GRL DisplayPort 1.2
Multi-lane Protocol Decode Software
GRL-DP-DEC

Installation and Quick Start Guide
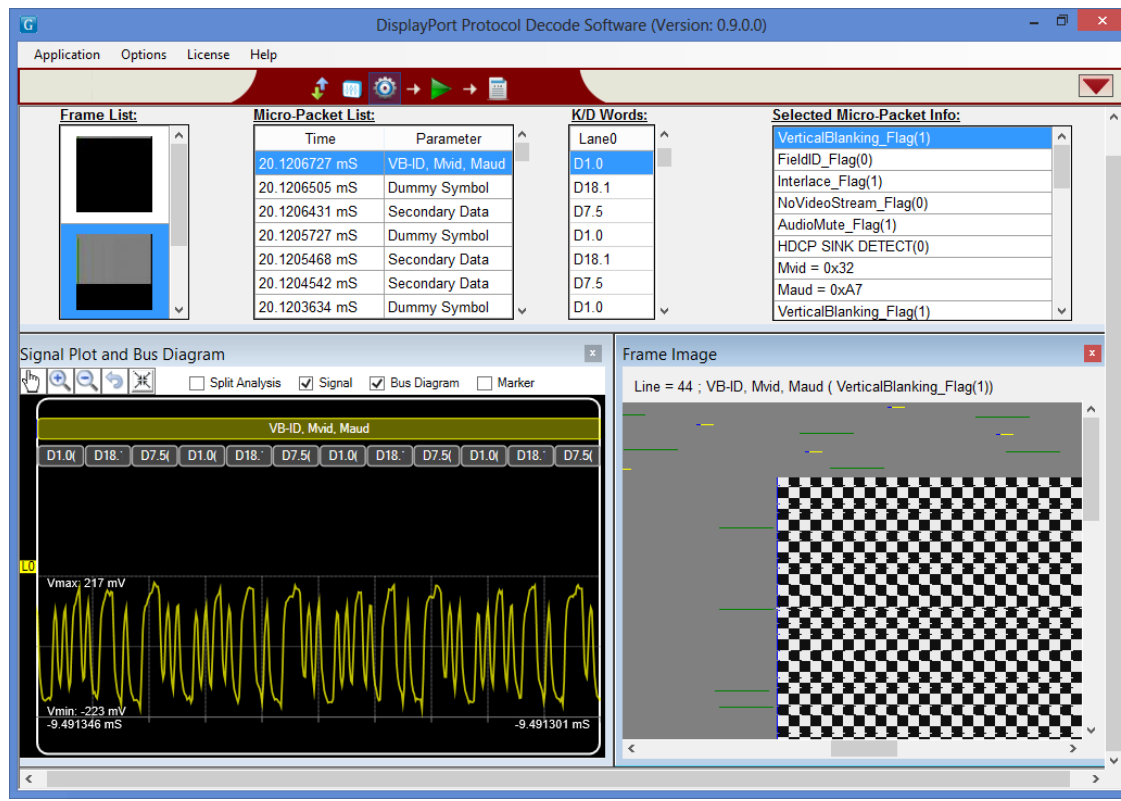
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1. Introduction

This Installation and Quick Start Guide provides procedures for installing, configuring, and verifying the operation of the GRL DisplayPort Protocol Decode Software. It also will help you familiarize yourself with the basic operation of the analyzer.

2. Pre-requisite

Following are pre-requisites for using the software on Agilent Oscilloscope:

1. Agilent Technologies 90000 X-Series, 9000, 90000, or 90000Q Series model oscilloscope
2. Agilent IO software (Pre-installed on the Oscilloscope)
3. Microsoft .NET 4.5 (If not available, please download and install from www.microsoft.com)
4. Differential probes and probe heads (Minimum 1 ea.)
5. Keyboard and Mouse

Following are pre-requisites for using the software on Tektronix Oscilloscope:

1. Tektronix DPO/MSO 70000 Series oscilloscope
2. TekVISA software (Pre-installed on the Oscilloscope)
3. Microsoft .NET 4.5 (If not available, please download and install from www.microsoft.com)
4. Differential probes and probe heads (Minimum 1 ea.)
5. Keyboard and Mouse

3. Installing the software

Download the latest software from www.graniteriverlabs.com. If you have received a product CD carefully open the CD and note the media serial number printed on the CD; you may require this information to obtain the activation key for this software.

Locate the installer file named "GRL Automated Test Solutions - Installer.exe". Open the application by double clicking the installer file. The install wizard will install the software
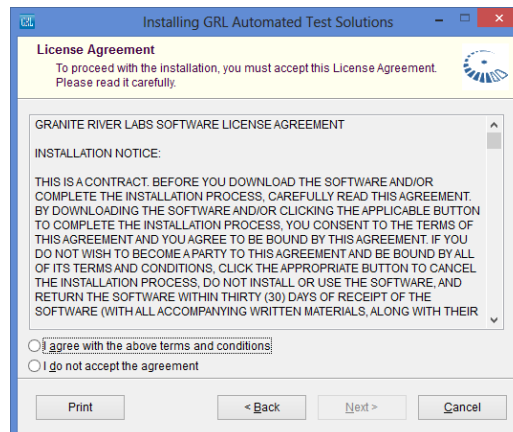
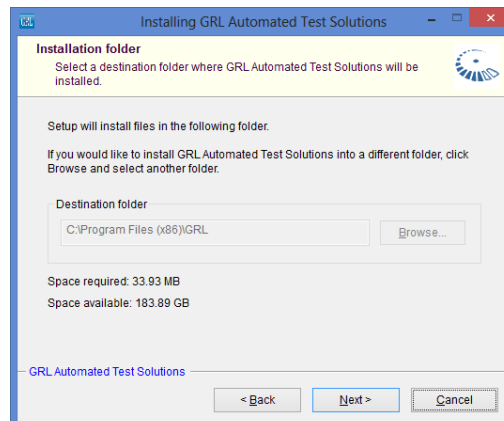Install the software as follows

Step 1: Double click Installer.exe.

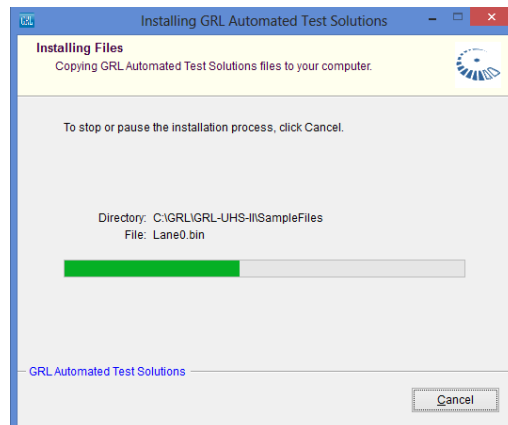Step 2: Click "Next" in the welcome screen
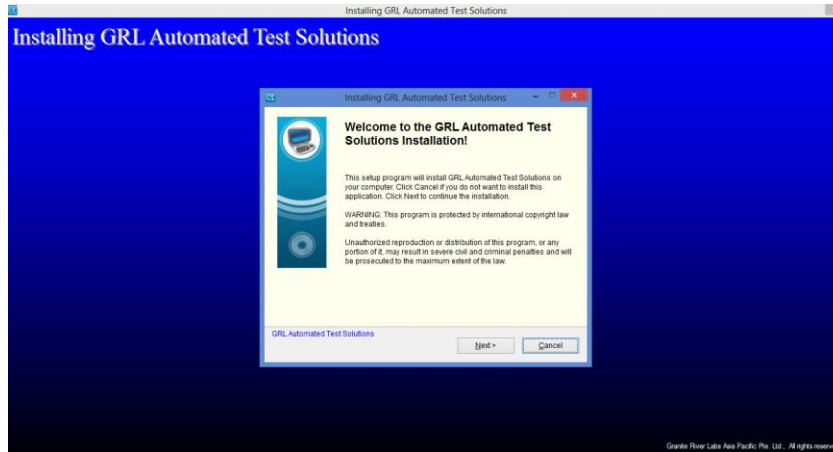
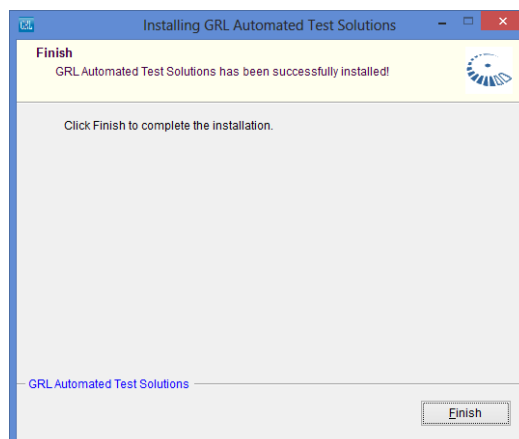Step 3: Read and agree the license agreement and click "Next"

