Pulsar | User Manual

Installation | Connection | Calibration| Measurements

User Manual revision 1.0

Notices

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013, or subparagraphs (c)(1) and (2) of the Commercial Computer Software -- Restricted Rights clause at FAR 52.227-19, as applicable.

MultiLane Inc. products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specifications and price change privileges reserved.

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service

To Avoid Fire or Personal Injury

Use Proper Power Cord. Only use the power cord specified for this product and certified for the country of use.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal that exceeds the maximum rating of that terminal.

Do Not Operate Without Covers.

Do not operate this product with covers or panels removed.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate with Suspected Failures.

If you suspect there is damage to this product, have it inspected by qualified service personnel.

Do Not Operate in Wet/Damp Conditions. Do Not Operate in an Explosive Atmosphere. Keep Product Surfaces Clean and Dry

Caution statements identify conditions or practices that could result in damage to this product or other property.

Electro static sensitive device. Operate in ESD supervised and controlled areas.

Table of Contents

Table of Figures

Revision Control

Revision number	Description	Release Date
4.2.5	Cerberus GUI for Pulsar	1/17/2024

Product Software

The instrument includes the following software:

- Cerberus SW

Instrument GUI runs on Windows XP (32/64 bit), Windows 7,8 and 10.

NOTE. *These applications require the Microsoft .NET Framework 3.5.*

If the Microsoft.NET Framework 3.5 is needed, it can be downloaded through this link: http://download.microsoft.com/download/2/0/e/20e90413-712f-438c-988e-fdaa79a8ac3d/dotnetfx35.exe.

For more products updates, check the following webpage:
www.multilaneinc.com/products.html

Minimum PC Requirements

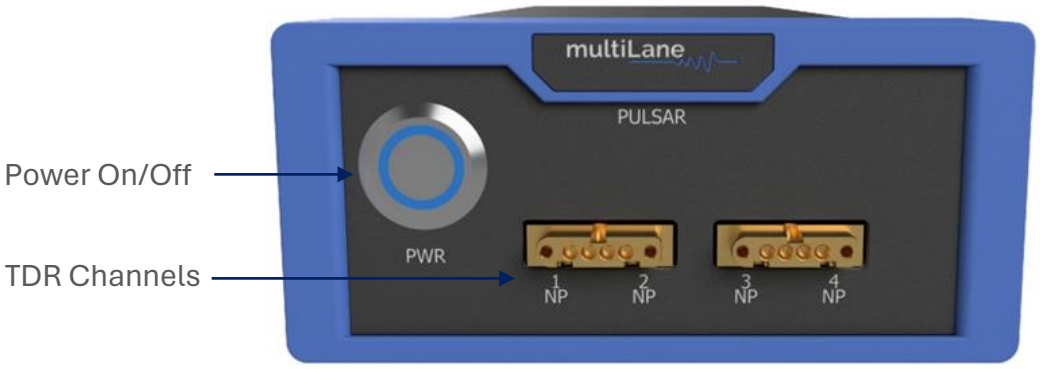
The Windows PC properties for Pulsar's software should meet the following specifications:

- Windows XP SP3 or greater
- Minimum 1 GB RAM
- 1 Ethernet card to establish connection with the device
- USB Connector
- Pentium 4 processor 2.0 GHz or greater
- .NET Framework 3.5 sp1

List of Acronyms

Acronym	Definition
BW	Bandwidth
BERT	Bit Error Rate Tester
Conf	Configuration
DUT	Device Under Test
FEC	Forward Error Correction
FW	Firmware
GBd	Giga Baud
Gbps	Gigabits per second
GUI	Graphical User Interface
HW	Hardware
ISI	Inter-symbol Interference
JTOL	Jitter Tolerance
KGU	Known Good Unit
NRZ	Non-Return to Zero
PAM4	Pulse Amplitude Modulation (4-level)
SI	Signal Integrity
SNR	Signal-to-Noise Ratio
Sim	Simulation
SW	Software

Pulsar



Installation

After downloading Cerberus setup file, select run and follow this easy step-by-step setup installation procedure:

