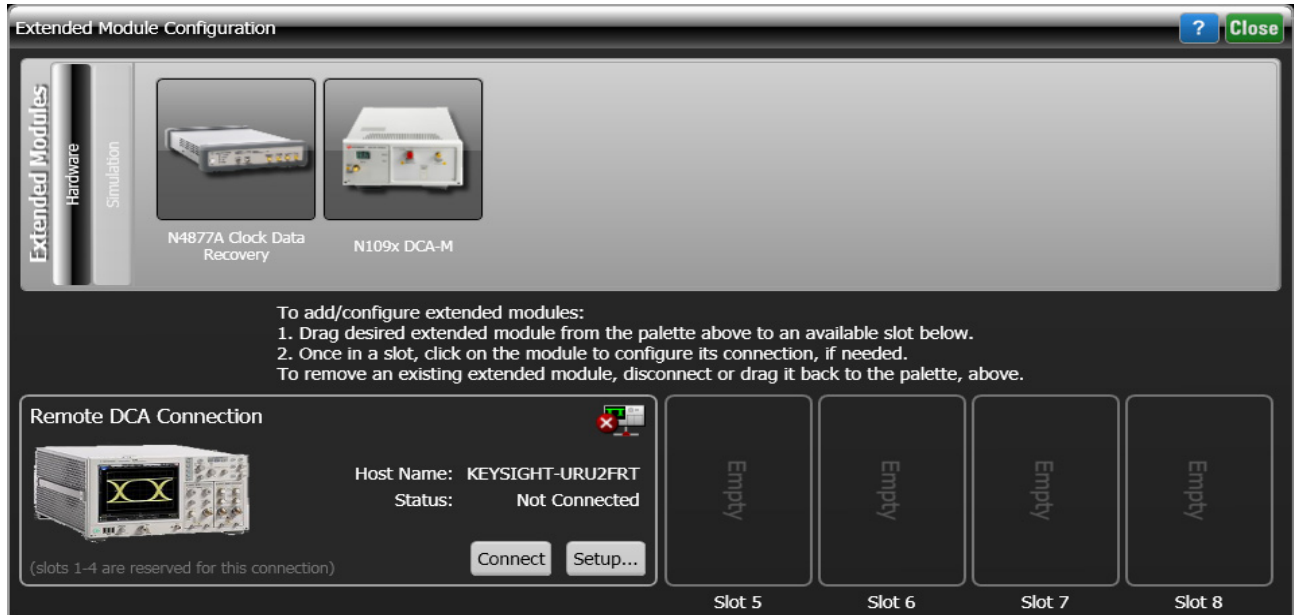


Figure 45 Extended Module Configuration dialog box for connecting N1010A FlexDCA to 86100D

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.

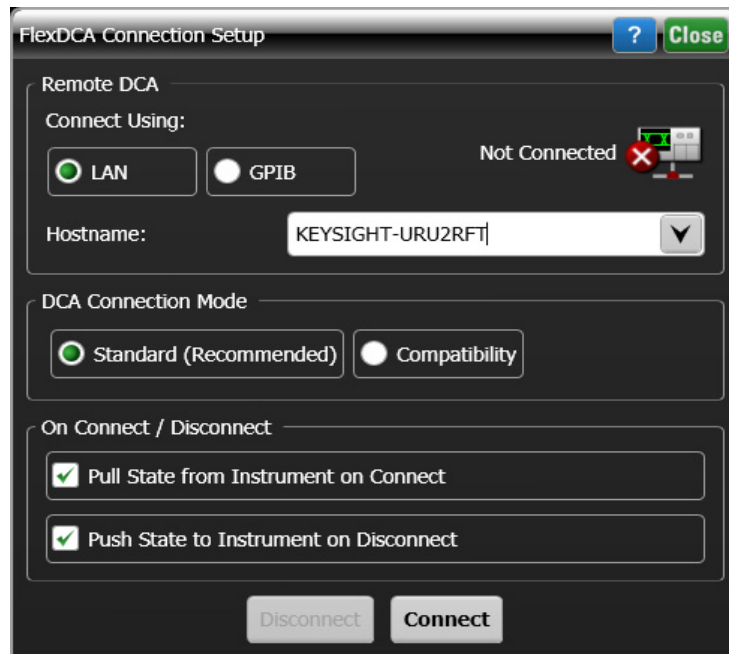


Figure 46 N1010A FlexDCA Connection Setup to connect to 86100D Oscilloscope

9 Click **Connect**.

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

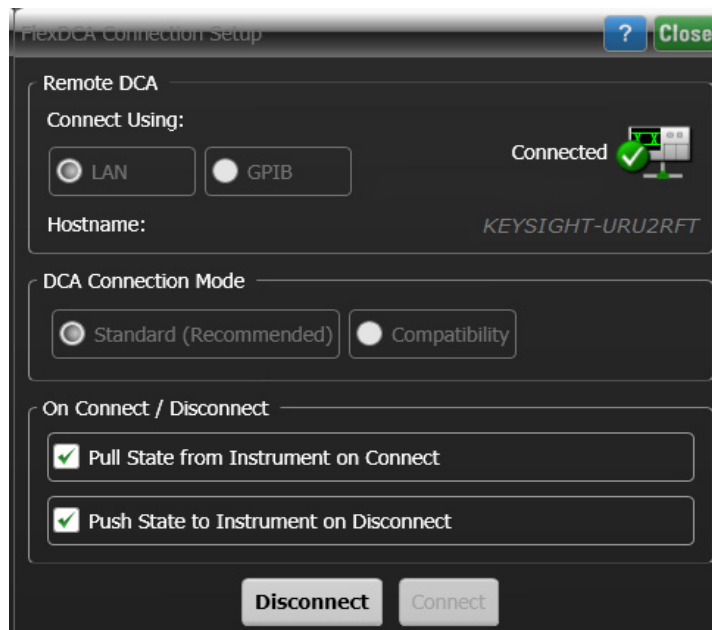


Figure 47 86100D Oscilloscope connection status on the FlexDCA Connection Setup

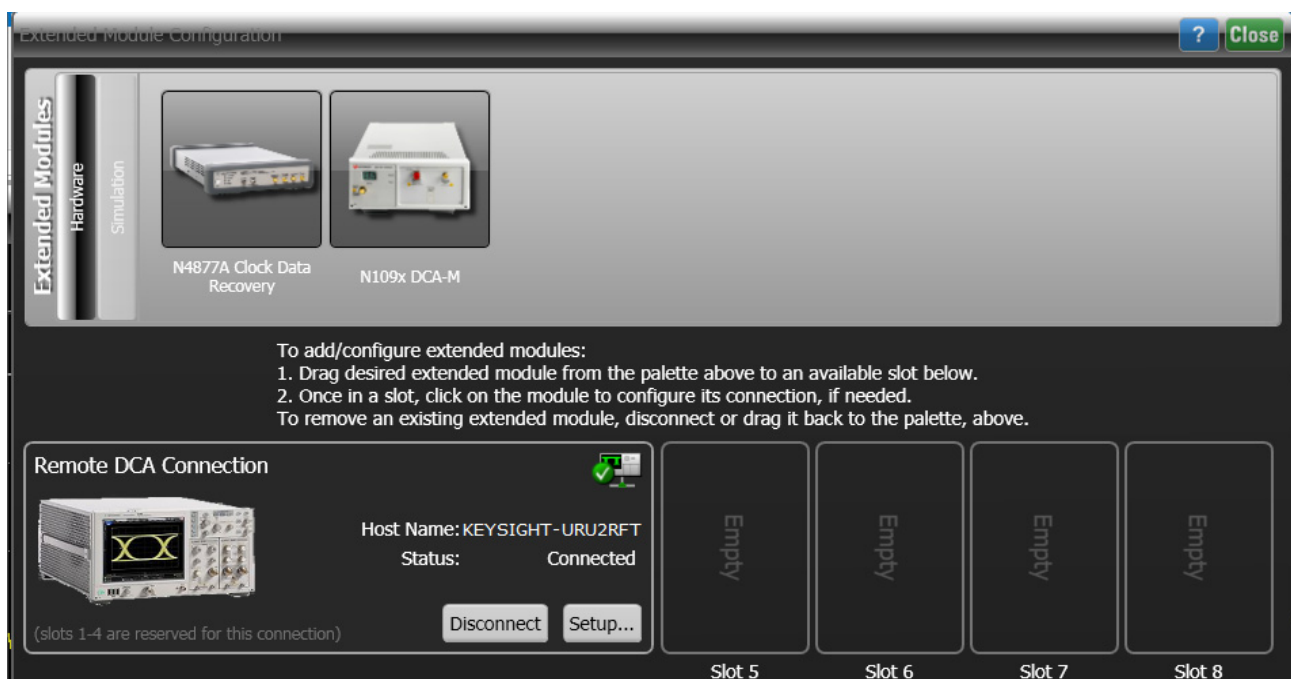
10 Click **Close** to exit the **FlexDCA Connection Setup** dialog box.11 Click **Close** to exit the **Extended Module Configuration** window.

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.

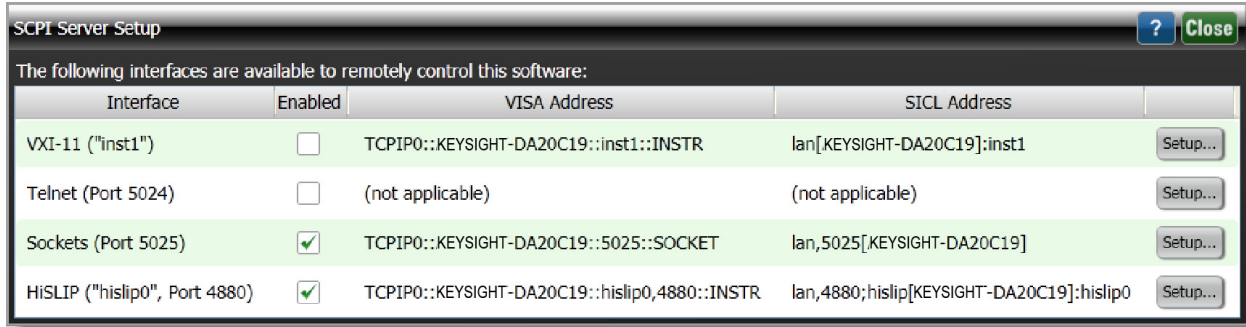


Figure 49 FlexDCA's SCPI Server Setup Dialog Box

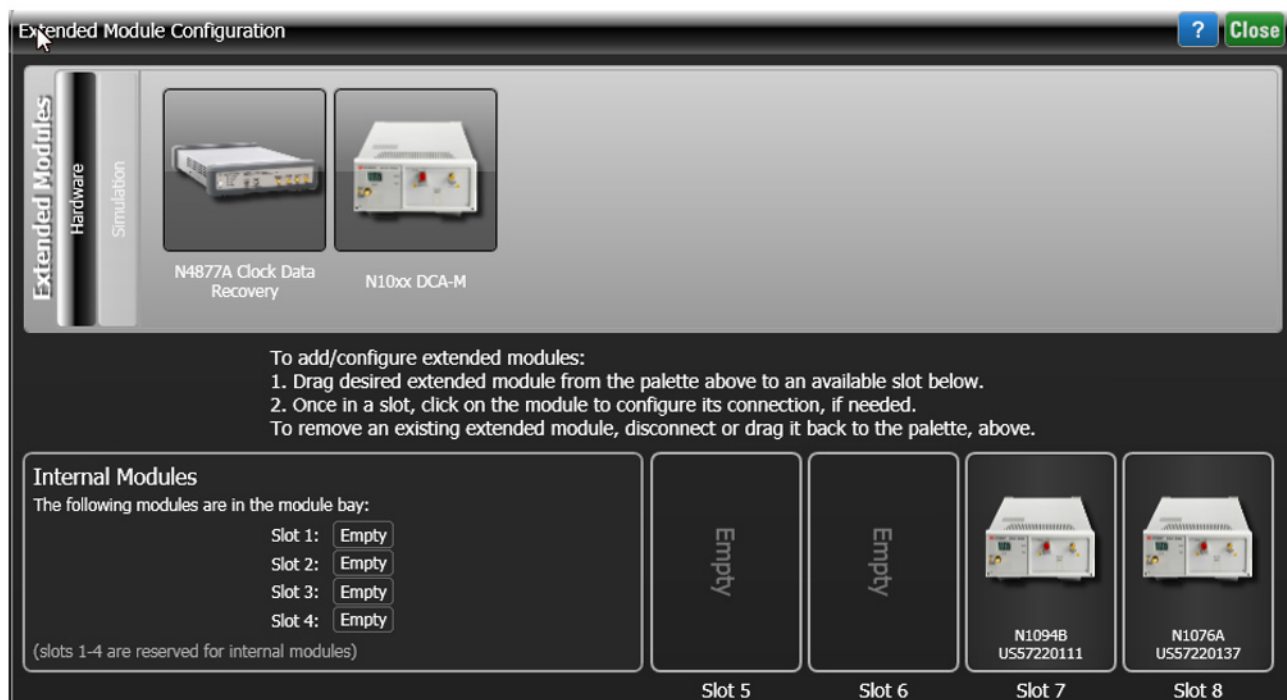
- 15 Once the connection is established, you may proceed to launch the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application on your PC.



## 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 N1091..CA Series IEEE 802.3 NRZ Compliance Test Application on your PC.

## Starting the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application

After you install the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application on a PC along with the N1010A FlexDCA interface, start the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application in one of the following ways:

### Access the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application directly from the Start menu

Refer to [“Starting the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application”](#) on page 75, where the procedure to start the application directly (that is, without launching the N1010A FlexDCA Software) is described.

### Access the N1091..CA Series IEEE 802.3 NRZ 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 [“Connecting N1010A FlexDCA to 86100D or N1000A”](#) on page 43.
- 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](#).

