

MURIDEO®



HDBT™ Test Device

Model MU-M4SOL

User's Manual

Revision A16

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Revision History

Revision	Date	Description
A1	November 2016	First issue
A2	February 2017	General update
A3	March 2017	<ul style="list-style-type: none"> • Explanation of HDBaseT Link classes • How to connect the test device for EDID • Description of test cases • USB connectivity indicator
A4	April 2017	Cable certification – report generator
A5	July 2017	GUI screenshots update
A6	November 2017	Tx and Rx FW upgrade added
A7	January 2018	GUI-related updates
A8	January 2018	Physical/Mechanical measurement update
A9	April 2018	Model MS104B replaces model MS102TD
A10	Jul 2018	<ul style="list-style-type: none"> • Wi-Fi Client GUI updated • New DC Resistance module
A11	Nov 2018	Date/Clock settings added
A12	June 2019	<ul style="list-style-type: none"> • GUI modifications • Local PDF certification report
A13	September 2019	New HDMI Cable Tester module
A14	November 2019	HDMI Generator update
A15	March 2020	Adding a logo to certification report & remove PDF Creator Application
A16	May 20	Adding Network capabilities

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1. Introduction

This document is intended as a guide for installation and operation of the **MU-M4SOL** HDBaseT Test Device from Media Solutions Ltd.

The MU-M4SOL test device provides an elegant solution for in-the-field testing of HDBaseT-based communications systems and cabling.

Use the MU-M4SOL device to test and certify the HDBaseT performance and link quality of CATx cabling *before* performing installations. In addition, the MS-TestPro's built-in monitoring, logging, and diagnostics capabilities allow for quick, efficient analysis and troubleshooting.



Figure 1: The MU-M4SOL HDBaseT Test Device

MU-M4SOL is the ultimate testing device for installers, developers, and integrators. The device is supplied with HDBaseT transmitter, receiver, and PoH (Power over HDBaseT) functionality, providing a highly-efficient testing platform for HDBaseT source and sink nodes, powered devices, and CATx cabling intended for use in HDBaseT networks.

NOTE

The MU-M4SOL requires use of CAT5e (or higher quality) cable – referred to in this manual as *CATx cabling*. **The HDBaseT standard supports a cable length range of 20 to 100 meters (66 to 328 feet).**

Why do you need the MU-M4SOL HDBaseT test device?

You have finished wiring the audiovisual system and have connected the audio/visual devices over the HDBaseT link. You can see the picture and hear the sound. Everything is OK, right?

No! A link test is essential in guaranteeing perfect performance. You certainly do not want to come back to perform the installation again.

When you connect the test device and see error levels in the red zone – *even if the link is up and you see a picture in your display* – the probability of a link failure is high. Any EMC interference, caused by switching on lights or an air conditioning unit, can cause a transmission breakdown and a drop in the video link.

With the MU-M4SOL test device, you can identify faulty cabling and systems **before installing them**, saving time and money.



Figure 2: Faulty Link

1.1 MU-M4SOL Models

Users can choose between two MU-M4SOL models:

- Wi-Fi Client Model, with 3.5" screen, **built-in HDMI pattern generator**, and Wi-Fi interface for browser-based management (MS103TDs)



Figure 3: MS103TDs

- Battery based Wi-Fi Client Model, with 3.5" screen, **built-in HDMI pattern generator** and Wi-Fi interface for browser-based management (MS104B)



Figure 4: MS104B

1.2 Standard Modules

- The HDBaseT Tester is supplied with Spec 1.0 Tx and Rx Modules that can be used with either of the above-mentioned tester models.



Figure 5: HDBaseT Spec 1.0 Tx/Rx Modules

1.3 Optional Add-On Modules

- The HDBaseT Spec 2.0 Modules (Tx and Rx units) are available as an optional add-on that can be used with any of the above-mentioned tester models.



Figure 6: HDBaseT Spec 2.0 Tx/Rx Modules

- The DCR (DC Resistance) and Looper Modules are available as optional add-ons that can be used with any of the above-mentioned testers.



Figure 7: DC Resistance and Looper Modules

- The HDMI Cable Tester and Looper Modules are available as optional add-ons that can be used with any of the above-mentioned testers.



Figure 8: HDMI Cable Tester and Looper Modules

2. Product Description

2.1 Overview

The basic MU-M4SOL HDBaseT test device is composed of 3 units:

- Main unit – the MU-M4SOL chassis – containing a power supply, USB connector, and 3.5-inch touch screen.
- HDBaseT transmitter module – for transmitting HDBaseT traffic to sink devices, such as projectors or television sets
- HDBaseT receiver module – for receiving HDBaseT traffic from source devices, such as a PCs, set-top box (STB), DVD or Blu-ray player.

2.2 Models

The MU-M4SOL HDBaseT Test Device is supplied in a variety of models and add-on modules:

Table 1: MU-M4SOL Models

Model	Description
MS103TDs	HDBaseT tester main unit with 3.5" touch display, built-in HDMI pattern generator, and Wi-Fi connection for smart devices
MS104B	Battery based HDBaseT tester main unit with 3.5" touch display, built-in HDMI pattern generator, and Wi-Fi connection for smart devices

Table 2: MU-M4SOL Modules

Model	Description
Standard Modules	
HDBaseT Spec 1.0 Transmitter and Receiver Modules	The MU-M4SOL HDBaseT Test Device is supplied with HDBaseT Spec 1.0-standard Tx and Rx modules.
Optional Add-On Modules	
HDBaseT Spec 2.0 Transmitter and Receiver Modules	The HDBaseT Spec 2.0 Modules (Tx and Rx units) are available as an optional add-on that can be used with any of the test devices listed in Table 1 above.
DCR Module	The DC Resistance feature enables installers and integrators to check DC resistance unbalance easily and reliably – both within and between twisted pairs – ensuring system integrity in even the most advanced, high-powered Power-over-HDBaseT systems.
HCT Module	The HDMI Cable Tester module allows installers and integrators to test the quality of HDMI cables before their installation. The module identifies missing and shorted wires in HDMI cable that will render the cable incapable of 4K streaming.
Looper Module	The Looper module is a remote-end module with RJ45 and HDMI ports that is used to create the loop at the other end for DC Resistance and HDMI cable testing.

2.3 Subsystems

Table 3 below describes the MU-M4SOL test device's

subsystems. **Table 3: MU-M4SOL Subsystems**

Subsystem	Description
Main unit MS103TDs	<ul style="list-style-type: none"> Power supply, 48V, 0.5A, positive polarity central pin USB 2.0 port – for memory stick connectivity Ethernet connection for future use HDMI pattern generator
Main unit MS104B	<ul style="list-style-type: none"> Battery based Charger, 12.6V, 3.0A, positive polarity central pin USB 2.0 port – for memory stick connectivity Ethernet connection for future use HDMI pattern generator
HDBaseT Spec 1.0 Transmitter module	<ul style="list-style-type: none"> HDBaseT Spec 1.0 output port HDMI input, supporting pixel clock speed of up to 340 MHz (4K/60 Hz, 4:2:0) PoE (PoH, powered device)
HDBaseT Spec 1.0 Receiver module	<ul style="list-style-type: none"> HDBaseT Spec 1.0 input port HDMI output, supporting pixel clock speed of up to 340 MHz (4K/60 Hz, 4:2:0) PoE (PoH, powered device)
HDBaseT Spec 2.0 Transmitter module*	<ul style="list-style-type: none"> HDBaseT Spec 2.0 output port HDMI input, supporting pixel clock speed of up to 340 MHz (4K/60 Hz, 4:2:0) PoE (PoH, powered device)
HDBaseT Spec 2.0 Receiver module*	<ul style="list-style-type: none"> HDBaseT Spec 2.0 input port HDMI output, supporting pixel clock speed of up to 340 MHz (4K/60 Hz, 4:2:0) PoE (PoH, powered device)
DC Resistance module*	<ul style="list-style-type: none"> RJ45 output port
HDMI Cable Tester module*	<ul style="list-style-type: none"> HDMI output port
Looper*	<ul style="list-style-type: none"> RJ45 input port HDMI input port

* Optional equipment

2.4 HDBaseT Support

The MU-M4SOL test device integrates a Valens VS100 HDBaseT Class A or VS2310 HDBaseT class C chipset, including transmit and receive ICs. The class A chipset supports HDBaseT Specification 1.0, and is compatible with HDBaseT Specification 2.0, allowing it to work with HDBaseT devices of the following classes:

Table 4: MU-M4SOL Compatibility with HDBaseT Classes

Class	HDBaseT Specification	Media Type	Maximum Resolution	Supported Cabling	
				Maximum Length	Category
Class A	1.0	Copper	1080p	100 m	CAT5e
			4K	70 m	CAT5e
Class B	1.0	Copper	1080p	70 m	CAT6a
			4K	35 m	CAT5e
Class C	2.0	Copper	1080p	100 m	CAT5e
			4K	90 m	CAT5e
			4K	100 m	CAT6a
Class D	2.0	Copper	1080p	30 m	CAT6a
Class E	2.0	Fiber	4K	Not supported by MU-M4SOL	

3. Installation

3.1 Unpacking the Unit

The complete MU-M4SOL HDBaseT Test Device kit is depicted in Figure 9 below.



Figure 9: MU-M4SOL HDBaseT Test Device Kit



Figure 10: MU-M4SOL HDBaseT Test Device Kit Contents

The TestPro system is supplied with the following components:

Table 5: MU-M4SOL Components

Number	Component
1	Main unit
2	Transmitter module
3	Receiver module
4	External 48 VDC power supply for MS103TDs or 12.6 VDC charger for MS104B
5	Pluggable PoH Adapter – allows the remote transmitter or receiver module to serve as a PoH powered device (PD)
6	Stylus pen for operating the touch screen
7	HDMI Cable

NOTE

Please contact MSolutions if any of the items listed are missing or damaged.

4. Operating the Touchscreen

4.1 Test Setup

This section describes the physical setup and connectivity schemes used to perform tests using MU-M4SOL.

- Testing MU-M4SOL Modules
- Connection to System Under Test (SUT)

IMPORTANT

- * Make sure that you complete all cable connections **before** powering up the MU-M4SOL test device.
 - * Always power down the unit for cartridge replacement.
-

4.1.1 MU-M4SOL Test Setup

In the MU-M4SOL Modules test setup mode, the transmitter and receiver modules of the MU-M4SOL device are directly connected to each other using a CATx cable of up to 100 meters (328 feet) in length, as shown in Figure 11 and Figure 12 below.

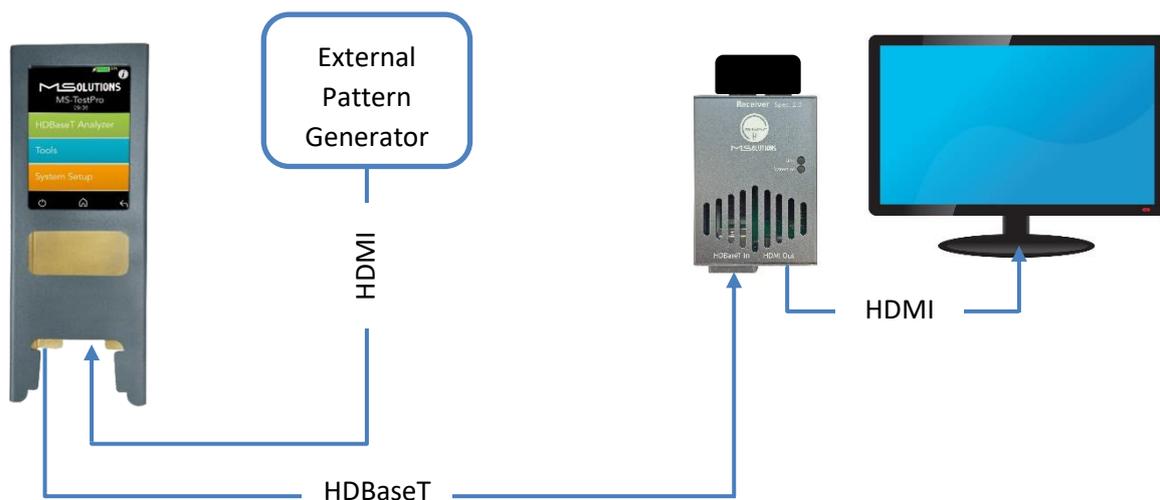


Figure 11: MU-M4SOL Modules Test Setup using External Pattern Generator

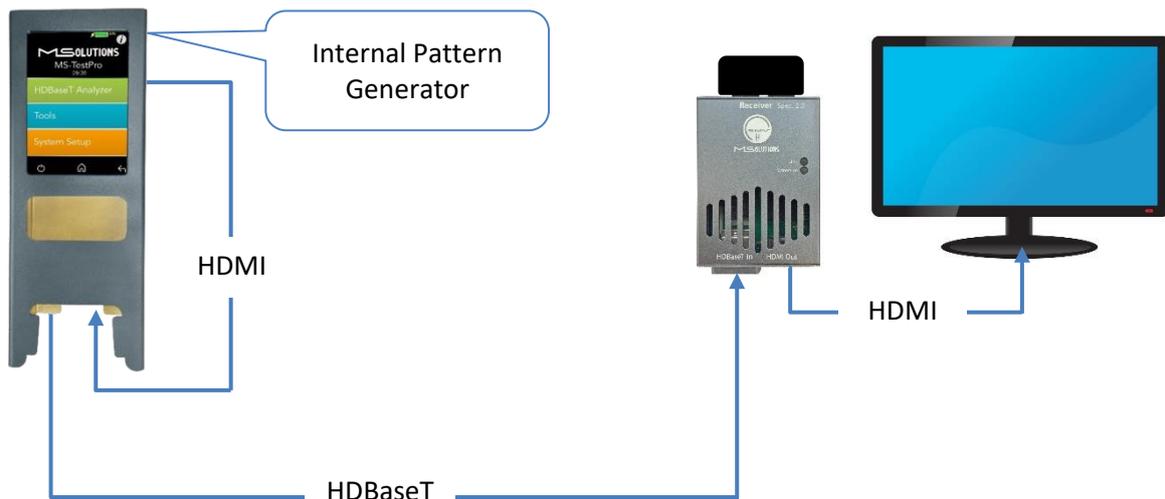


Figure 12: MU-M4SOL Modules Test Setup using Internal Pattern Generator

To setup the system for testing:

Insert the Transmitter or Receiver module into the MU-M4SOL main unit in the lower slot –this module will be defined as the *local* module. The other module will be defined as the *remote* module.

NOTE

Only the *lower slot* is used to connect modules to the MU-M4SOL main unit. The upper slot is used for module storage only.

2. Using a CATx cable, connect the HDBaseT port (RJ45) of the local module to the HDBaseT port of the remote module.
3. Attach the pluggable PoH adapter to the remote module so that it will function as a PoH powered device (PD).



Figure 13: Pluggable PoH Adapter on Remote Module

4. Insert the 48 VDC power supply connector into the designated socket in the main unit to power the device.

NOTE

The device will not power up unless a local module has been inserted into the lower slot of the device.



Figure 14: MS103TDs and MS104B Input Powering Sockets

4.1.2 Connection to System Under Test (SUT)

Use the following guidelines to connect the MU-M4SOL to an HDBaseT *source* device (i.e. an HDBaseT transmitter such as Matrix or Blu-ray). The MU-M4SOL acts as a sink device.

To test an HDBaseT source device:

Insert the receiver module into the MU-M4SOL main unit in the lower slot – the module will be defined as the local module.

Using a CATx cable, connect the HDBaseT input port of the receiver module to the output port source device, using one of the following methods:

- Connecting the CATx cable directly to an integrated or 3rd party HDBaseT output port in the source device.
- Connecting the CATx cable to the MU-M4SOL transmitter module and connecting the transmitter module to the source device with an HDMI cable.

Insert the 48 VDC power supply connector into the designated socket in the main unit to power the device.

Use the following guidelines to connect the MU-M4SOL to an HDBaseT *sink* device (i.e. an HDBaseT or HDMI receiver such as a display). The MU-M4SOL acts as a source device.

To test an HDBaseT sink device:

Insert the transmitter module into the MU-M4SOL main unit in the lower slot – the module will be defined as the *local* module.

Using a CATx cable, connect the HDBaseT output port of the transmitter module to the input port sink device, using one of the following methods:

- Connecting the CATx cable directly to an integrated HDBaseT input port in the sink device.

- Connecting the CATx cable to the MU-M4SOL receiver module and connecting the receiver module to the sink device with an HDMI cable.
3. Insert the power supply connector into the designated socket in the main unit to provide power.

NOTE

The MS103TDs should be powered by a 48V Power Supply.
For the MS104B, use a 12.6V Power Charger.

4.2 Performing the Tests

4.2.1 Main Screen

The main screen (see the figure below) offers the following functionalities:

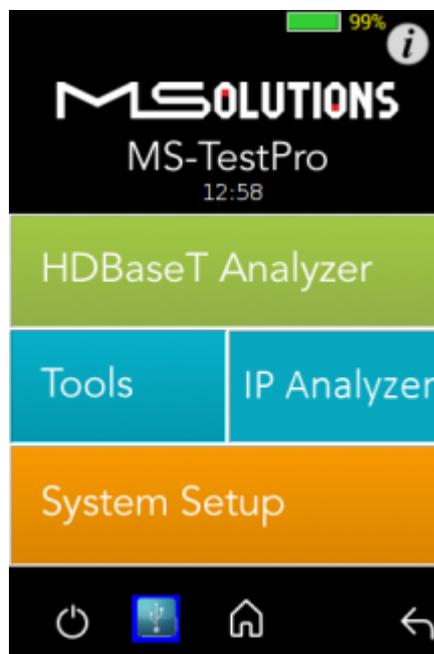


Figure 15: MU-M4SOL Main Screen

- **Information.** The  icon provides access to informative guidelines and system documentation.
- **HDBaseT Analyzer**
 - Basic Analysis: Basic Pass/Fail report.
 - Performance: Real-time access to HDBaseT cable performance data.
 - Configuration: Read-only access to the system configuration.
- **Tools**
 - HDMI Generator: HDMI Pattern Generator.
 - EDID Analyzer: Access information on the display capabilities of HDMI sink devices.
 - Certification report: Collect the data required to produce the HDBaseT test report.

- Log Analyzer: For continuous testing up to 24 hours.
- HDBaseT Firmware Update: To update the firmware of 3rd party HDBaseT units.
- DC Resistance testing (supported if the DCR module is inserted)
- HDMI cable testing (supported if the HCT module is inserted)
- **System Setup.** Used to perform system configuration, tester unit upgrade and maintenance operations.
 - System Upgrade
 - System Reboot
 - System Settings
- **Power Off.** Tap the on/off icon  at the left side of the bottom line of the screen to power down the system. To safely shutdown the system, see the shutdown instructions in section 4.4.
- **Home.** Tap the Home button  in the middle of the bottom line of the screen to return to the Main screen.
- **Back.** Tap the Back button  at the right side of the bottom line of the screen to return to the previous screen.

4.2.2 Information Menu

Using the information menu (see Figure 16 below), you can access the following materials:

- The latest version of this user's manual
- The MU-M4SOL application note
- A link to MS-Pro video tutorials (available in a future release)

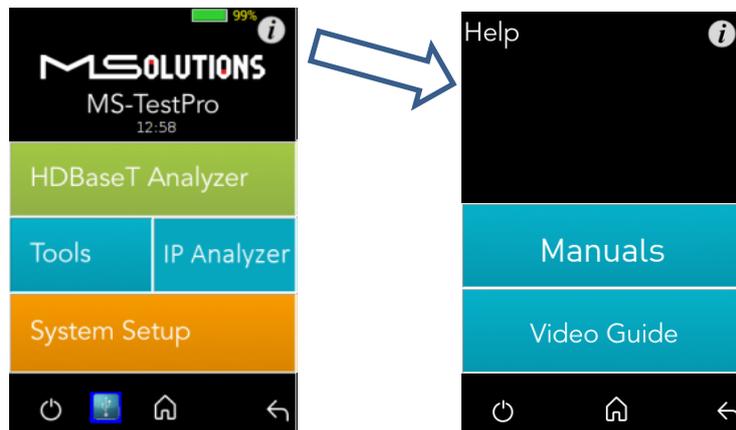


Figure 16: Information Menu

4.2.3 HDBaseT Analyzer

To get to HDBaseT Analyzer menu, tap on the HDBaseT analyzer button as shown in the figure below:

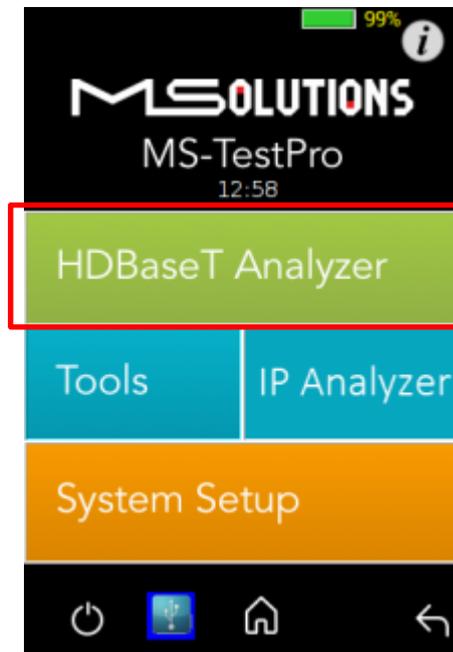


Figure 17: Selecting the HDBaseT Analyzer Menu

The following screen will appear:

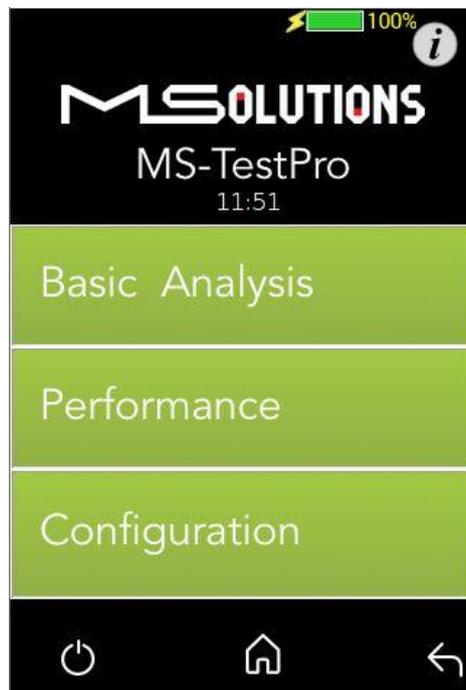


Figure 18: HDBaseT Analyzer Screen

4.2.3.1 Basic Analysis

The Basic Analysis function is used to report on HDBaseT link quality.

To analyze the link, tap on the **Basic Analysis** button, as shown in the figure below.

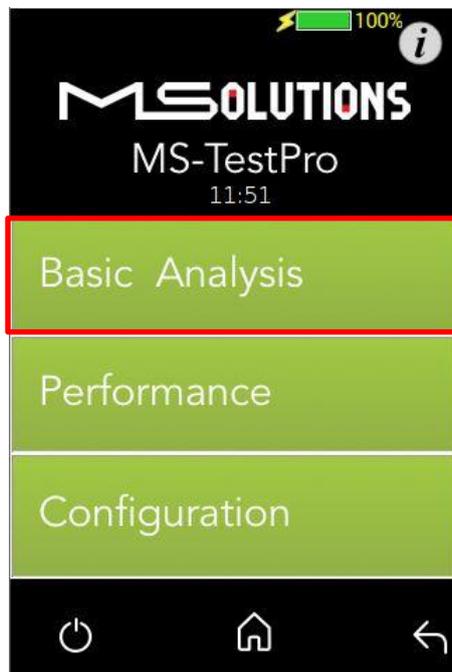


Figure 19: Selecting Basic Analysis

The Basic Analysis page appears as shown in the figure below.

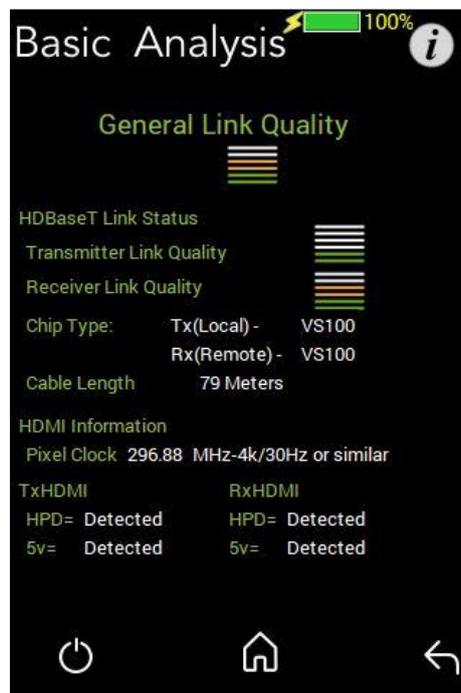


Figure 20: Basic Analysis Page

The basic analysis page displays the following information:

- **General Link Quality.** Red, yellow, green as defined below.
- **Transmitter Link Quality.** Red, yellow, green as defined below.
- **Receiver Link Quality.** Red, yellow, green as defined below.
 - **Green.** The link is functional.
 - **Yellow.** The link is unstable.
 - **Red.** The link is faulty with a high probability of failure.
- **Pixel Clock.** The clock frequency of the video transmission. The Pixel Clock values in the receiver and transmitter screens should be similar.
- **Chip Type.** The chip model/part number.
- **Cable Length.** Approximate cable length calculation (accuracy level $\pm 10\%$), in Meters or Feet.
- **HDMI HPD.** Hot Plug Detection.



4.2.3.2 Performance Management

To access performance management functionality, tap on the **Performance** button, as shown in the figure below.