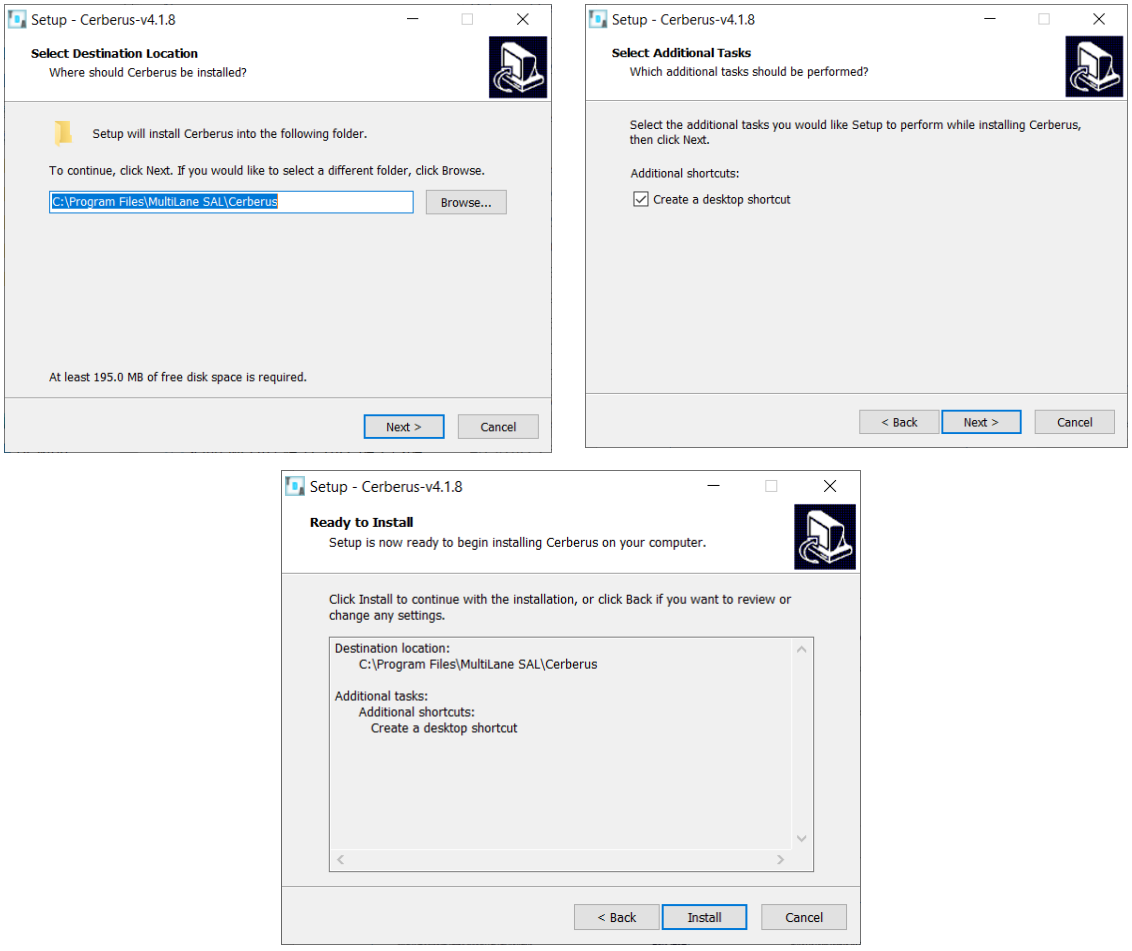


Figure 1: Setup installation procedure

Connecting to the Instrument

To connect to the instrument, follow this sequence of steps:

- ***Install*** Cerberus.
- ***Connect*** the power cable to the power jack of Pulsar and plug it into an AC outlet.
  The power cable is already included in the package accessories.
- ***Power Up*** Pulsar.
- ***Connect*** the device to the network* using a RJ45/LAN cable.
  LAN connection can be validated with a ping to the static instrument IP.
- ***Run*** Cerberus.
- ***Connect*** using the IP address of the target instrument(s) (Figure 2). The IP address is printed on the back side of the instrument.

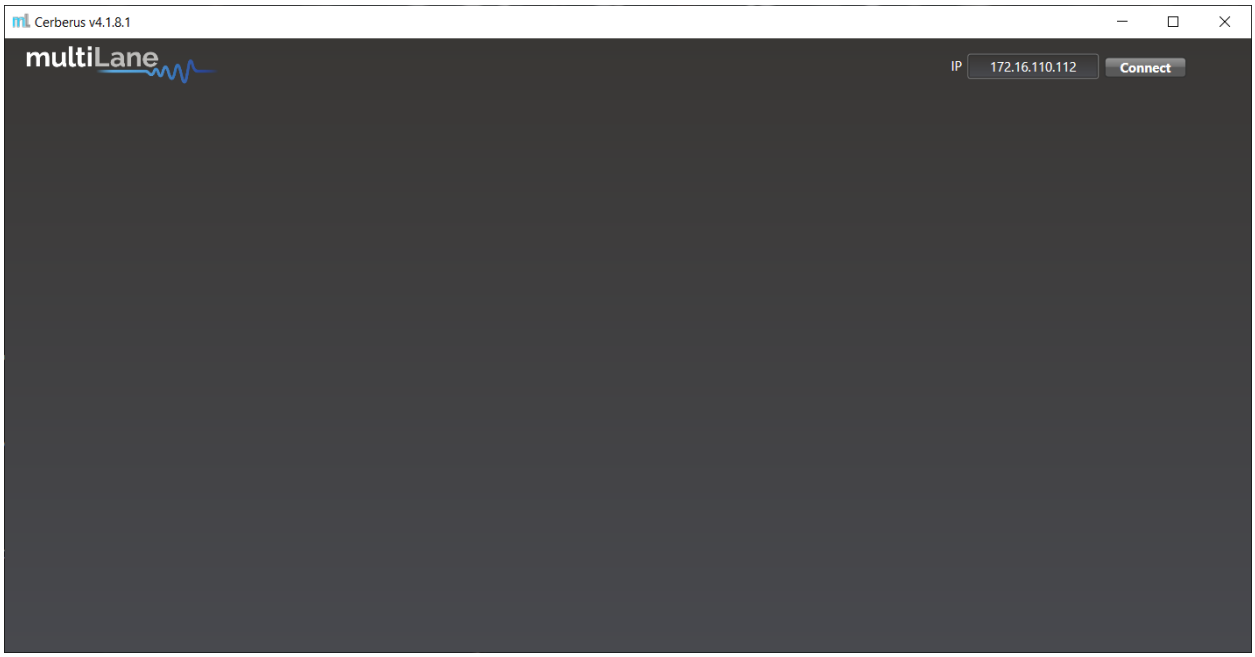


Figure 2: Connection box

NOTE

- In the case of a connection failure, a pop-up message will appear indicating a connection error (Figure 3).