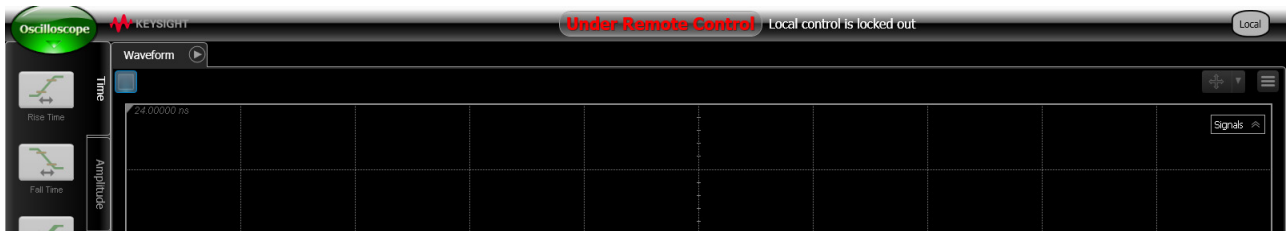


Figure 50 N1010A FlexDCA under Remote Control

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

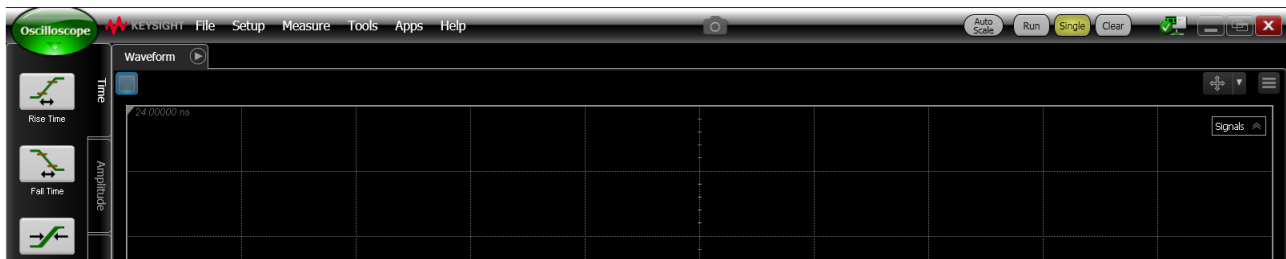


Figure 51 N1010A FlexDCA Remote App under Remote Control

- 3 From the FlexDCA's main menu, click **Apps>Automated Test Apps>IEEE 802.3 NRZ Test App**.
  - 4 The N1091..CA Series IEEE 802.3 NRZ Compliance Test Application banner appears.
- The default view of the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application appears.

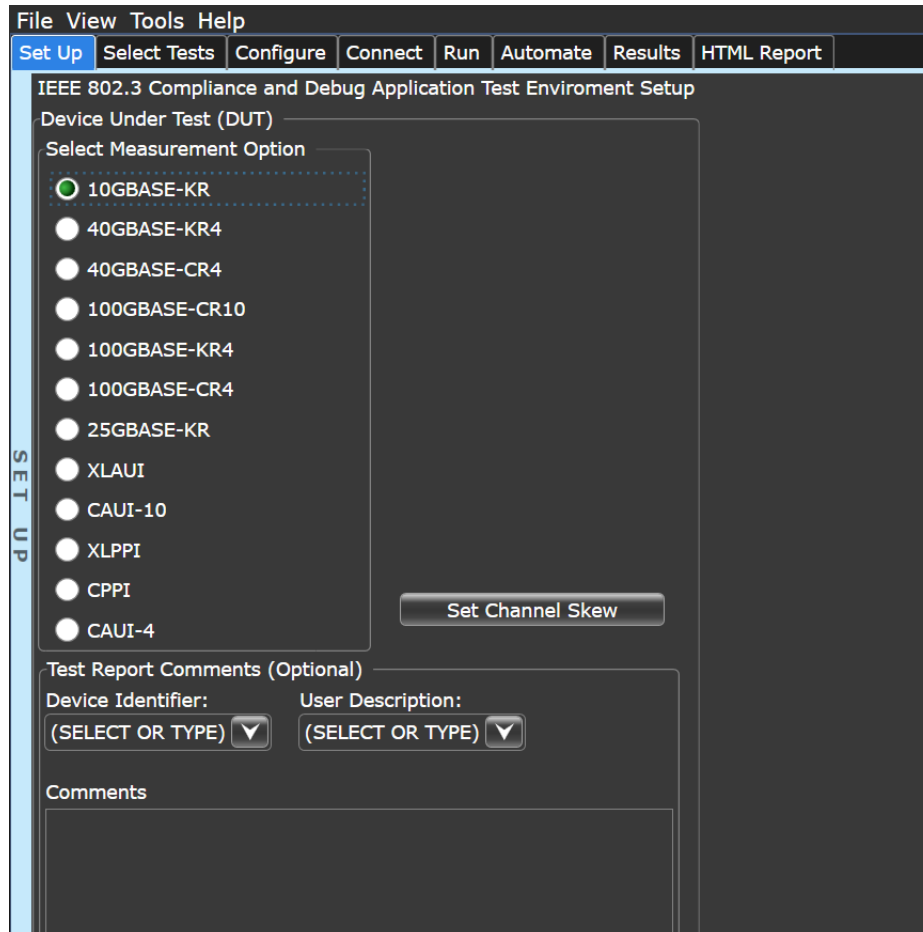


Figure 52 Default window of the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application

## Connecting to the Network Analyzer

Refer to [“Connecting to External Instruments”](#) on page 20 for connecting to the network analyzer you are using.

## Connecting to the N4877A

The N4877A is used whenever multiple N1000A or 86100D modules are used in the test setup rather than an 86108A/B module. Refer to [Table 3](#) on page 34.

### NOTE

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

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.

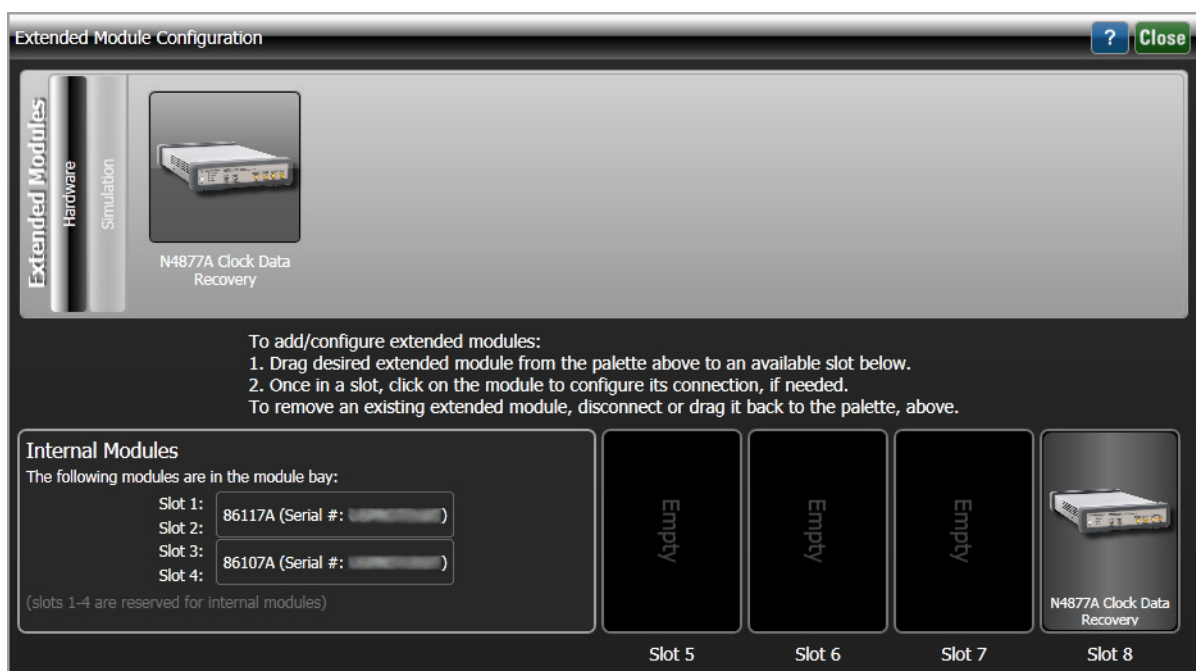


Figure 53 The Extended Module Configuration with the N4877A in Slot 8

## Connecting to the Switch Matrix

**NOTE**

For instructions on connecting to the Switch Matrix, refer to the Online Help for this application.

---

### 3 Installing IEEE 802.3 NRZ Test App on a PC Without N1010A FlexDCA

Follow the instructions in this chapter when you are installing the N1091..CA Series IEEE 802.3 NRZ 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 or N109X-401. Once the license is installed, the 86100DU-401 or N109X-401 software will be enabled.

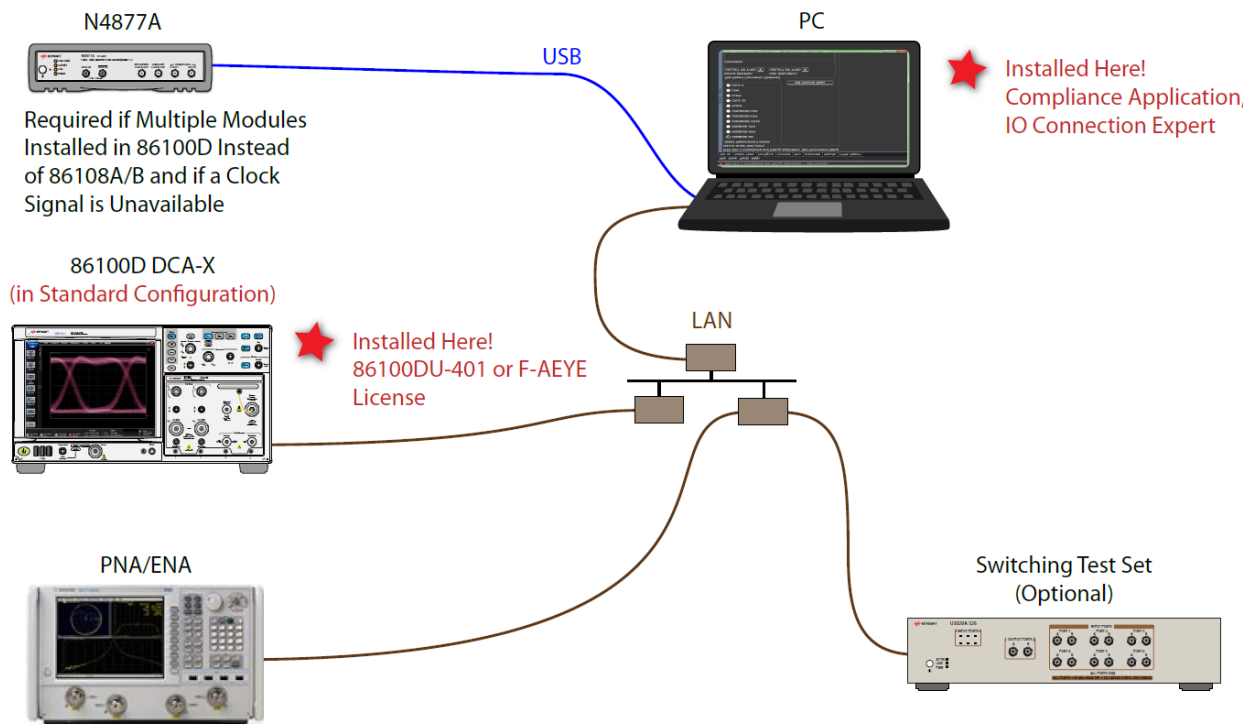


Figure 54 IEEE 802.3 NRZ Test App Installed on PC Without N1010A FlexDCA connected to 86100D DCA-X Oscilloscope

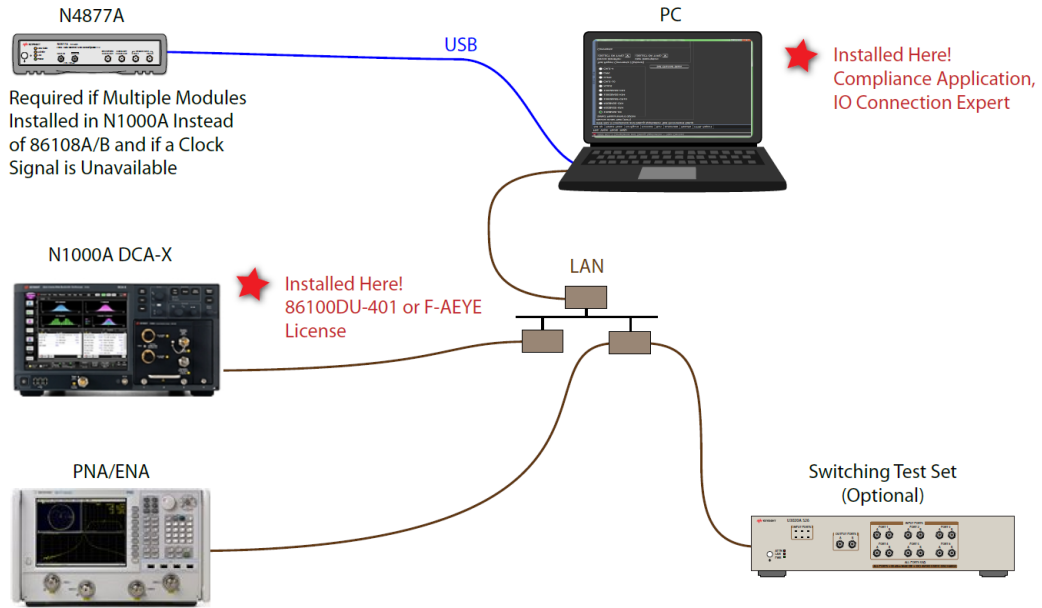


Figure 55 IEEE 802.3 NRZ Test App Installed on PC Without N1010A FlexDCA connected to N1000A DCA-X Oscilloscope