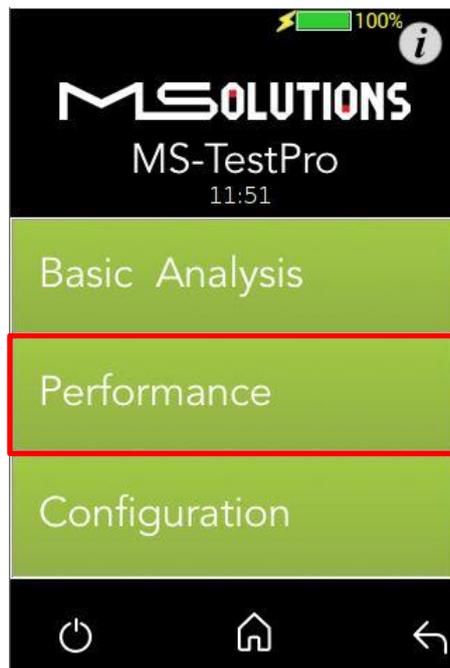


Figure 21: Selecting Performance Monitoring

The system provides performance monitoring of the four HDBaseT channels (each associated with a twisted pair) in the CATx cable – designated A, B, C, and D.

NOTE

When monitoring performance, the transmitter controls are always displayed on the left side, the receiver controls are always displayed on the right, as shown below in Figure 22.

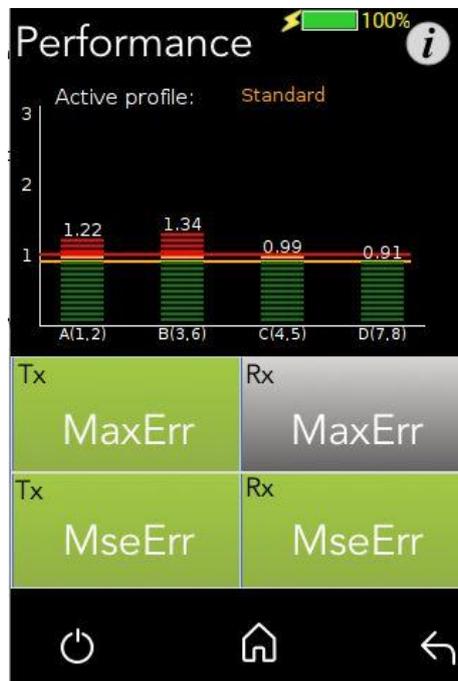


Figure 22: Performance Monitoring Screen. MaxErr Screen – Displaying Graph & Data.

The screen appears, displaying receiver (Rx) data. To display transmitter data, tap on a Tx button.

Note the yellow and red horizontal lines in the display. These are performance thresholds:

- **Yellow.** The link is unstable.
- **Red.** The link is faulty, with a high probability of errors.

Two types of measurements are tracked by the system:

- **MaxErr.** The per-channel maximum recorded value of the residual error for PAM-8/16.

The Max Error measurement is the absolute value of the maximum distance between the input signal on a given channel and the decision threshold in the HDBaseT modulation detection scheme. This measurement behaves as a peak detector, so the value read is always the maximal error witnessed on the channel.

- **MseErr.** The per-channel mean square of the residual error for PAM-8/16.

The actual MSE value is a fractional negative number of db. The higher the absolute value of the MSE, the better the quality of the HDBaseT signal (i.e. -19.8 is better than -18.3).

To display data, tap on the **MaxErr** or the **MseErr** button on the Transmitter or Receiver side. The background of the tapped button appears in gray.

The data appear in the graph that is displayed on the top of the screen, as shown in Figure 22 above. The graphical display is continuously updated.

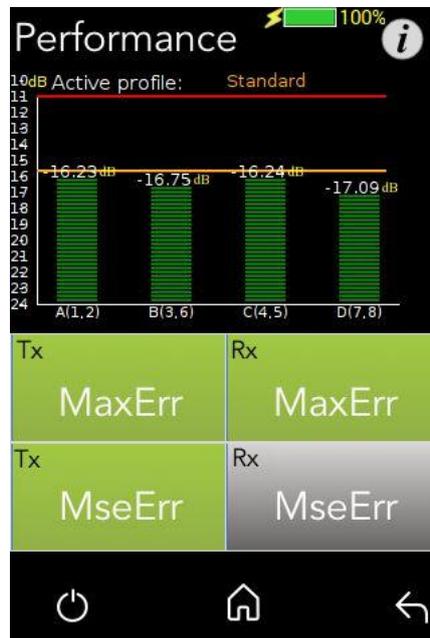


Figure 23: MseErr Screen – Displaying Graph & Data

4.2.3.3 Configuration

To view the current system configuration, tap on the **Configuration** button, as shown in the figure below.



Figure 24: Selecting Configuration Management

The configuration screen appears as shown in the figure below:

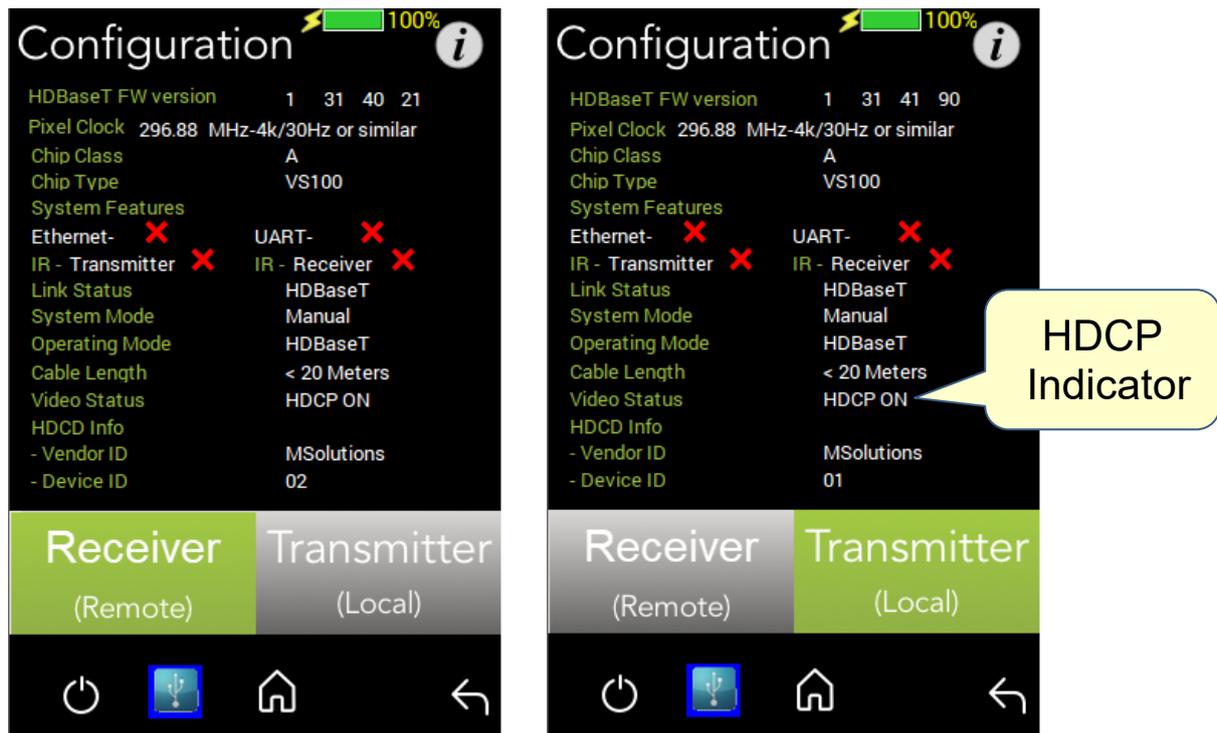


Figure 25: Rx and Tx Configuration Screens

The remote and local HDBaseT transceivers are identified – as either transmitter or receiver – and displayed at the bottom of the page. Tap to select **Receiver** or **Transmitter**. The current selection appears on a gray background.

NOTE

The system correctly identifies the local and remote transceivers – even when both are transmitters, or both are receivers.

Tap on either the local or the remote entity to display configuration information (read only):

- **FW Ver.** The HDBaseT chip’s firmware version.
- **Pixel Clock.** The clock frequency of the video transmission. The Pixel Clock values in the receiver and transmitter screens should be similar.
- **Chip Class.** Class of HDBaseT chip, according to the HDBaseT Standard.
- **Chip Type.** The chip model/part number.
- **Supported System Features.** The interfaces that are extended by the chip over the HDBaseT link, such as: Ethernet, RS232, IR (Infrared support provided by the chip).
- **Link Status.** HDBaseT or No link.
- **System Mode.** Specifies whether Operating Mode changes are performed automatically or manually.
- **Operating Mode.** Current HDBaseT operating mode – HDBaseT, LPPF1/2, Disconnect, FB (Ethernet Fallback), or Bypass Mode.

- **Cable Length.** Approximate cable length calculation (accuracy level $\pm 10\%$), in Meters or Feet.
- **Video Status.** Indicates whether HDCP content is being transmitted.
 - **Video On.** HDMI transmission without HDCP content.
 - **HDCP On.** HDMI transmission *with HDCP content*.
- **HDCD Information.** Vendor and Device ID, as specified in the HDBaseT standard.

4.2.4 Tools

To access Tools menu options, tap on the **Tools** button, as shown in the figure below.

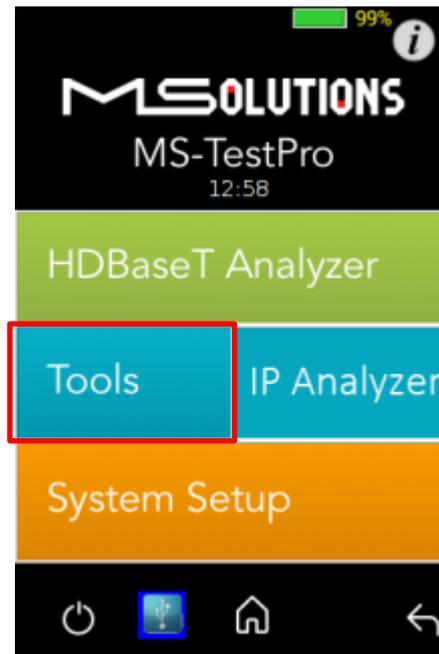


Figure 26: Tools menu access

The Tools page, which provides access to the following tools, is depicted in the figure below:

- [HDMI Generator](#)
- [EDID Analyzer](#)
- [Certification Report](#)
- [Log Analyzer](#)
- [HDBaseT FW Update](#)
- [DC Resistance Tester](#) (appears only if the DC Resistance module is inserted in the lower slot in the MU-M4SOL main unit)
- [HDMI Cable Tester](#) (appears only if the HDMI Cable Tester module is inserted in the lower slot in the MU-M4SOL main unit)

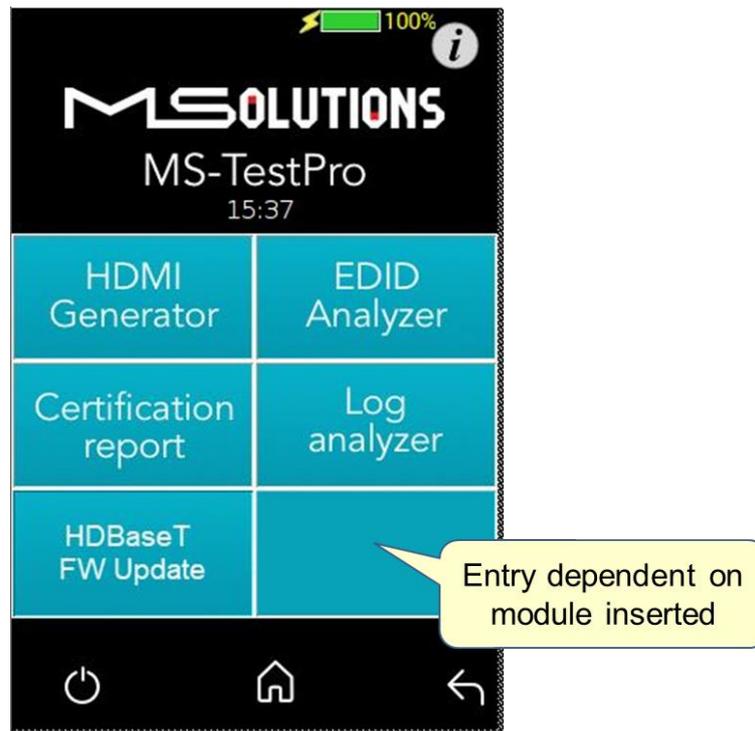


Figure 27: Tools Page

4.2.4.1 HDMI Generator

The HDMI pattern generator provides ability to generate a variety of HDMI display patterns in a wide range of resolutions.

The HDMI pattern generator screen appears as shown below in Figure 28.

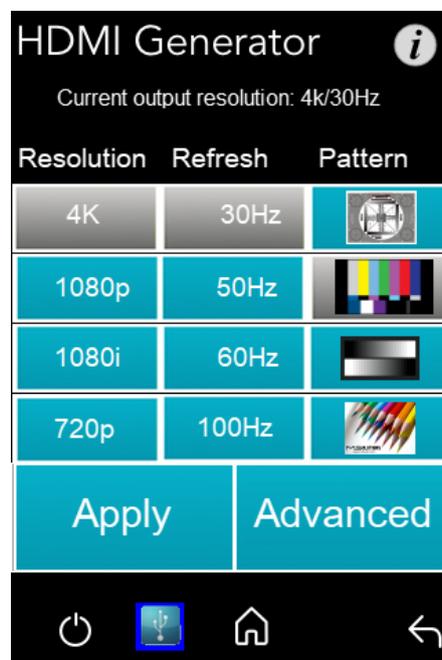


Figure 28: HDMI Generator Screen

To generate an HDMI pattern, select a **Resolution**, a **Refresh** rate, and a **Pattern** from the lists. The selections appear in a gray background. Tap **Apply** to initiate the generation for a default duration of 20 seconds

Tap on **Advanced** to select from additional resolutions and patterns. In addition, you can select the duration of the generation. Choose 10, 30, 60, or 300 seconds (5 minutes), and tap **Apply**.

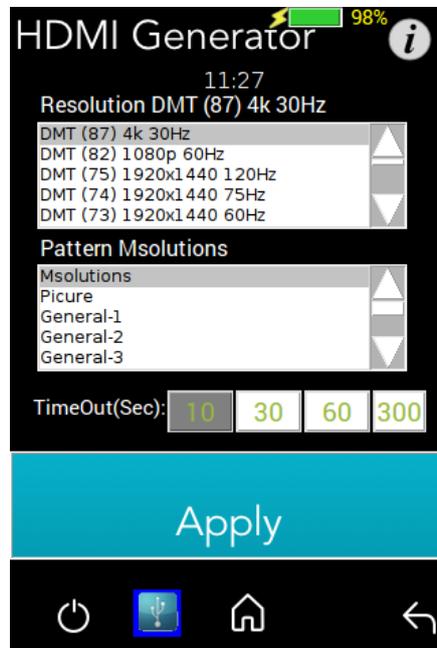


Figure 29: HDMI Generator Advanced Screen

The selected pattern will be activated for the duration selected, and then will resume normal testing activity.

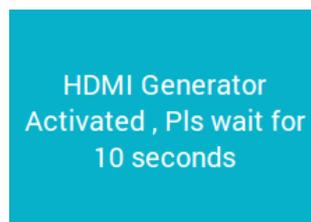


Figure 30: Pattern Generator Activation Message

4.2.4.2 EDID Analyzer

You can use EDID to access information on the display capabilities of HDMI sink devices. There are two test setups that you can use to access the information:

- Connecting the MU-M4SOL test device to an HDMI sink device via an HDBaseT link.
- Connecting the MU-M4SOL test device directly to an HDMI cable.

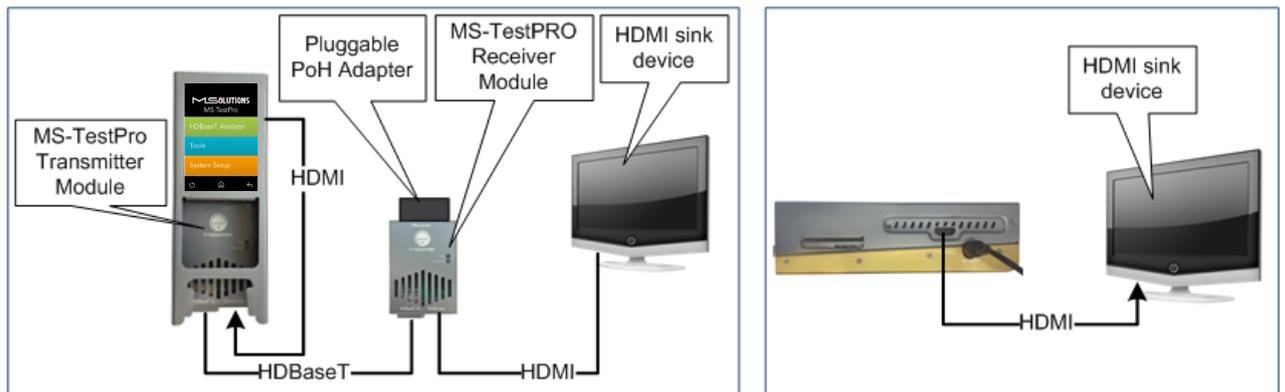


Figure 31: Connecting the MU-M4SOL to the HDMI Sink Device

To access display capabilities using EDID:

Connect the MU-M4SOL test device to the HDMI sink device using one of the methods described above.

Tap on the **EDID Analyzer** button to access information on the display capabilities of the HDMI sink device. The following screen appears, presenting the sink device display information, and supported display resolutions.



Figure 32: EDID Information Page

3. To save EDID data to the tester internal memory, tap the **Save** button.
To download EDID data, connect the USB memory stick and tap the **Download** button.
Two files will be saved – *EDIDXXXX.txt* and *EDIDXXXX.bin*.
4. To delete EDID data from tester, select the files to delete and tap the **Delete** button.

4.2.4.3 Certification Report

The certification report menu provides the following capabilities:

- **Run Certification** – report data generation
- **Report Files** – saves the report data from the tester to the USB memory stick
- **Cable Profile** – Cable profile configuration

4.2.4.3.1 Run Certification

The HDBaseT report data collection feature is used to collect the data required to perform HDBaseT cable analysis.

To access data for HDBaseT cable analysis:

Connect the MU-M4SOL test device to both ends of the CATx cable, as shown below in Figure 33:

- The HDMI cable **must** be connected to the Internal Generator to ensure that HDMI traffic is running on the HDBaseT link.
- The “local” side of the cable is connected to either the transmitter or receiver module, housed in the MU-M4SOL chassis.
- The “remote” side of the cable is connected to the other MU-M4SOL module.
Make sure that the remote module is terminated by a Pluggable POH Adapter as shown below.

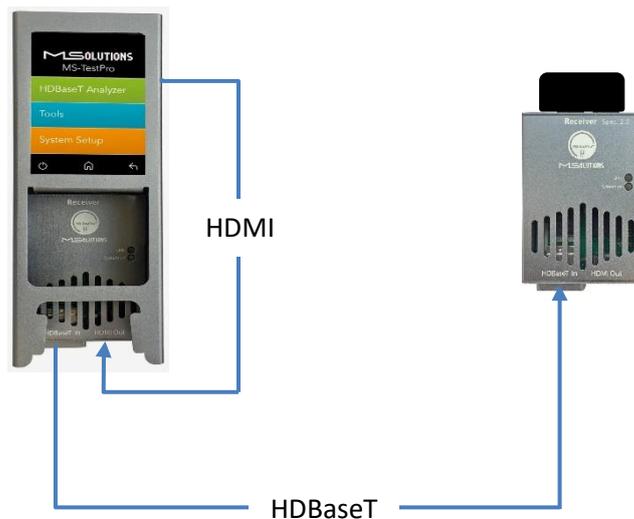


Figure 33: Cable Test Setup

IMPORTANT

The HDMI cable must be connected to the Internal Generator to ensure that HDMI traffic is running on the HDBaseT link.

2. Select **Certification report >> Run (Generate Data)**, as shown below in Figure 34:

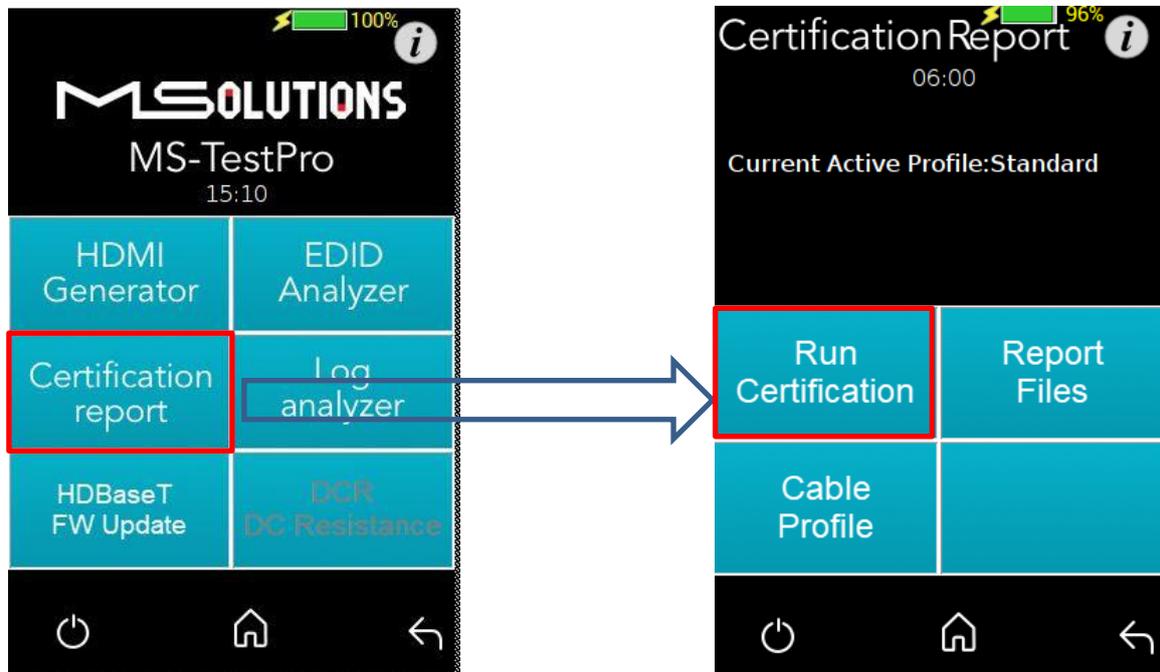


Figure 34: Generate Report Data

A progress bar appears in the window:

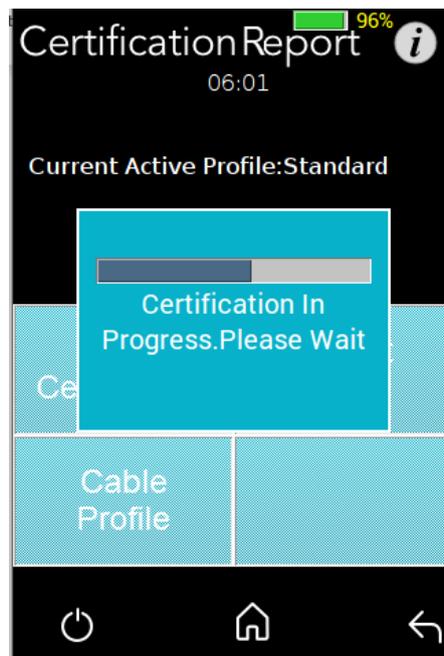


Figure 35: Generating Report Data

- 3. After the data is generated, the line certification results appear at the top of the screen, as shown in the figure below. To save the generated data files, insert the USB memory stick and tap on the **Report Files** button (see the figure below).