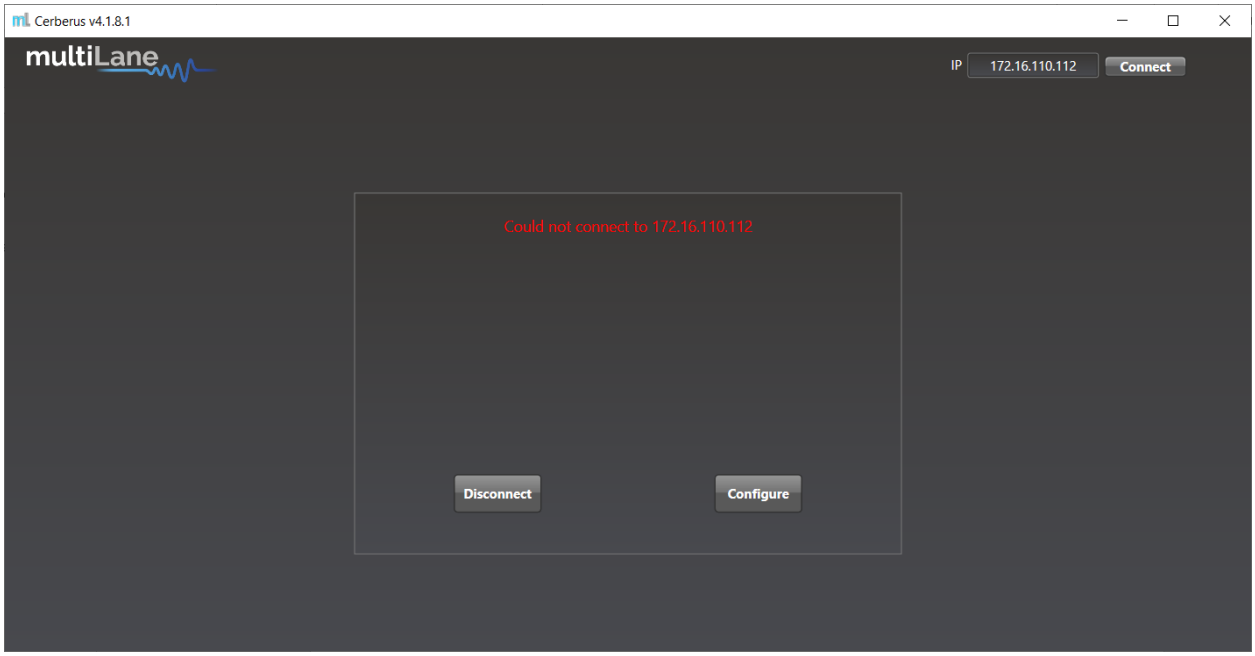


Figure 3: Connection failure notification.

*To add the device to the network, consult Appendix I at the end of this manual

Connection & Mode Selection

After connecting to the instrument by typing its IP in the appropriate text box, select the desired mode of operation and press “Configure”.

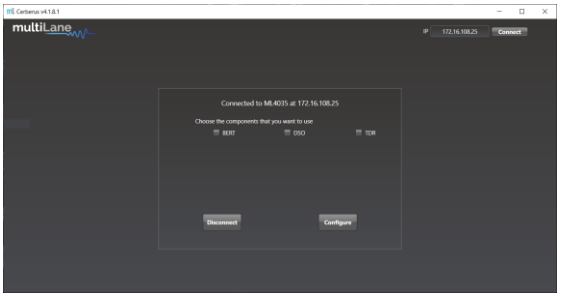


Figure 4 mode selection.

TDR Measurements

When selected, the rightmost checkbox starts the instrument and software in TDR mode. This mode allows the user to perform time and frequency domain measurements such as TDR, and Sdd11.

This mode can be used for many applications, including impedance profile evaluation, locating faults & discontinuities, and phase matching.

This section will list and explain how to perform all measurements that fall under this umbrella.

Time-Domain Reflectometry

TDR can be used for many applications, such as to characterize the impedance of DUTs, backplanes, and other physical media, locating faults, discontinuities or breaks along a cable, cable matching, and more.

Impedance Profile Gating Calibration

Gating is the default calibration method for return loss measurements, and the one that should be used when the DUT is followed by unwanted system components such as MCB traces, connectors, etc. The calibration wizard uses TDR to allow the user to locate the DUT's boundaries, set markers and apply gating. This process is done as follows:

- ***Select*** the channel(s) on which the calibration will be performed.
- ***Click*** on "Align"

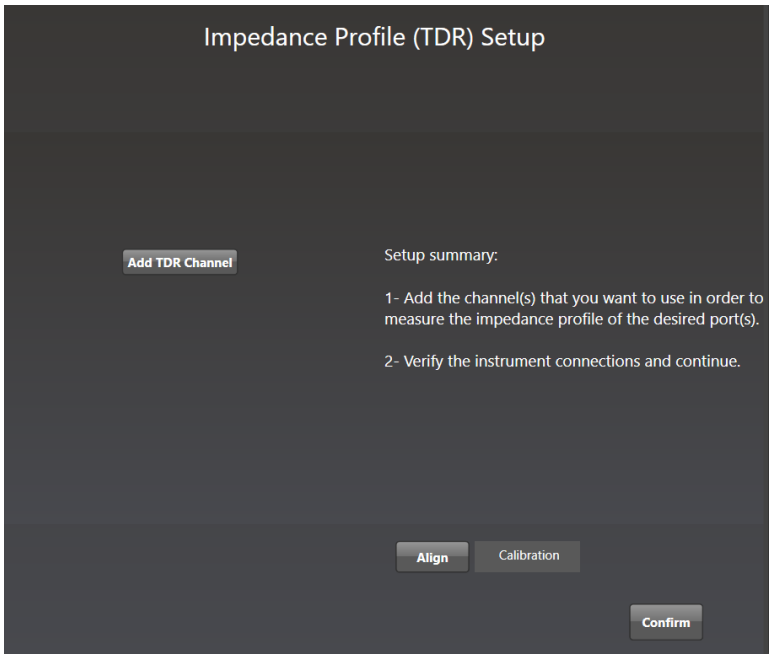


Figure 5 Align Step

- ***Disconnect*** the OSFP/QDD connector from the host and click on “Confirm” then “done”.