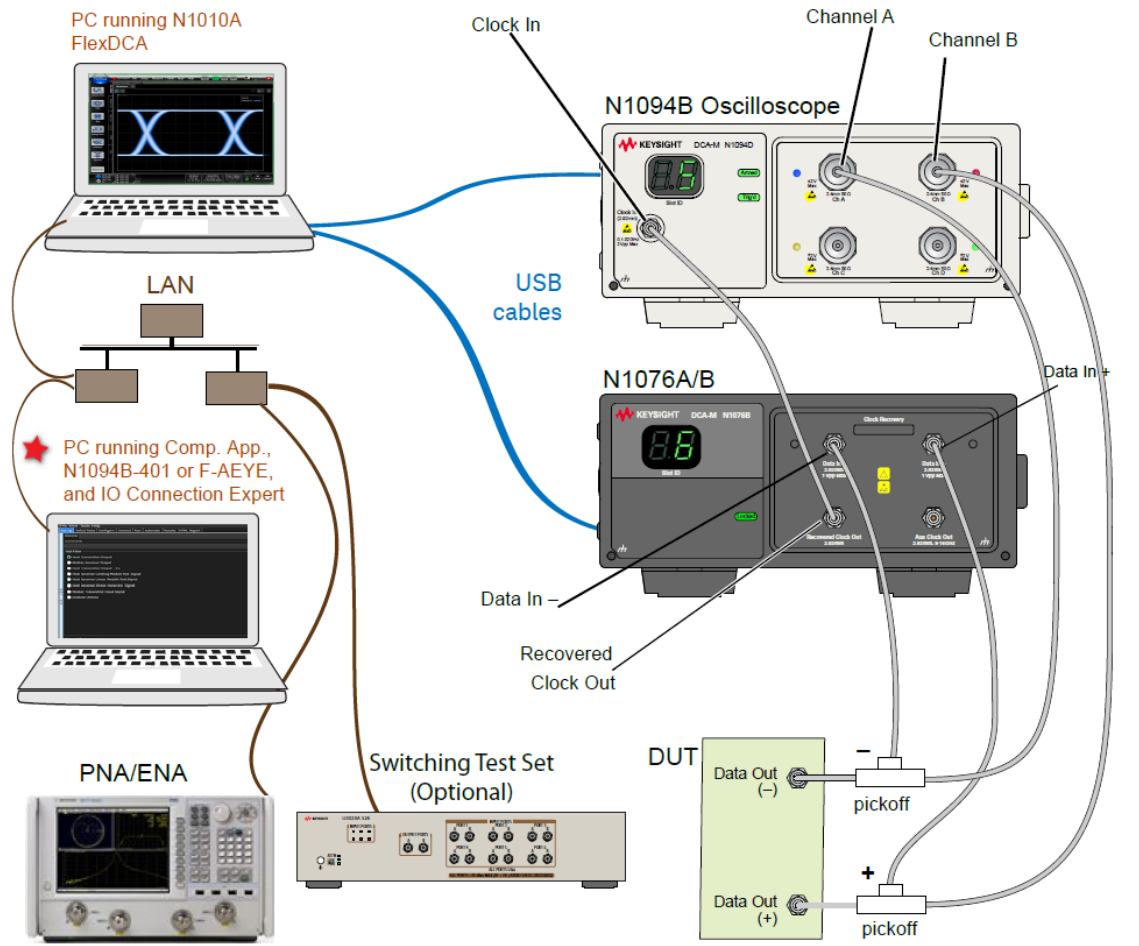


Figure 56 IEEE 802.3 NRZ Test App Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via another PC

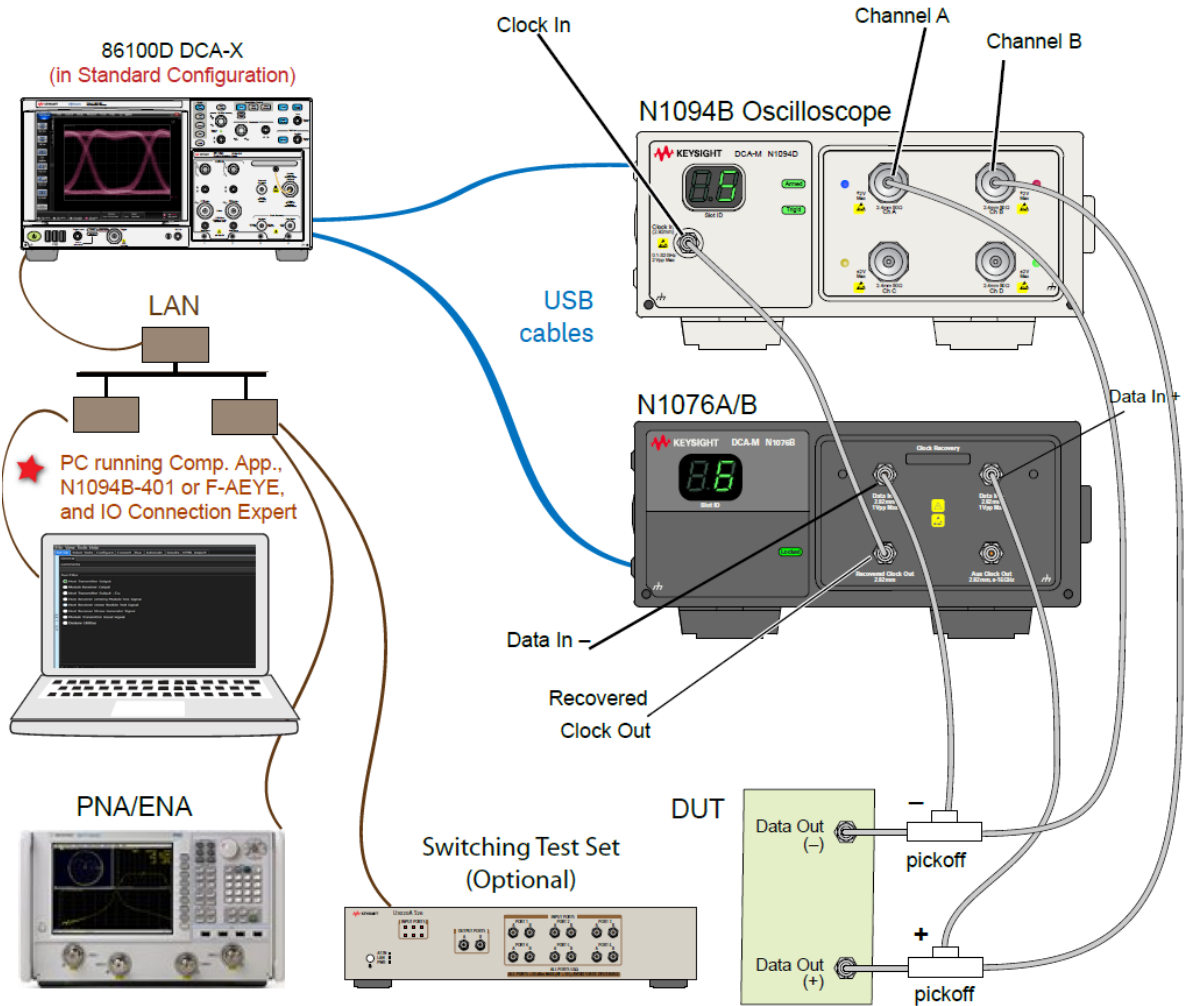


Figure 57 IEEE 802.3 NRZ Test App Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via 86100 DCA-X Oscilloscope

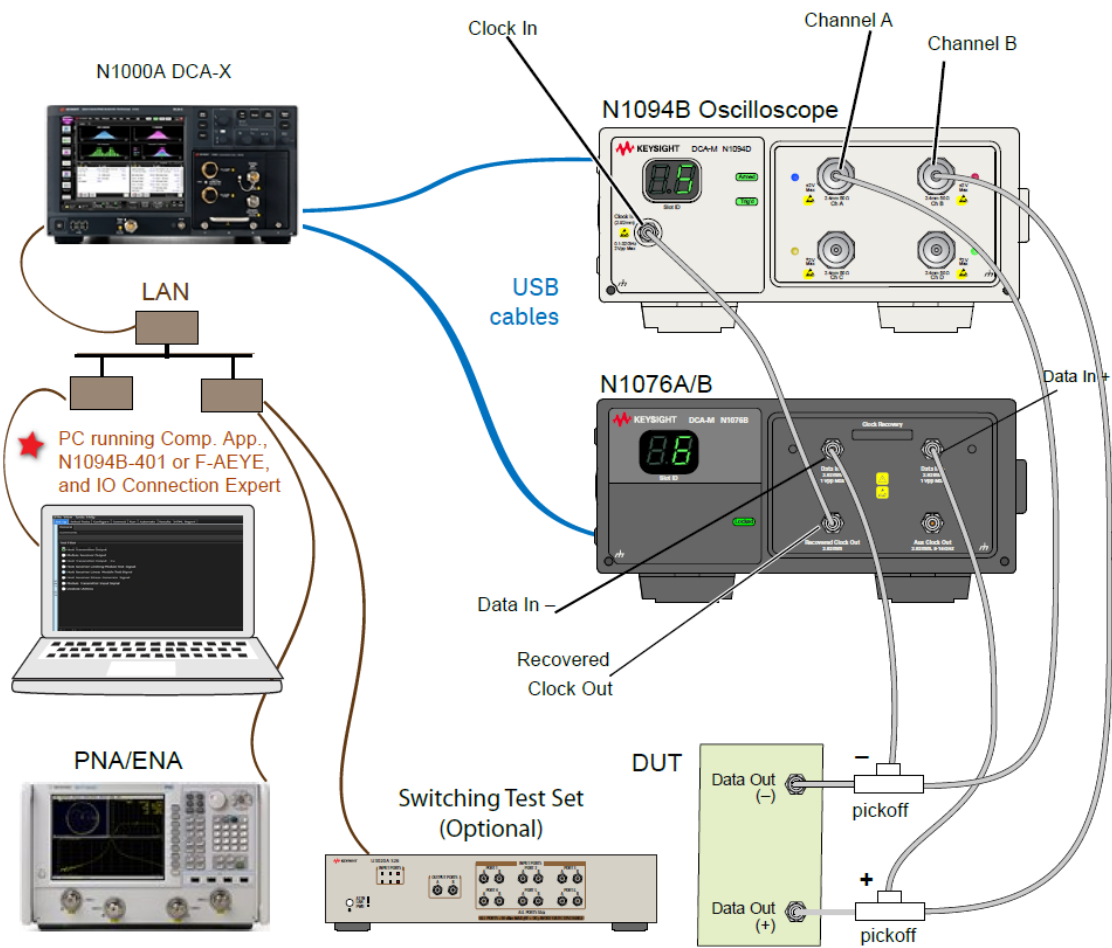


Figure 58 IEEE 802.3 NRZ Test App Installed on PC Without N1010A FlexDCA connected to N1094B DCA-M Oscilloscope via N1000A DCA-X Oscilloscope

**NOTE**

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

## Connecting the Equipment

- 1 For a DCA-X oscilloscope, install one of the module combinations listed in [Table 5](#) into the 86100D or N1000A.

**Table 5 Module combinations for DCA-X Oscilloscope**

Installed Module Configurations	Single Plug-In Module Setup	Multiple Plug-In Module Setup	Description
86108A/B N1060A	Available		The 86108B can have either options LBW or HBW plus 216 or 232.
86112A, 54754A, 86117A, or 86118A-H01 86107A (any option) N4877A, N1076 A/B, N1077A, N1078A Clock Data Recovery Options 216/232* N1040A N1045A, N1045B, and N1055A, N1046A 75/85/100 GHz		Available	Option 216 provides a maximum data rate of 16 Gb/s. Option 232 provides a maximum data rate of 32 Gb/s.

\* If you have access to the clock for the device, you can connect the clock to the 86100D's or N1000A **Trigger** input *instead* of using the CDR.

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

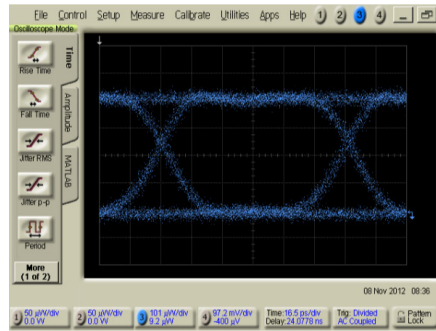
**Table 6 Supported configurations for DCA-M Oscilloscope**

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

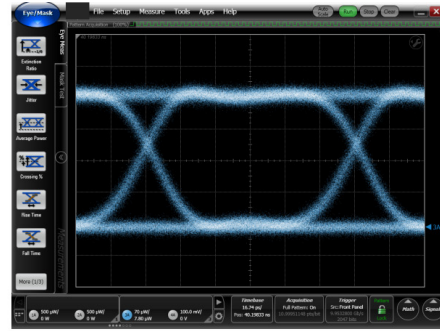
- 3 Connect the equipment as shown in the connection diagrams above and power on all of the instruments.

## Place the 86100D in Standard Configuration

- 1 Start the 86100D.
- 2 If the 86100D's Legacy GUI is visible, click **File** > **Exit** to exit the GUI and view the Windows desktop.



86100D Legacy Configuration



86100D Standard Configuration

Figure 59 86100D User Interfaces

- 3 On the Windows Start menu, click **All Programs** > Keysight **FlexDCA** > Keysight **FlexDCA**.

## Installing the I/O Library Suite

- 1 Navigate to [www.keysight.com/find/iosuite](http://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 IEEE 802.3 NRZ Test Application requires I/O Libraries Suite 16.3 or higher.

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

## Installing the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application

Follow the steps below to install the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application and its license as well as the license for the 86100DU-401 or N109X-401. When the license for 86100DU-401 is installed, the 86100DU-401 software is enabled.

- 1 Go to [www.keysight.com](http://www.keysight.com) and search for and download the compliance application. Install the application on the specific 86100D or N1000A for which you redeemed the license.

### NOTE

When you redeem an IEEE 802.3 NRZ Test App 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, F-AEYE, 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.