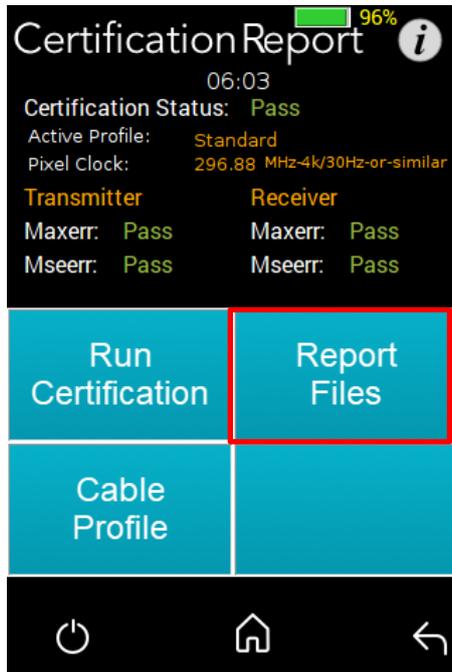


Figure 36: Downloading Report Data

In the following screen appears a list of certification tests that were run in the unit:

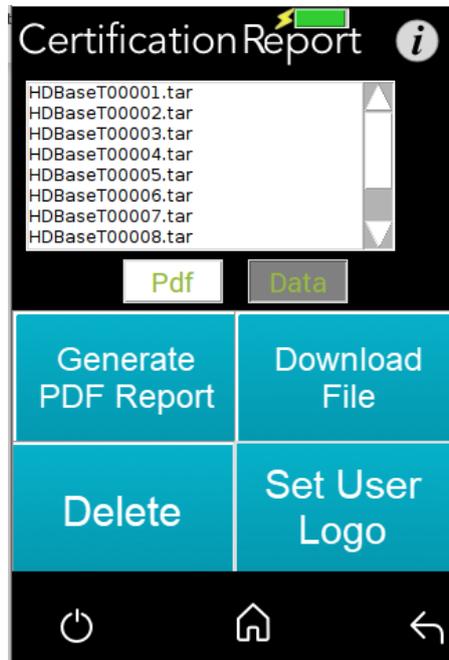


Figure 37: Certification Report Data File Options

4. Insert a USB memory stick into one of the USB ports of the MU-M4SOL device. Select a report data file or files from the list as shown in Figure 37, and tap **Download** to save the file to the memory stick. Wait until the following message disappears:

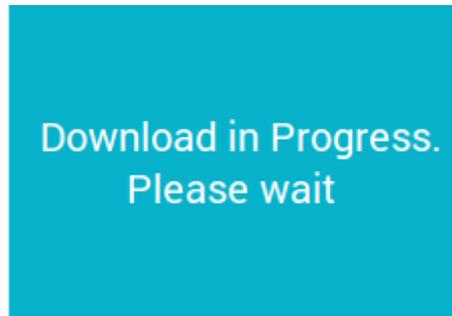


Figure 38: Message - Downloading Report Data

5. To delete files, select one or more report data files from the list, and tap **Delete**.
6. To generate PDF Report(s), select one or more report data from the list, and tap **Generate PDF Report(s)**. Wait until the following message disappears:



Figure 39: Message - Generating PDF

In the following screen appears a list of selected PDF certification tests:

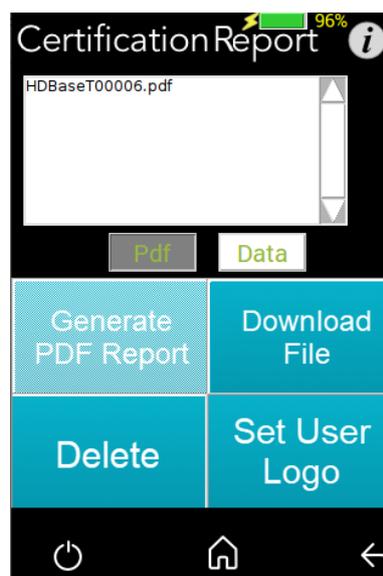


Figure 40: PDF Certification Report

7. To generate a printable certification report based on the downloaded data, see Appendix D: *Generating an HDBaseT Certification Report*.

4.2.4.3.2 Profile Configuration

To choose the appropriate profile, tap the Cable **Profile** button based on the cable which is used. If the desired cable is not on the list, tap on **Standard Profile**, note the selected profile appears on a gray background.

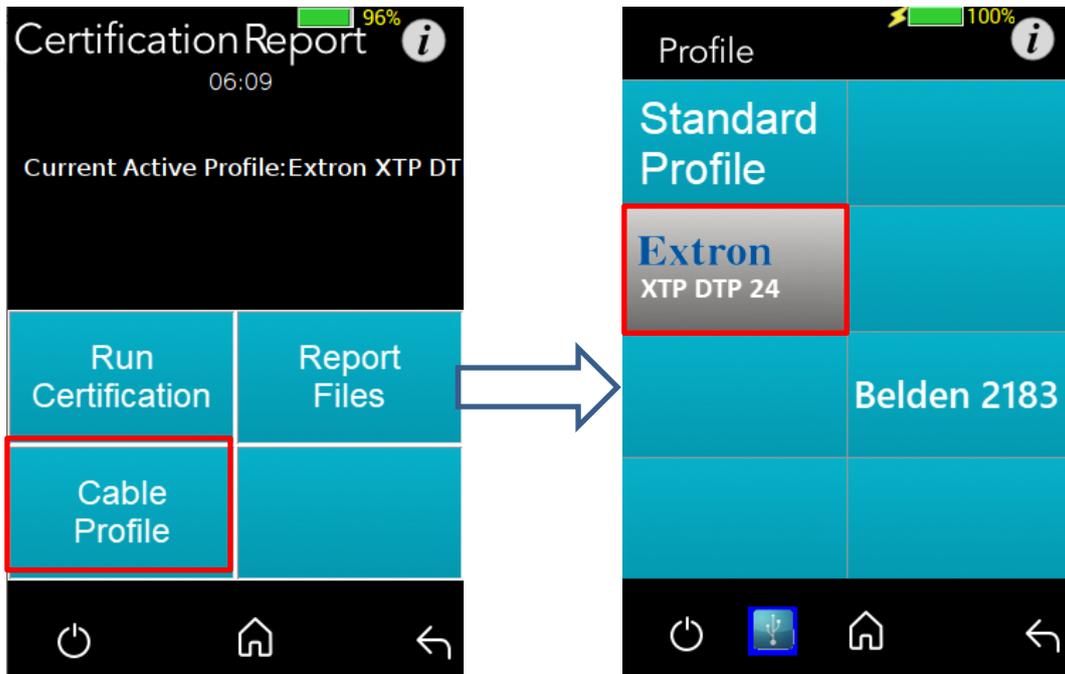


Figure 41: Profile Configuration Process

4.2.4.3.3 Setting up a Custom Logo

We have now enabled the MU-M4SOL to imprint your own custom logo on the top left corner of each certification report you run.

The process to upload your custom logo is: -

1. Insert a USB memory stick with your custom logo (must be PNG file extension) into one of the USB ports on the rear of the MU-M4SOL device with your logo
2. Once the USB stick is recognized (This symbol will appear) 
3. Now press **Set User Logo** and your logo will be detected.
4. Then press **Import Logo**. A **Logo Download in progress** will pop up.
5. Once you generate a certification report, your logo will appear on top left corner.



Figure 42: Setting up a custom logo

4.2.4.4 Log Analyzer

The comprehensive Log Analyzer function measures over sixty different parameters. It is intended to track random failures over a long period of time. The recommended test duration is 24 hours, allowing you capture the performance of the cable during the course of an entire day. This enables you to perform an in-depth analysis of any problem. Log files are generated in pairs – one for the transmitter module and one for the receiver module. Up to 5 pairs of log files are stored in the system. When a 6th pair of log files is generated, the oldest log file pair in the system is automatically deleted.

4.2.4.4.1 Log Generation

➔ **To perform log generation:**

1. To begin log generation, tap on the **Log Analyzer**, then the **Start** button.
2. To manually end log generation, tap on **Stop** button as shown in the figure below. The system generates transmitter *and* receiver logs.

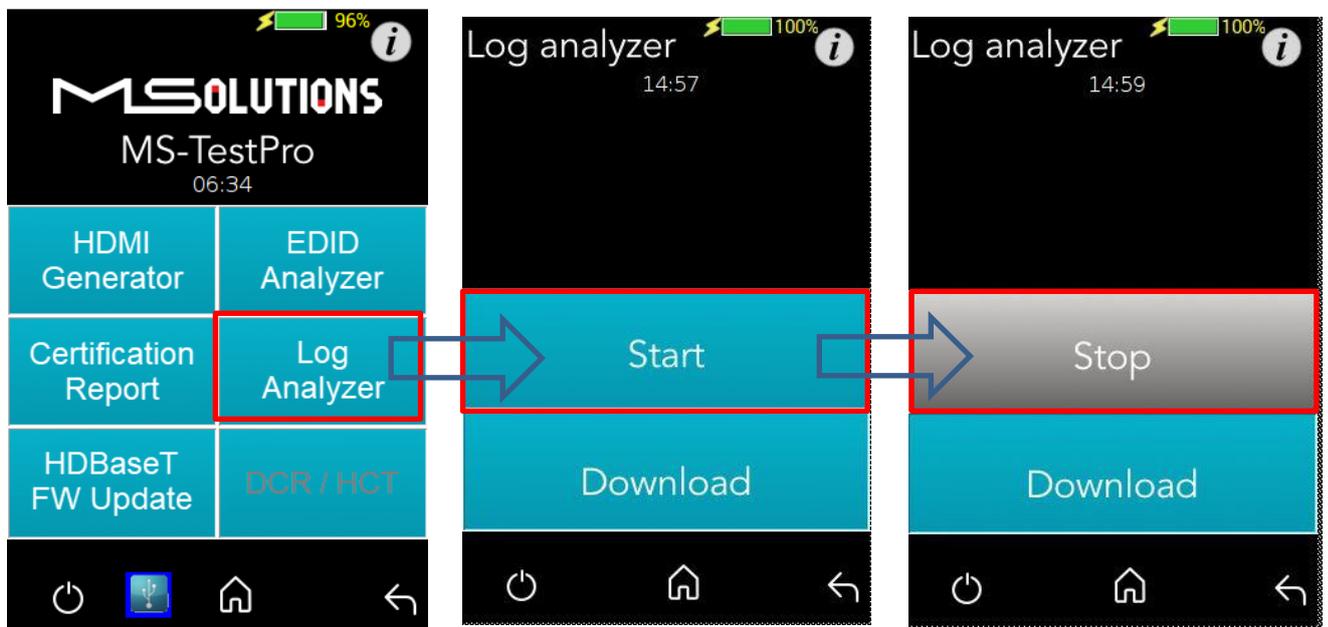


Figure 43: Starting Log Generation

4.2.4.4.2 Log Distribution

You can export log files to a USB memory stick for further processing.

➔ **To export log files to a USB memory stick:**

1. Insert a USB memory stick into one of the USB ports. Upon connection, the USB indicator  is displayed at the bottom of the screen.
2. To distribute a log for analysis, mark files and tap **Download** button. The transmitter and receiver logs that you generated are copied to the USB memory stick.

Up to 5 pairs of transmitter/receiver logs can be stored in the main unit. Generation of additional logs will cause the oldest log pair to be deleted.

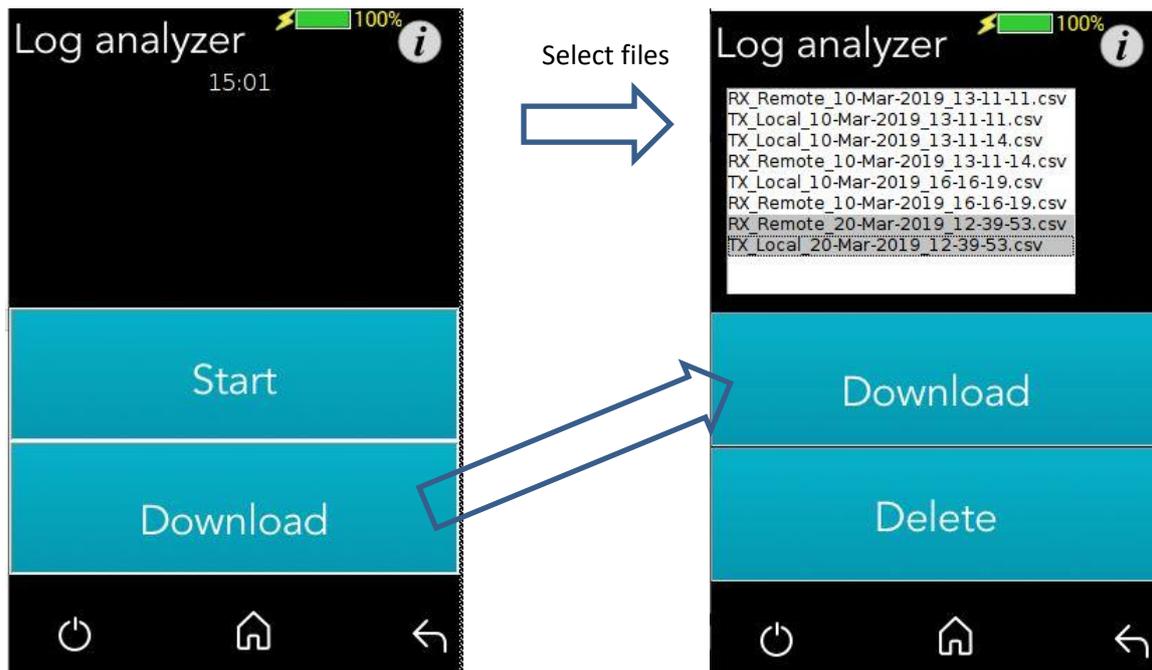


Figure 44: Downloading Files

You can choose to move any of the file pairs to the USB memory stick.

3. To delete files, select a file or files from the list, and tap **Delete**.

The image shows a screenshot of a log report table. The table has a header row with columns labeled AT#, Time, and various parameters. The parameters include RX Input, TX Input, RX Graph, TX Graph, RX MAXERR Graph, RX MSERR Graph, TX MAX OUT GRAPH, and TX MAE OUT GRAPH. The data rows show numerical values for each parameter, with some cells containing error messages like 'HDBase0'. The table is displayed in a spreadsheet-like format with a grid and a status bar at the bottom.

Figure 45: Log Report

4.2.4.5 HDBaseT Firmware Update

To upgrade 3rd party Tx or Rx remote unit firmware:

Prepare a USB memory stick with the upgrade file *xxx.Hex* in the **root** folder of the stick.

Connect the stick to one of the USB ports in the MU-M4SOL device.

Tap on the **HDBaseT FW Update** button on the Tools screen.

Mark **Tx (Rx)** and **Reset** on the next screen.

Select the related file.

Tap on the **Apply** button as shown in the figure below.

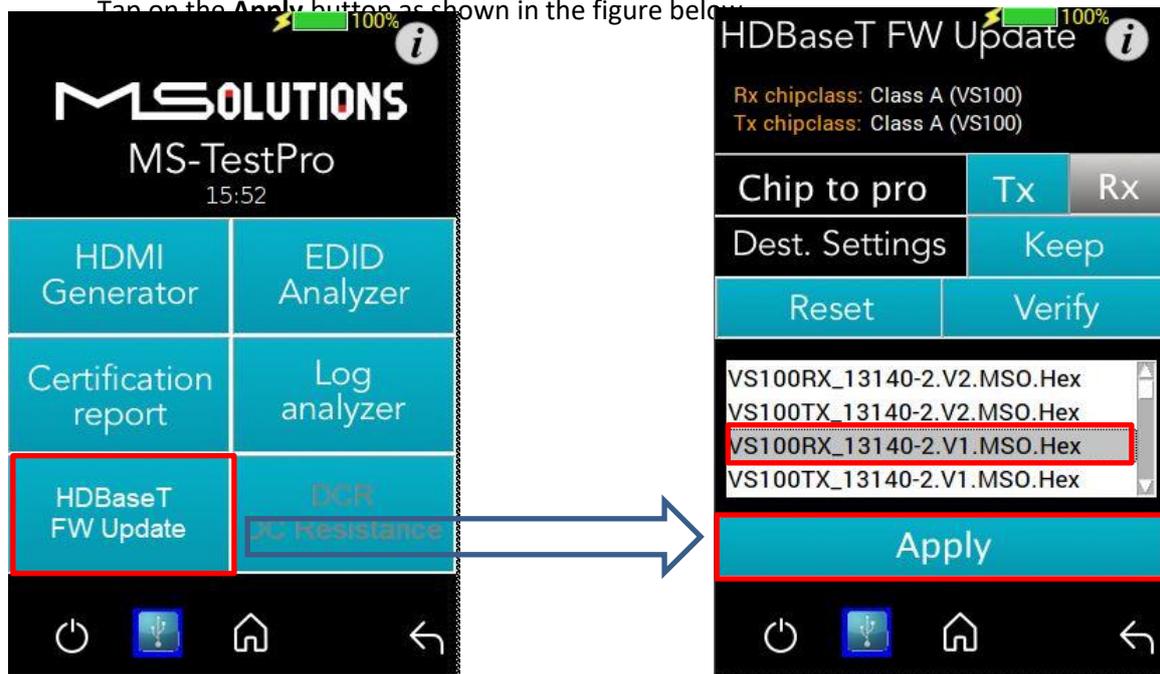


Figure 46: HDBaseT Firmware Update

NOTE

- * Do not switch off the device's power during the upgrade!
- * Firmware updates are available only to 3rd party remote Transmitter or Receiver units.
- * The HDBaseT firmware of the MU-M4SOL Transmitter and Receiver cannot be upgraded.
- * An upgrade should only be done by an expert technician and with a file supplied by the manufacturer of the equipment that will be upgraded.

GUI buttons:

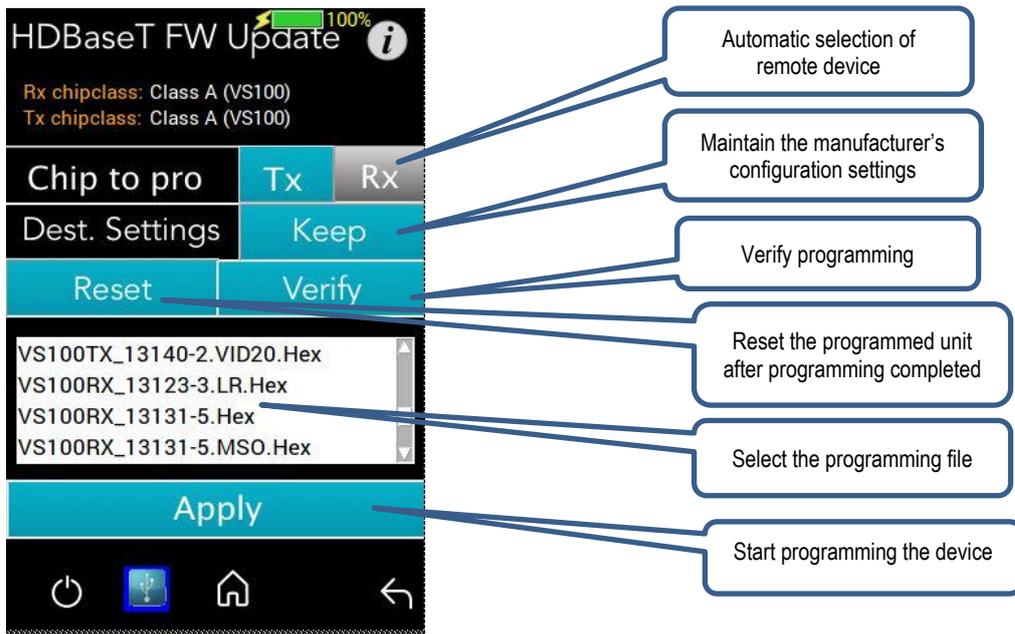


Figure 47: Firmware Upgrade GUI

Wait for the progress bar to disappear:

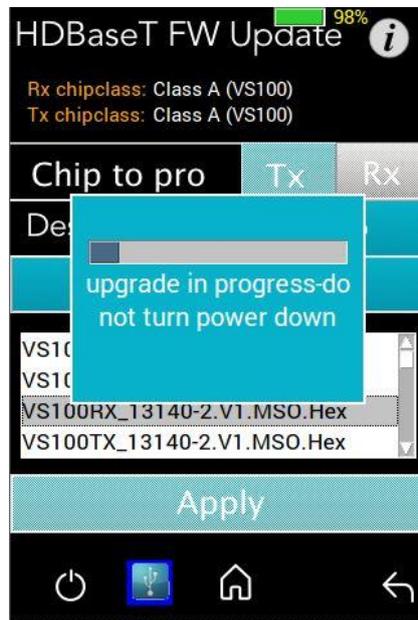


Figure 48: Firmware Update in Progress

To verify if the upgraded unit was successfully upgraded, access the **Configuration** menu, and read the current HDBaseT firmware version. See Figure 25.

4.2.4.6 DCR - DC Resistance Testing

Using the MU-M4SOL **DCR** and **Looper** modules, you can test the DC resistance of CATx cables, and check their ability to provide a sufficient level of PoH (Power over HDBaseT) powering.

The DC Resistance module is inserted into the lower slot in the MU-M4SOL main unit, while the CATx cable is connected to the DC Resistance module at one end, and to the Looper module at the other end, as depicted in the figure below:

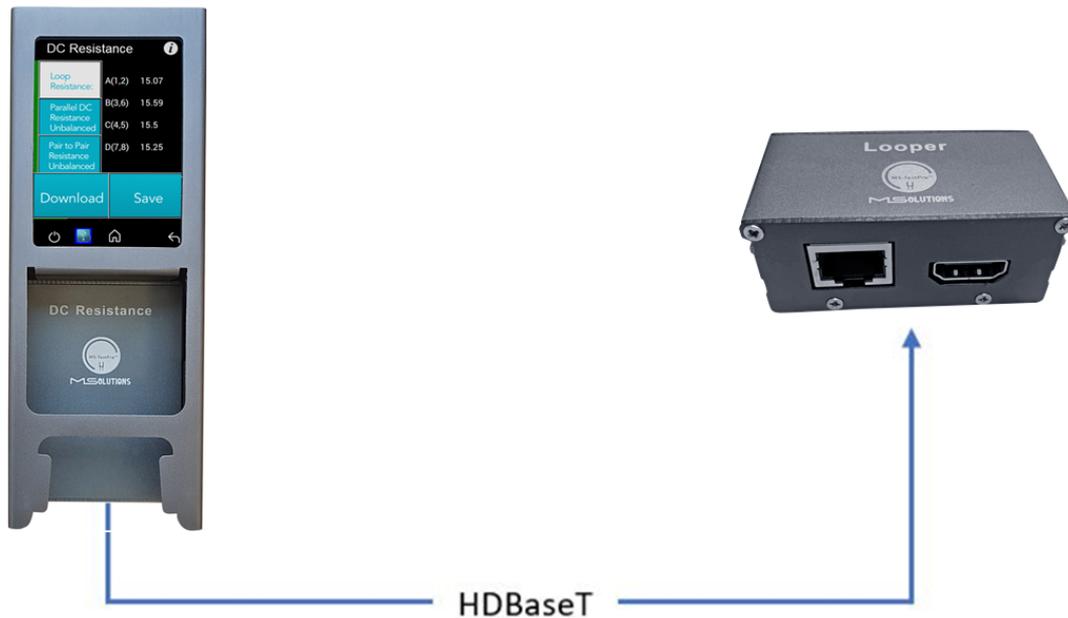


Figure 49: DC Resistance Test Setup

➔ **To test the DC resistance of a CATx cable:**

1. Attach the cable to the DC Resistance and Looper modules as shown in the figure above.
2. From the Tools page, tap on the **DCR** button. The DCR page appears, together with three buttons:
 - Loop Resistance
 - Parallel DC Resistance Unbalanced
 - Pair to Pair Resistance Unbalanced
3. Tap on the **Loop Resistance** button to display Loop Resistance data, as shown in the figure below. Loop resistance represents the DC resistance (in ohms) of a single twisted pair in a cable and is calculated as the sum of the DC resistance of the two conductors of the twisted pair.

Resistance of *under 20 ohms* indicates that the pair should be capable of delivering the minimum of 80% of the power to the remote side.

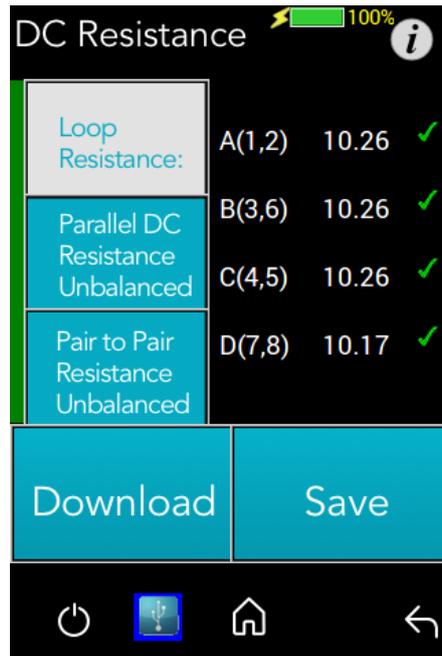


Figure 50: Loop Resistance Results

4. Tap on the **Parallel DC Resistance Unbalanced** button to display the parallel resistance of the CATx two conductors in each cable pair. For each pair, the difference is expressed in ohms, as shown in the figure below.



Figure 51: Parallel DC Resistance Unbalanced Results

5. Tap on the **Pair-to-Pair Resistance Unbalanced** button to display the difference in DC resistance between the four pairs in the cable. For each pair, the difference is expressed in ohms, as shown in the figure below.

A difference of *under 0.2 ohms* or 5% (the higher between the two) indicates that the pair should be capable of delivering the required common-mode current needed to effectively support PoH and data transmission over the pair.

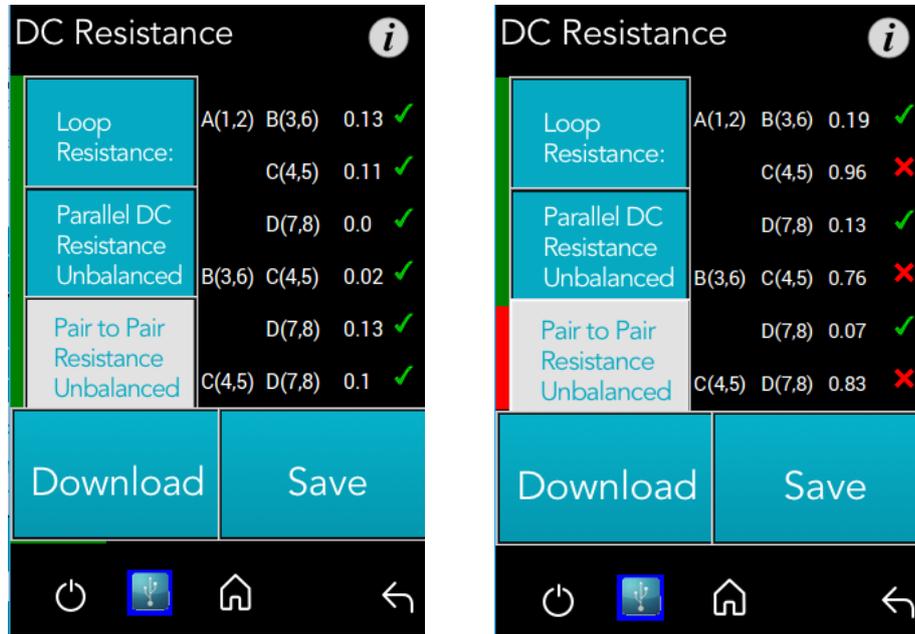


Figure 52: Pair-to-Pair Resistance Unbalanced Results

IMPORTANT

The MU-M4SOL modules are not “hot swappable”. Make sure to shut down by pressing the



Off

6. To save DCR data to the tester internal memory, tap the **Save** button.
To download DCR data to a USB memory stick, tap the **Download** button. A screen containing a list of DCR data files appears as shown in the figure below.