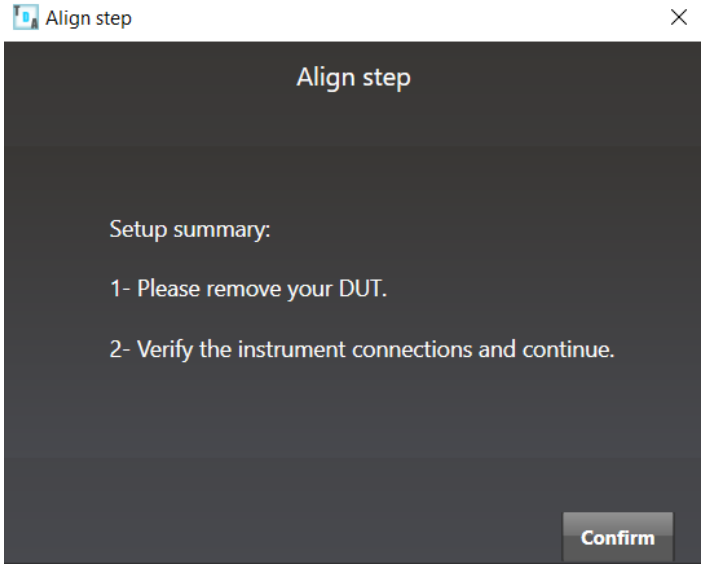


Figure 6 Confirm Alignment

- ***Close*** the page to exit the calibration wizard.
- ***Plug*** the OSFP/QDD connector in the host.

TDR Measurement

- Measurements can either be differential or single ended. For single ended measurement, “Single_Ended” mode should be selected in the main window tab and only one port is used for each channel while the second is terminated with a 50Ω load.
- Select the channel(s) on which the impedance profile measurement will be performed.
- Click “Confirm” to measure the impedance profile.
- Press ▶ to measure continuously or ⏭ for a single capture.

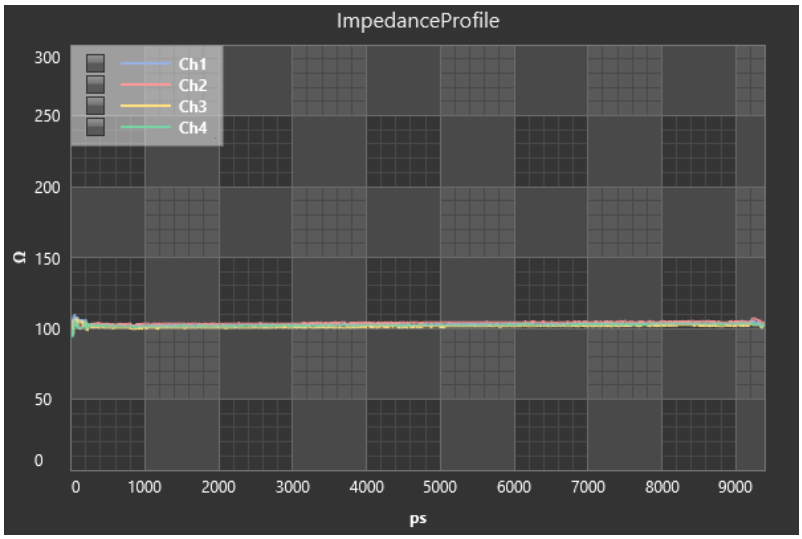


Figure 7 Impedance profile Graph.

Locating Faults & Discontinuities

One popular application for TDR is locating faults and discontinuities in a physical medium.

As the velocity of propagation of electromagnetic waves in vacuum is known, additional information related to the characteristics of the physical medium such as the copper cable's velocity of propagation (VoP) allows the speed of propagation to be estimated and the distance between two points can therefore be calculated.

Placing two markers at different points on the graph will allow the user to see both the temporal and spatial difference between the two points.

The velocity of propagation can be set in the "Advanced Settings" tab.

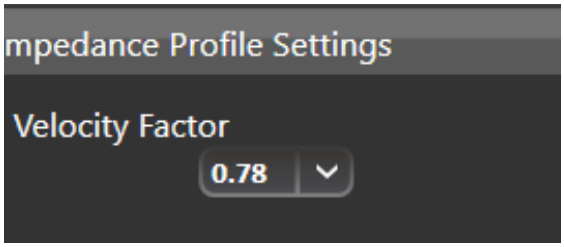


Figure 8 Velocity of propagation.

Figure 9 Ohm Offset

It is also possible to add a positive or negative ohm offset to each/all channels.