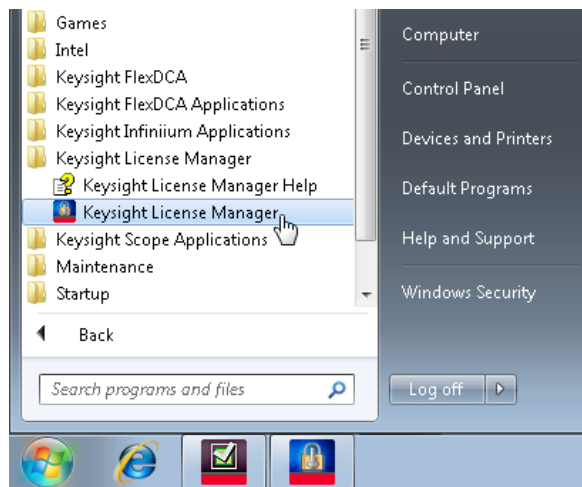


Figure 60 Launching Keysight Connection Expert from the Start menu

### 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 IEEE 802.3 NRZ Test App-Series 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.

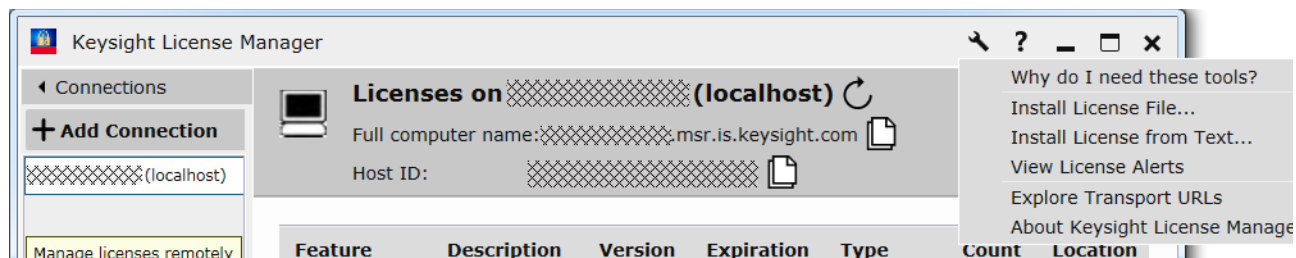


Figure 61 Installing license file on Keysight License Manager version 5.1 & above

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

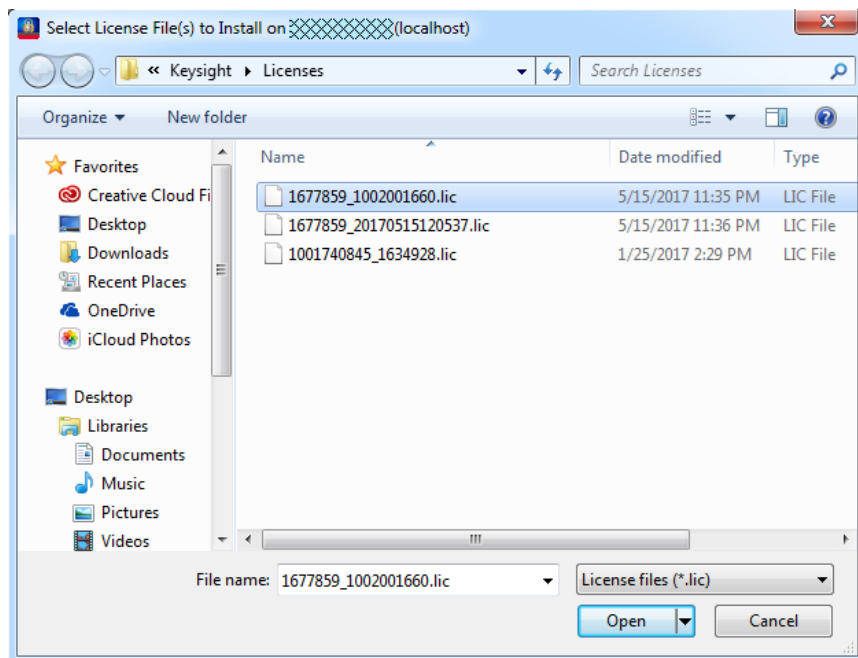


Figure 62 Selecting license file from the folder

- 3 Navigate to the folder where the IEEE 802.3 NRZ Test App 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 IEEE 802.3 NRZ Test App-Series 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...**

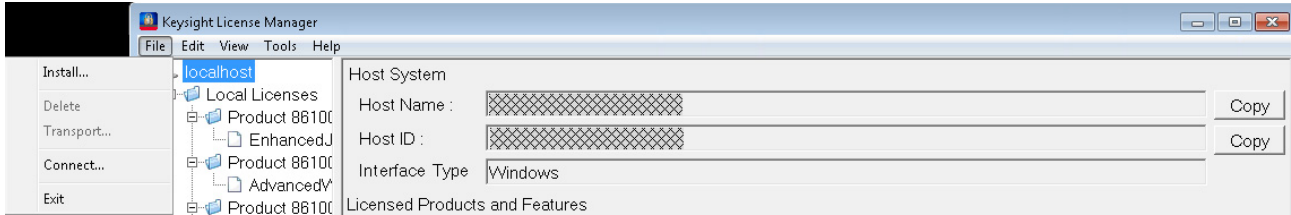


Figure 63 Installing license file on Keysight License Manager version 5.0 or earlier

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

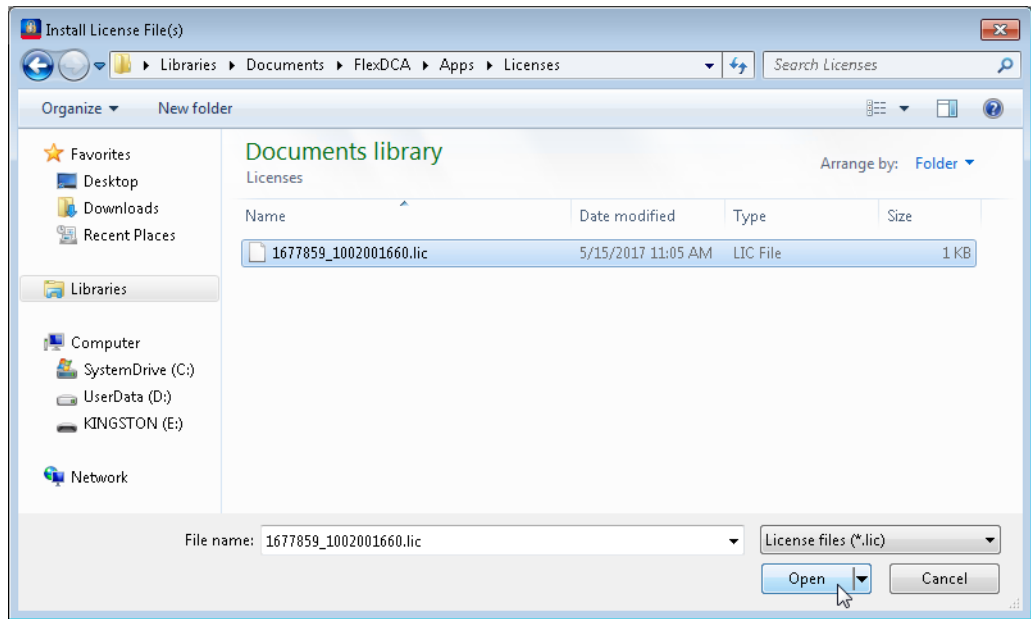


Figure 64 Selecting license file from the folder

- 3 Navigate to the folder where the IEEE 802.3 NRZ Test App 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.

Using same procedure, you can install the 86100DU-401, F-AEYE, or N109X-401 license.



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

**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 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 65](#).

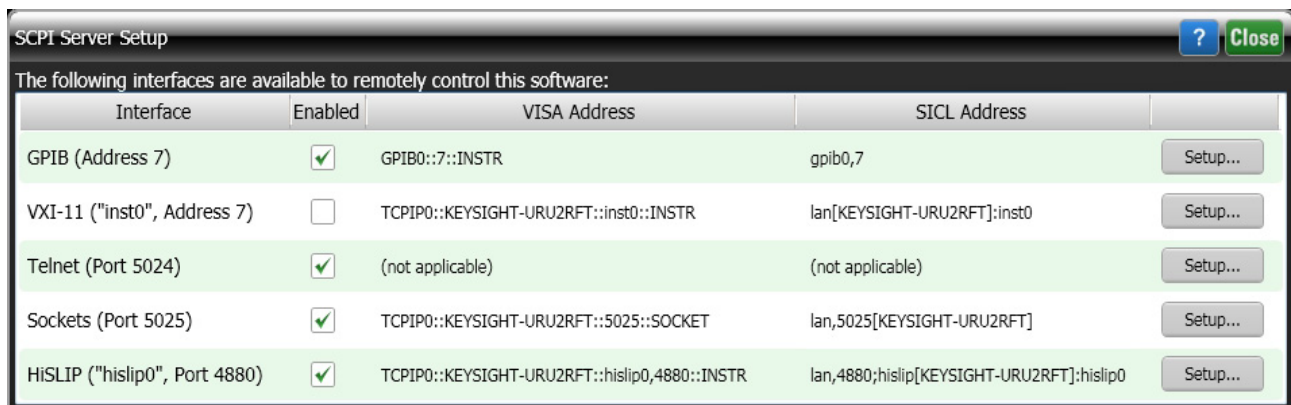


Figure 65 86100D's SCPI Server Setup Dialog Box

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

## Adding 86100D or N1000A to Keysight Connection Expert

Most of the measurements in the IEEE 802.3 NRZ Test Application use a supported DCA-X or DCA-M sampling oscilloscope.

### NOTE

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

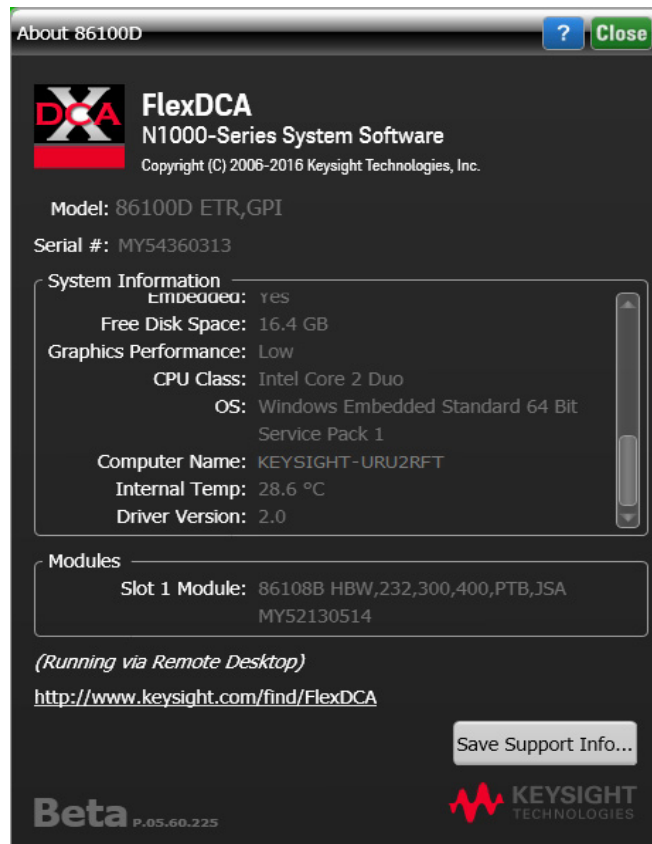


Figure 66 86100D Oscilloscope's hostname

- 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.

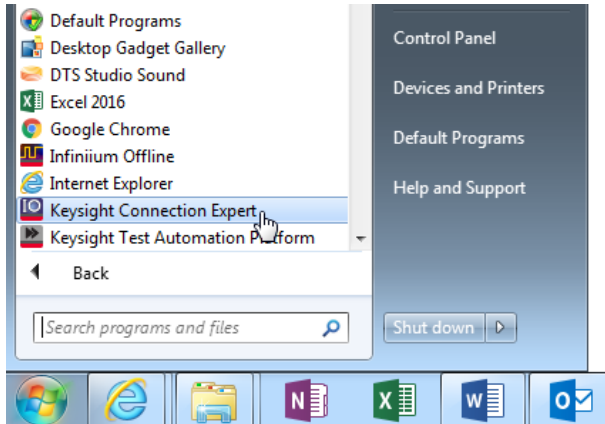


Figure 67 Launching the Keysight Connection Expert

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

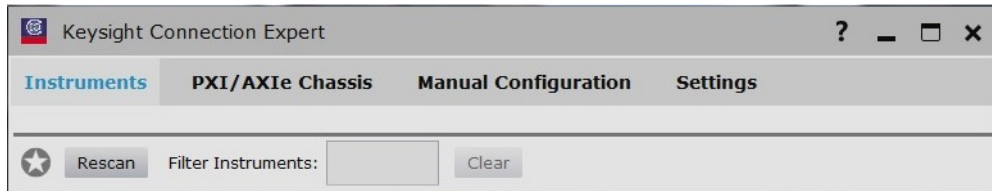


Figure 68 Tabs within Keysight Connection Expert

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

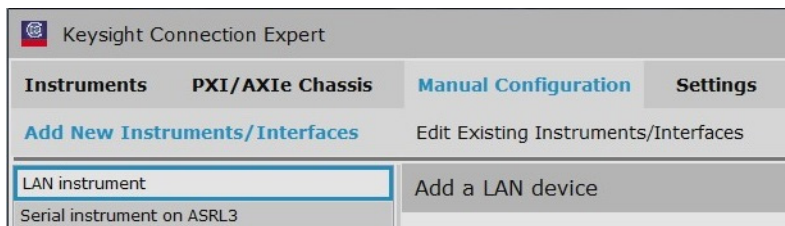


Figure 69 Performing Manual Configuration in Keysight Connection Expert

- 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.