Step 4: Review the install folders and click "Next"

Step 5: Click "Install" and the Install wizard installs all required files.

Step 6: Click "Finish" to complete the installation
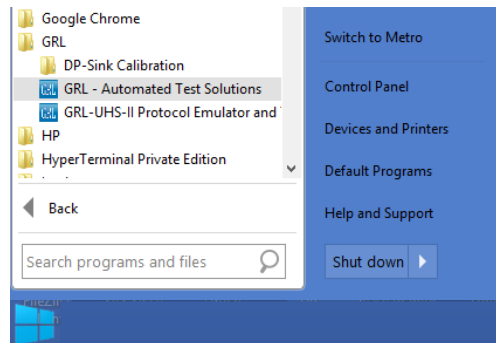
![GRL Granite River Labs logo]

4. Running the Software

The software installer automatically creates short cuts in the Desktop and Start Menu.

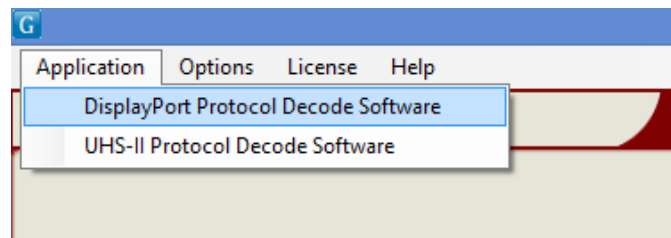To open the application follow the below procedure:

Step 1: Navigate to Start Menu > All Programs > GRL > GRL Automated Test Solutions
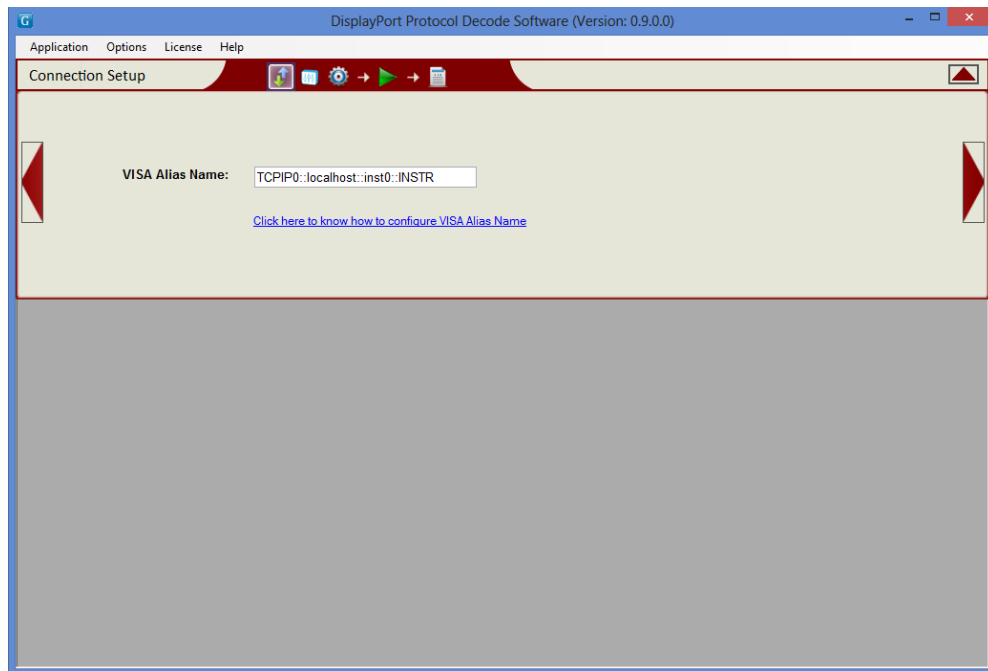

Step 2: Click "GRL- Automated Test Solutions" to open the application.
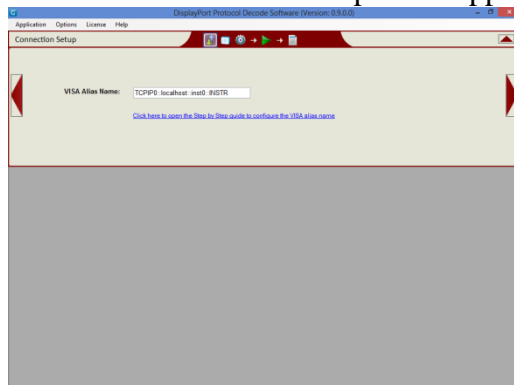
Step 3: Click the Application Menu, and open "DisplayPort Protocol Decode Software"
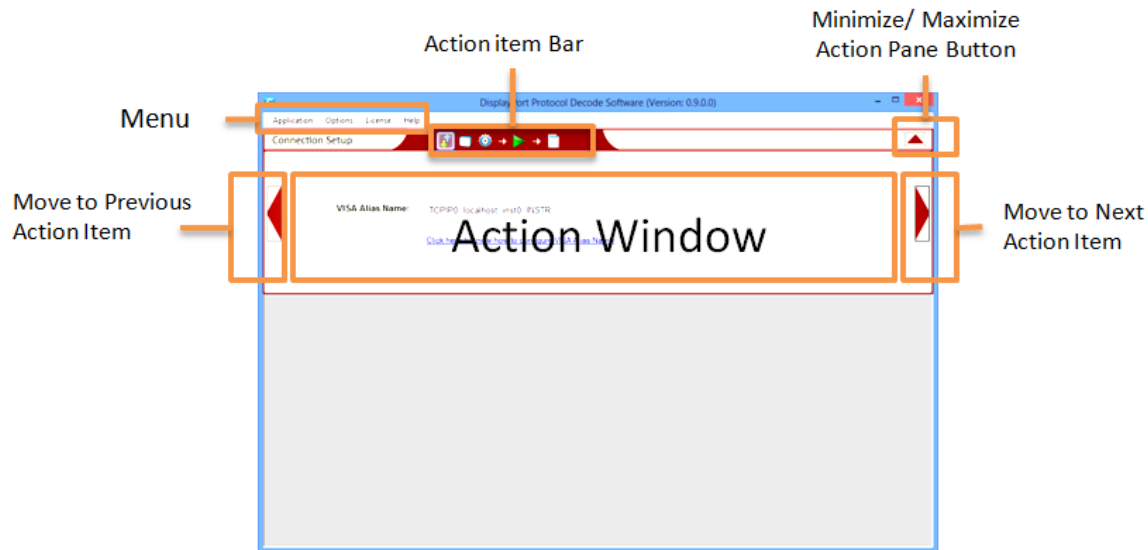
Step 4: DisplayPort Protocol Decode Application is ready to use

5. Introduction to Software User Interface

The software user interface includes a Menu, Action Item Bar, and Action Window as shown in the below image. The Action Window changes according to the selection of Action Item Bar.