User defined mask

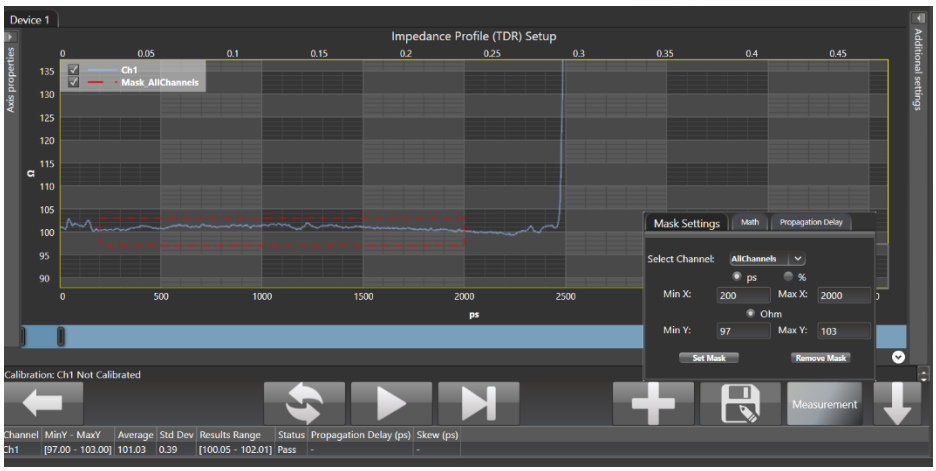


Figure 10 User defined mask

The user can define in the measurement section a custom mask by setting the minimum and maximum time, as well as impedance. A Pass/Fail verdict is shown to indicate if the points are within the mask or violating it.

Math

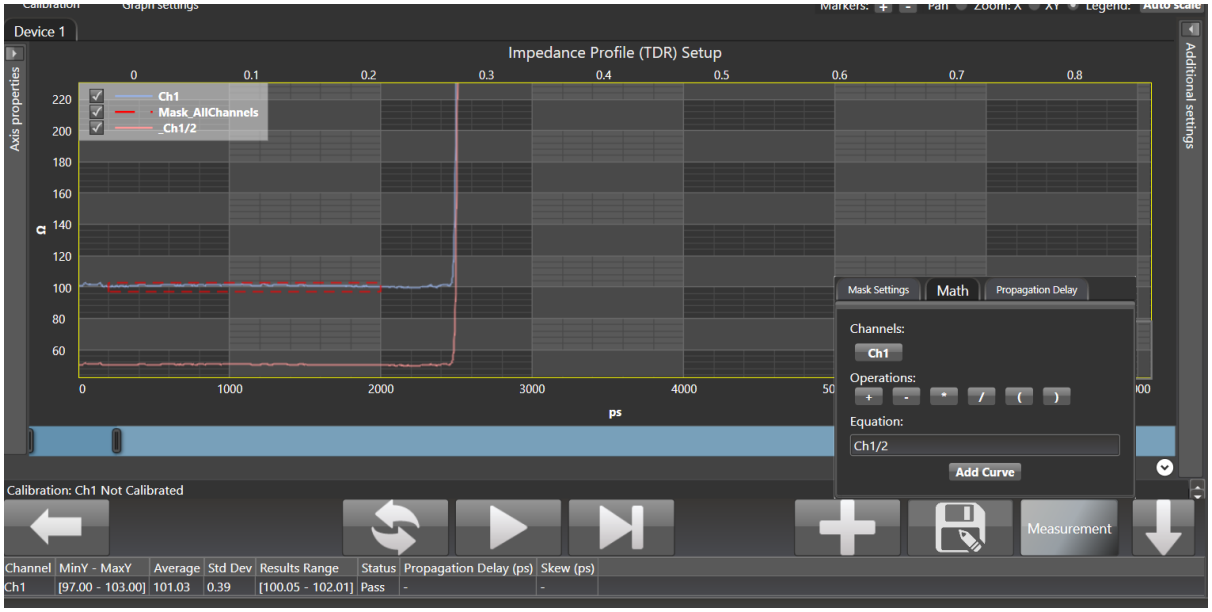


Figure 11 Math Functions

A math function is included to perform (-) (+) (*) (/) operations using the selected channels.

Propagation Delay

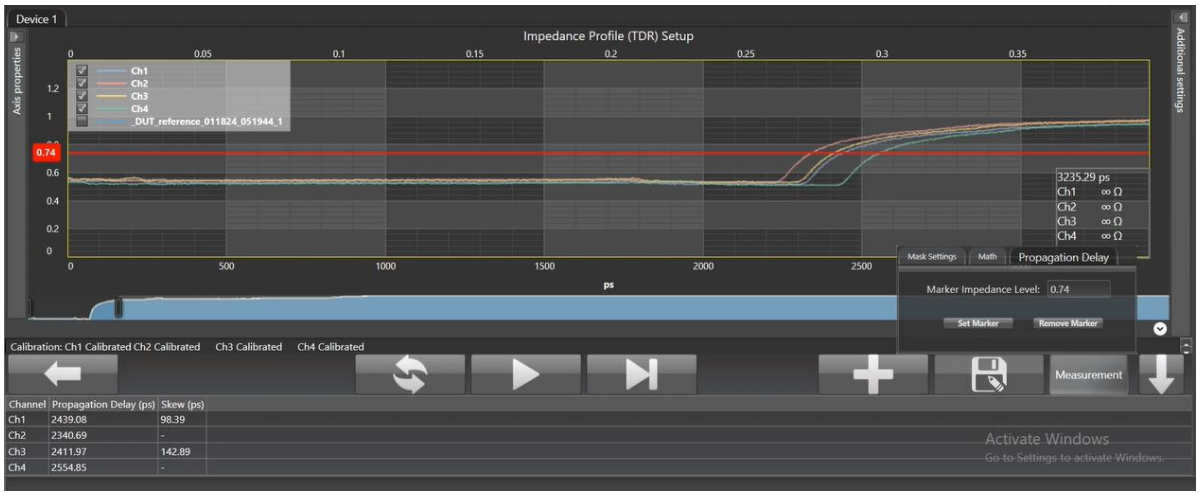


Figure 12 Skew Measurements

Propagation Delay is used to measure intra and inter pair skew. The marker impedance level is set at half of the input signal's voltage.

$$\frac{Vmax - Vmin}{2}$$

Return Loss

Pulsar can also be used to measure return loss. Similarly to impedance profile, Pulsar performs a TDR measurement in time domain and then converts it to the frequency domain, resulting in return loss measurements.