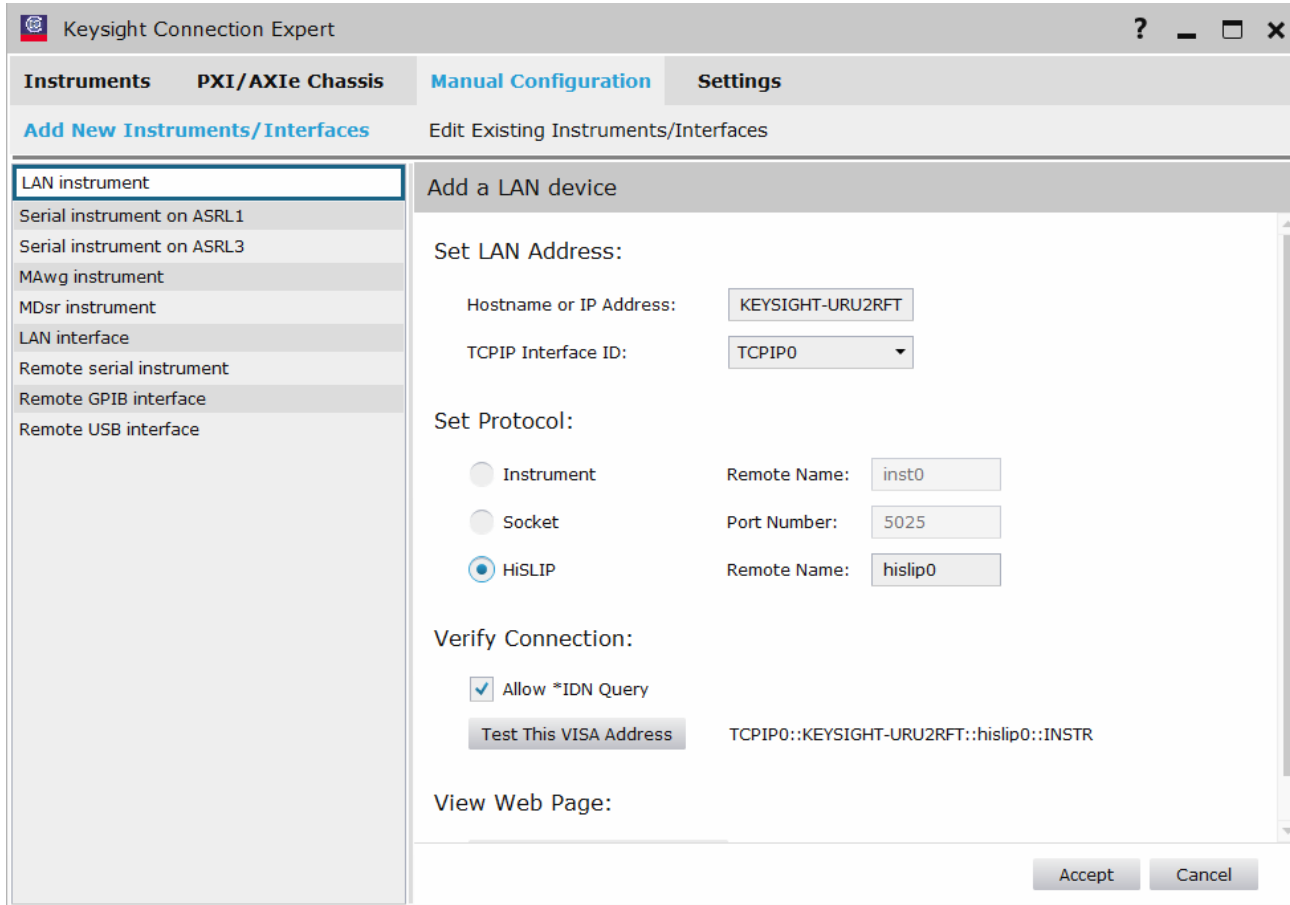


Figure 70 Adding the 86100D device information in the Keysight Connection Expert

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.

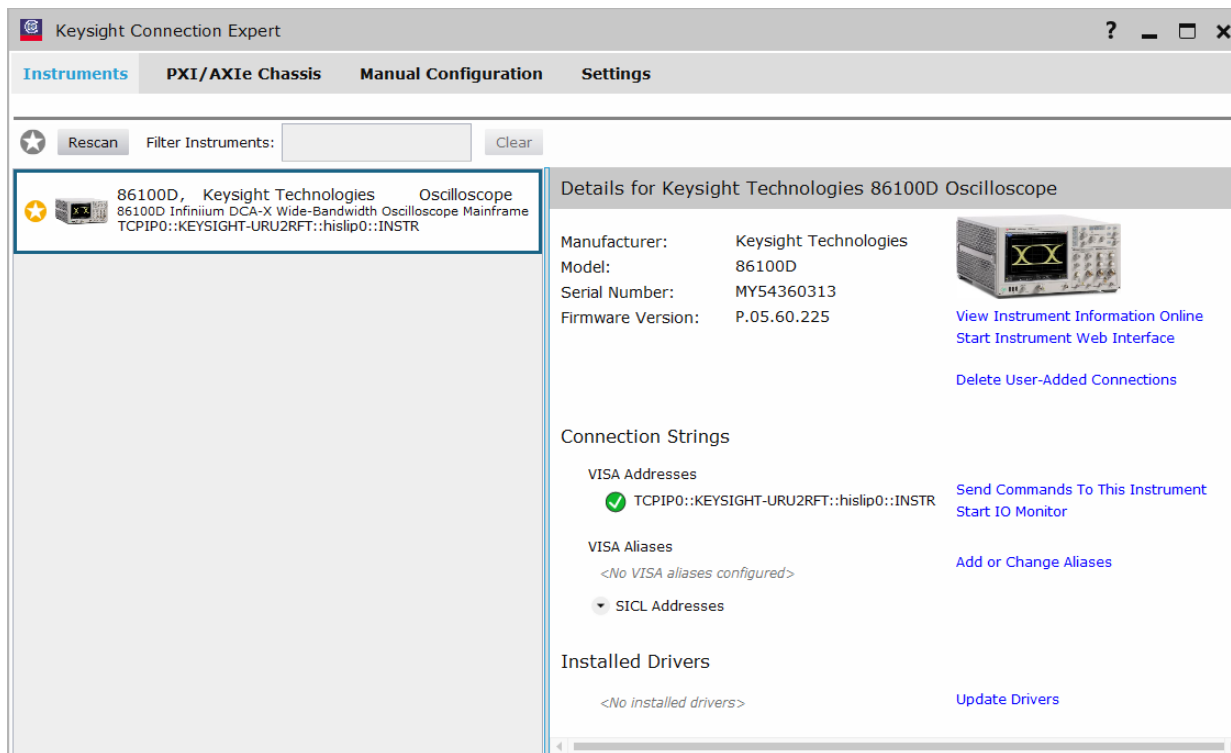


Figure 71 Validating 86100D Oscilloscope's connection

- 13 Close the Keysight Connection Expert window.

**Connection using Keysight Connection Expert 2017 (v18.0) and 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.

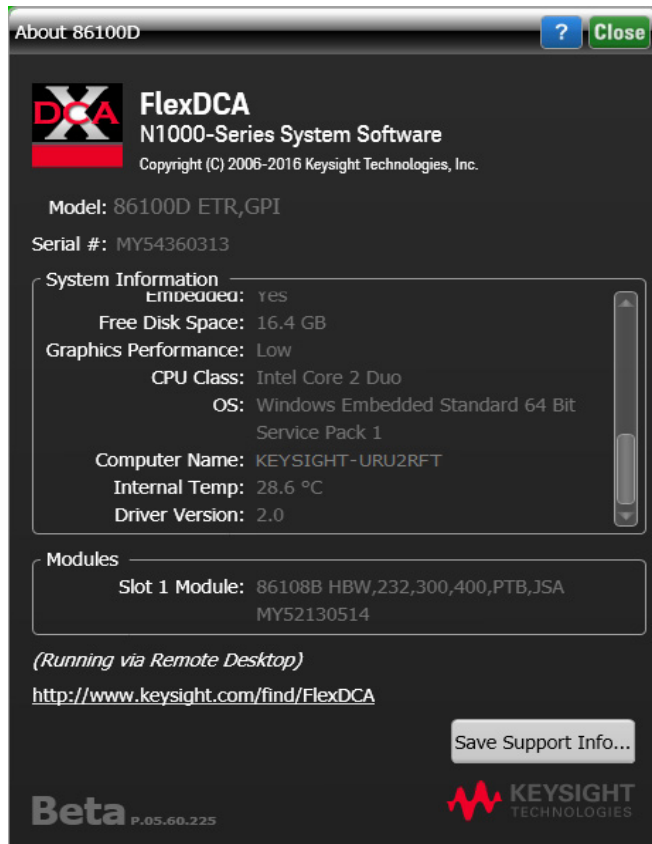


Figure 72 86100D Oscilloscope's hostname

- 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.

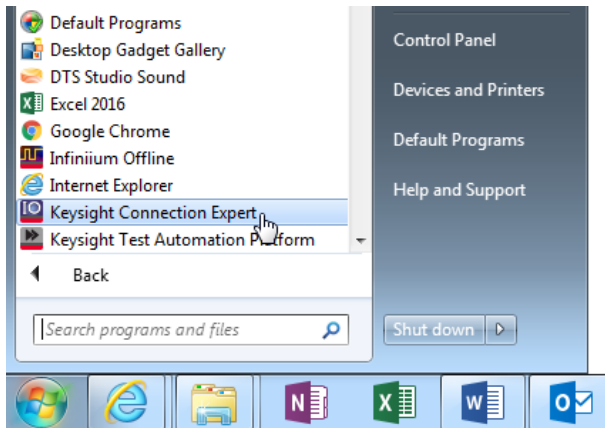


Figure 73 Launching the Keysight Connection Expert 2017

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

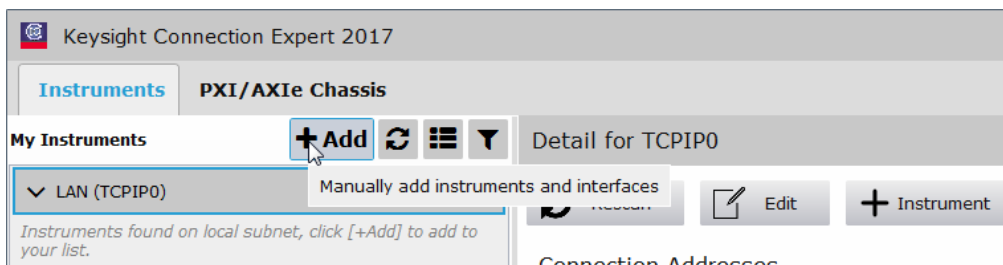


Figure 74 Adding 86100D Oscilloscope manually in the Keysight Connection Expert 2017

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

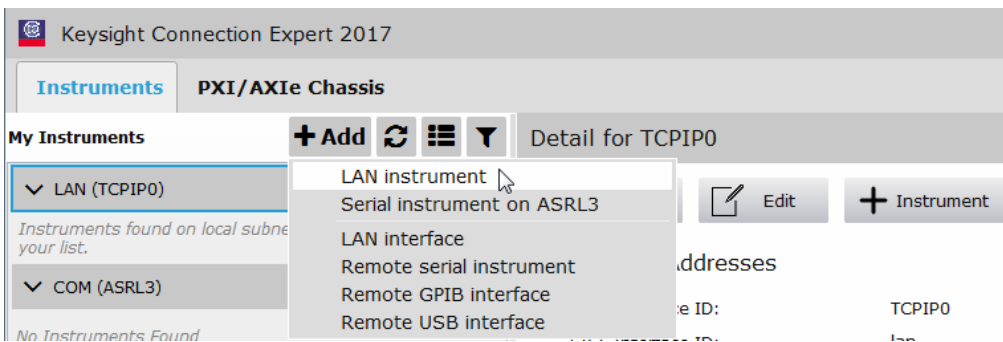


Figure 75 Selecting LAN instrument in the Keysight Connection Expert 2017

- 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.

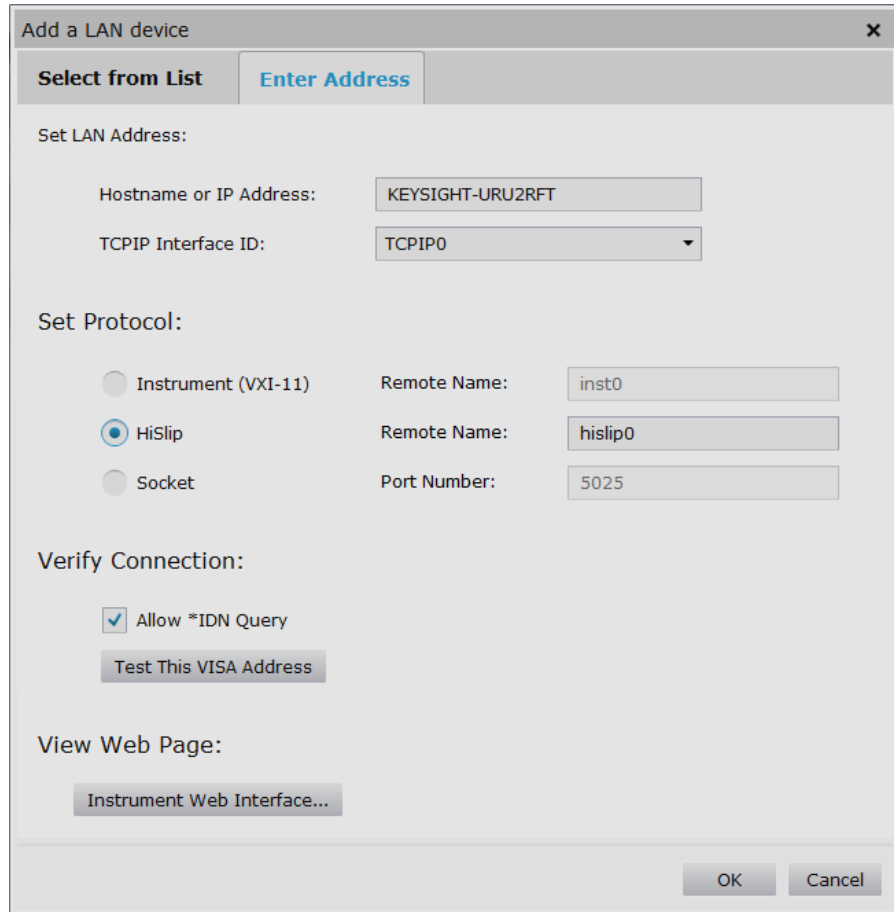


Figure 76 Adding 86100D Oscilloscope's device information in the Keysight Connection Expert 2017

- 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.