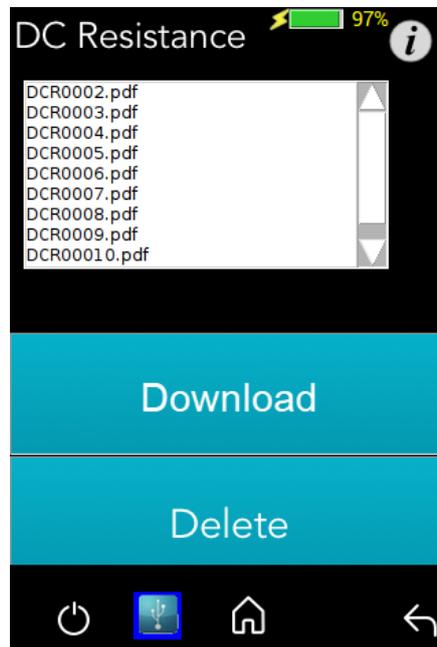


Figure 53: List of DC Resistance Reports in PDF Format

7. Select one or more PDF files, and perform one of the following actions:
 - To download the file(s) to a USB memory stick, connect the stick and tap on **Download**.
 - Tap on **Delete** to delete the selected files.

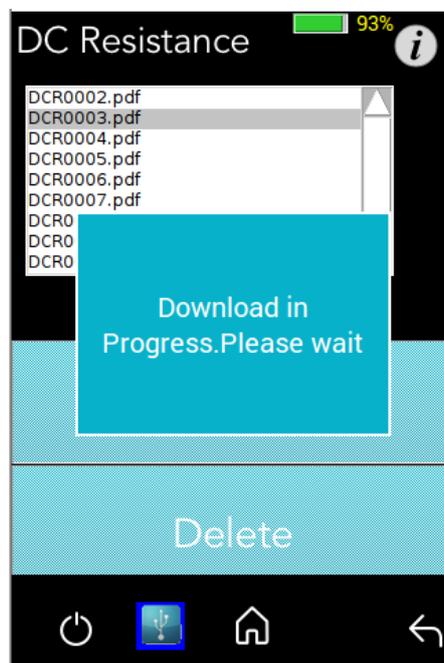


Figure 54: Saving a file

4.2.4.7 HCT - HDMI Cable Testing

Using the MU-M4SOL **HDMI Cable Tester** and **Looper** modules, you can test the quality of HDMI cables before their installation. In order to reduce costs and boost profits, some HDMI cable suppliers sell cables with missing or shorted wires. These substandard cables are usually discovered only when trying to stream high resolutions like 4K or run CEC commands. With the MU-M4SOL HDMI Cable Testing function, you will identify the problem immediately, and not in a post-installation service call.

Just insert the HDMI Cable Tester module into the lower slot of the MU-M4SOL main unit, attach one end of the HDMI cable to the module's HDMI port, and attach the other end of the HDMI cable to the HDMI port on the Looper module, as shown in the figure below.



Figure 55: HDMI Cable Tester Setup

The MU-M4SOL HDMI modules perform physical layer quality tests on each of the cable's conductors and the cable shielding, providing instant feedback on missing or defective wiring:

- Checks the presence of each of the 19 HDMI-standard conductors and cable shielding.
- Tests the ability of the cable to support an array of HDMI bandwidth requirements, as specified in the HDMI 1.4, 2.0, 2.1, and future 2.3 standards.
- Ensures that none of the cable's conductors are shorted or missing.
- Measures the gauge (AWG) of each of the conductors, detecting resistance imbalances within the cable that cause degraded transmission quality (planned for a future release).

- ➔ To test the quality of an HDMI cable:
1. Attach the cable to the HDMI Cable Tester and Looper modules as shown in Figure 55 above.
 2. From the Tools page, tap on the **HDMI Cable Tester** button.

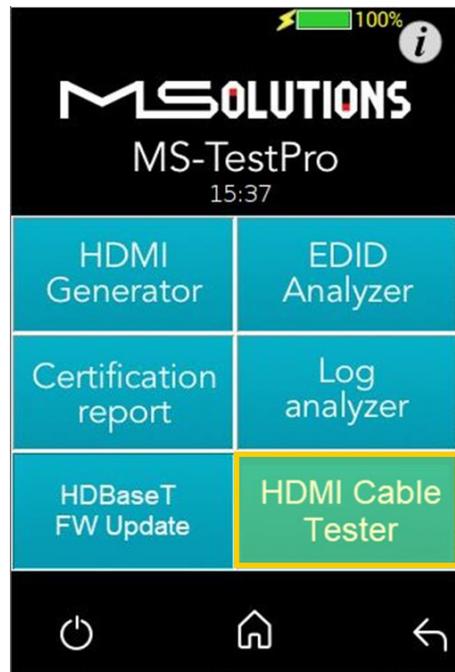


Figure 56: HDMI Cable Tester Button

The HDMI Cable Tester page appears as shown in the figure below.

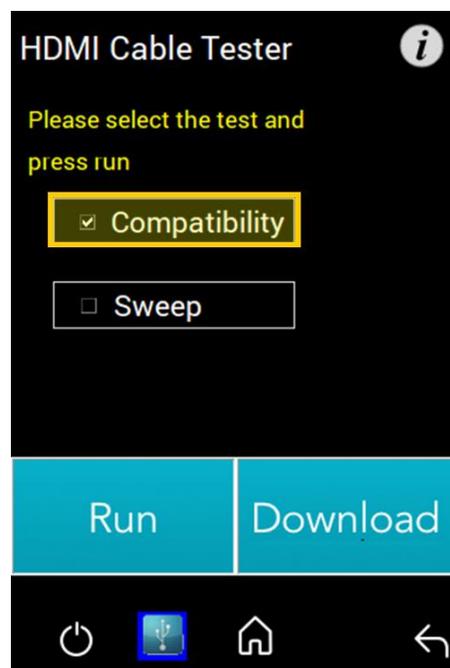


Figure 57: Run Compatibility Tests

3. Check the **Compatibility** box and tap **Run**.

NOTE

In this description, the Compatibility and Sweep tests are presented separately. You can check *both* the **Compatibility** and **Sweep** boxes to run the two tests simultaneously.

4. The MU-M4SOL begins testing the cable's compatibility with the HDMI bandwidth. When the test is complete, a summary screen appears. In the example shown below, the cable failed the 4K/60Hz test. A list of shorted wires – wires that were interconnected within the cable, thus neutralizing their functionality – appears as well. If needed, tap **Run** to perform another compatibility test.

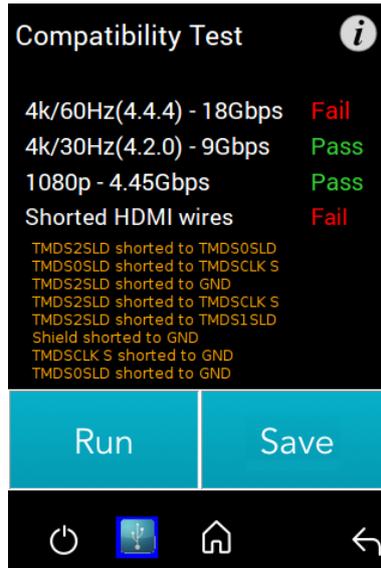


Figure 58: Compatibility Test Results

5. If the message “Cable not found” appears on the screen, check the physical connection of the cable to the modules, and tap **Run** again.

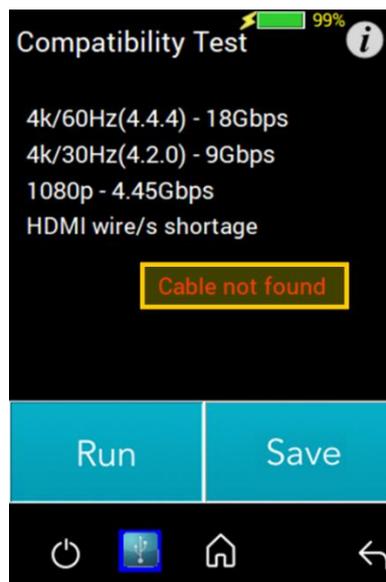


Figure 59: "Cable not found" Message

6. Tap **Save** to save the test results in a report format. Following generation of the report, tap **Download** to copy the report to a disk-on-key attached to the tester's USB port. File is created into PDF automatically.
7. To perform the Sweep test, return to the HDMI Cable Tester page appears as shown in the figure below.

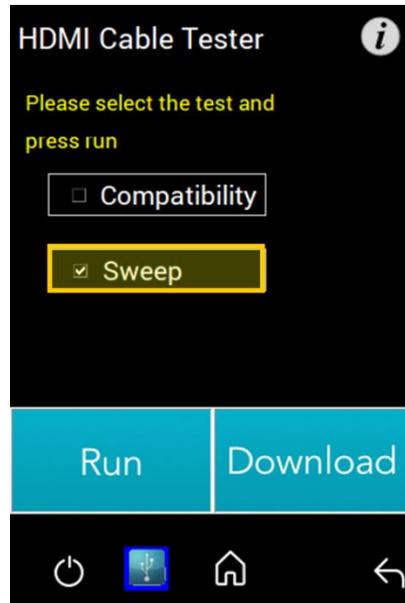


Figure 60: Run Sweep Tests

8. Check the **Sweep** box and tap **Run**.

NOTE

In this description, the Compatibility and Sweep tests are presented separately. You can check *both* the **Compatibility** and **Sweep** boxes to run the two tests simultaneously.

9. The MU-M4SOL begins to test the quality of each of the wires in the cable. If needed, tap **Run** to perform another Sweep test.

The existence of each wire tested is indicated by a color, as listed in the table below:

Table 6: Wire Quality Color Code

Color	Severity
● Green	Wire exists
● Red	Wire is missing
● Orange	Wire is shorted
● Grey	Test in progress

The figure below shows the sweep test in progress. If necessary, you can tap **Stop** to cancel the test.

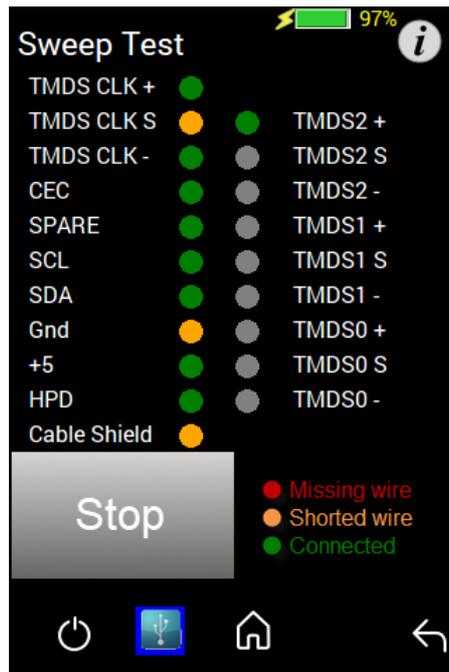


Figure 61: Sweep Test in Progress

- At the end of the test, the **Start** button appears. Click on the button if you wish to run another Sweep test.

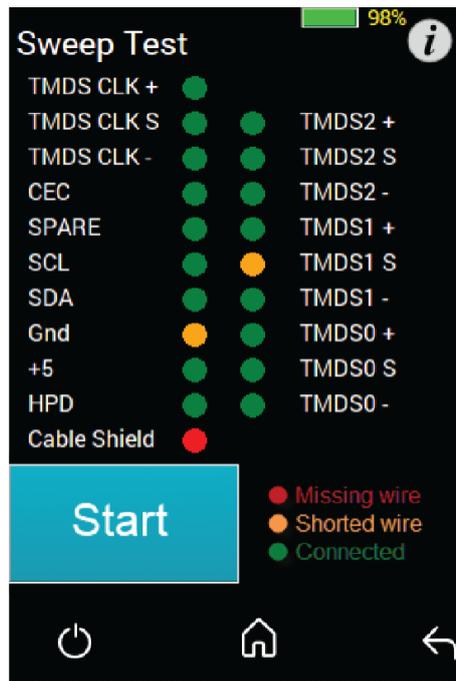


Figure 62: Sweep Test Complete

4.2.5 IP Network Analyzer

To access the IP option, tap on the **IP Analyzer** button, as shown in the figure below.

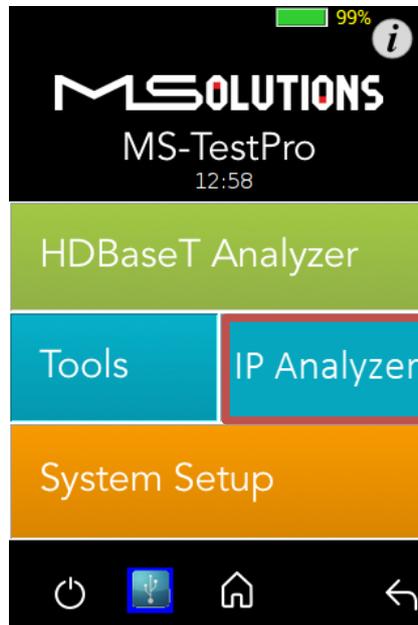


Figure 63: Selecting IP Module

4.2.5.1 Enabling license

All the MU-M4SOL units, are IP ready, but require a license needs to activate.

When you first select IP Analyzer you will be presented with the screen below.

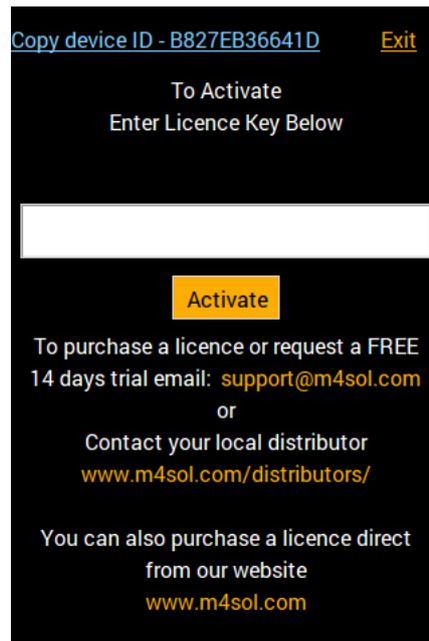


Figure 64: IP Analyzer licensing window

All our IP License subscriptions include a 14-day free trial, after which you have the option to buy the license.

Then proceed with the following steps: -

1. Plug in a USB memory stick into one of the USB ports on the rear of the tester.

2. NOTE

Please ensure the USB stick is formatted as “standard FAT format”

3. Then click on the top left link "Copy device ID"- this operation will store a "Device.conf" file on the USB stick

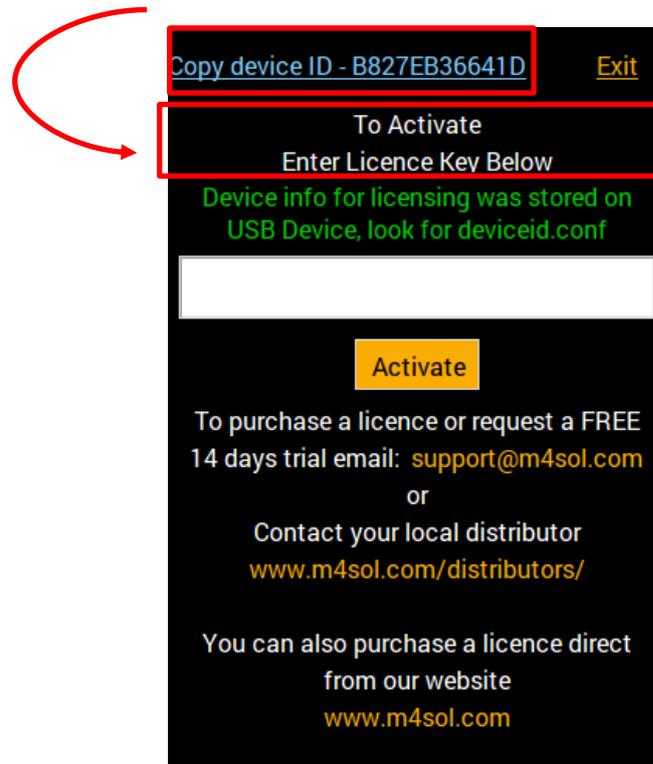


Figure 65: generating device configuration file

4. Please email the stored file stored to Support@m4sol.com
5. Within up to 24 hours you will be emailed with a license 'key' from our support team which will include a file called 'ip module.lic'
6. You need to copy that 'ip module.lic' file to the root directory of your USB stick

7. Then Plug the USB stick back into one of the free rear USB ports and, once again click on the "IP analyzer' button.
8. The system will automatically enable the Ip window as seen in the illustration below

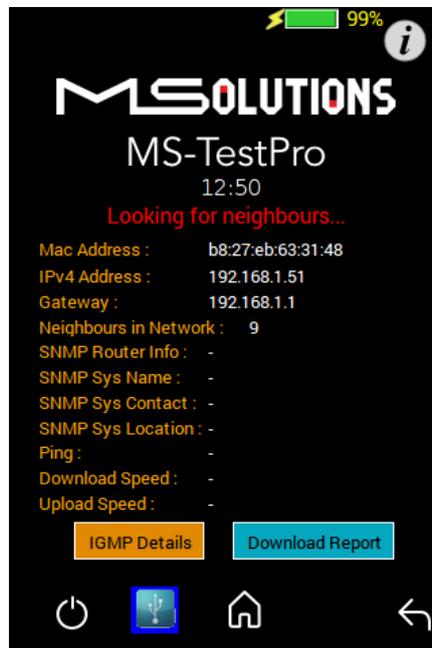


Figure 66: IP Module main Screen

4.2.5.2 IP Module information

The IP analyzer provides the installer snapshot of the AVoIP switch configuration

4.2.5.2.1 IP module main screen information

The window highlighted in Figure 67 contains general information about the network

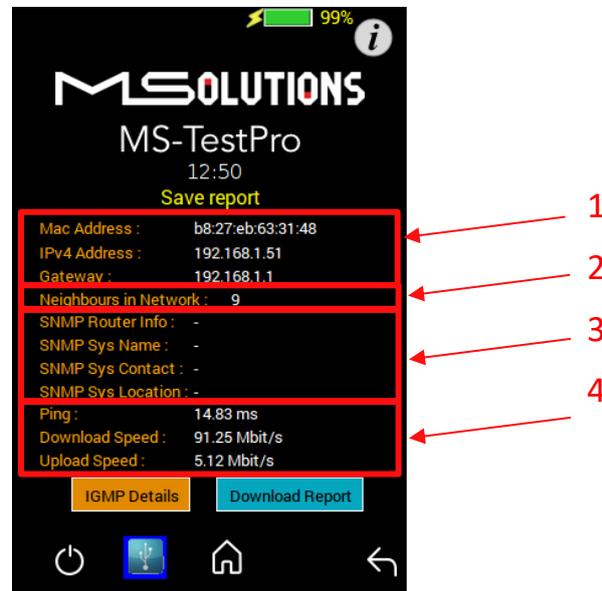


Figure 67: IP analyzer main screen information

The information contains

1. General information e.g. MAC and IP addresses
2. Neighbors in the network – This is a very IMPORTANT parameter within the AVoIP network, as it represents how many end nodes are in the network, which will impact traffic speed and throughput.
3. Simple Network Management Protocol (SNMP) e.g. SNMP router info, name etc....
4. Ping time and current download/upload speeds

4.2.5.2.2 IP Analyzer Internet Group Management Protocol (IGMP)

This window provides the IGMP information with critical parameters of the AVoIP network like the VLAN setup, fast leave support and more.

Please select the switch vendor, switch base IP, username and password as seen below in Figure 68

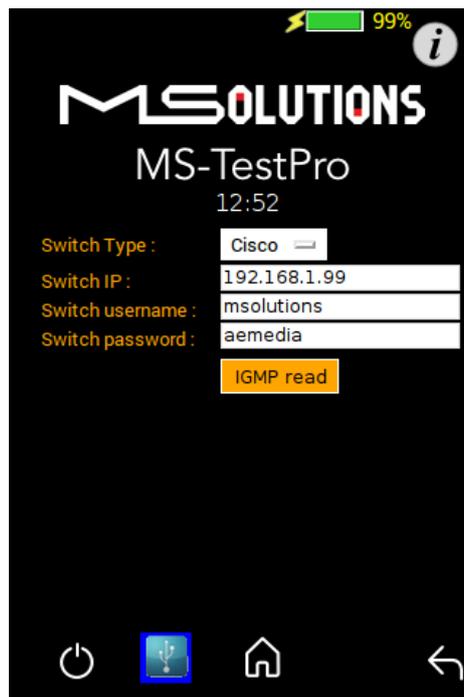


Figure 68: IP module IGMP interface

Once you select the “IGMP read” button, the IGMP information will be extracted from the switch and presented in the following format below in Figure 69.

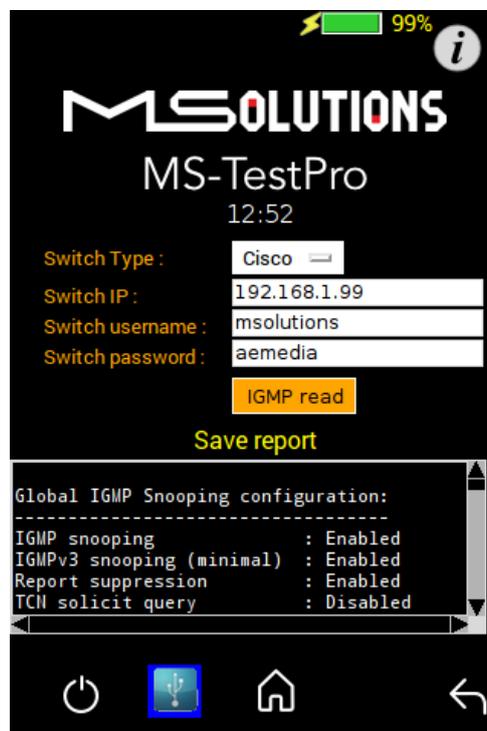


Figure 69: IGMP information

4.2.5.2.3 Generating report

Once all the data has been collected, the “Save report” will appear, and then press the ‘Save report’ and a PDF report file will be generated.

There are two reports available, the IP module main screen report or the IGMP screen report.

The main difference between the two reports that the IP main module report will only store the general network information as see on Figure 67.

When you generate a report within the IGMP screen, as well as the general network information, you will also be presented with further detailed information including IGMP and VLANs configuration?