The Action Item Bar provides access to all functionalities of the software. When an action item is selected, the Action Window is loaded with the Action Item. You can navigate to various Action Items using the arrow bars located in the left and right side of the window. The Minimize/Maximize action button minimizes and maximizes the Action Window.

6. Activating the Application

Application by default is provided with 10 days of activation. Without any activation key the application can be used for 10 days for evaluation.

After the purchase, if you received a CD of the software, you can find the Media number. You may need to use this media number for any further communications.

Below are the steps to activate the application license:

Step 1: Open the application (For more information, see Running the application)
Step 2: In the application menu, Click License > License Details
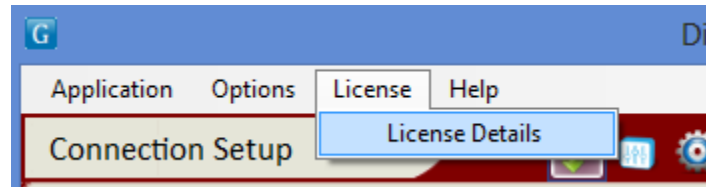
Step 3: Review the installed applications

Step 4: Copy the Host ID by clicking "Copy to Clipboard"

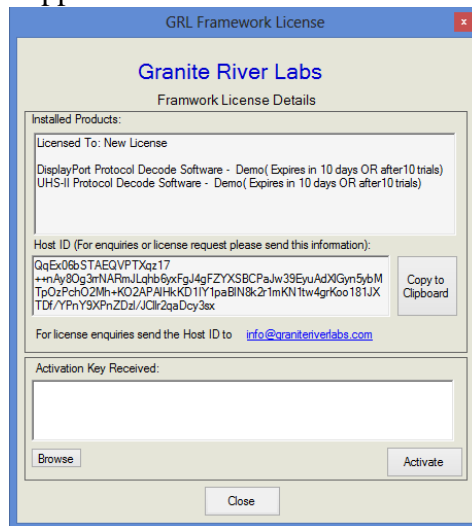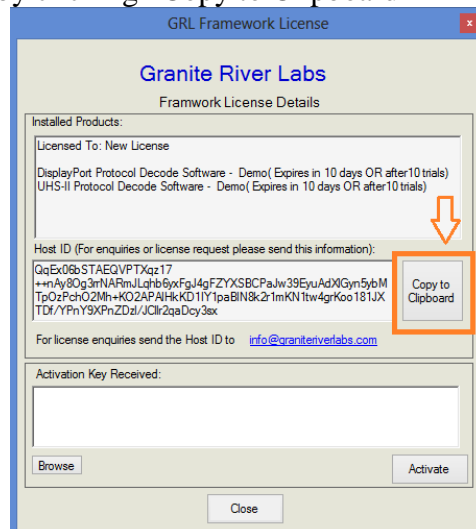Step 5: Send the following details to info@graniteriverlabs.com:

      Media Number / Order Number:
      Company Name:
      Contact person:

Note: Media number will be written on the CD case. If you would have ordered online and received an application installer, use the Order Number specified in the confirmation e-mail.

Step 6: Paste the activation key received from info@graniteriverlabs.com in the Activation Key Received text box provided in the License Dialog
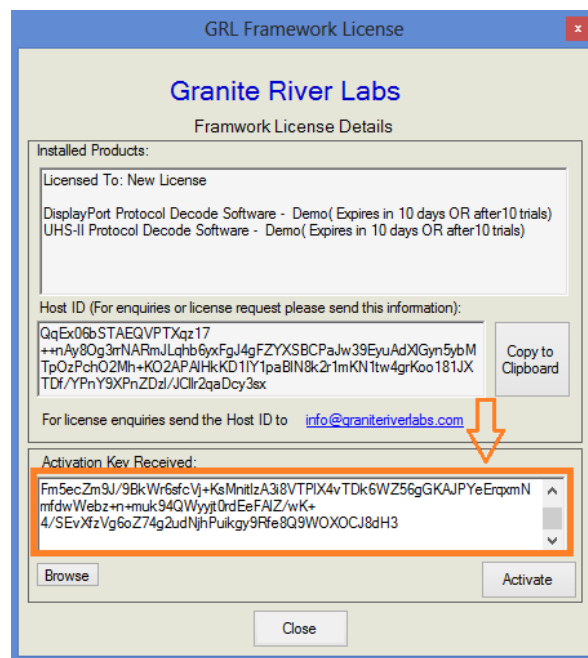
Step 7: Click "Activate"
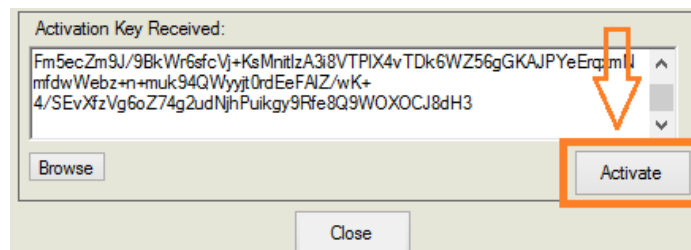
Step 8: The following Confirmation message will be shown, Click OK

Step 9: Review the license, and click close in the License Dialog
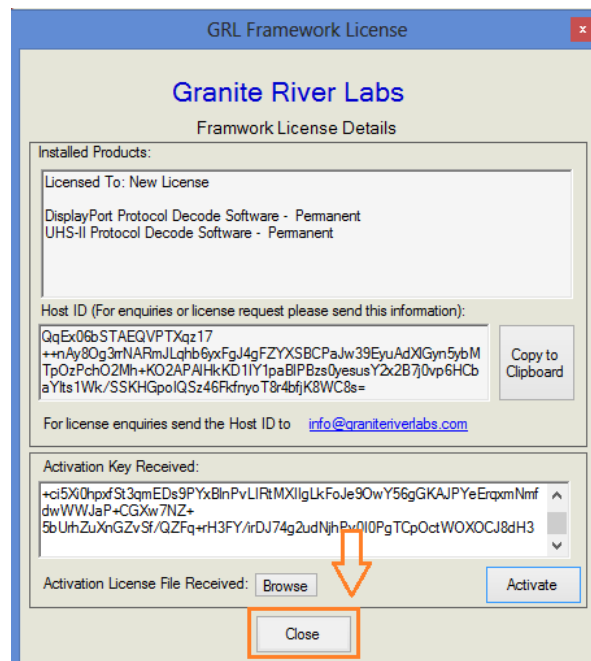
7. Instrument/Oscilloscope Configuration

To operate GRL Automated Test Solutions may require configuring the VISA aliasing to make the software communicate with the Oscilloscope.

Click "Oscilloscope Configuration" in the Action Bar button. The following action window appears:

For Tektronix Oscilloscope use GPIB8::1::INSTR for the VISA aliasing

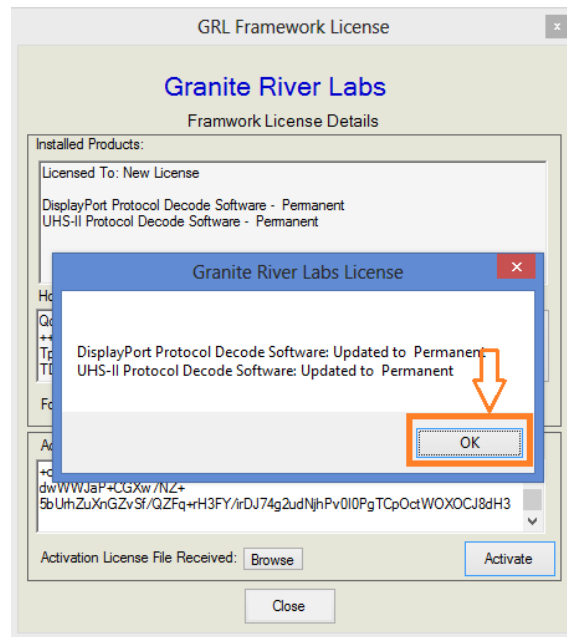The following instructions helps to configure the VISA aliasing in Agilent Oscilloscope.