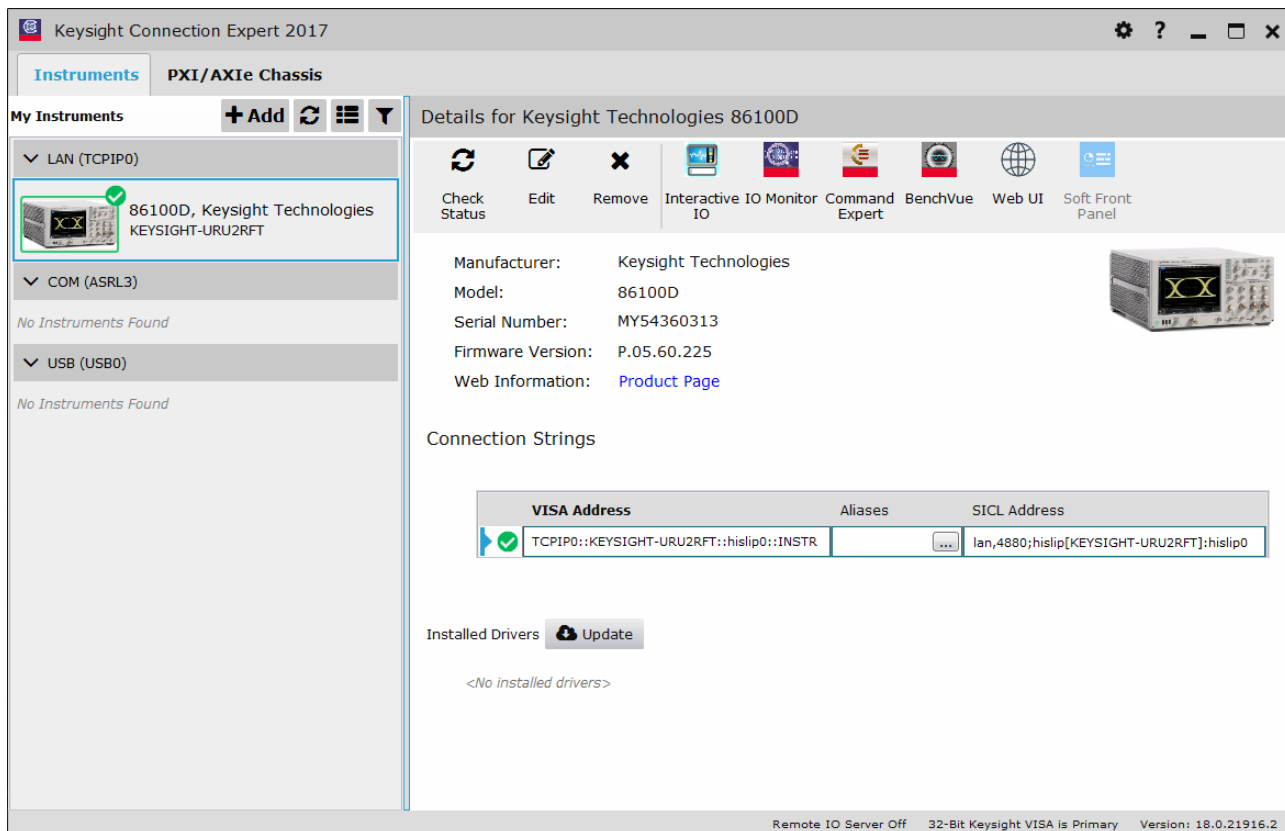


Figure 77 Validating 86100D Oscilloscope's connection

- 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 N1091..CA Series IEEE 802.3 NRZ Compliance Test Application on your PC.

## Starting the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application

After you install the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application on a PC without the N1010A FlexDCA interface, follow the steps below to start the N1091..CA Series IEEE 802.3 NRZ 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 66.
- 2 From the Windows **Start** menu, navigate to **Start>All Programs>Keysight FlexDCA Applications>802.3 Test App** and click **Launch 802.3 Test App**.
- 3 The IEEE 802.3 NRZ Test Application banner appears followed by the **Connect to FlexDCA** dialog.

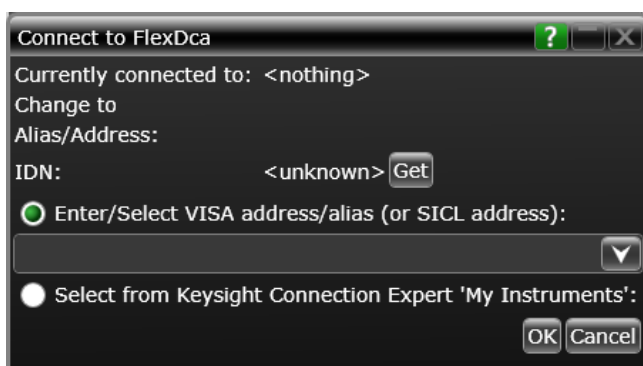


Figure 78 Connect to FlexDCA dialog

- 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 IEEE 802.3 NRZ Test Application appears.

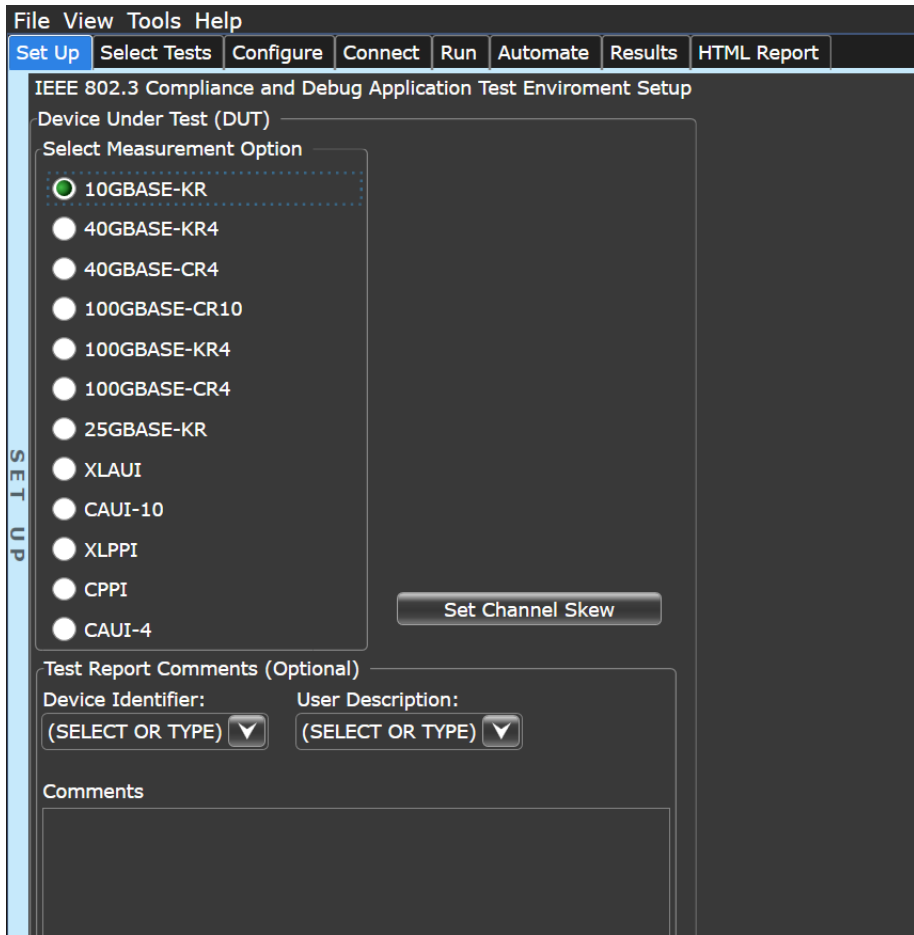


Figure 79 Default window of the IEEE 802.3 NRZ Test Application

**NOTE**

If you click the **View 802.3 Test App in Demo Mode** option under **Start>All Programs>Keysight FlexDCA Applications>802.3 Test App**, 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 20 for connecting to the network analyzer you are using.

## Connecting to the N4877A

The N4877A is used whenever multiple N1000A or 86100D modules are used in the test setup rather than an 86108A/B module. Refer to [Table 5](#) on page 60.

### NOTE

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

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.

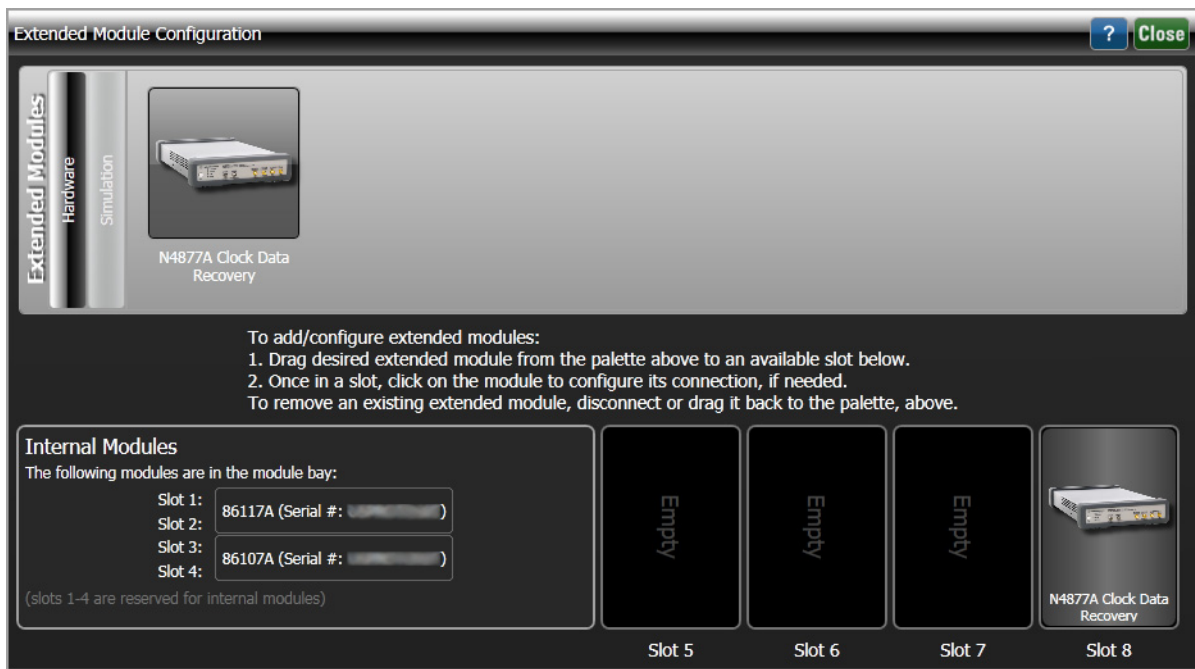


Figure 80 The Extended Module Configuration with the N4877A in Slot 8

## Connecting to the Switch Matrix

**NOTE**

For instructions on connecting to the Switch Matrix, refer to the Online Help for this application.

---





# 4 Installing IEEE 802.3 NRZ Test App on the oscilloscope

Follow the instructions in this chapter when you are installing both the IEEE 802.3 NRZ Test App 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.