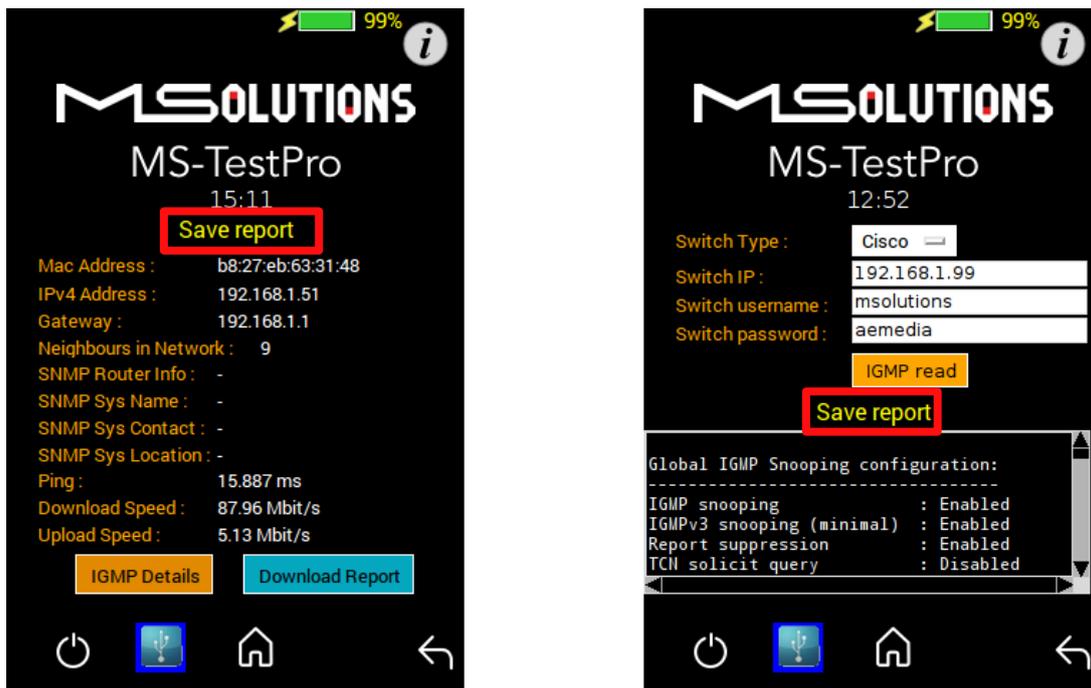


Figure 70: IP Module report

4.2.5.3 IP Module Report

An example of the detailed report generated by the MU-M4SOL below in Fig

71

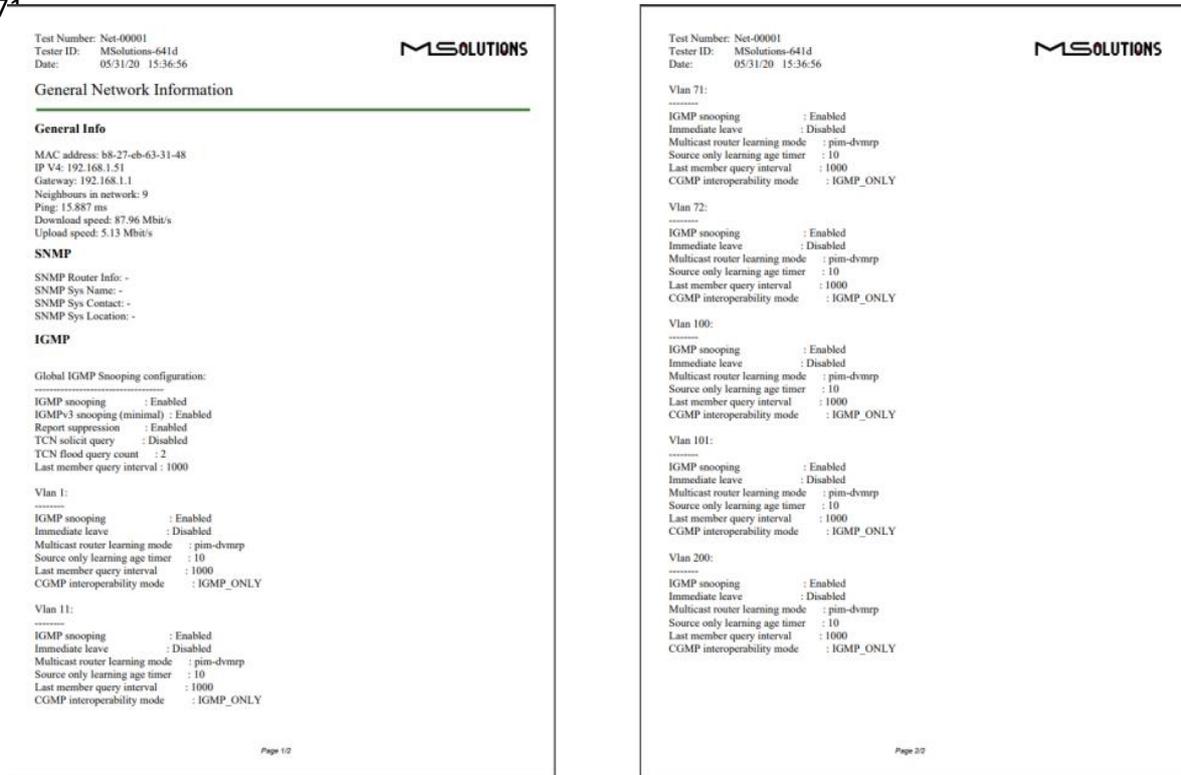


Figure 71:IP module report

4.3 System Setup

To perform setup functions, tap on the **System Setup** main screen button, as shown in the figure below.

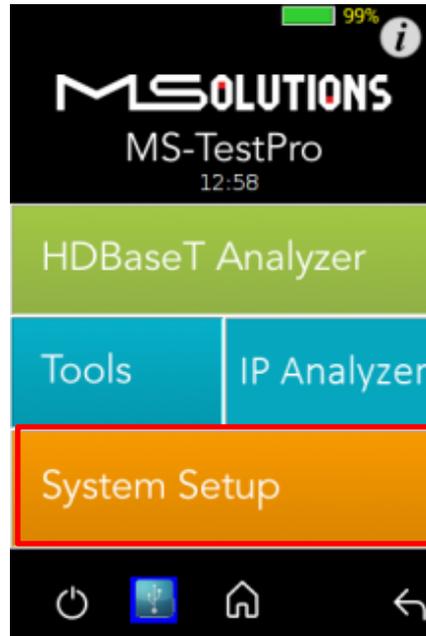


Figure 72: Selecting System Setup

The System Setup screen (see Figure 73 below) offers the following information and functionalities:

- **MU-M4SQL Application Software Version.**
- **System upgrade.** Upgrades the MU-M4SQL system software.
- **System Settings.** Provides information about main system features.
- **System Reboot.** Restarts the MU-M4SQL test device.



Figure 73: System Setup screen

4.3.1 System Upgrade

To upgrade the MU-M4SOL System Software:

Prepare a USB memory stick with the upgrade file **updateXXX.mst** in the root folder. Connect the stick to one of the USB ports in the MU-M4SOL device.

Select the **updateXXX.mst** file and tap on the **System Upgrade** button (see the picture below). The system performs the upgrade and reboots using the new version in approximately 10 seconds.

IMPORTANT

1. For firmware version 2.00.30 or earlier, the file name is **update.mst**.
 2. Latest updated FW can be found at <https://www.m4sol.com/support/>
 3. Do not switch off the device's power during the upgrade!
-

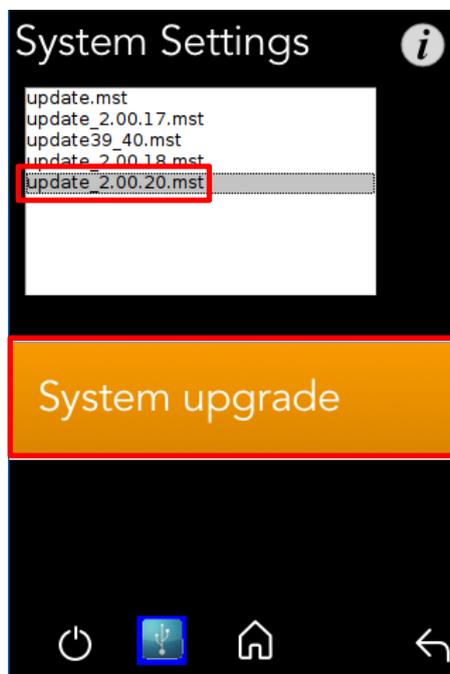


Figure 74: System upgrade

4.3.2 System Reboot

To restart the MU-M4SOL test device, tap the **System Reboot** button and **Yes** on the next screen, as shown in the figure below.

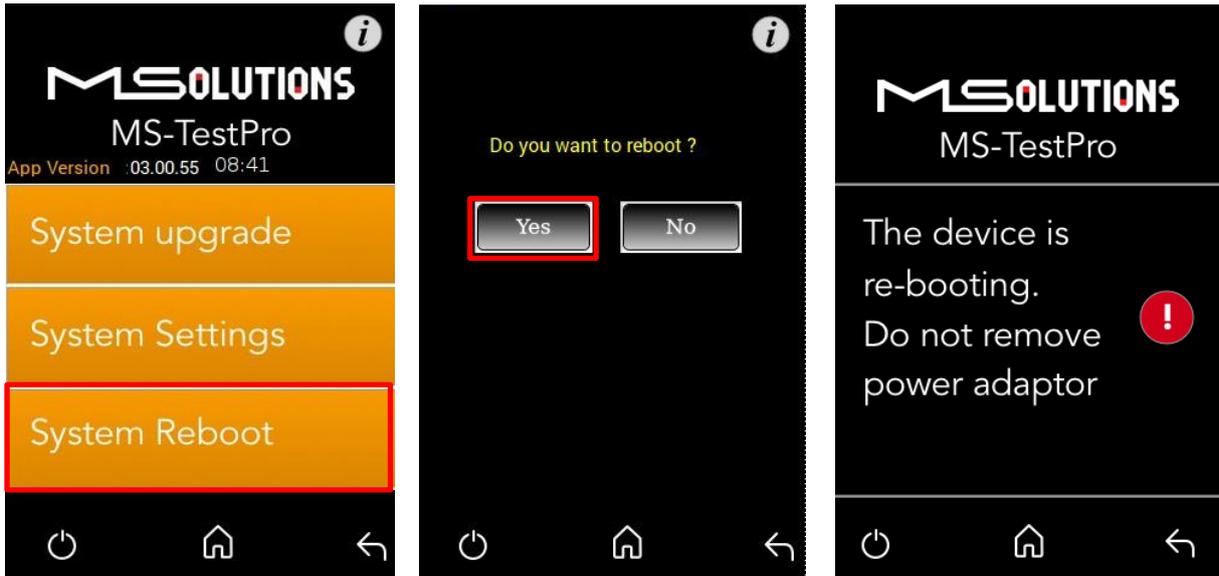


Figure 75: System Reboot Screens

The system will reboot in about 15-20 seconds.

4.3.3 System Settings

The System Settings screen provides access to the system configuration. The System Settings screen is depicted in the figure below. The upper part of the screen displays read-only system information.

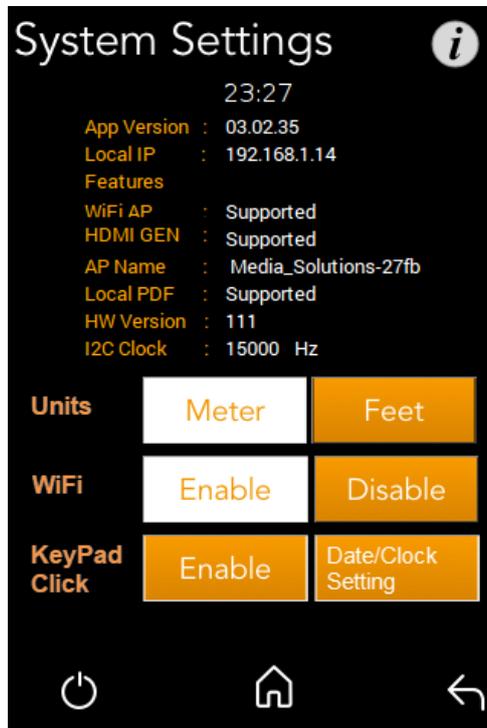


Figure 76: System Settings screen

The System Settings page provides the following information and configuration options for the MU-M4SOL system:

- **App Version.** Tester firmware version.
- **Local IP.** Allocated IP address (for future use).
- **Features.** A list of supported features:
 - **Wi-Fi AP.** Whether Wi-Fi connectivity is supported.
 - **HDMI Gen.** Whether the HDMI traffic generation feature is supported.
 - **AP.** The name of the AP (access point) used to establish Wi-Fi connectivity.
 - **Local PDF.** Indicates where the unit is capable for creating a PDF report file locally- if it is indicating “Not supported” please contact our support@m4sol.com for a FW upgrade
 - **HW Ver.** Internal use
 - **I2C Clock** Internal use
- **Units.** Tap to select the unit of measure to be used (feet/meters). The current selection appears on a white background.
- **Wi-Fi.** Tap to **Enable** or **Disable** Wi-Fi connectivity. The current selection appears on a white background.
- **Keypad clicks** Tap to **Enable** or **Disable the sound of the unit clicks**
- **Date/Clock Settings.** Tap on the button configure date and time settings.

4.3.3.1 Date/Clock Settings

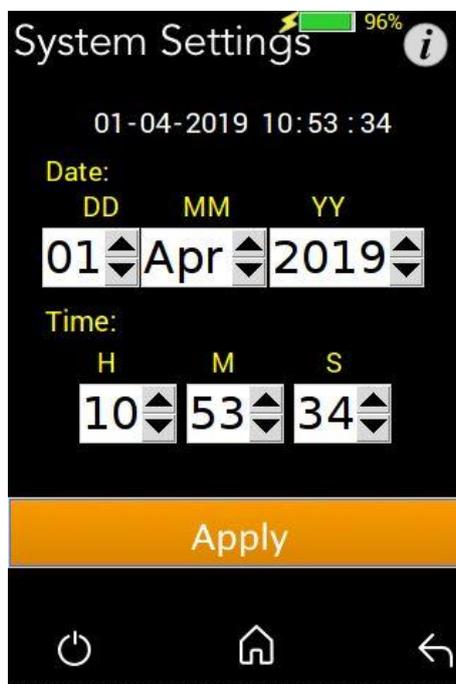


Figure 77: Date/Clock setting screen

Set Date/Clock values and press the Apply button.

Note: Date and time will be set automatically when connecting Tester to a PC using a Wi-Fi connection.

4.4 Shutdown

This section describes how to safely shut down the MU-M4SOL test device.

➔ **To shut down the test device:**

1. Tap on the on/off icon  to exit the system. The following messages appears on the screen:



Figure 78: Confirmation and Shutdown Screens

2. Wait for the screen to turn white.
3. Remove the power supply connector from the input powering socket.

5. Operating the Wi-Fi Client

You can manage the MU-M4SOL test unit using a Wi-Fi enabled computing device (mobile phone, tablet, PC) equipped with a browser. The device connects as a client to the web server software embedded in the test unit.

5.1 Connecting the Wi-Fi Device

The following steps describe how to connect your Wi-Fi client device to the MU-M4SOL test unit.

To connect your Wi-Fi device to the MU-M4SOL test unit:

Power on the MU-M4SOL test unit.

Using your Wi-Fi enabled device, scan for Wi-Fi networks. The "**Media-Solutions**" network should appear on the scanned list, as shown in Figure 79 below.

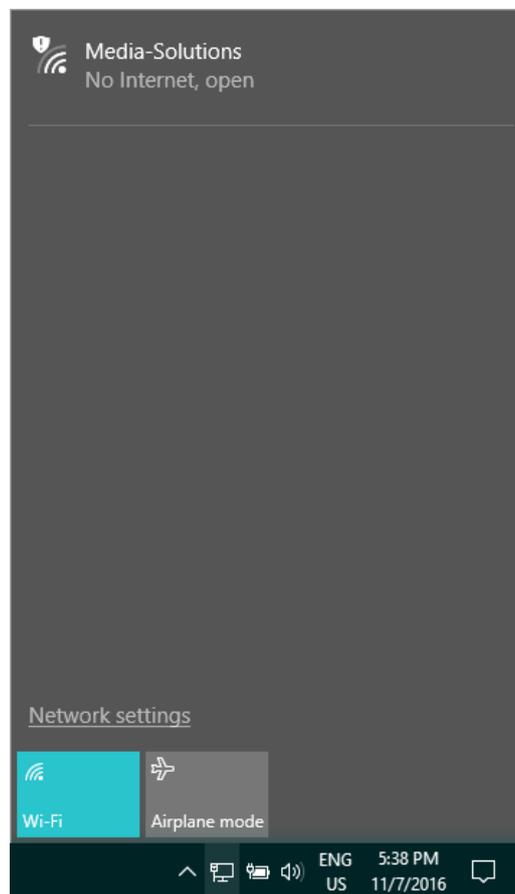


Figure 79: Scanning for Available Wi-Fi Networks

3. Select the "**Media-Solutions**" network from the list, and tap on the **Connect** button that appears on the screen (see Figure 80 below).

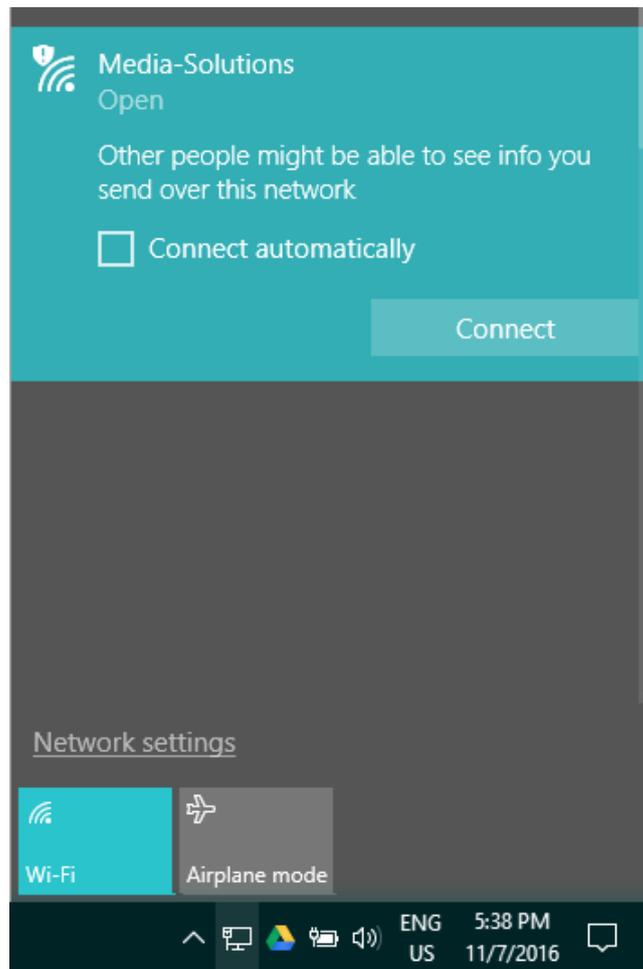


Figure 80: Connecting to the Media-Solutions Network

4. Initialize the system as described in the following section.

5.2 System Initialization

The following steps describe how to initialize the MU-M4SOL client on your Wi-Fi device and connect it to the test unit.

To initialize the MU-M4SOL system on your Wi-Fi client:

Open your browser and enter the URL of the MU-M4SOL System: **192.168.11.1** as shown in the figure below.



Figure 81: Entering the MU-M4SOL System URL



Figure 82: MU-M4SOL Home Page

5.3 Performing the Tests

5.3.1 Main Screen

The main screen (see the figure above) offers the following functionalities:

- **Information.** The  icon provides access to informative guidelines and system documentation.
- **HDBaseT Analyzer**
 - Basic Analysis: Basic Pass/Fail report.
 - Performance: Real-time access to HDBaseT cable performance data.
 - Configuration: Read-only access to the system configuration.
- **Tools**
 - HDMI Generator: HDMI Pattern Generator.
 - EDID Analyzer: Access information on the display capabilities of HDMI sink devices.
 - Certification report: Collect the data required to produce the HDBaseT test report.
 - Log Analyzer: For continuous testing up to 24 hours.
 - HDBaseT Firmware Update: To update the firmware of 3rd party HDBaseT units.
 - DC Resistance
- **System Setup.** Used to perform system configuration, tester unit upgrade and maintenance operations.
 - System Upgrade
 - System Reboot
 - System Settings
- **Power Off.** Tap the on/off icon  at the left side of the bottom line of the screen to power down the system. To safely shutdown the system, see the shutdown instructions in section 4.4.
- **Home.** Tap the Home button  in the middle of the bottom line of the screen to return to the Main screen.
- **Back.** Tap the Back button  at the right side of the bottom line of the screen to return to the previous screen.

5.3.2 Information Menu

Using the information menu (see Figure 16 below), you can access the following materials:

- The latest version of this user's manual
- The MU-M4SOL application note
- A link to MS-Pro video tutorials (available in a future release)

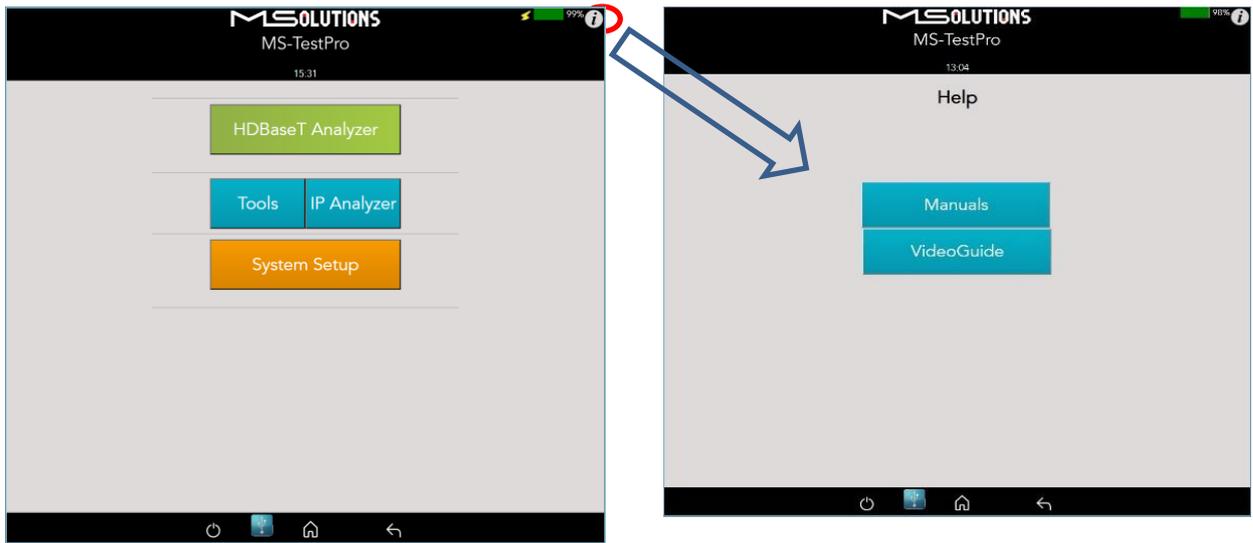


Figure 83: Information Menu

5.3.3 HDBaseT Analyzer

To get to HDBaseT Analyzer menu, tap on the HDBaseT Analyzer button as shown in the figure below:

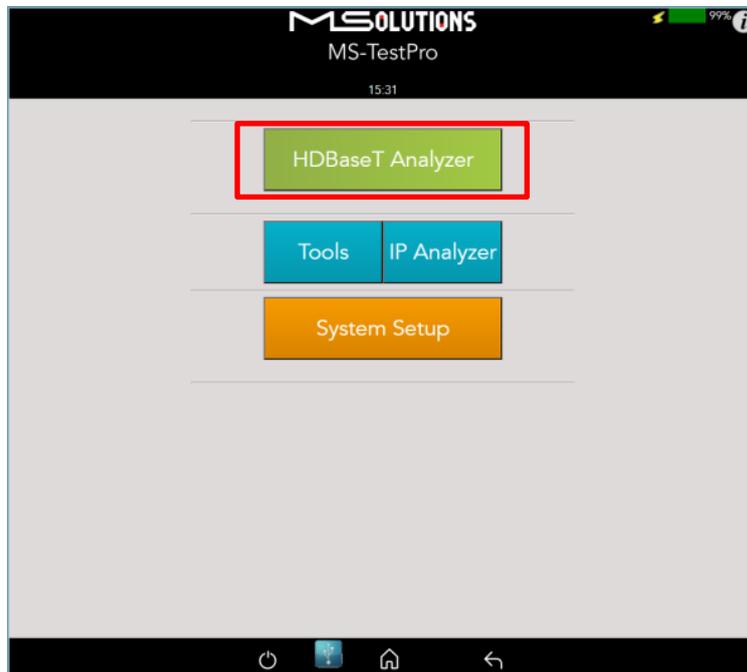


Figure 84: Selecting the HDBaseT Analyzer Menu

The following screen will appear:

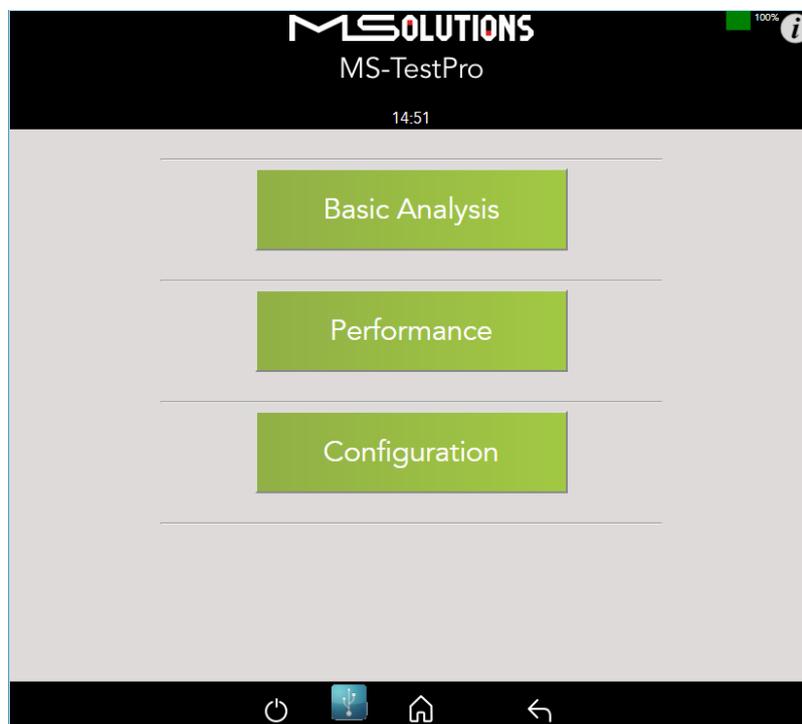


Figure 85: HDBaseT Analyzer Screen

5.3.3.1 Basic Analysis

The Basic Analysis function is used to report on HDBaseT link quality.

To analyze the link, tap on the **Basic Analysis** button, as shown in the figure below.

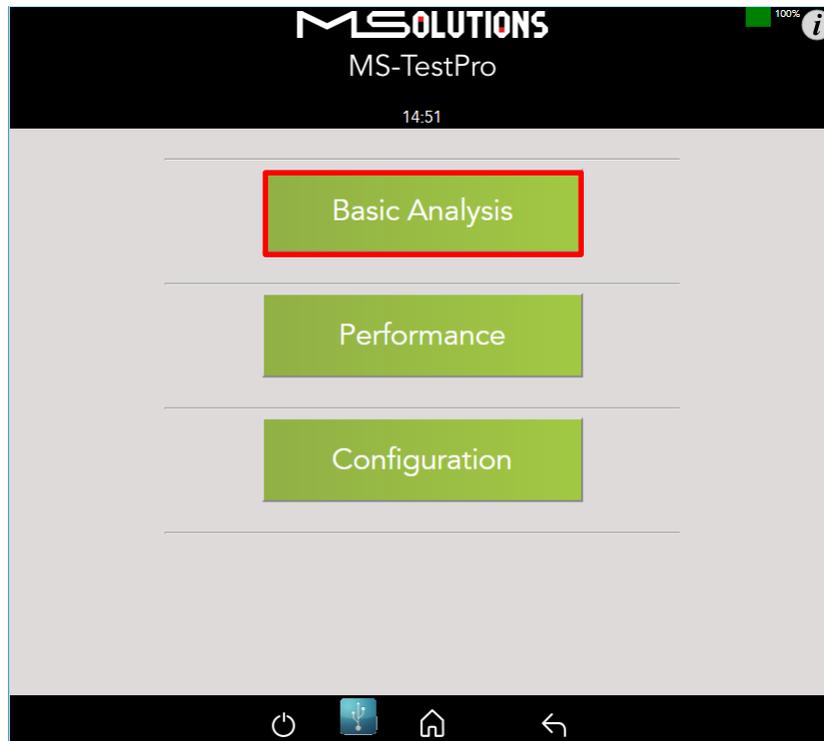


Figure 86: Selecting Basic Analysis

The Basic Analysis page appears as shown in the figure below.