Prerequisite:
1. Agilent Technologies 90000 X-Series, 9000, 90000, or 90000Q Series model oscilloscope
2. Key board and Mouse
3. GRL Automated Test Solutions Software

Step 1: Open the Agilent IO Control
Find the Agilent IO icon on the system tray as shown below and **right click** the Agilent IO control.
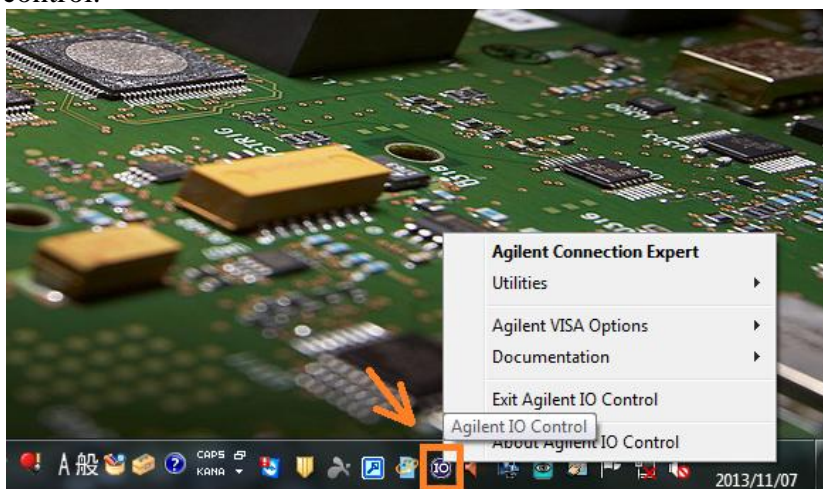
Step 2: Open Agilent Connection Expert
Click "Agilent Connection Expert" and open the application
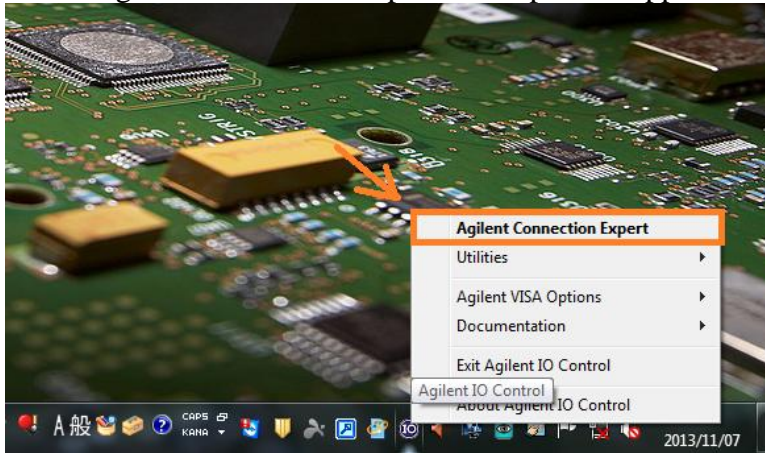
This opens the Agilent Connection Expert as shown below

Step 3: Select LAN instrument

In Agilent Connection Expert Select the LAN instrument
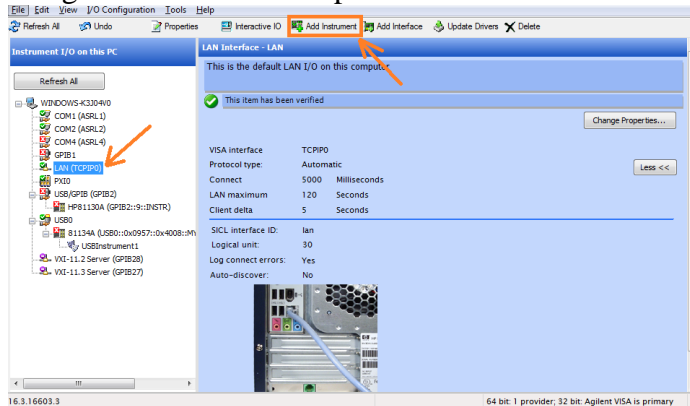
Step 4: Add Instrument

Right click the LAN as shown below and click "Add Instrument" or click "Add Instrument" in the ribbon bar.
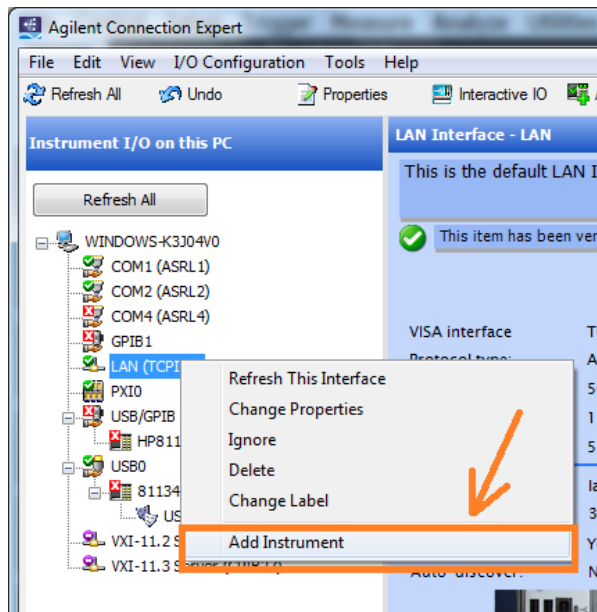
Step 5: Configure the LAN instrument

Click "Add Address" in the "Add LAN Instrument" dialog as shown below:
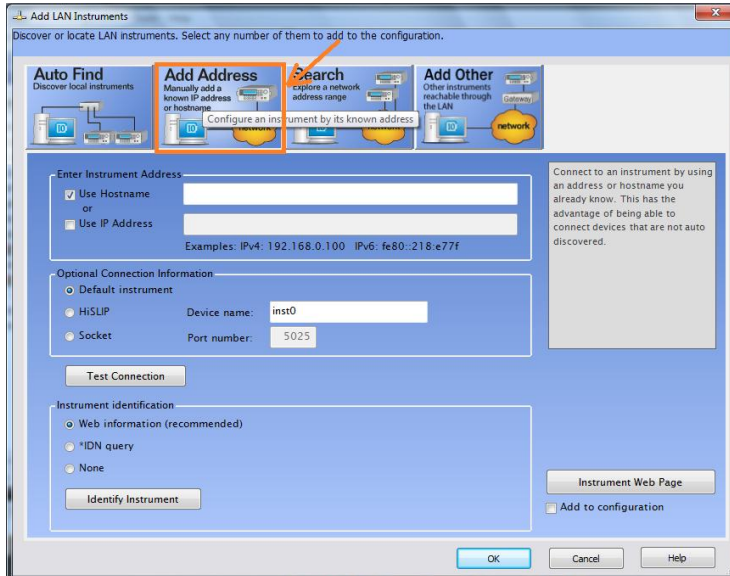
Step 6: Configure the IP address of LAN Instrument