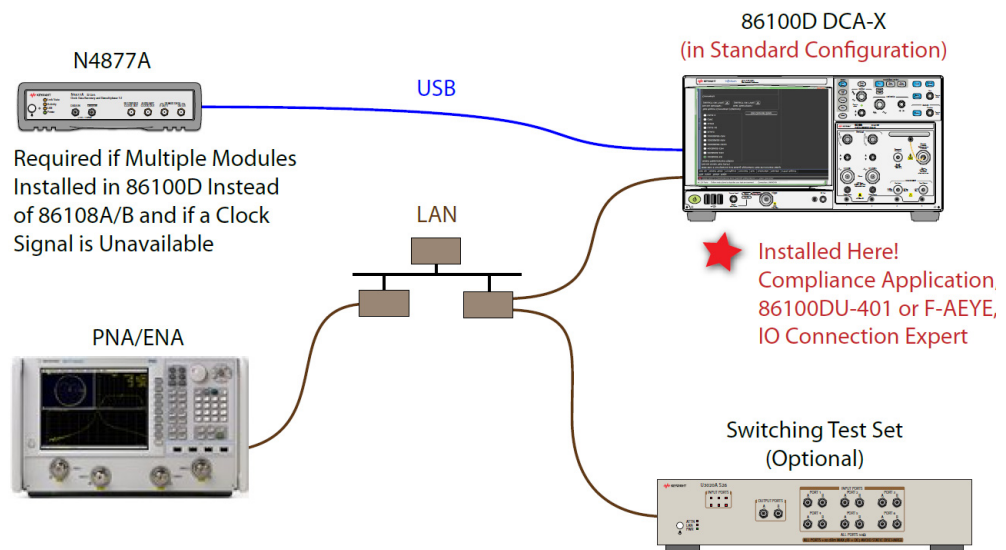


Figure 81 IEEE 802.3 NRZ Test App Installed on 86100D

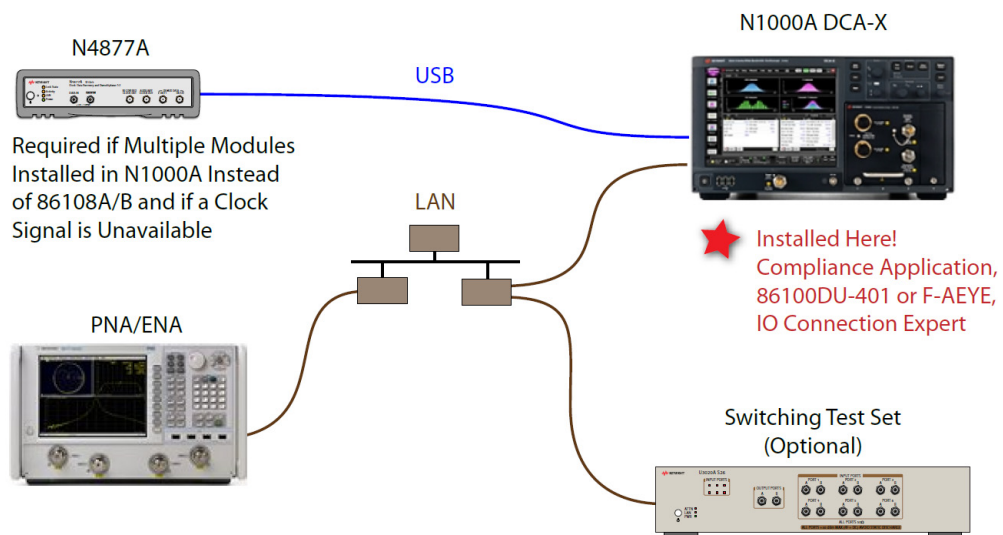


Figure 82 IEEE 802.3 NRZ Test App Installed on N1000A

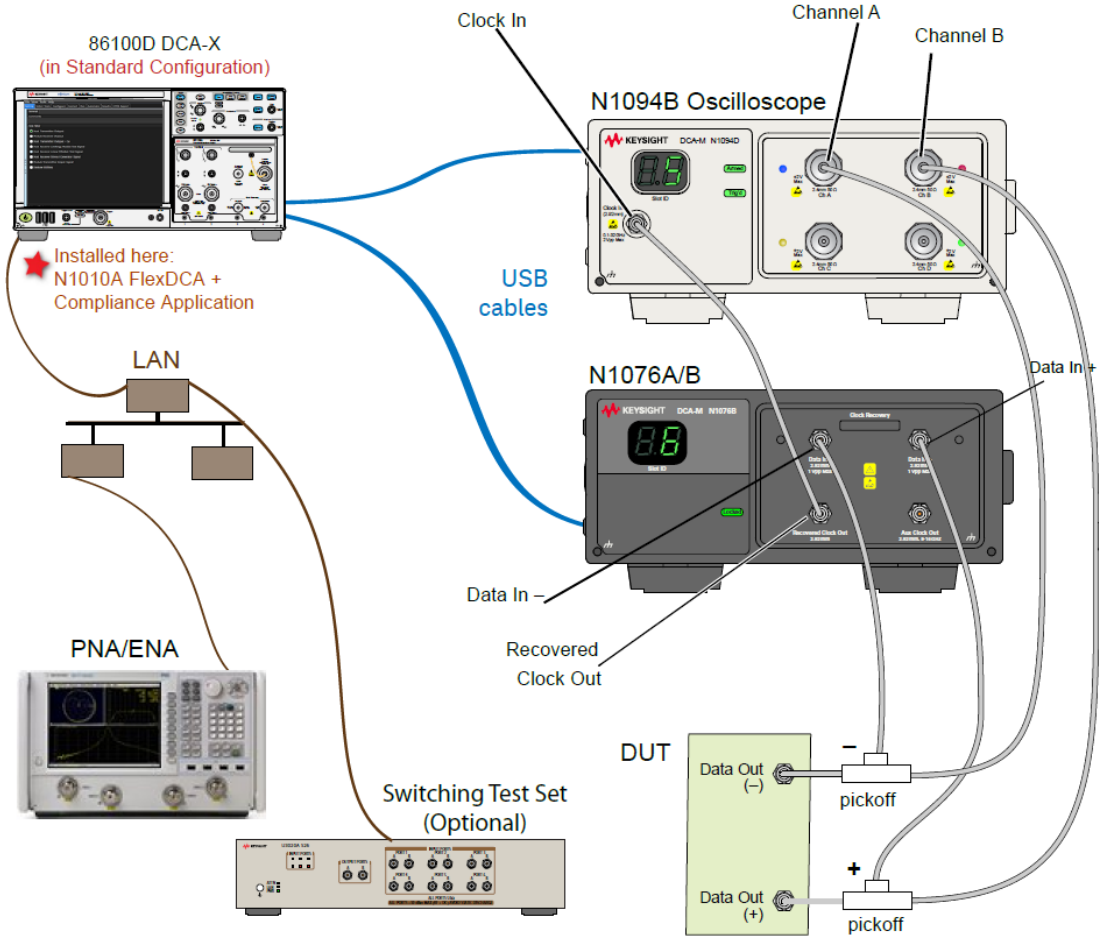


Figure 83 IEEE 802.3 NRZ Test App Installed on 86100D connected to a DCA-M setup

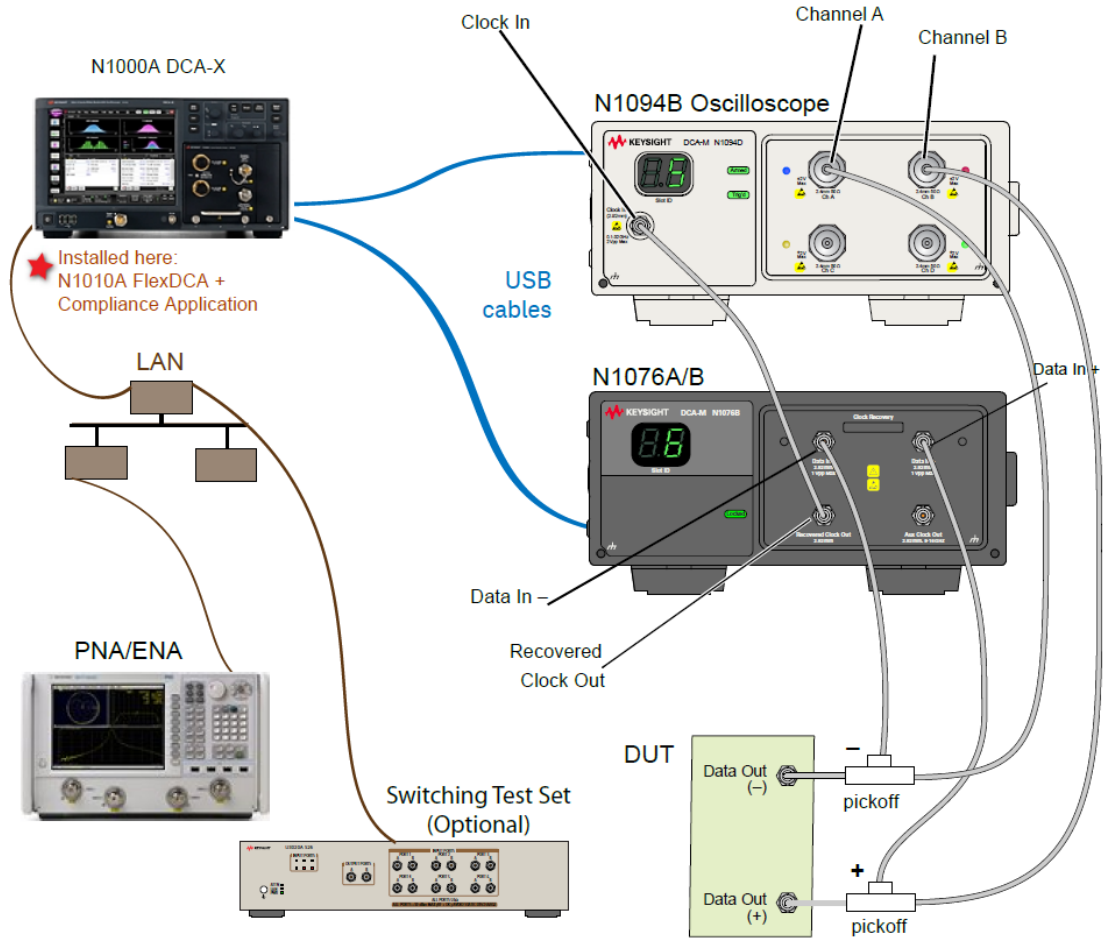


Figure 84 IEEE 802.3 NRZ Test App Installed on N1000A connected to a DCA-M setup

**NOTE**

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

## Connecting the Equipment

- 1 For a DCA-X oscilloscope, install one of the module combinations listed in [Table 7](#) into the 86100D or N1000A.

**Table 7** Module combinations for DCA-X Oscilloscope

Installed Module Configurations	Single Plug-In Module Setup	Multiple Plug-In Module Setup	Description
86108A/B N1060A	Available		The 86108B can have either options LBW or HBW plus 216 or 232.
86112A, 54754A, 86117A, or 86118A-H01 86107A (any option) N4877A, N1076 A/B, N1077A, N1078A Clock Data Recovery Options 216/232* N1040A N1045A, N1045B, and N1055A, N1046A 75/85/100 GHz		Available	Option 216 provides a maximum data rate of 16 Gb/s. Option 232 provides a maximum data rate of 32 Gb/s.

\* If you have access to the clock for the device, you can connect the clock to the 86100D's or N1000A's **Trigger** input *instead* of using the CDR.

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

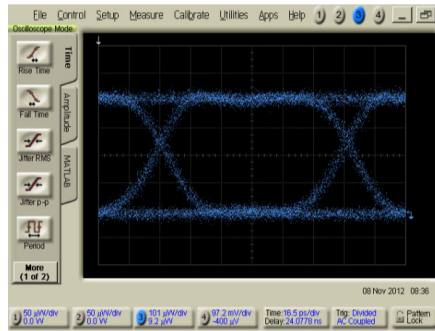
**Table 8** Supported configurations for DCA-M Oscilloscope

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

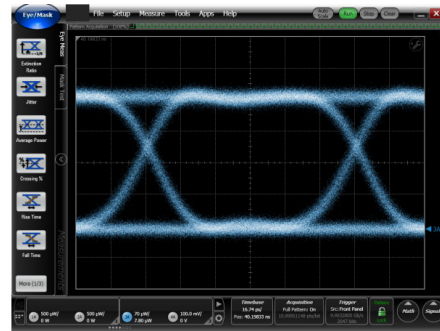
- 3 Connect the equipment as shown in the connection diagrams above and turn on all of the instruments.

## Place the 86100D in Standard Configuration

- 1 Start the 86100D.
- 2 If the 86100D's Legacy GUI is visible, click **File** > **Exit** to exit the GUI and view the Windows desktop.



86100D Legacy Configuration



86100D Standard Configuration

Figure 85 86100D User Interfaces

- 3 On the Windows Start menu, click **All Programs** > Keysight **FlexDCA** > Keysight **FlexDCA**.
- 4 Minimize the 86100D's graphical user interface so that you can see the Windows desktop.

## Installing the I/O Library Suite

- 1 Navigate to [www.keysight.com/find/iosuite](http://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 N1091..CA Series IEEE 802.3 NRZ 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 IEEE 802.3 NRZ Test App.

## Installing the N1091..CA Series IEEE 802.3 NRZ Compliance Test Application

Follow the steps below to install the N1091..CA Series IEEE 802.3 NRZ 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 Go to [www.keysight.com](http://www.keysight.com) and search for and download the compliance application. Install the application on the specific 86100D for which you redeemed the license.

### NOTE

When you redeem an IEEE 802.3 NRZ Test App 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 F-AEYE 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.

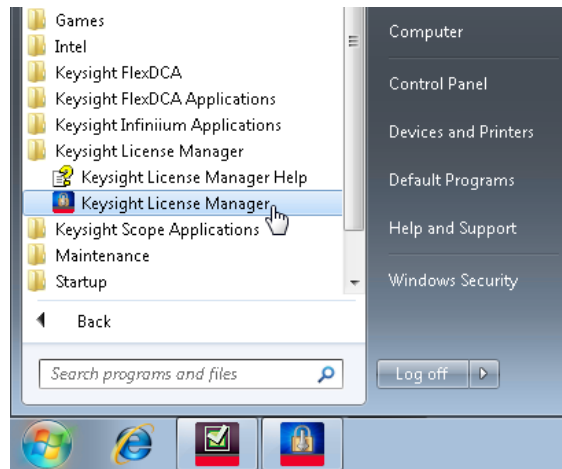


Figure 86 Launching Keysight Connection Expert from the Start menu

### 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 IEEE 802.3 NRZ Test App-Series 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.