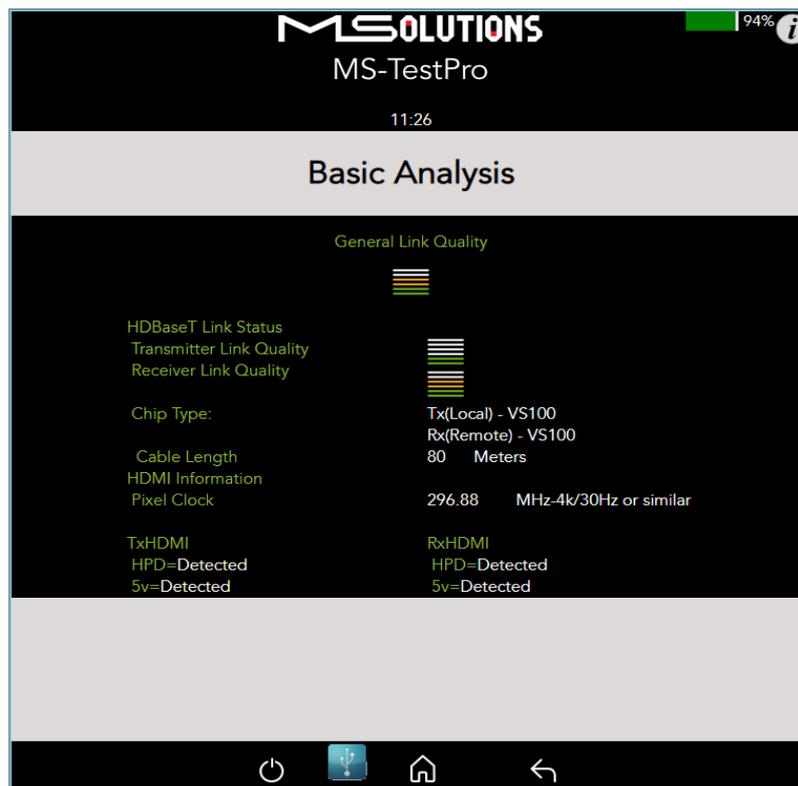


Figure 87: Basic Analysis Page

The basic analysis page displays the following information:

- **General Link Quality.** Red, yellow, green as defined below.
- **Transmitter Link Quality.** Red, yellow, green as defined below.
- **Receiver Link Quality.** Red, yellow, green as defined below.
 - **Green.** The link is functional.
 - **Yellow.** The link is unstable.
 - **Red.** The link is faulty with a high probability of failure.
- **Pixel Clock.** The clock frequency of the video transmission. The Pixel Clock values in the receiver and transmitter screens should be similar.
- **Chip Type.** The chip model/part number.
- **Cable Length.** Approximate cable length calculation (accuracy level $\pm 10\%$), in Meters or Feet.
- **HDMI HPD.** Hot Plug Detection.



5.3.3.2 Performance Management

To access performance management functionality, tap on the **Performance** button, as shown in the figure below.

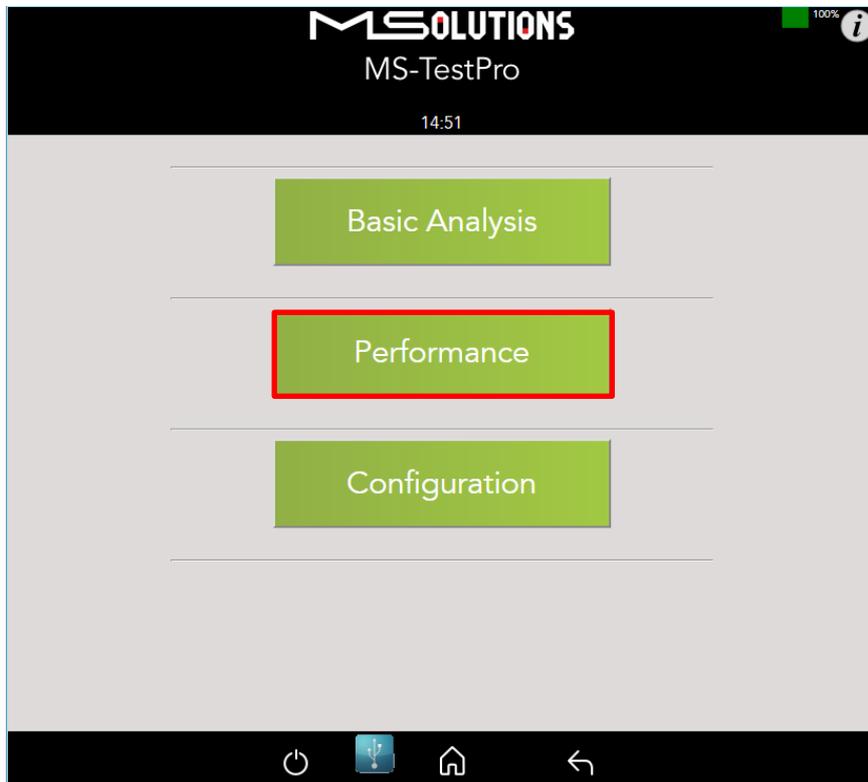


Figure 88: Selecting Performance Monitoring

The system provides performance monitoring of the four HDBaseT channels (each associated with a twisted pair) in the CATx cable – designated A, B, C, and D.

NOTE

When monitoring performance, the transmitter controls are always displayed on the left side, the receiver controls are always displayed on the right, as shown below in Figure 22.



Figure 89: Performance Monitoring Screen. MaxErr Screen – Displaying Graph & Data.

The screen appears, displaying receiver (Rx) data. To display transmitter data, tap on a Tx button.

Note the yellow and red horizontal lines in the display. These are performance thresholds:

- **Yellow.** The link is unstable.
- **Red.** The link is faulty with a high probability of errors.

Two types of measurements are tracked by the system:

- **MaxErr.** The per-channel maximum recorded value of the residual error for PAM-8/16.
The Max Error measurement is the absolute value of the maximal distance between the input signal on a given channel and the decision threshold in the HDBaseT modulation detection scheme. This measurement behaves as a peak detector, so the value read is always the maximal error witnessed on the channel.
- **MseErr.** The per-channel mean square of the residual error for PAM-8/16.
The actual MSE value is a fractional negative number of db. The higher the absolute value of the MSE, the better the quality of the HDBaseT reception (i.e. -19.8 is better than -18.3).

To display data, tap on the **MaxErr** or the **MseErr** button on the Transmitter or Receiver side. The background of the tapped button appears in gray.

The data appear in the graph that is displayed on the top of the screen, as shown in the figure below. The graphical display is continuously updated.

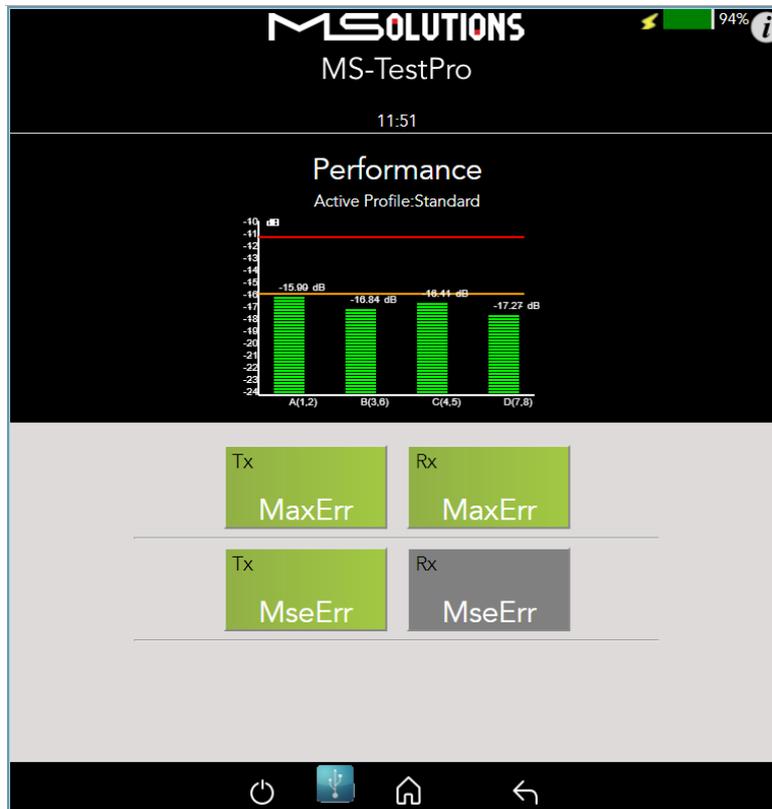


Figure 90: MseErr Screen – Displaying Graph & Data

5.3.3.3 Configuration

To view the current system configuration, tap on the **Configuration** button, as shown in the figure below.



Figure 91: Selecting Configuration Management

The Rx configuration screen appears as shown in the figure below:

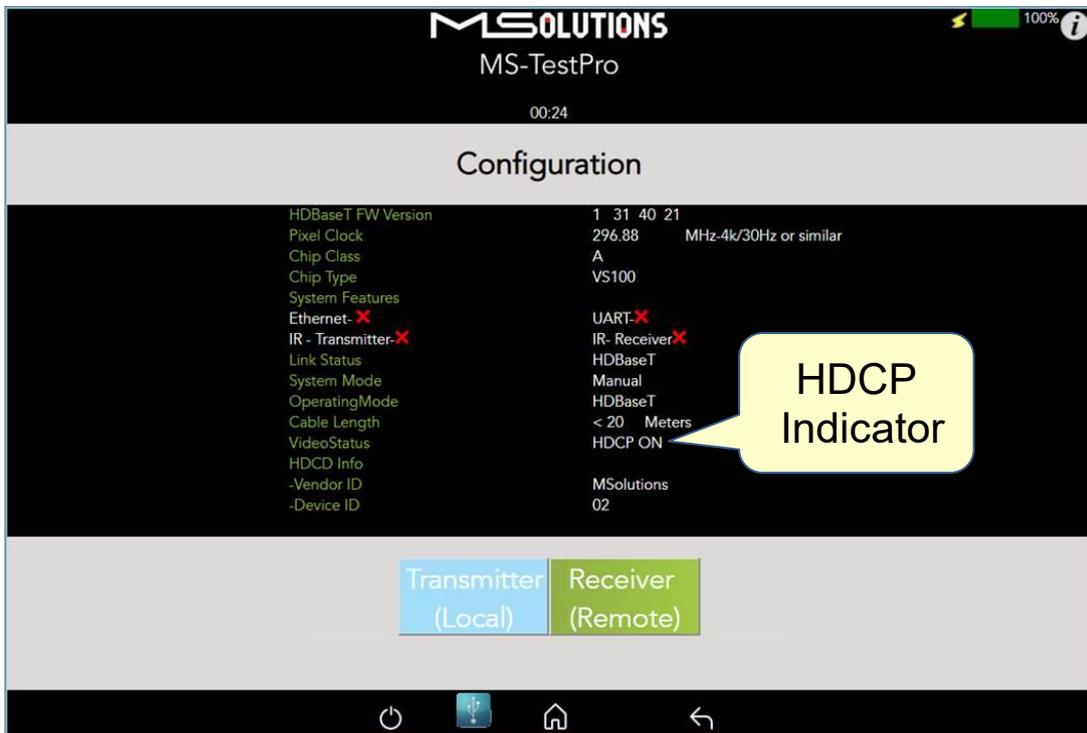


Figure 92: Rx Configuration Screen

The Tx configuration screen appears as shown in the figure below:

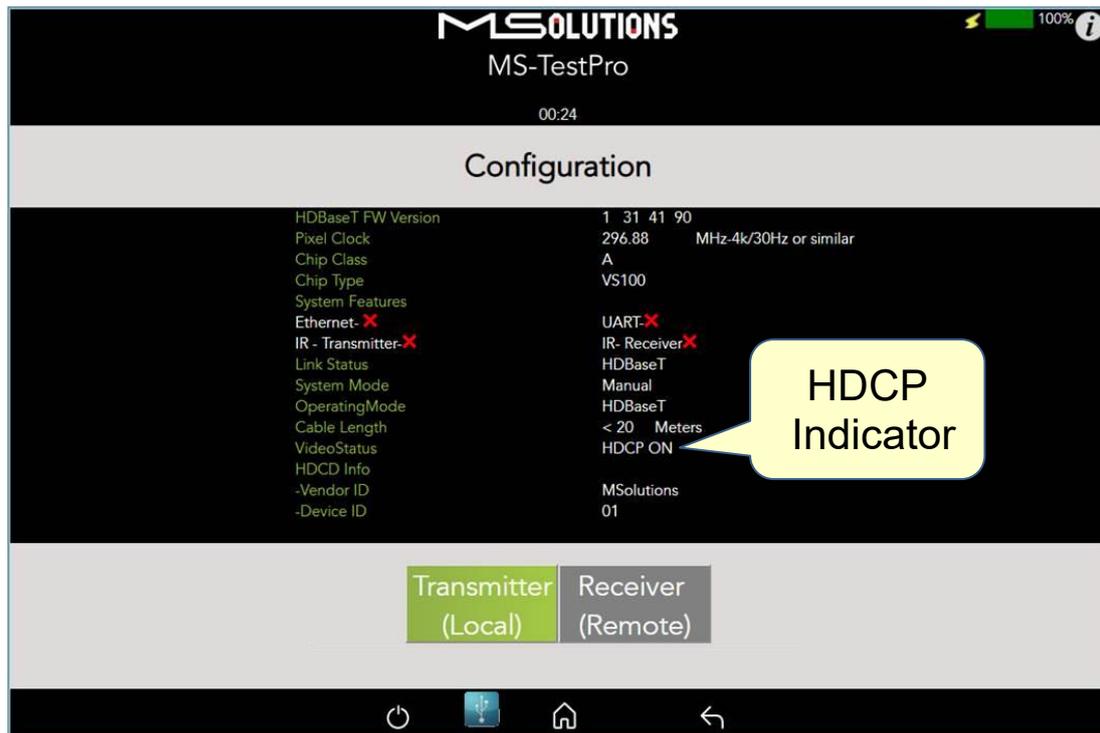


Figure 93: Tx Configuration Screen

The remote and local HDBaseT transceivers are identified – as either transmitter or receiver – and displayed at the top of the page.

NOTE

The system correctly identifies the local and remote transceivers – even when both are transmitters, or both are receivers.

Tap on either the local or the remote entity to display configuration information (read only):

- **FW Ver.** The HDBaseT chip's firmware version.
- **Pixel Clock.** The clock frequency of the video transmission. The Pixel Clock values in the receiver and transmitter screens should be similar.
- **Chip Class.** Class of HDBaseT chip, according to the HDBaseT Standard.
- **Chip Type.** The chip model/part number.
- **Supported System Features.** The interfaces that are extended by the chip over the HDBaseT link, such as: Ethernet, RS232, IR (Infrared support provided by the chip).
- **Link Status.** HDBaseT or No link.
- **System Mode.** Specifies whether Operating Mode changes are performed automatically or manually.
- **Operating Mode.** Current HDBaseT operating mode – HDBaseT, LPPF1/2, Disconnect, FB (Ethernet Fallback), or Bypass Mode.

- **Cable Length.** Approximate cable length calculation (accuracy level $\pm 10\%$), in Meters or Feet.
- **Video Status.** Indicates whether HDCP content is being transmitted.
 - **Video On.** HDMI transmission without HDCP content.
 - **HDCP On.** HDMI transmission *with HDCP content*.
- **HDCD Information.** Vendor and Device ID, as specified in the HDBaseT standard.

5.3.4 Tools

To access Tools menu options, tap on the **Tools** button, as shown in the figure below.

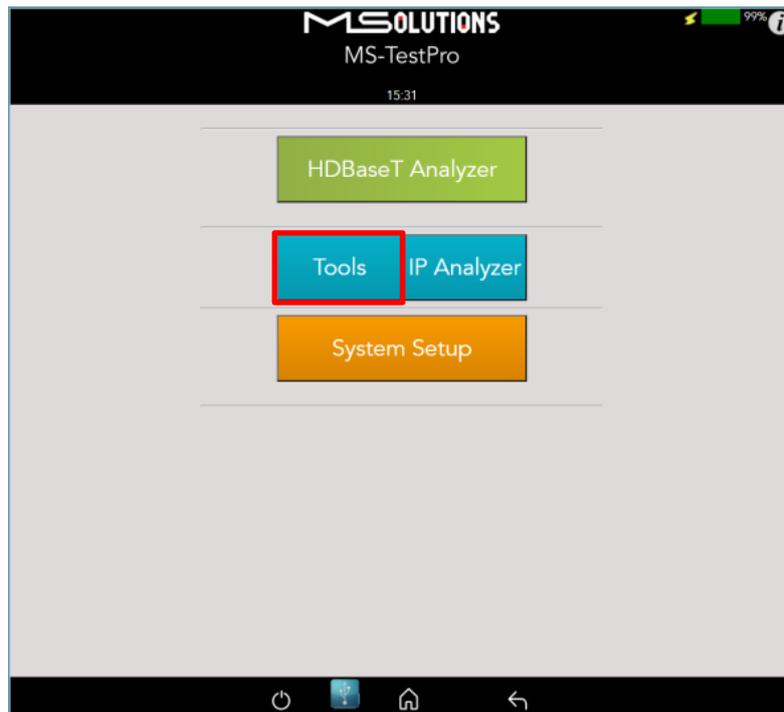


Figure 94: Tools Menu Access

The Tools page is depicted in the figure below.

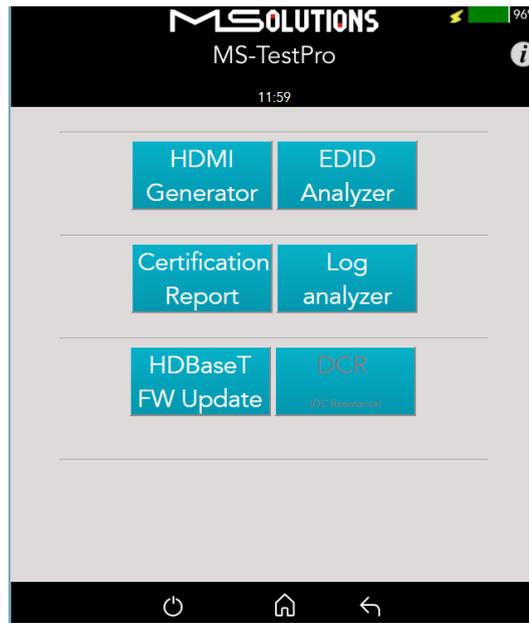


Figure 95: Tools Page

5.3.4.1 HDMI Generator

The HDMI pattern generator provides the ability to generate a variety of HDMI display patterns in a wide range of resolutions.

The HDMI pattern generator screen appears as shown below.

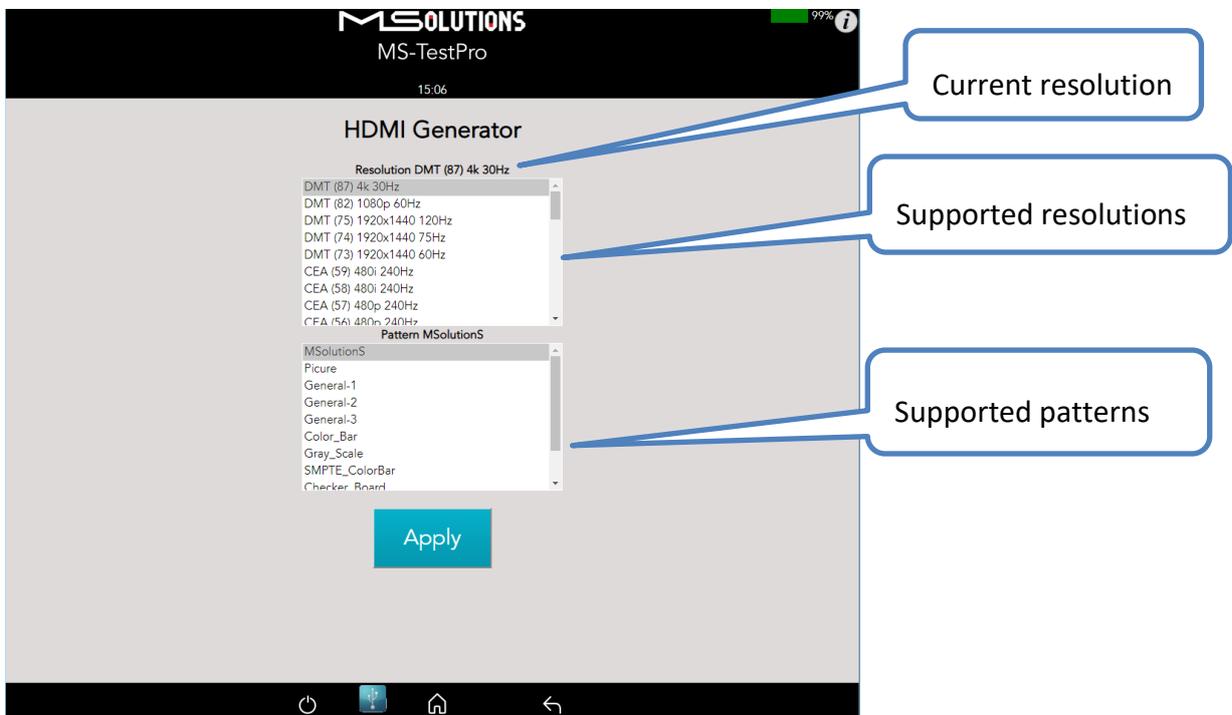


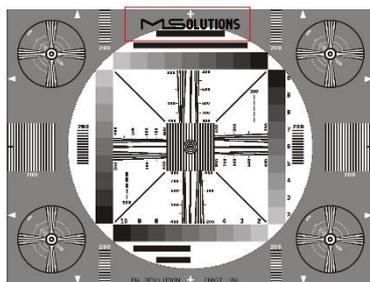
Figure 96: HDMI Generator Screen

To begin generating HDMI pattern, select the **Resolution** and **Pattern** from the list boxes and tap **Apply**.

Table 7: Supported HDMI Resolutions

Resolution	Frequency	Resolution	Frequency
1080p	24Hz	720p	60Hz
1080p	25Hz	1080i	60Hz
4kp	30Hz	480i	60Hz
1080p	30Hz	1080i	100Hz
1080p	50Hz	720p	100Hz
1080i	50Hz	1080i	120Hz
720p	50Hz	720p	120Hz
1080i	50Hz	480p	120Hz
1080p	60Hz	480i	120Hz
480p	60Hz	480i	240Hz
1080p	60Hz	480p	240Hz

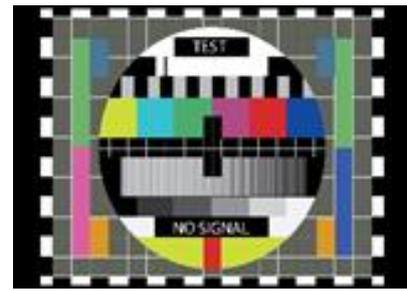
The supported HDMI patterns appear in the figure below.



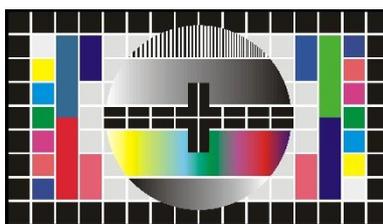
MSolutions



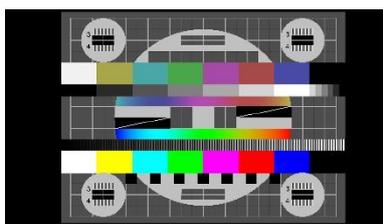
Picture



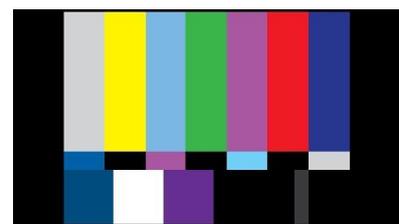
General 1



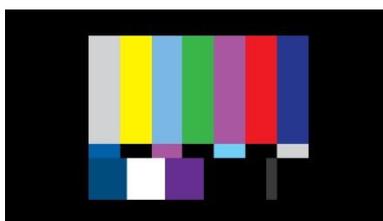
General 2



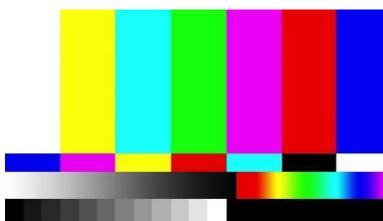
General 3



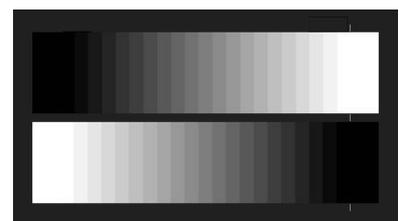
Color Bar 1



Color Bar 2



SMPTE Color Bar



Gray

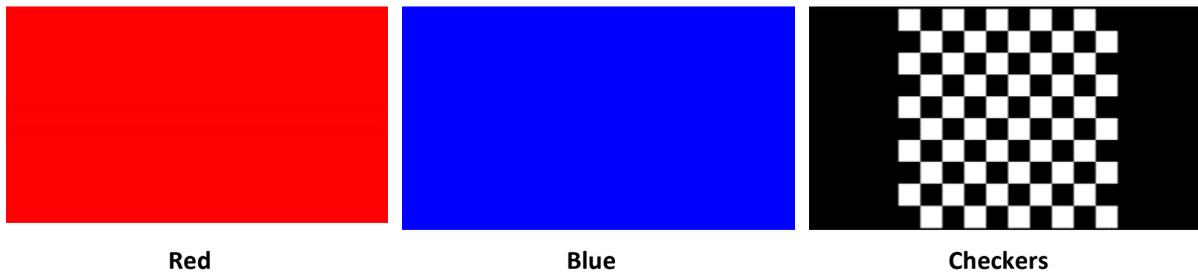


Figure 97: Supported HDMI Patterns

The pattern will be activated for an indefinite period, as shown in the figure below. To deactivate the pattern, reset the MU-M4SOL device.