In Add Address page, select "Use Hostname" and type "localhost" in the text box provided for local host.
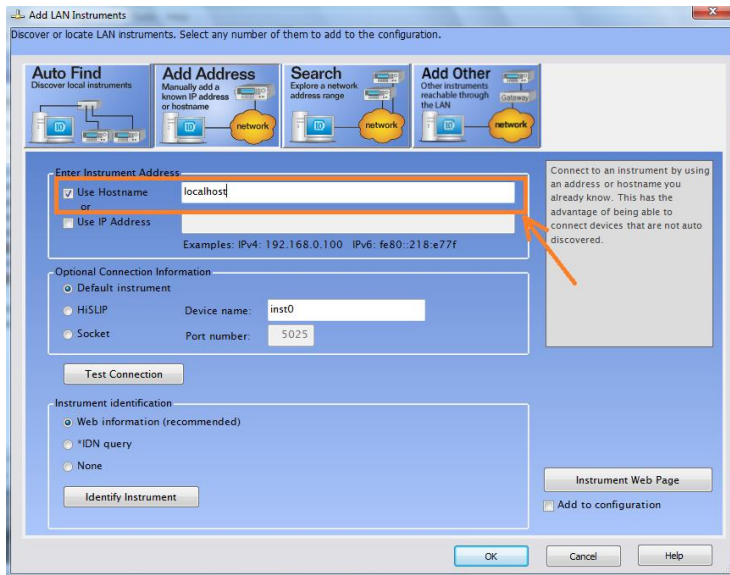
Step 7: Test the connection
Click "Test Connection" to make sure that the Agilent IO configuration is correct. After this you should be able to see "The instrument is present"
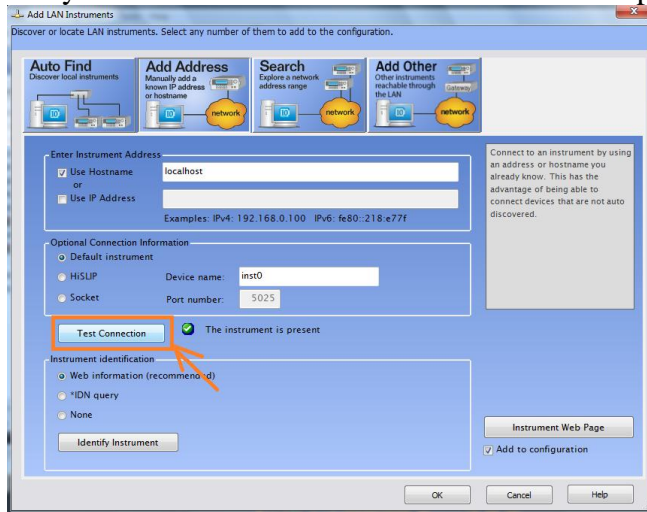
Step 8: Check the Instrument Identification
In the instrument identification, select "*IDN Query" and click "Identify Instrument". If the instrument is configured correctly you should be able to see the instrument name next to the "Identify Instrument" button as shown below:
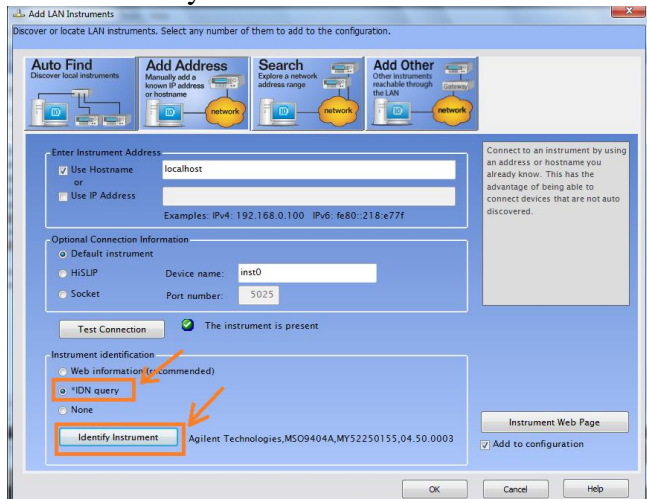
Step 9: Complete Add LAN Instrument
Click "OK" to complete Add LAN Instrument

Step 10: Copy VISA alias name

At the end of Step 9, you should be able to see your Oscilloscope in the LAN instrument. Copy or note the VISA address:
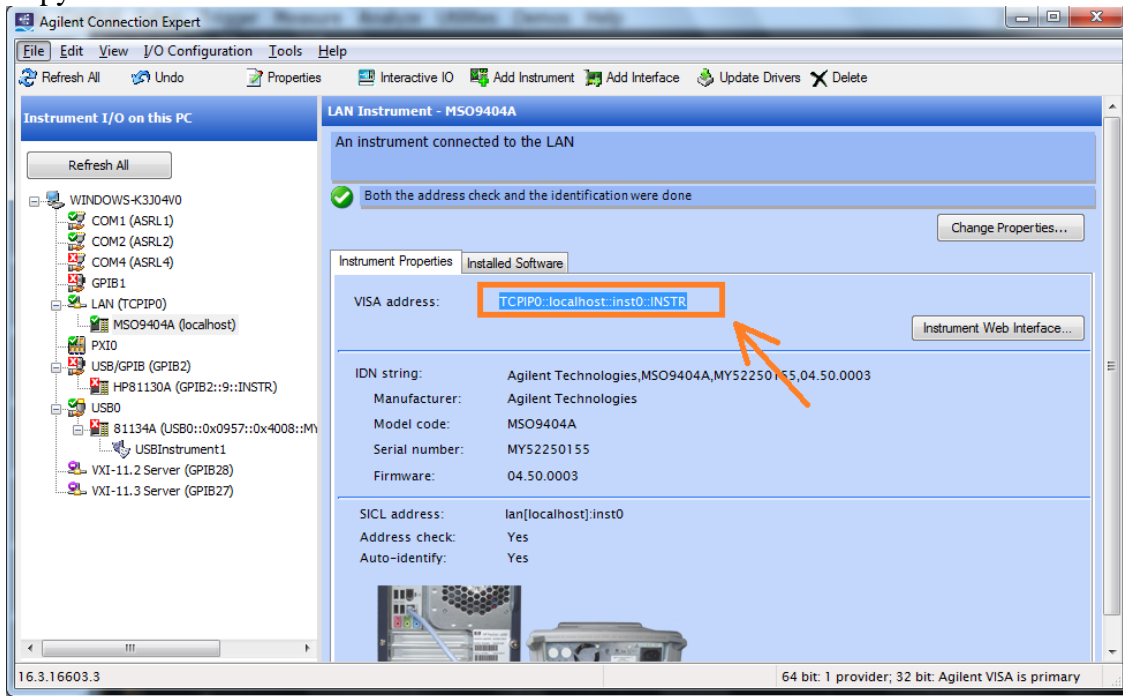
Step 11: Configure the GRL Automated Test Solution

Copy the VISA name provided in the Step 10 and type the same in the GRL Automated Software "VISA Alias Name":
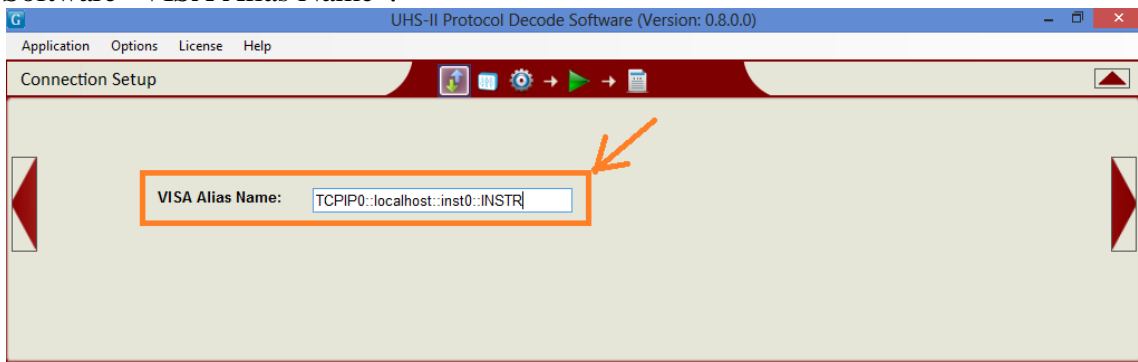
8. Test Setup Connection