Gating

Gating is the default calibration method for return loss measurements and the one that should be used when the DUT is followed by unwanted system components such as MCB traces, connectors, etc. The calibration wizard uses TDR to allow the user to locate the DUT's boundaries, set markers and apply gating. This process is done as follows:

- ***Select*** the channel(s) on which the calibration will be performed.
- ***Click*** on "Calibration" followed by "Run" to start the calibration process.
- ***Click*** on "Next Setup"

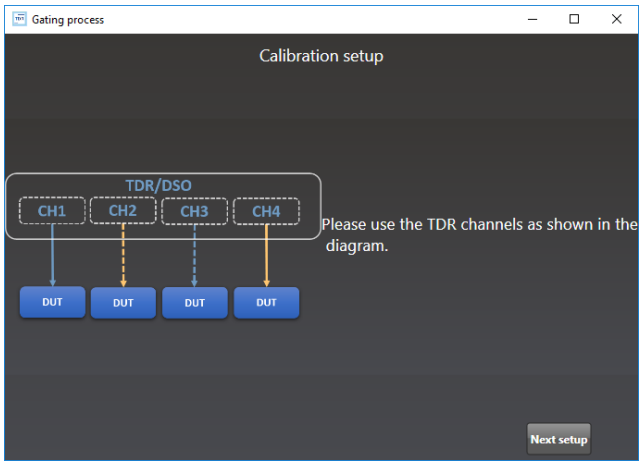


Figure 13 Calibration Wizard

- ***Connect*** the twinax cables to Pulsar and click on "Next setup"
- ***Remove*** the OSFP/QDD connector from the host and press "Next Setup".
- ***Click*** on "Next Setup"

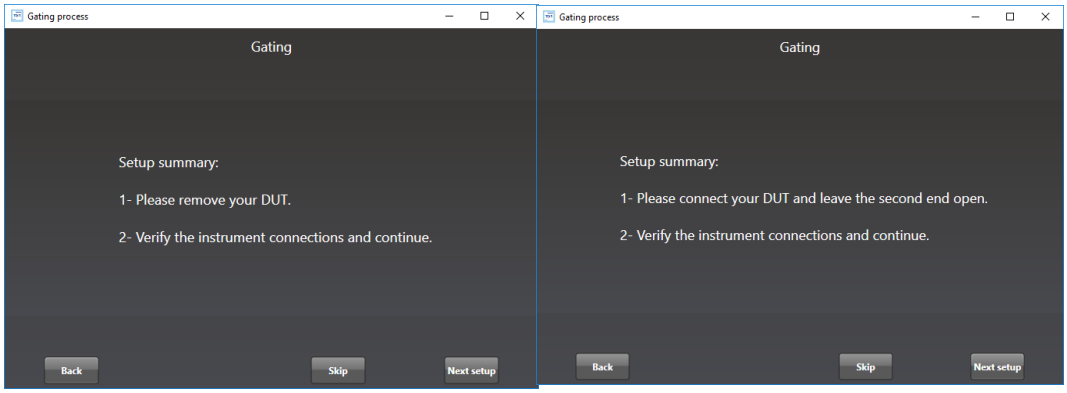


Figure 14 Gating setup

- ***Apply*** markers at the points of difference between the main setup's impedance profile and the other two and press "Apply Gating"**.**

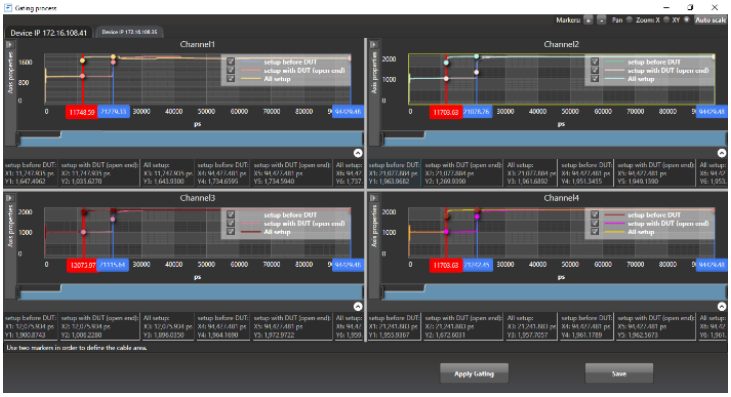


Figure 15 Markers

- ***Close*** the page to exit the calibration wizard.

This step allows the detection of the start and end of the measured DUT. In the case of a host, we locate the start and end of the trace.

Return Loss Measurement

Press ▶ to measure continuously or ⏭ for a single capture.