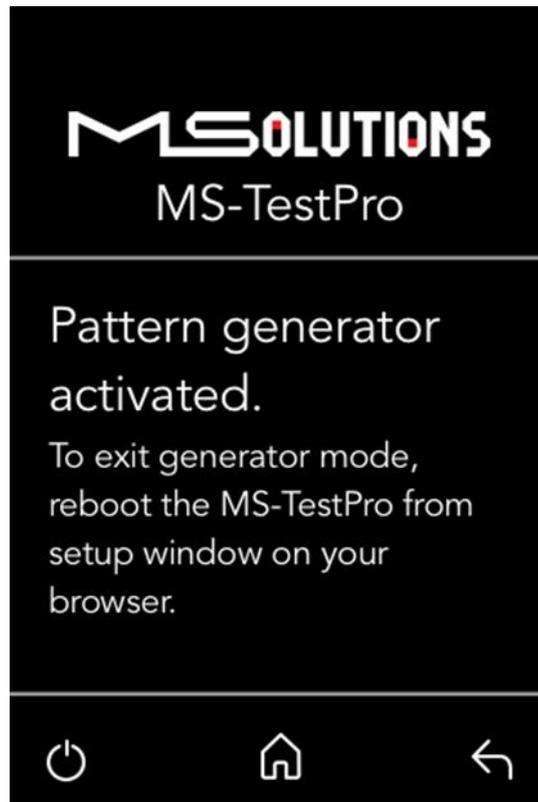


Figure 98: Reset the MU-M4SOL to Deactivate the Pattern

5.3.4.2 EDID Analyzer

You can use EDID to access information on the display capabilities of HDMI sink devices. There are two test setups that you can use to access the information:

- Connecting the MU-M4SOL test device to an HDMI sink device via an HDBaseT link.
- Connecting the MU-M4SOL test device directly to an HDMI cable.

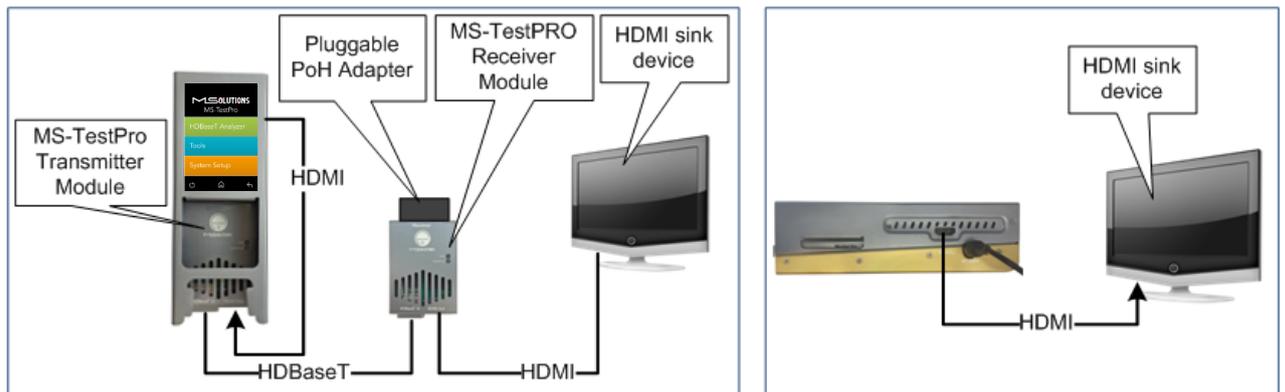


Figure 99: Connecting the MU-M4SOL to the HDMI Sink Device

To access display capabilities using EDID:

Connect the MU-M4SOL test device to the HDMI sink device using one of the methods described above.

Tap on the **EDID Analyzer** button to access information on the display capabilities of the HDMI sink device. The following screen appears, presenting the sink device display information, and supported display resolutions.

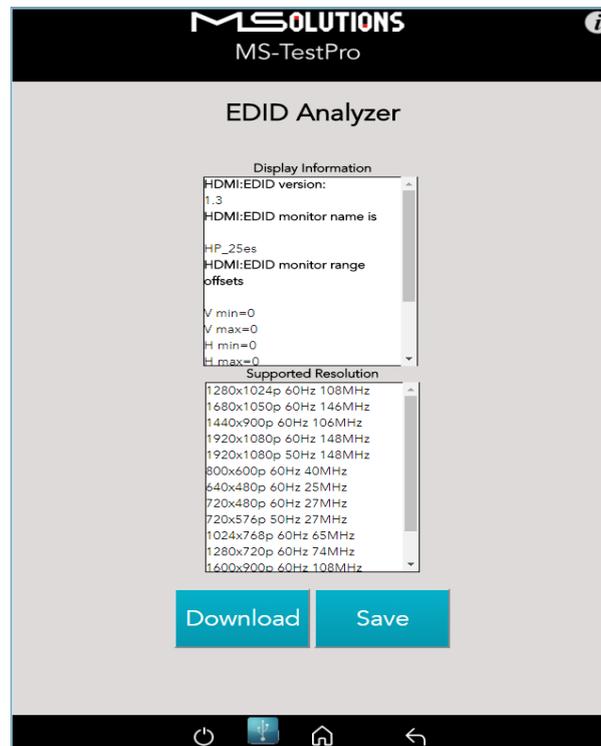


Figure 100: EDID Information Page

3. To save EDID data to the tester internal memory, tap the **Save** button.
To download EDID data, connect the USB memory stick and tap the **Download** button.
Two files will be saved – *EDIDXXXX.txt* and *EDIDXXXX.bin*.
4. To delete EDID data from tester, select the files to delete and tap the **Delete** button.

5.3.4.3 Certification report

The certification report menu provides the following capabilities:

- **Run** – report data generation
- **Download (Report Data)** – saves the report data from the tester to the USB memory stick
- **Profile** – profile configuration
- **Download (PDF Creator Software)** – downloads PDF Creator Software

5.3.4.3.1 Run (Generate Data)

The HDBaseT report data collection feature is used to collect the data required to perform HDBaseT cable analysis.

To access data for HDBaseT cable analysis:

Connect the MU-M4SOL test device to both ends of the CATx cable, as shown below in Figure 33:

- The HDMI cable **must** be connected to the Internal Generator to ensure that HDMI traffic is running on the HDBaseT link.
- The “local” side of the cable is connected to either the transmitter or receiver module, housed in the MU-M4SOL chassis.
- The “remote” side of the cable is connected to the other MU-M4SOL module. **Make sure** that the remote module is terminated by a Pluggable POH Adapter as shown below.

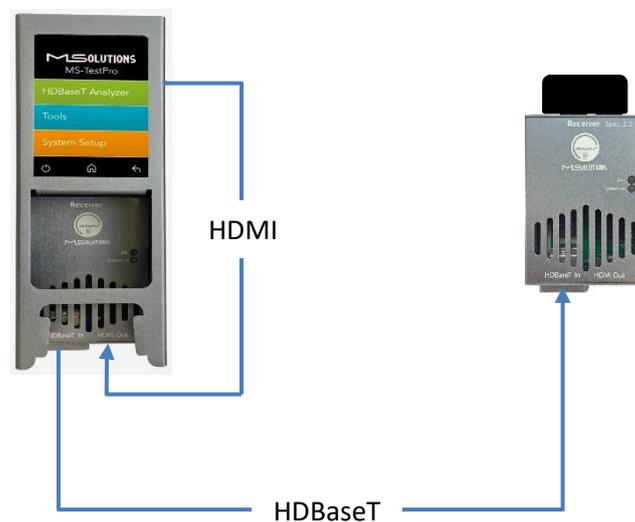


Figure 101: Cable Test Setup

IMPORTANT

The HDMI cable must be connected to the Internal Generator to ensure that HDMI traffic is running on the HDBaseT link.

2. Select Certification report >> Run (Generate Data), as shown below:

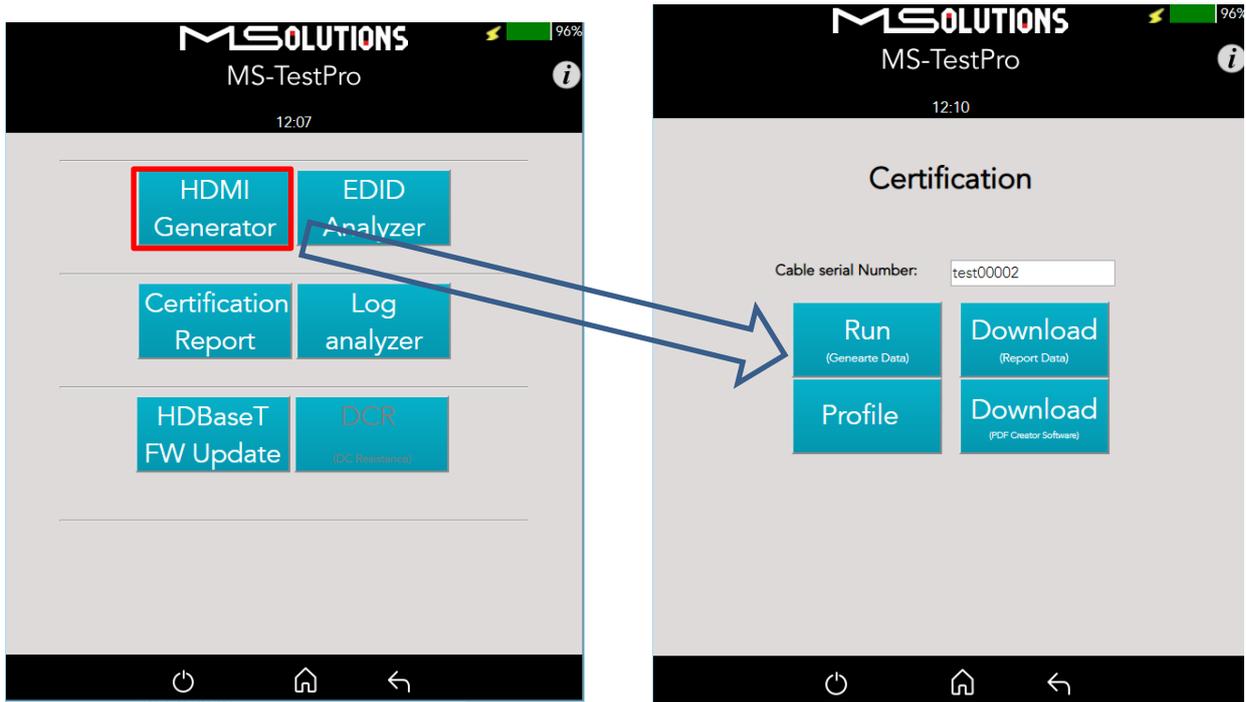


Figure 102: Generate Report Data

A progress bar appears in the window:

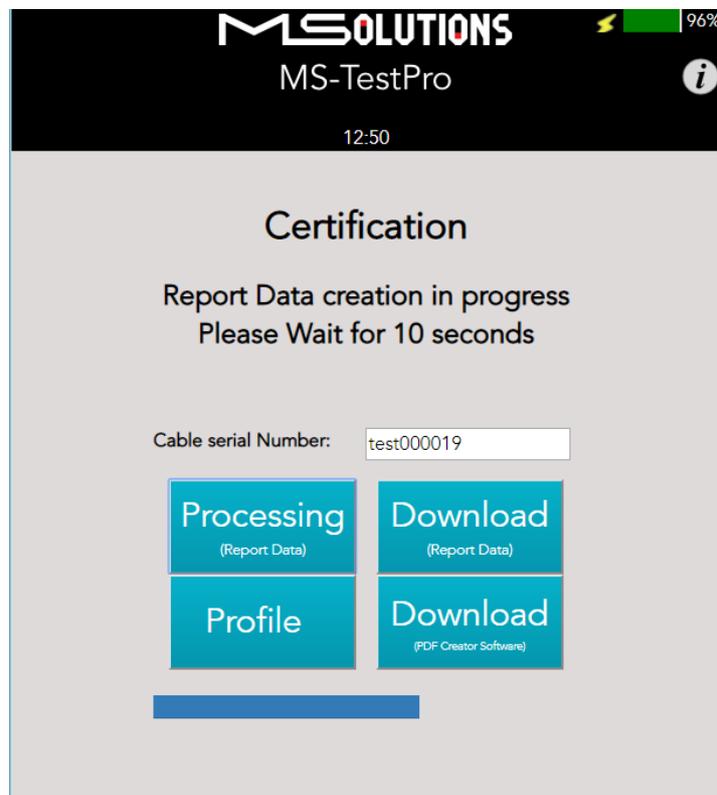


Figure 103: Generating Report Data

3. After the data is generated, the line certification results appear at the top of the screen, as shown in the figure below. To save the generated data files, insert the USB memory stick and tap on the **Download (Report Data)** button (see the figure below).



Figure 104: Downloading Report Data

In the following screen appears a list of certification tests data files:

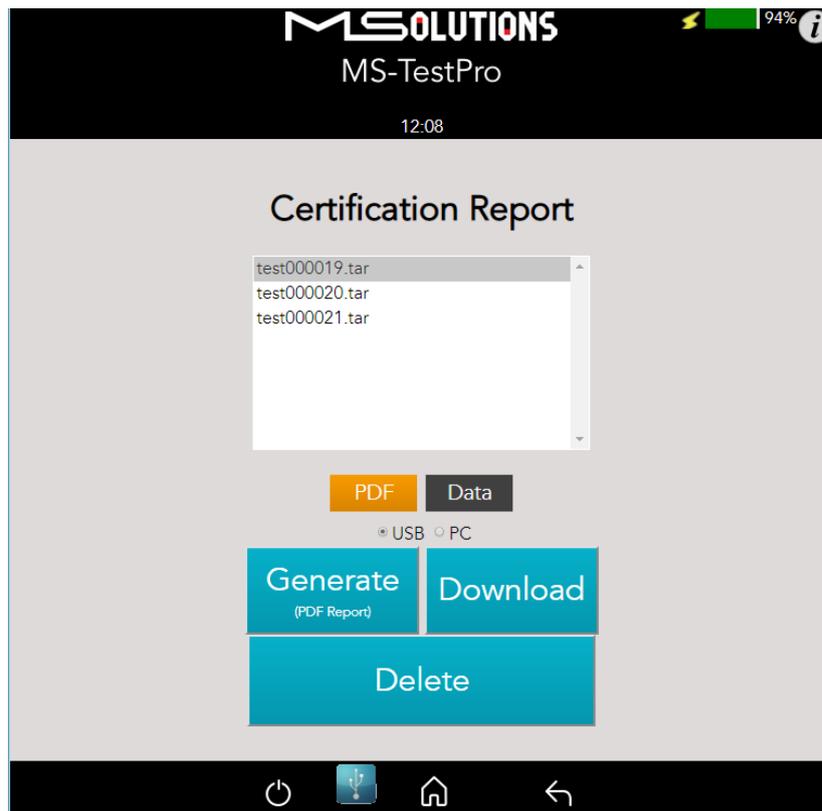


Figure 105: Certification Report Data File Options

4. To download file to USB flash memory, select the USB radio button, insert a USB memory stick into one of the USB ports of the MU-M4SOL device. Select a report data file or files from the list as shown in Figure 37, and tap **Download** to save the file to the memory stick. Wait until the following message disappears:

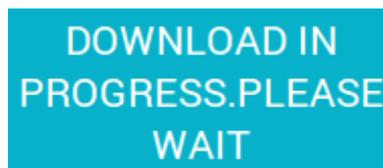


Figure 106: Message - Downloading Report Data

5. Data files may be downloaded to the PC as well. Mark the **PC** radio button, select one or more report data files from the list, choose the PC target directory, and tap **Download**.
6. To create a PDF Report, select **Generate (PDF Report)**, and select one or more report data files from the list, as shown in Figure 105. Tap **Generate**, as shown in Figure 107.

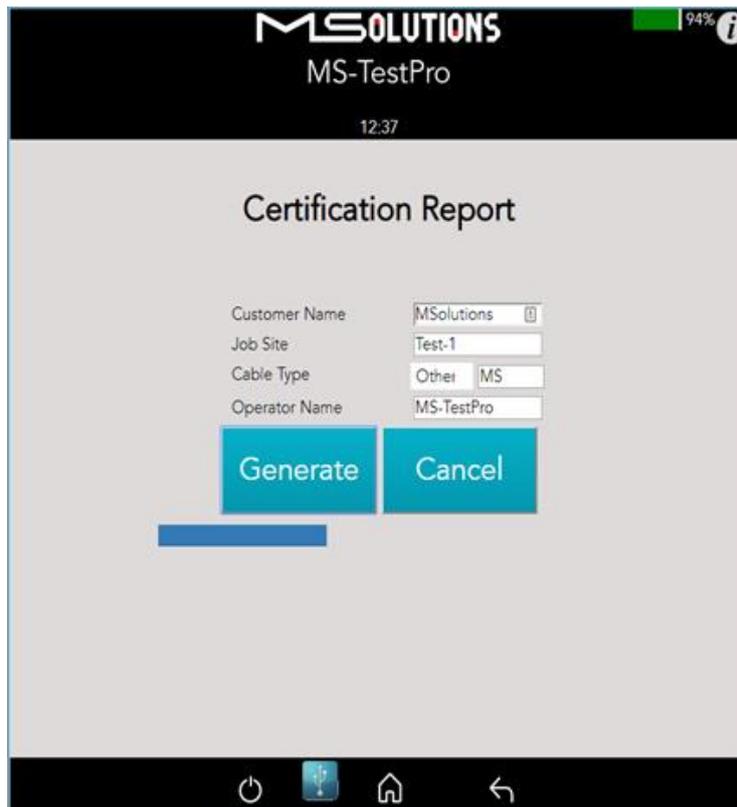


Figure 107: Certification Report

To see generated PDF Report, check PDF on the Figure 105 and Download to PC or USB.

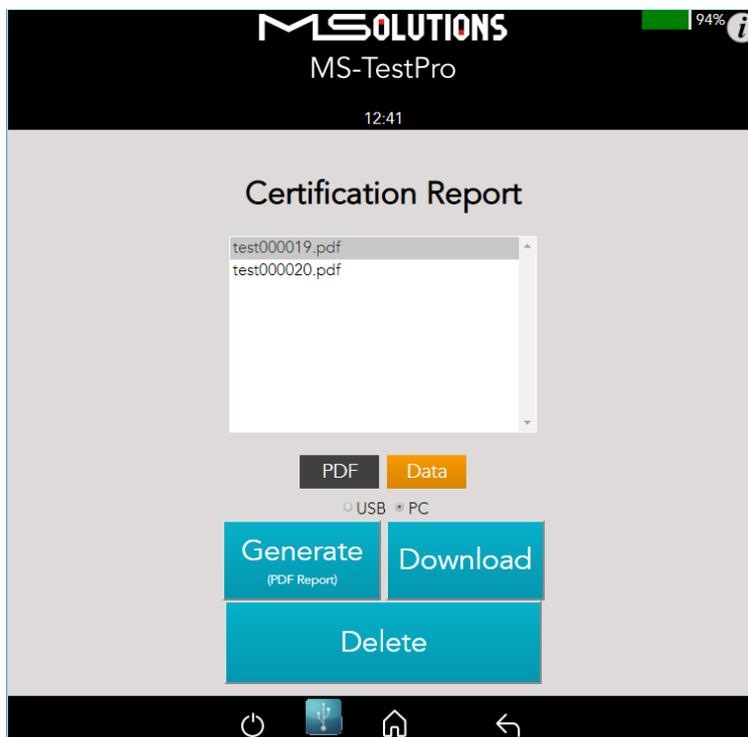


Figure 108: PDF Certification Report Download

7. To delete files, select a report data file or files from the list, and tap **Delete**.
8. To generate a printable certification report based on the downloaded data, see Appendix D: *Generating an HDBaseT Certification Report*.

5.3.4.3.2 Profile Configuration

To choose the appropriate profile, tap the **Profile** button based on the cable which is used. If the desired cable is not on the list, tap on **Standard** → **Apply**, note the selected profile appears on a gray background.

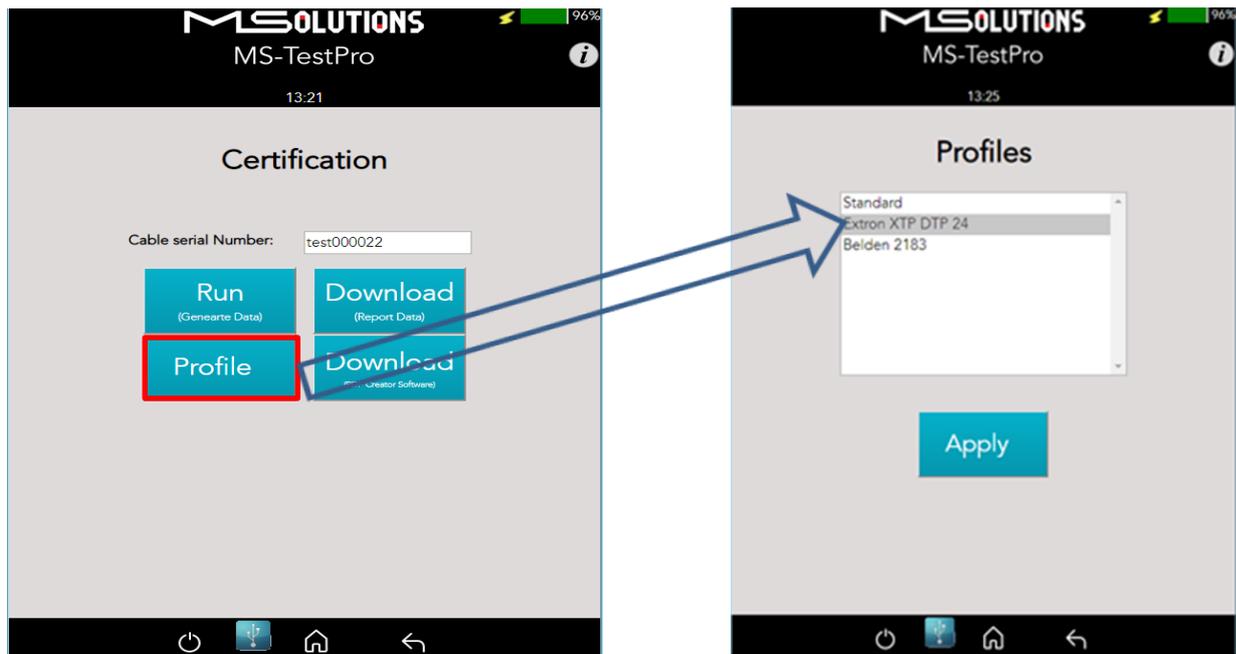


Figure 109: Profile Configuration Process

5.3.4.3.3 Download PDF Creator Application

To Download the Report Generator Tool, insert a USB memory stick into one of the USB ports of the MU-M4SOL device, and tap on the **Download (PDF Creator Software)** button. A detailed explanation how to use it can be found in Appendix D.



Figure 110: Download PDF Creator Software

5.3.4.4 Log Analyzer

The comprehensive Log Analyzer function measures over sixty different parameters. It is intended to track random failures over a long period of time. The recommended test duration is 24 hours, allowing you capture the performance of the cable during the course of an entire day. This enables you to perform an in-depth analysis of any problem. Log files are generated in pairs – one for the transmitter module and one for the receiver module. Up to 5 pairs of log files are stored in the system. When a 6th pair of log files is generated, the oldest log file pair in the system is automatically deleted.

5.3.4.4.1 Log Generation

➔ **To perform log generation:**

1. To begin log generation, tap on the **Log Analyzer**, then the **Start** button.
2. To end log generation, tap on **Stop** button as shown in the figure below. The system generates transmitter *and* receiver logs.