Click "Test Setup Connection" action bar button to view the test setup required to efficiently run the GRL DisplayPort Protocol Decode tool. In both recommended test setups active differential probes are required based on your DisplayPort main link number of active lanes; use 1, 2, 4 probes for x1 lane, x2 lane and x4 lanes respectively.
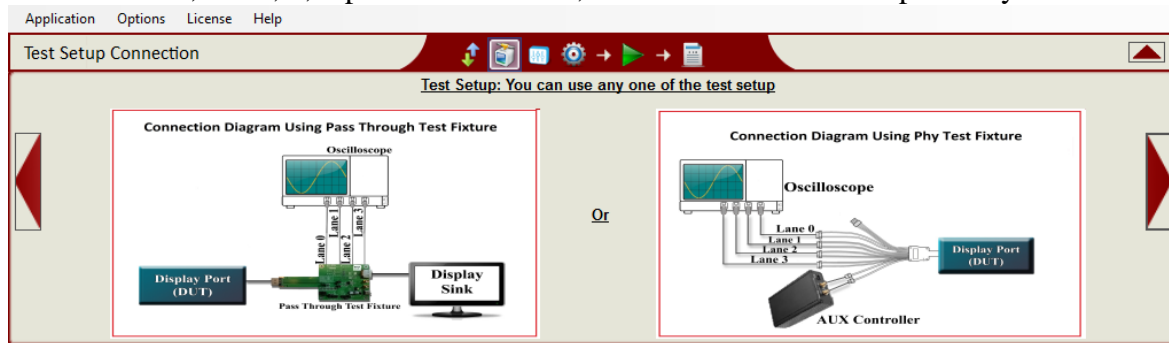
If you would like to view live traffic in the DisplayPort main link, you can use pass through test fixtures and probes. If you have a DisplayPort AUX Controller which enables the Source device to transmit the line traffic you can use a test fixture and AUX controller configuration.

Note: The GRL DisplayPort Protocol Decode software is not designed to communicate with the DP AUX Controller. You may require a separate software program to control the DP AUX Controller.

9. Test Selection

(Note: This feature will be supported in a future software version.)
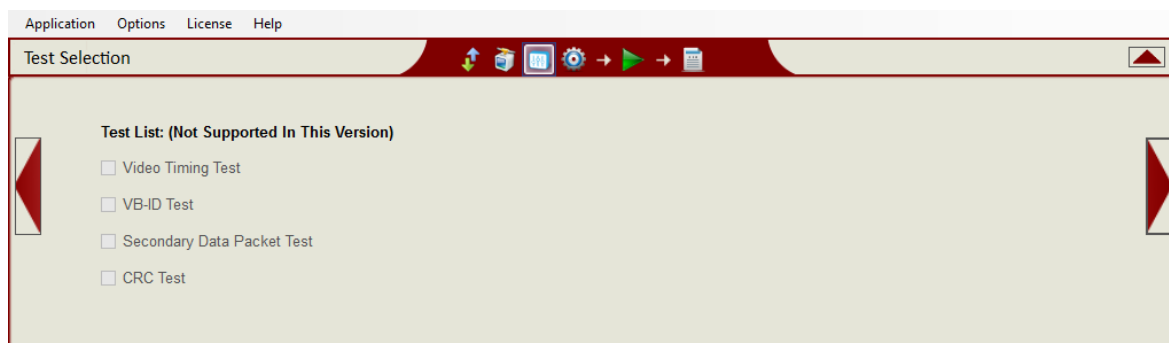
10. Decoder Configuration

To configure the decoder, click "Decoder Configuration" button in the Action Bar. It is essential to review this configuration before running the software.
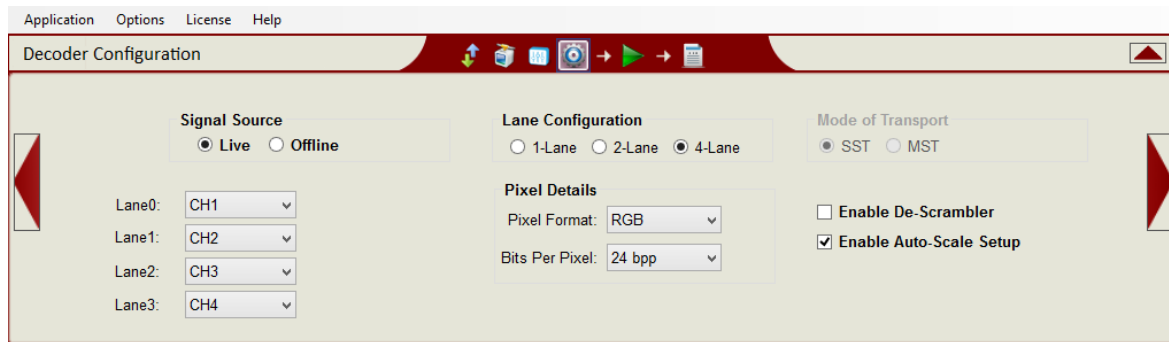
Lane Configuration:

Depending on the DisplayPort Source you may be required to input the Lane Configuration:

> Select 1 Lane if your DisplayPort Source is configured for x1 Lane
> Select 2 Lane if your DisplayPort Source is configured for x2 Lane
> Select 4 Lane if your DisplayPort Source is configured for x4 Lane

Depending on the lane configuration the number of input signals will be enabled in the Signal Source panel.

Signal Source:

If you want to analyze the signal using a live waveform captured using Oscilloscope select "Live" If you want to analyze a waveform stored already, select "Offline".

Note: Refer to the datasheet for list of Oscilloscope and waveform formats supported.

Depending on the DisplayPort lane configuration the number of DisplayPort lanes will be enabled.

> If 1 Lane is selected in Lane Configuration, only Lane 0 will be enabled.
> If 2 Lane is selected in Lane Configuration, only Lane 0 and Lane 1 will be enabled

If 4 Lane is selected in Lane Configuration, Lane 0, Lane 1, Lane 2 and Lane 3 will be enabled.

For Live Signal Capture, connect the signals as shown in the Test Setup Connection and select the appropriate channels in the software.

To analyze previously stored waveforms, select "Offline Mode" and input the appropriate files in using the "File Browse" button.

Currently the software supports Agilent's BIN file format and Tektronix .wfm file format.

Pixel Details:
These selections are based on your DisplayPort Source Device Under Test (DUT)'s current configuration during the test being carried out. Select the appropriate values.

Pixel Format Selection:
Select RGB in the pixel format if the source DUT transmits the video stream in RGB
Select YCbCr 4:2:2 in the pixel format if the source DUT transmits the video stream in 4:2:2
Select Y in the pixel format if the source DUT transmit the video stream in Y

Bits Per Pixel Selection:
Select 18,24,30, 36, 48 bits per pixel depending on your DisplayPort Source DUT's transmission.

Note: . The stream re-production capability is based on the selection pixel details based on the DisplayPort Source DUT's configuration. Wrong input may lead to improper decode functionality.

Enable De-Scrambler:
If your DisplayPort Source DUT scrambles the data before it sends, select "Enable De-Scrambler".

If the Scrambler is not enabled in the DisplayPort Source DUT, de-select this selection.