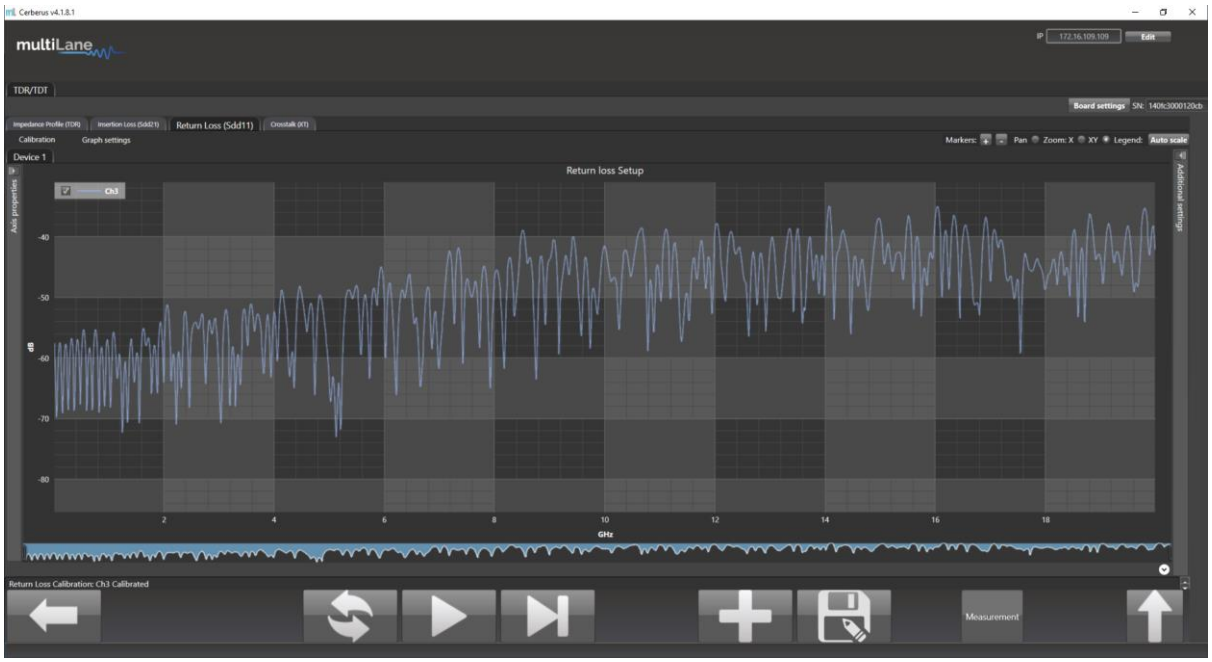


Figure 16 Return Loss Measurement

Measurements and masks can be loaded in the software by pressing “Measurement” on the bottom right side of the page.

The available measurements for return loss are loss at Nyquist and the return loss mask, for which the mask type is available for different standards that the user can choose from.

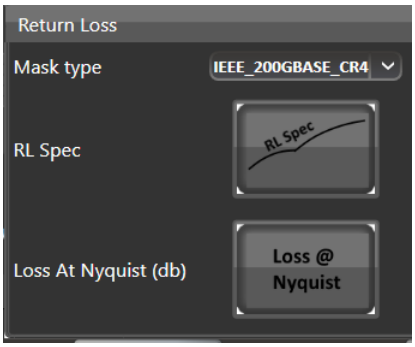


Figure 17 S11 Measurements

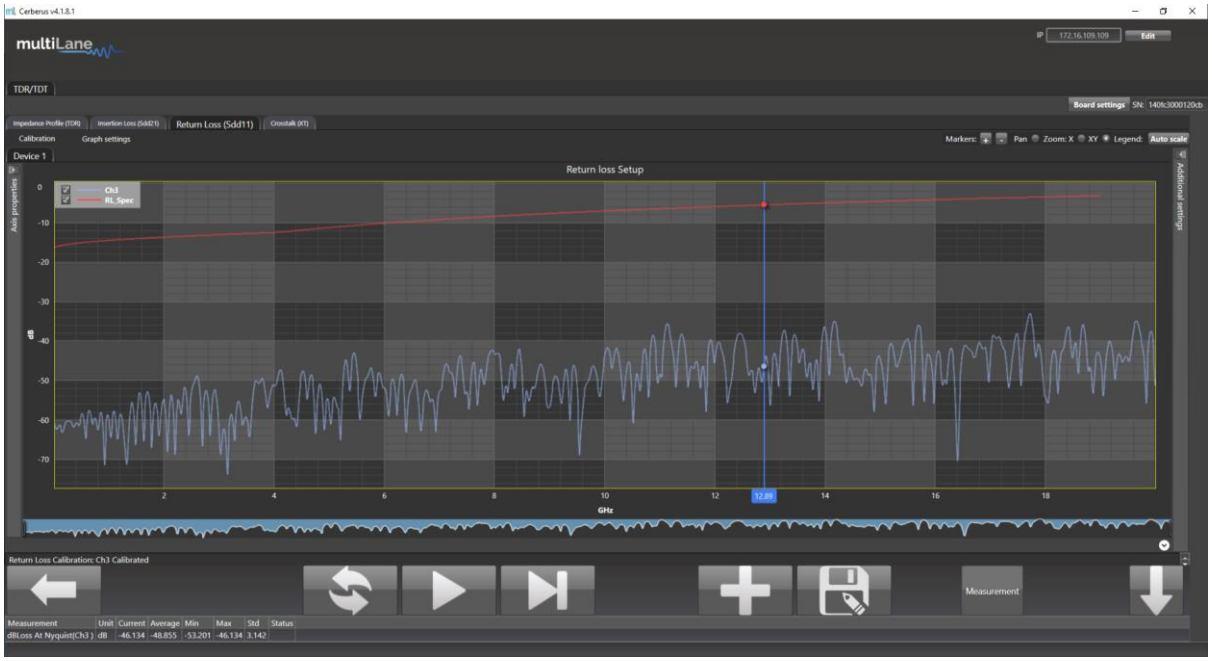
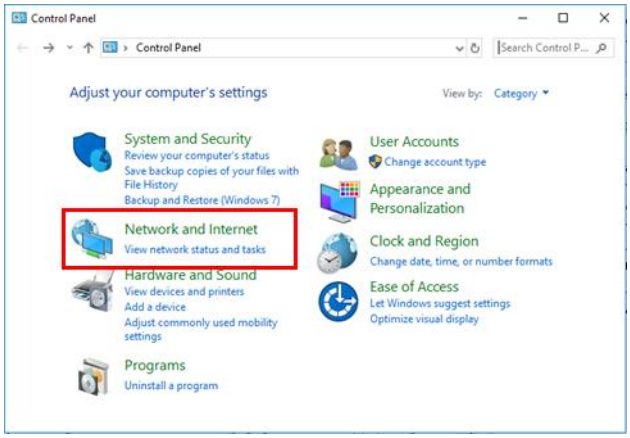