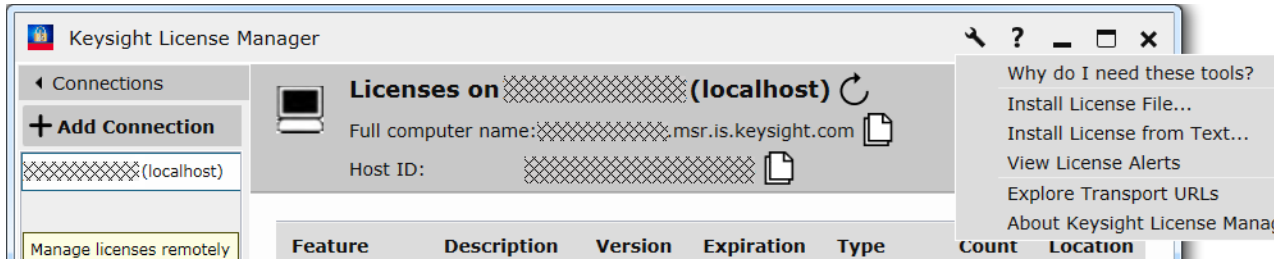


Figure 87 Installing license file on Keysight License Manager version 5.1 & above

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

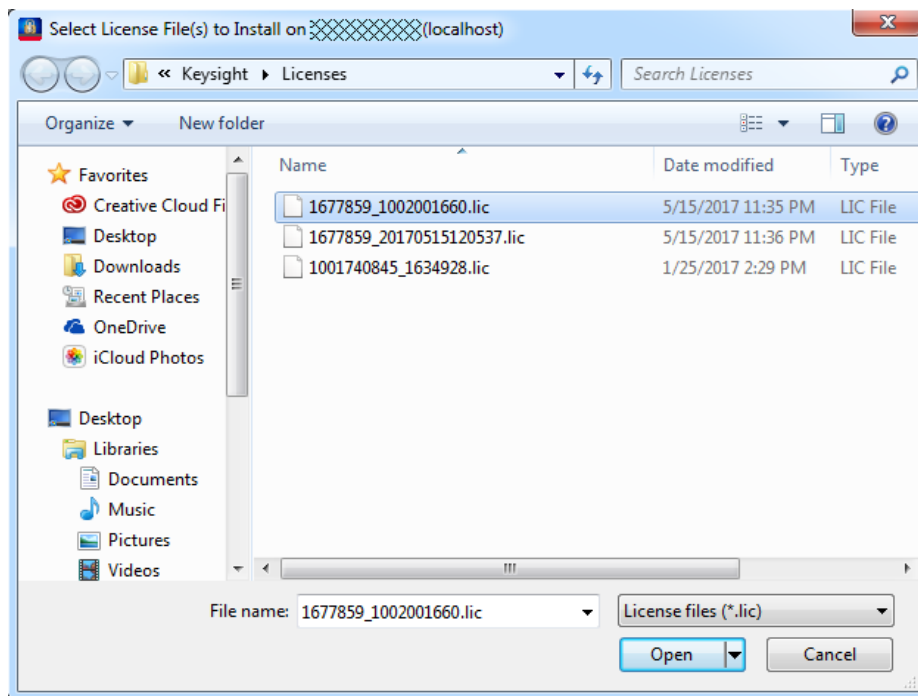


Figure 88 Selecting license file from the folder

- 3 Navigate to the folder where the IEEE 802.3 NRZ Test App 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 IEEE 802.3 NRZ Test App-Series 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...**

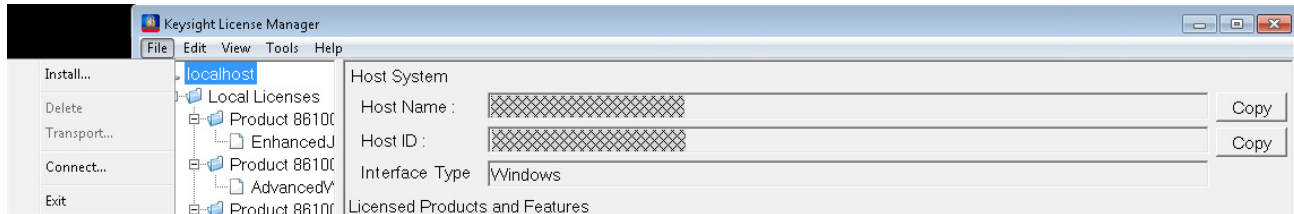


Figure 89 Installing license file on Keysight License Manager version 5.0 or earlier

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

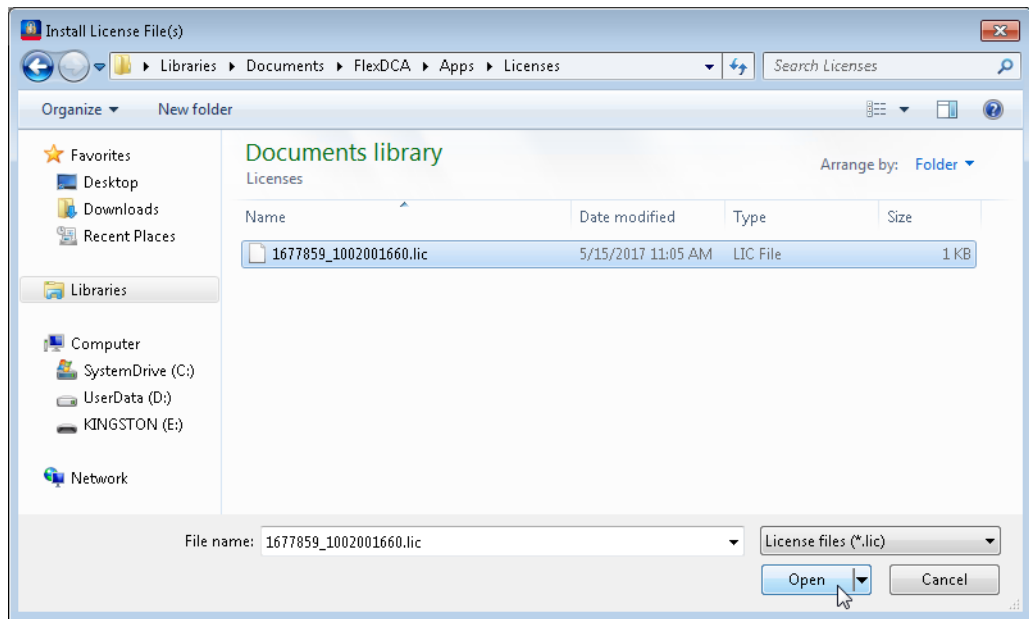


Figure 90 Selecting license file from the folder

- 3 Navigate to the folder where the IEEE 802.3 NRZ Test App 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.

Using same procedure, you can install the 86100DU-401 or F-AEYE license.

## Configuring FlexDCA's SCPI Server Setup

**NOTE**

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

- 1 On the 86100D, 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 91](#).
- 4 Close the dialog box.

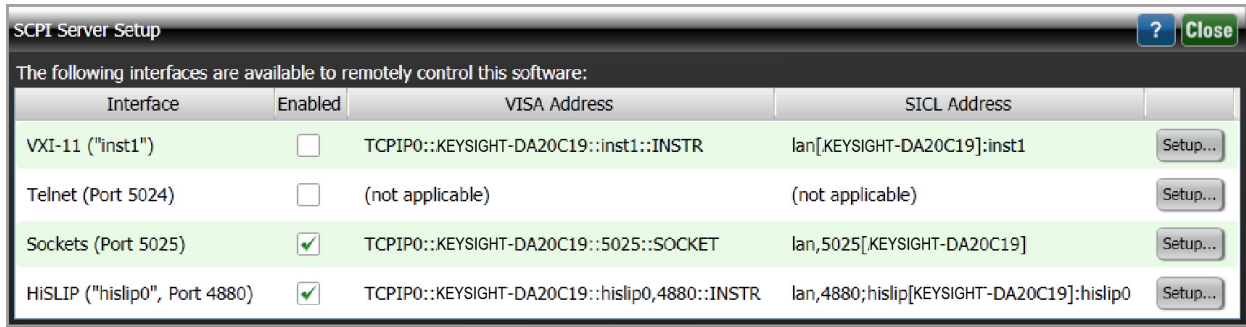


Figure 91 FlexDCA's SCPI Server Setup Dialog Box

- 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 IEEE 802.3 NRZ Test Application on your PC.

## Starting the IEEE 802.3 NRZ Test App-Series Compliance Test Application

After you install the IEEE 802.3 NRZ Test App-Series Compliance Test Application on the N1000A or 86100D Oscilloscope, follow the steps below to start the IEEE 802.3 NRZ Test App-Series Compliance Test Application:

- 1 On the N1000A or 86100D Oscilloscope, launch the Keysight FlexDCA application.
  - 2 From the FlexDCA's main menu, click **Apps>Automated Test Apps>IEEE 802.3 NRZ Test App**.
  - 3 The IEEE 802.3 NRZ Test Application banner appears.
- The default view of the IEEE 802.3 NRZ Test Application appears.

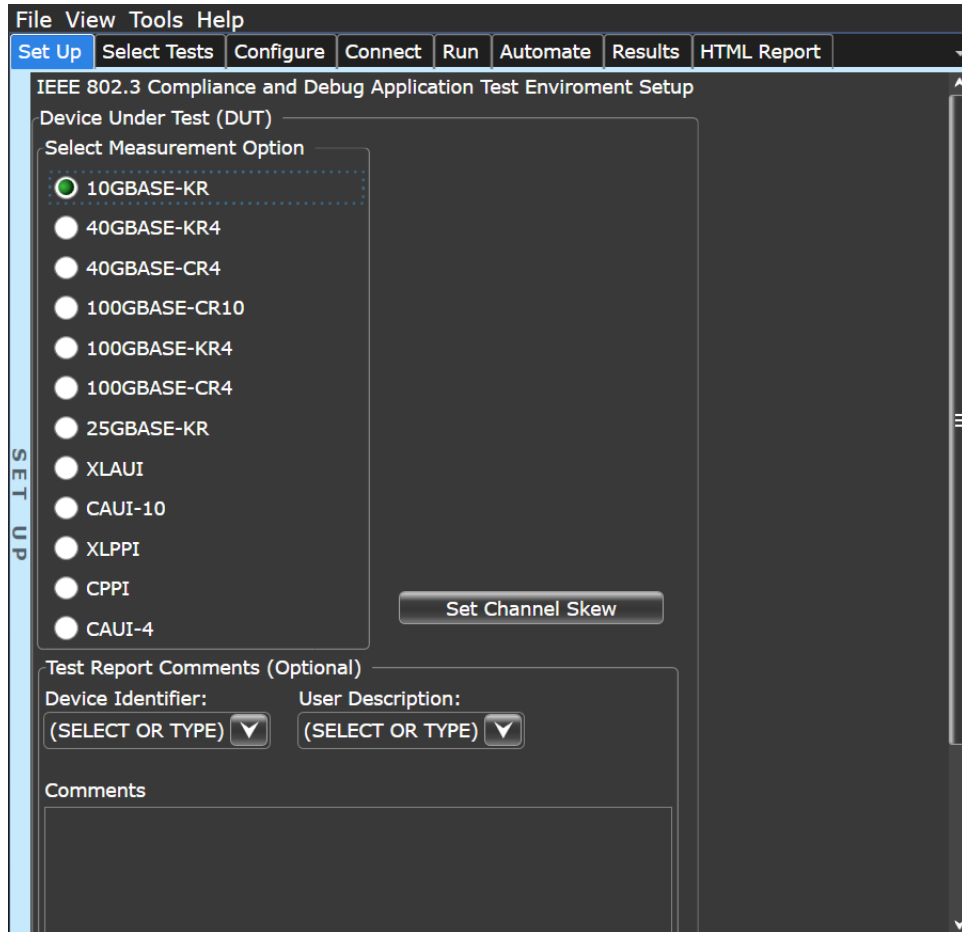


Figure 92 Default window of the IEEE 802.3 NRZ Test App-Series Compliance Test Application

## Connecting to the Network Analyzer

Refer to [“Connecting to External Instruments”](#) on page 20 for connecting to the network analyzer you are using.

## Connecting to the N4877A

The N4877A is used whenever multiple N1000A or 86100D modules are used in the test setup rather than an 86108A/B module. Refer to [Table 7](#) on page 85.

**NOTE**

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

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.

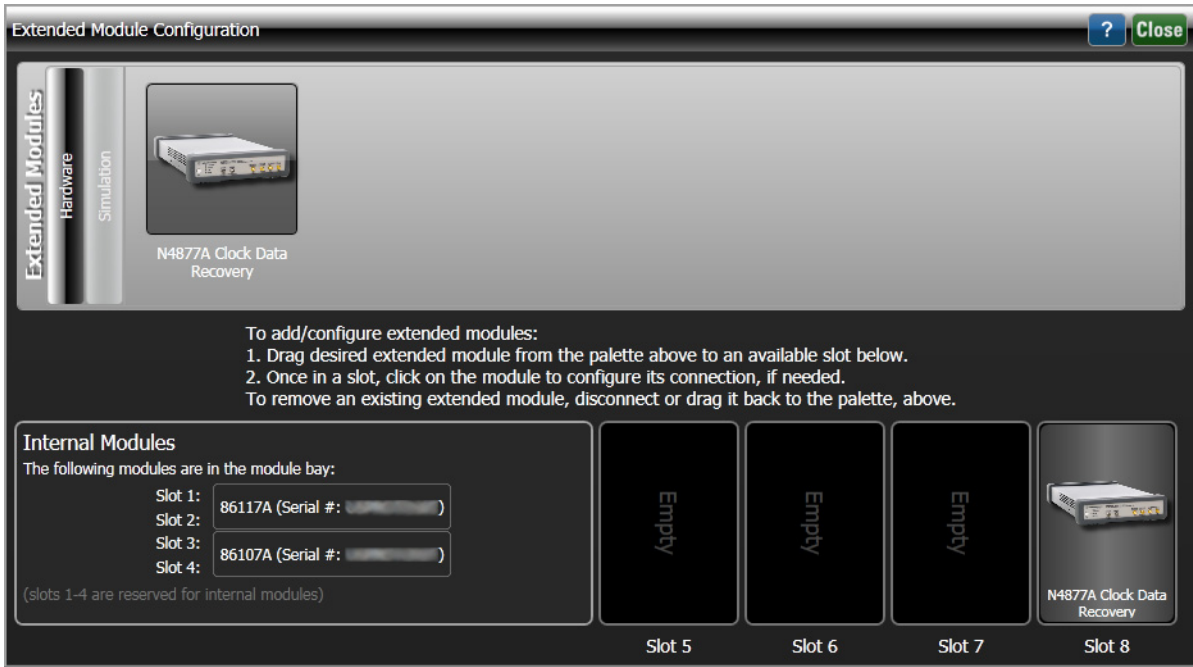


Figure 93 The Extended Module Configuration with the N4877A in Slot 8

## Connecting to the Switch Matrix

**NOTE**

For instructions on connecting to the Switch Matrix, refer to the Online Help for this application.

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