11. Run / Start the Decoder

Before Run / Start the Decoder, ensure that:

1. The Oscilloscope configuration is appropriate if you are using live signal mode capture
2. Connect all the probes as per the recommended Test Setup if you are using live signal mode in the decoder configuration
3. Ensure that you have selected the required tests you would like to perform. (Note, this feature will be supported in a future software version)
4. Based on the DisplayPort Source device configuration you have Configured the Decoder software and connected the appropriate signals to the Oscilloscope if you are using Live signal source. Or you have selected the appropriate offline signal files.

Make sure that you have completed all the above required steps before Run/Start the decoder software. Any inappropriate inputs will lead to un-determined output of the decode application.

Click the "Run/Start" button in the Action Bar to start the application:
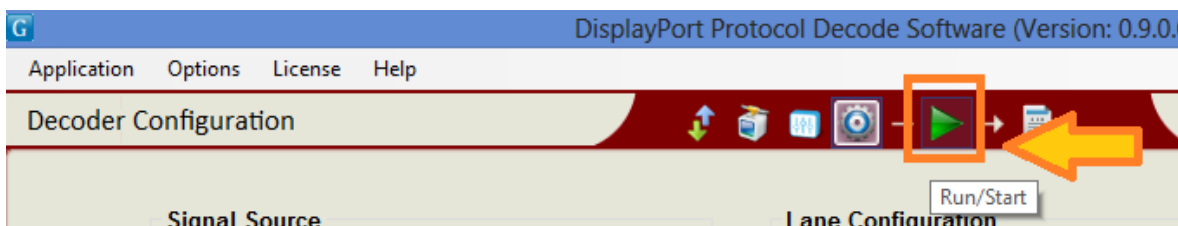
Once you click Run, the decode software takes the inputs from the configuration and decodes the signal. The inbuilt de-serializer creates a stream of data and decodes all the DisplayPort micro packets.

The status bar displays the progress and shows the activities beingcarried out. To stop the Decode/Analysis operation, click the "Stop" button as shown below:
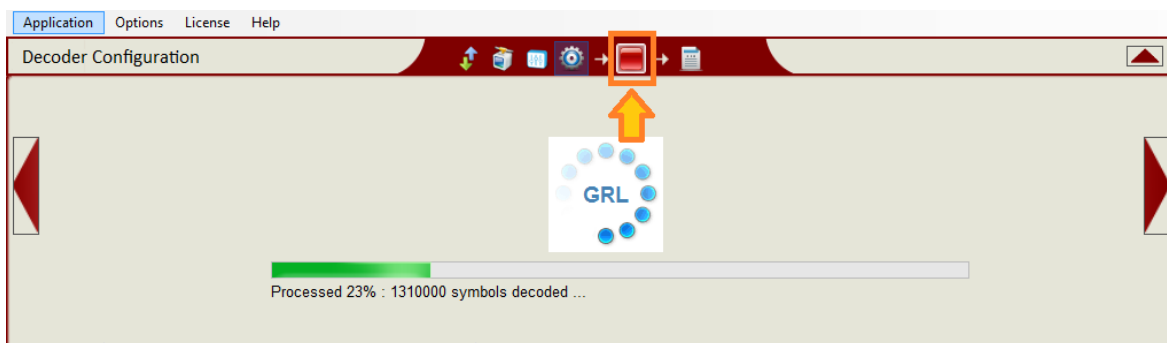
After completing the analysis, the software minimizes the action window and displays the decode results.

12. Analyzing The Results

After completing the decode process, the GRL DisplayPort Protocol Decode software displays comprehensive test results.

Note: If the test results do not meet your expectations, first review the test setup, decoder configuration. Any inappropriate inputs in the decoder configuration may result in incorrect test results.

The software provides a list of frames, micro-packets, description of each micro packet, K codes, D codes, transmitted image with horizontal and vertical blanking periods, active video periods, secondary data packets, bus diagram, and physical layer waveforms. All these items can be cross-correlated with the physical layer waveforms.
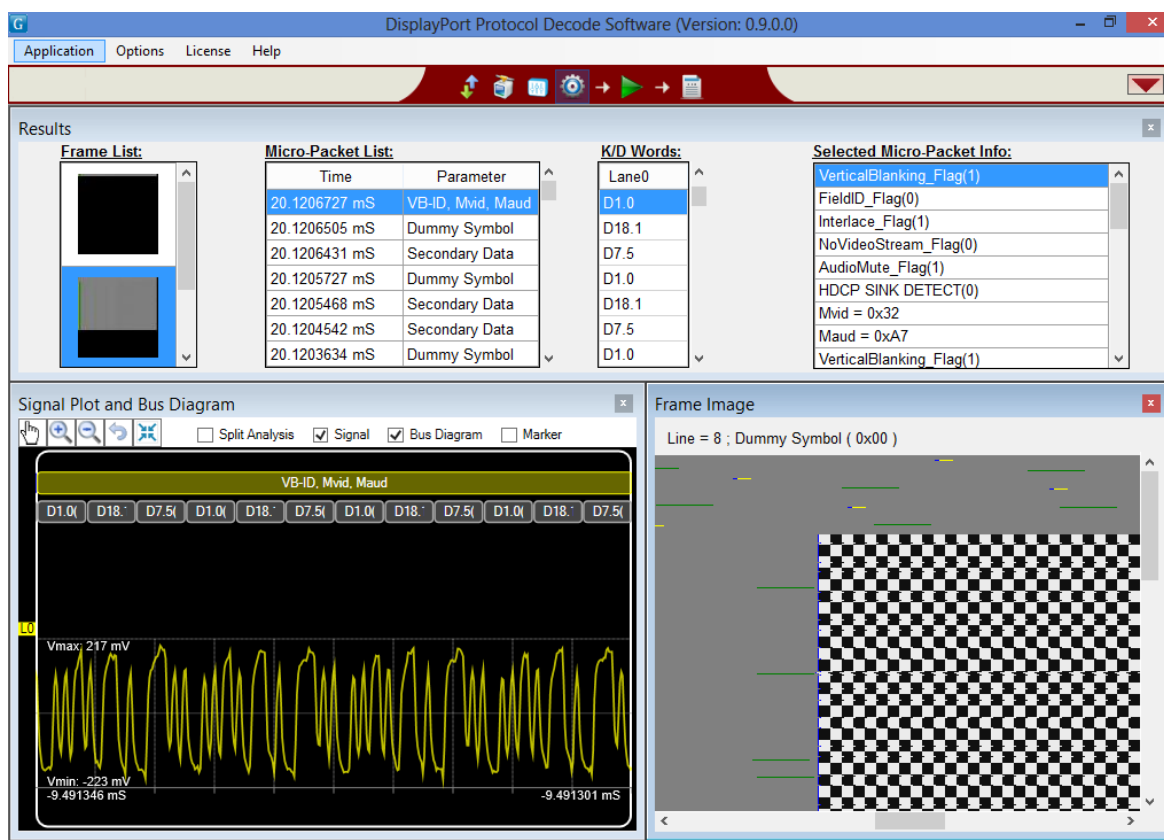
Frame List

Frame List provide the list of frames in the Oscilloscope acquisition. This gives indication of how many frames are present for the analysis.
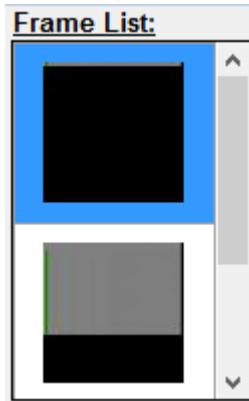
By clicking the frame, all other windiws such as Micro-packets, symbols, frame image and bus and signal diagrams will get updated to the selected frame's details.

Micro-packet List

Micro-packet list provide the list of micro-packets for the selected frames with the time stamp. By clicking the Micro-packet list the Symbol list and Micro Packet Details, Bus Diagrams will get the corresponding Micro-Packet information.