Figure 18 Return Loss Mask

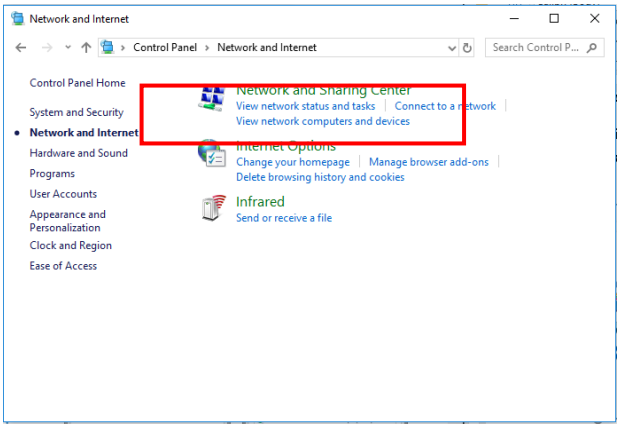
Appendix 1 – Adding Pulsar to the Network

To create a local network connection, please follow these steps:

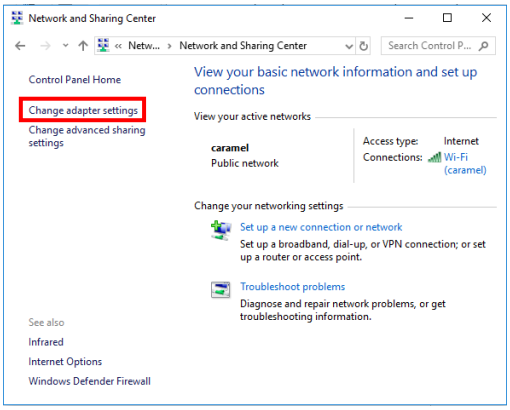
- ***Create a local network connection*** between the laptop and Pulsar using Internet Protocol Version 4 (TCP/IPv4).
  - ***Open*** *"Control Panel"* and ***choose*** *"Network and Internet"*.
  - ***Open*** *"Network and Sharing Center"*.

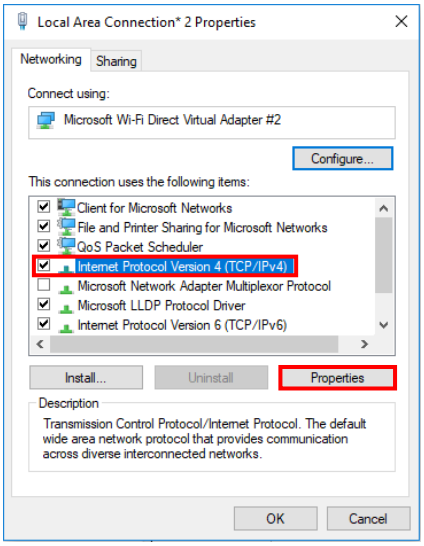


- ***Click on*** *"Change Adapter Settings"*, then ***choose*** *"Local Area Connection"*.

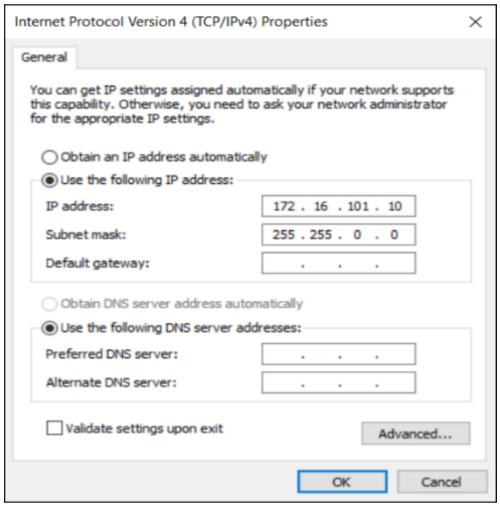


- In the Networking Tab, ***click on*** *"Internet Protocol Version 4 (TCP/IPv4)"* then *"Properties"*.





- ***Add a similar IP Address*** that shares a subnet with the instrument IP in the Advanced tab.
  This will be used to ping the instrument once the IP Address is changed to match that of the network.
- ***Connect the laptop*** directly to Pulsar using an Ethernet cable.
- ***Copy the IP Address*** found on the back of the unit.
- ***Ping the device*** to make sure that the connection is successful.
- Now a new local network has been successfully defined.



NOTE: These steps are illustrated using Windows 10. Kindly note that previous versions of Windows have a similar procedure with slight differences in tabs or folders' names.