Micro-packet description

Micro-packet description provides the details of the selected Micro-Packet as per the DisplayPort Specification.

Selected Micro-Packet Info:

- VerticalBlanking_Flag(1)
- FieldID_Flag(0)
- Interlace_Flag(1)
- NoVideoStream_Flag(0)
- AudioMute_Flag(1)
- HDCP SINK DETECT(0)
- Mvid = 0x32
- Maud = 0xA7
- VerticalBlanking_Flag(1)

Signal Plot and Bus Diagram

Signal Plot and Bus Diagram provides details of the bus diagram and associated physical layer waveforms.

Color coded bus diagram provides information on the Blanking Start, Blanking End, Secondary Data, Dummy Packets, Active Pixel area.

The plot utilities such as Pan, Zoom, Un-Zoom, Un-do, Fit to screen helps to analyze the data.
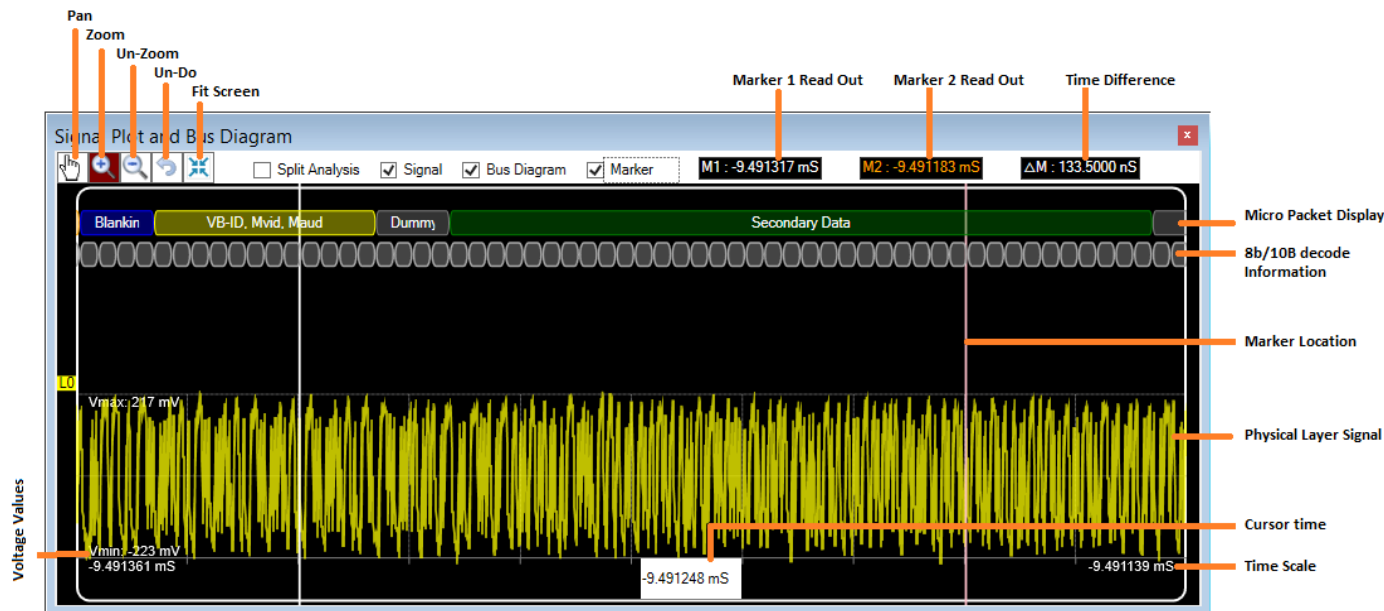
Frame Image

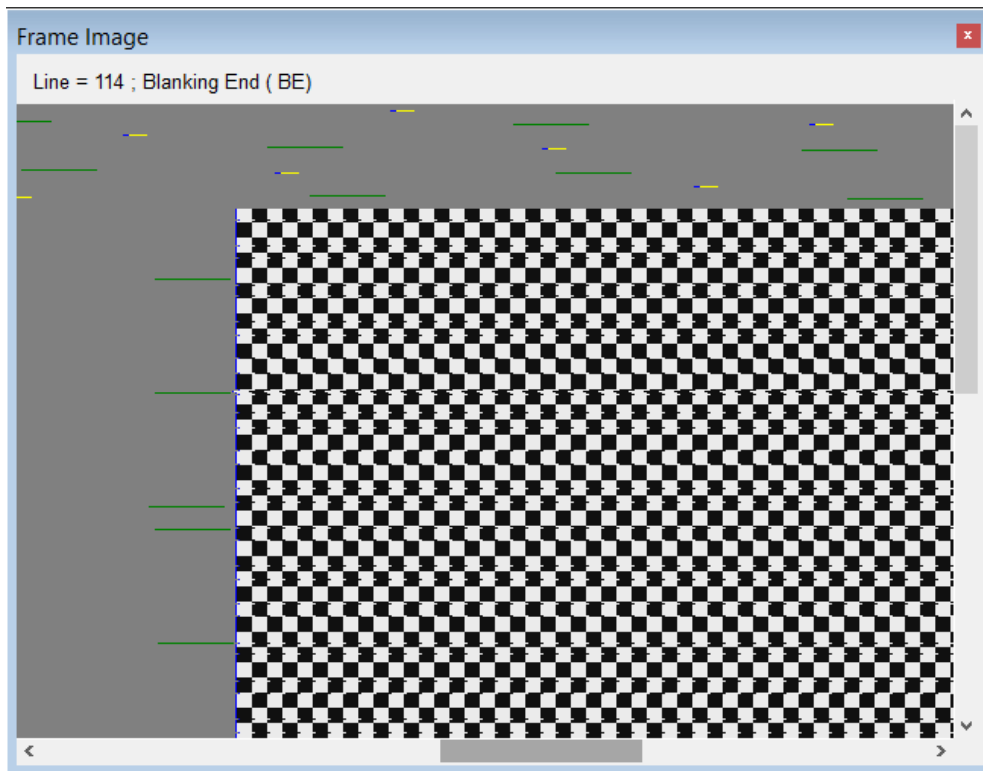DisplayPort Protocol Decode software's Frame Image provide the complete Frame grab of the transmitted video stream. This frame image also can show the details of Horizontal and vertical blanking periods.

During Horizontal and vertical blanking period, the dummy packets, secondary data packers, blanking start, blanking end etc are color coded and displayed in the image.

You can also move over the mouse on the image and find the respective information on the top of the image.

13. Test Report

DisplayPort protocol decode software's automated report generation capability provides ability to generate the report to share the test results.

You can also customize the test report with the details of the "Device Under Test Information", you can specify the Manufacturer information, model number, serial number and other test related information.

You can also choose the environment variables such as decoder configuration details, frame image and frame information in the test report.

14. Feedback and Suggestion

Granite River Labs values your feedback on our products. To help us serve you better, please send us your suggestions, ideas, or comments on the DisplayPort Protocol Decode software. Direct your feedback via e-mail to info@graniteriverlabs.com and include the following information:

General Information
- Instrument model number and hardware options, if any
- Probes used
- Your name, company, mailing address, phone number, FAX number, e-mail id
- Please indicate if you would like to be contacted by Granite River Labs about your suggestions or comments

Program-Specific Information
- Software version number
- Description of the problem such that technical support can duplicate the problem
- The instrument setup files
- Configuration used in the application.
- If possible, save the waveform on which you are performing the test

Once you have gathered this information, you can contact technical support by e-mail. When you use e-mail, be sure to type in the subject line "DisplayPort Protocol Decode Software Problem/Feedback/Suggestion,"