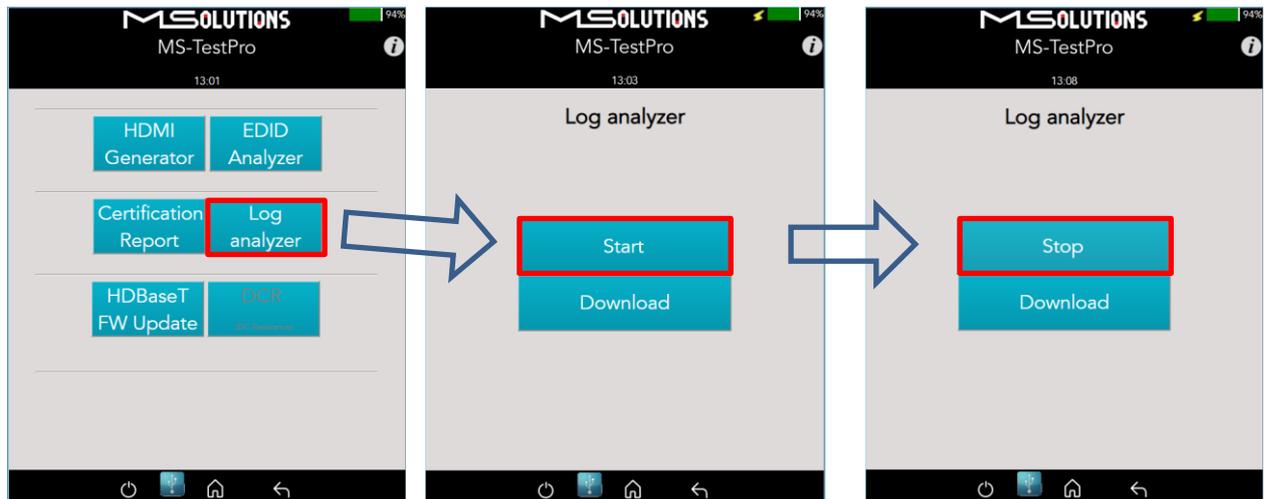


Figure 111: Starting Log Generation

5.3.4.4.2 Log Distribution

You can export log files to a USB memory stick for further processing.

➔ **To export log files to a USB memory stick:**

1. Insert a USB memory stick into one of the USB ports. Upon connection, the USB indicator  is displayed at the bottom of the screen.
2. To distribute a log for analysis, mark files, USB or PC radio button and tap **Download** button. The transmitter and receiver logs that you generated are copied to the USB memory stick.

Up to 5 pairs of transmitter/receiver logs can be stored in the main unit. Generation of additional logs will cause the oldest log pair to be deleted.

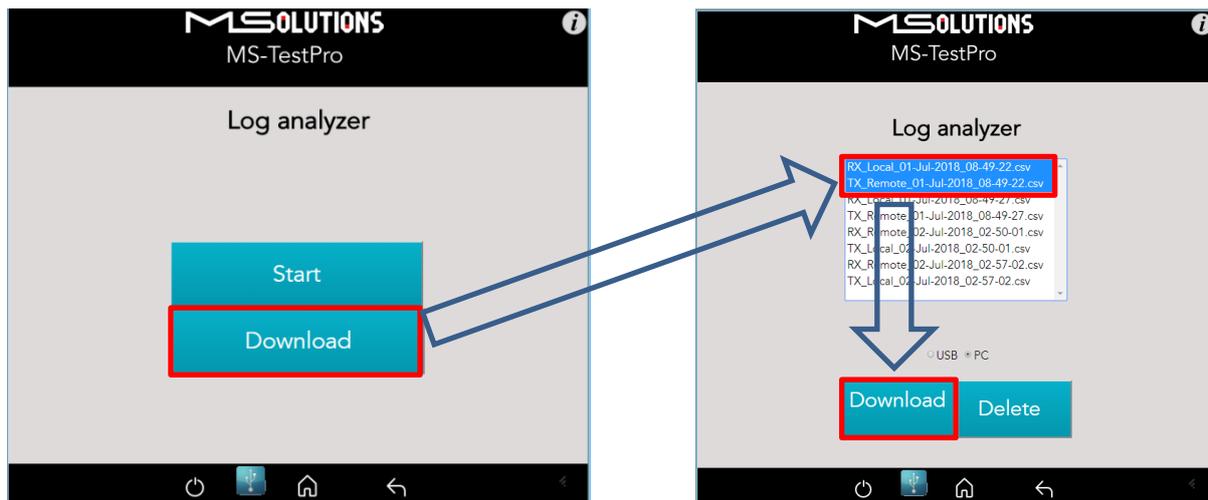


Figure 112: Downloading Files

You can choose to copy any of the file pairs to the PC or USB memory stick.

3. To delete files, select a file or files from the list, and tap **Delete**.

5.3.4.5 HDBaseT Firmware Update

➔ To upgrade 3rd party Tx or Rx remote unit firmware:

1. Prepare a USB memory stick with the upgrade file *xxx.Hex* in the **root** folder of the stick or directory with the same file on PC.
2. Tap on the **HDBaseT FW Update** button on the Tools screen.
3. Mark **Reset** checkbox on the next screen.
4. Select the related file from PC or USB stick.
5. Tap on the Upgrade button as shown in the figure below.

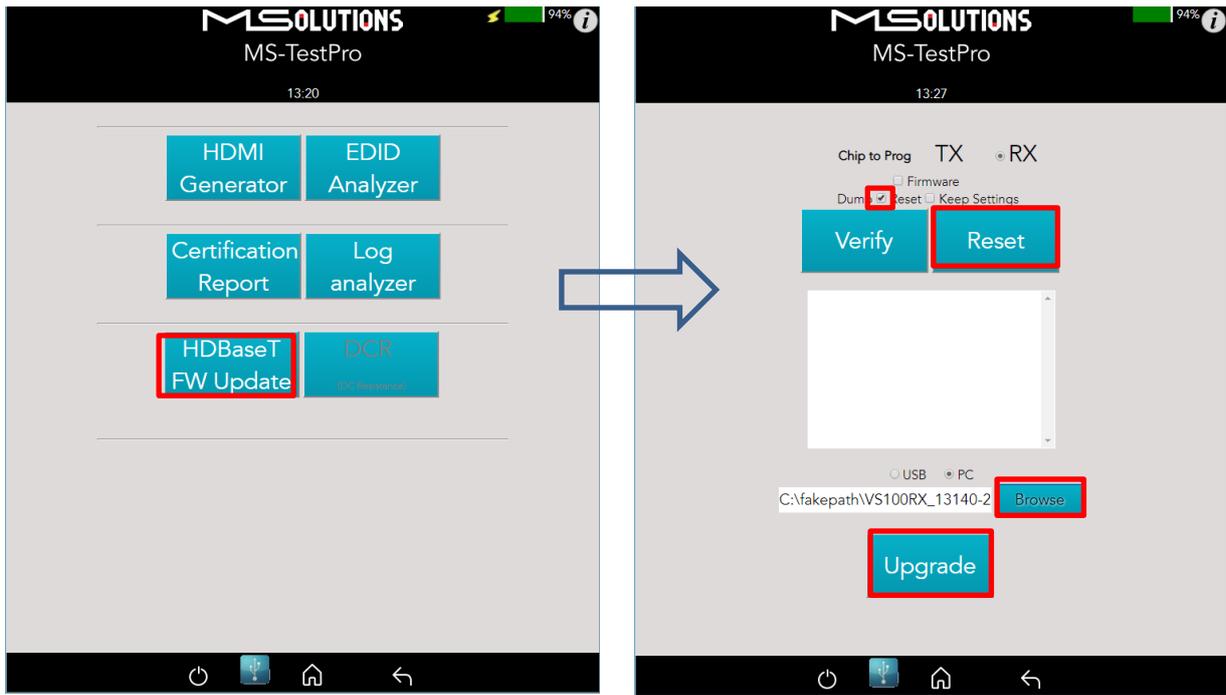


Figure 113: Remote Unit HDBaseT Firmware Update

NOTE

- * Do not switch off the device's power during the upgrade!
- * Firmware updates are available only to 3rd party remote Transmitter or Receiver units.
- * The HDBaseT firmware of the MU-M4SOL Transmitter and Receiver cannot be upgraded

GUI buttons:

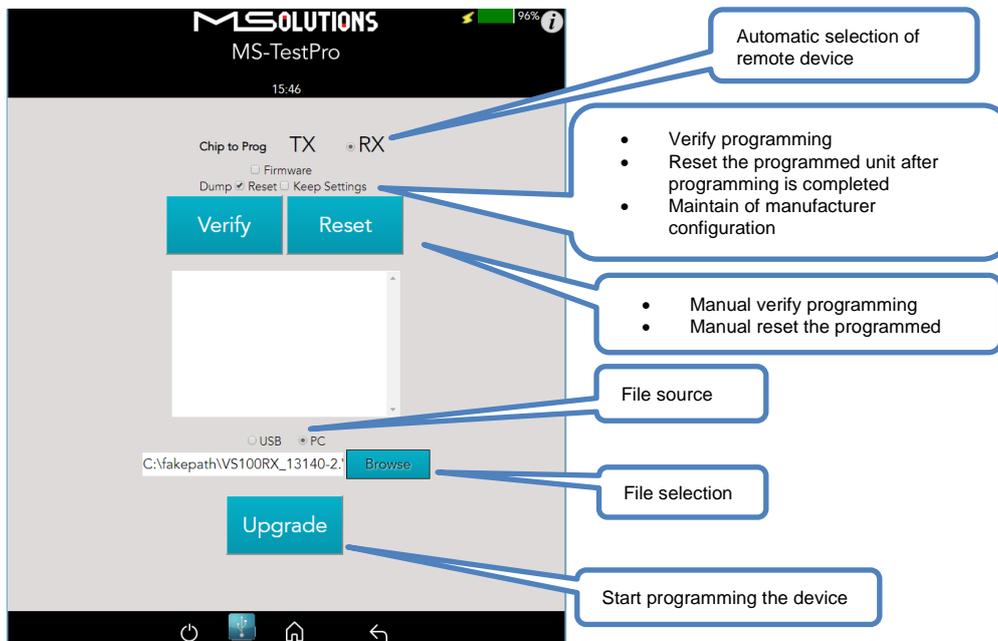


Figure 114: Firmware Upgrade GUI

Wait for the progress bar to disappear.

To verify if the upgraded unit was successfully upgraded, access the **Configuration** menu, and read the current HDBaseT firmware version. See Figure 92.

5.3.4.6 DC Resistance Unbalance Testing

Using the MU-M4SOL **DC Resistance** and **Looper** modules, you can test the DC resistance of CATx cables, and check their ability to provide a sufficient level of PoH (Power over HDBaseT) powering.

The DC Resistance module is inserted into the lower slot in the MU-M4SOL main unit, while the CATx cable is connected to the DC Resistance module at one end, and to the Looper module at the other end, as depicted in the figure below:

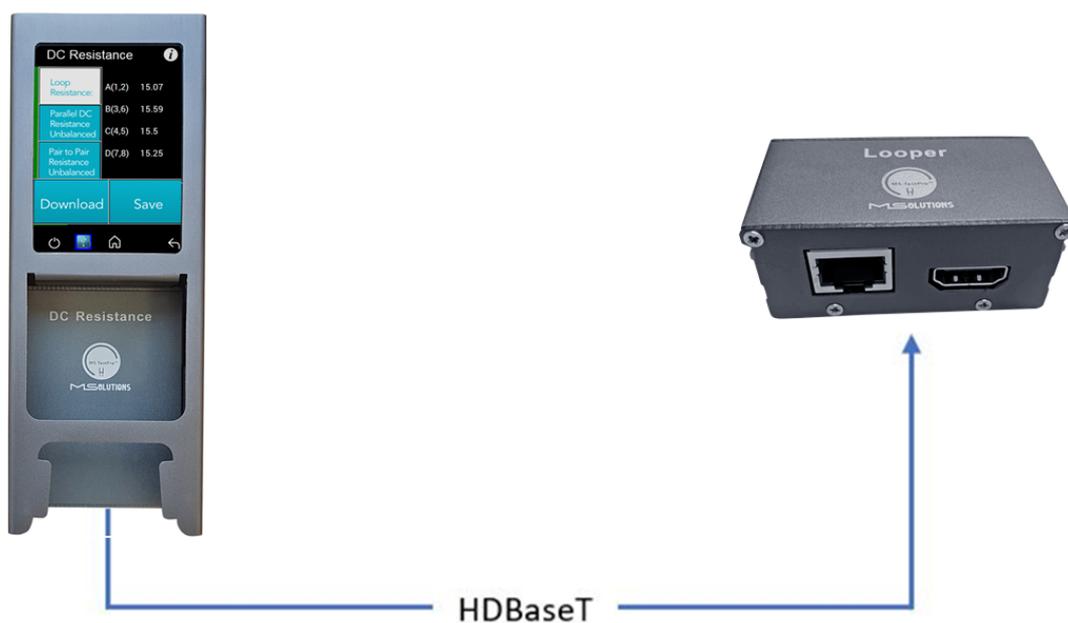


Figure 115: DC Resistance Test Setup

➔ **To test the DC resistance of a CATx cable:**

1. Attach the cable to the DC Resistance and Looper modules as shown in the figure above.
2. From the Tools page, tap on the **DCR DC Resistance** button. The DC Resistance page appears, together with three buttons:
 - Loop Resistance
 - Parallel DC Resistance Unbalanced
 - Pair to Pair Resistance Unbalanced

3. Tap on the **Loop Resistance** button to display Loop Resistance data, as shown in the figure below. Loop resistance represents the DC loop resistance (in ohms) of a cable and is calculated as the sum of the DC resistance of the two conductors in a pair.

Resistance of *under 20 ohms* indicates that the pair should be capable of delivering the minimum of 80% of the power to the remote side.

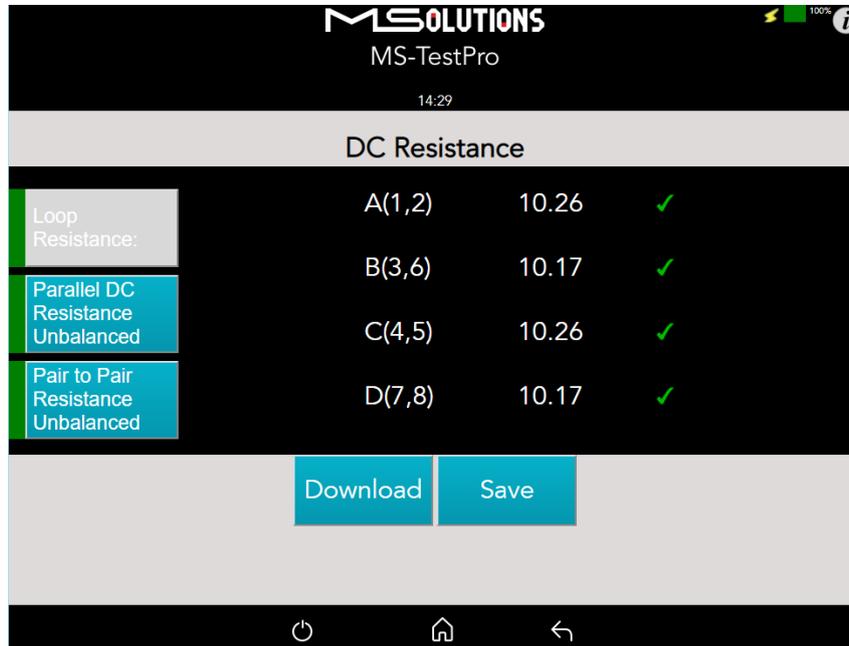


Figure 116: Loop Resistance Results

4. Tap on the **Parallel DC Resistance Unbalanced** button to display the parallel resistance of the CATx two conductors in each cable pair. For each pair, the difference is expressed in ohms, as shown in the figure below.

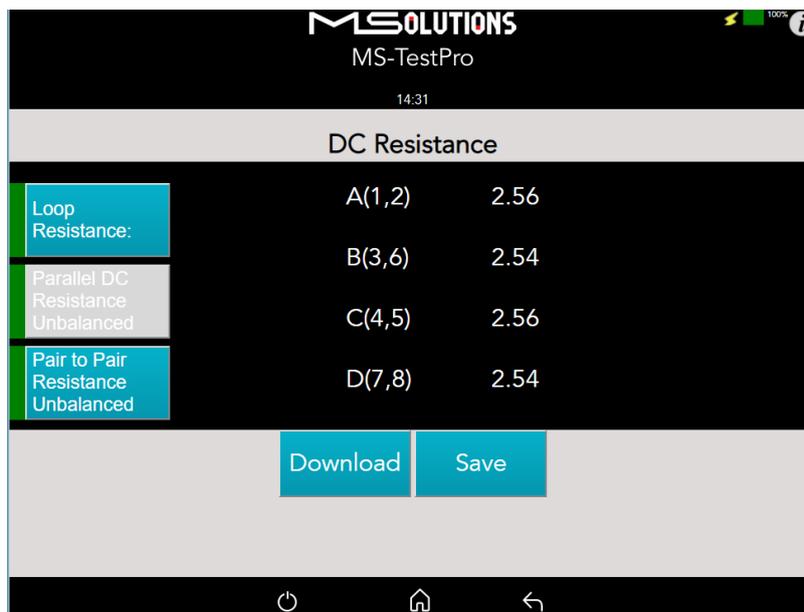


Figure 117: Parallel DC Resistance Unbalanced Results

5. Tap on the **Pair-to-Pair Resistance Unbalanced** button to display the difference in DC resistance between the four pairs in the cable. For each pair, the difference is expressed in ohms, as shown in the figure below.

A difference of *under 0.2 ohms* or 5% (the higher between the two) indicates that the pair should be capable of delivering the required common-mode current needed to effectively support PoH and data transmission over the pair.

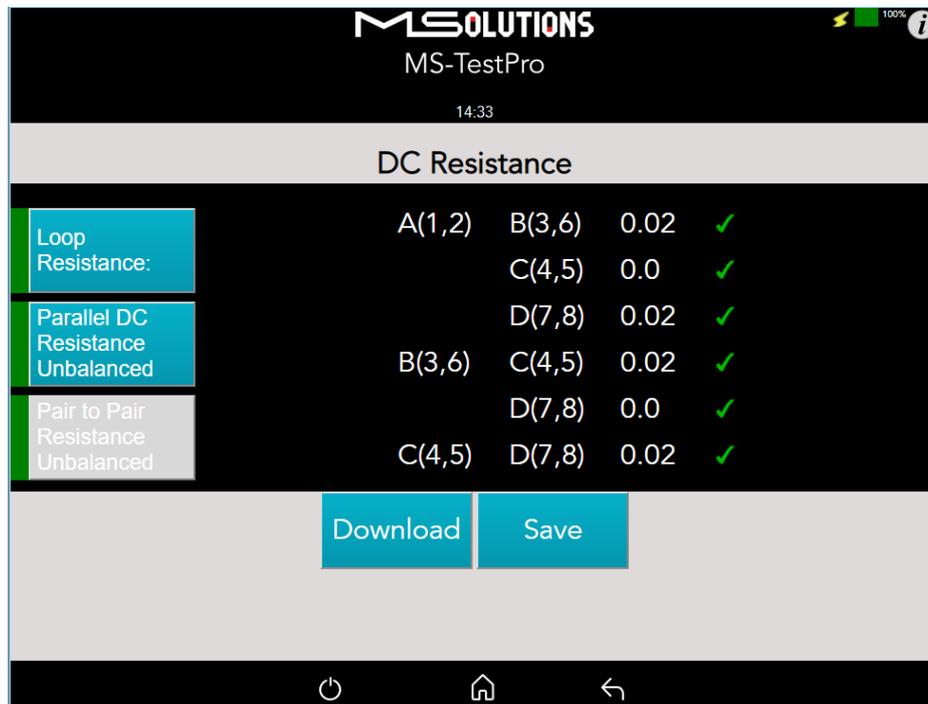


Figure 118: Pair-to-Pair Resistance Unbalanced Results

5.3.4.7 HDMI Cable Testing

Using the MU-M4SOL **HDMI Cable Tester** and **Looper** modules, you can test the quality of HDMI cables before their installation. In order to reduce costs and boost profits, some HDMI cable suppliers sell cables with missing or shorted wires. These substandard cables are usually discovered only when trying to stream high resolutions like 4K or run CEC commands. With the MU-M4SOL HDMI Cable Testing function, you will identify the problem immediately, and not in a post-installation service call.

Just insert the HDMI Cable Tester module into the lower slot of the MU-M4SOL main unit, attach one end of the HDMI cable to the module's HDMI port, and attach the other end of the HDMI cable to the HDMI port on the Looper module, as shown in the figure below.



Figure 119: HDMI Cable Tester Setup

The MU-M4SOL HDMI modules perform physical layer quality tests on each of the cable's conductors and the cable shielding, providing instant feedback on missing or defective wiring:

- Checks the presence of each of the 19 HDMI-standard conductors and cable shielding.
- Tests the ability of the cable to support an array of HDMI bandwidth requirements, as specified in the HDMI 1.4, 2.0, 2.1, and future 2.3 standards.
- Ensures that none of the cable's conductors are shorted or missing.
- Measures the gauge (AWG) of each of the conductors, detecting resistance imbalances within the cable that cause degraded transmission quality (planned for a future release).

➔ To test the quality of an HDMI cable:

1. Attach the cable to the HDMI Cable Tester and Looper modules as shown in Figure 119 above.
2. From the Basic Tools page, tap on the **HDMI Cable Tester** button.

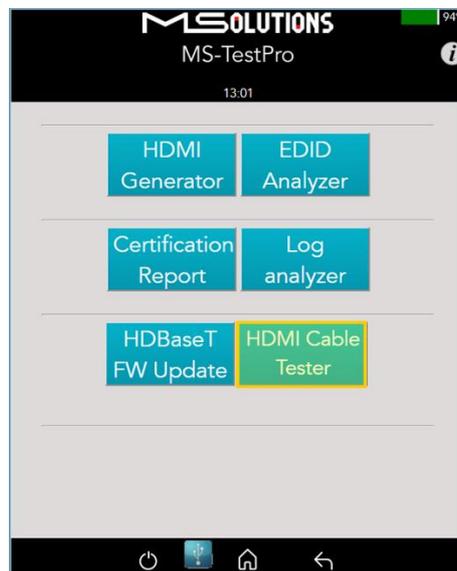


Figure 120: HDMI Cable Tester Button

The HDMI Cable Tester page appears as shown in the figure below.

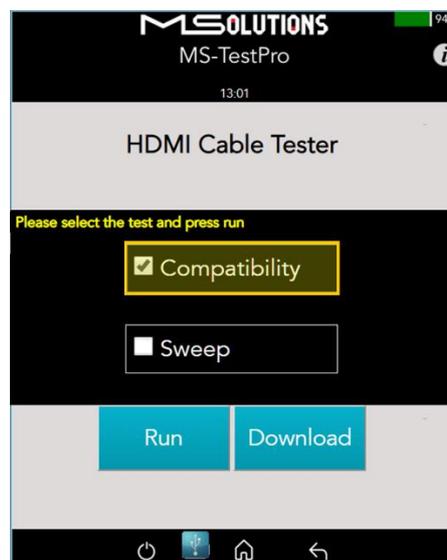


Figure 121: Run Compatibility Tests

3. Check the **Compatibility** box and tap **Run**.

NOTE

In this description, the Compatibility and Sweep tests are presented separately. You can check *both* the **Compatibility** and **Sweep** boxes to run the two tests simultaneously.

- The MU-M4SQL begins testing the cable's compatibility with the HDMI standard. When the test is complete, a summary screen appears. In the example shown below, the cable failed the 4K/60Hz test. A list of shorted wires appears as well. If needed, tap **Run** to perform another Compatibility test.

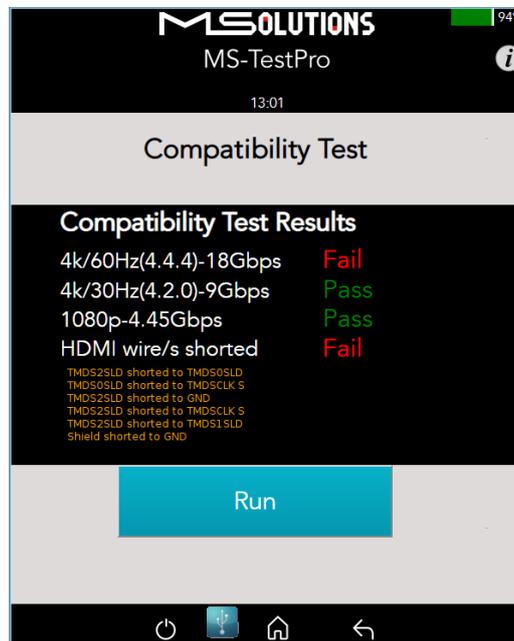


Figure 122: Compatibility Test Results

- If the message "Cable not found" appears on the screen, check the physical connection of the cable to the modules, and tap **Run** again.

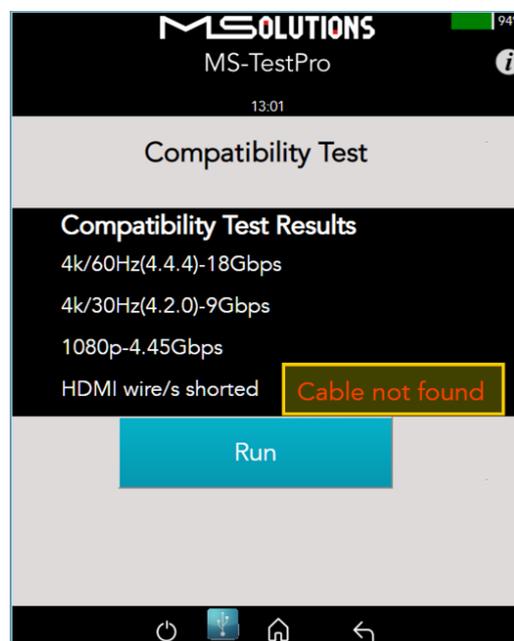


Figure 123: "Cable not found" Message

6. Tap **Save** to save the test results in a report format. Following generation of the report, tap **Download** to copy the report to your PC or to a disk-on-key attached to the tester's USB port.
7. To perform the Sweep test, return to the HDMI Cable Tester page appears as shown in the figure below.

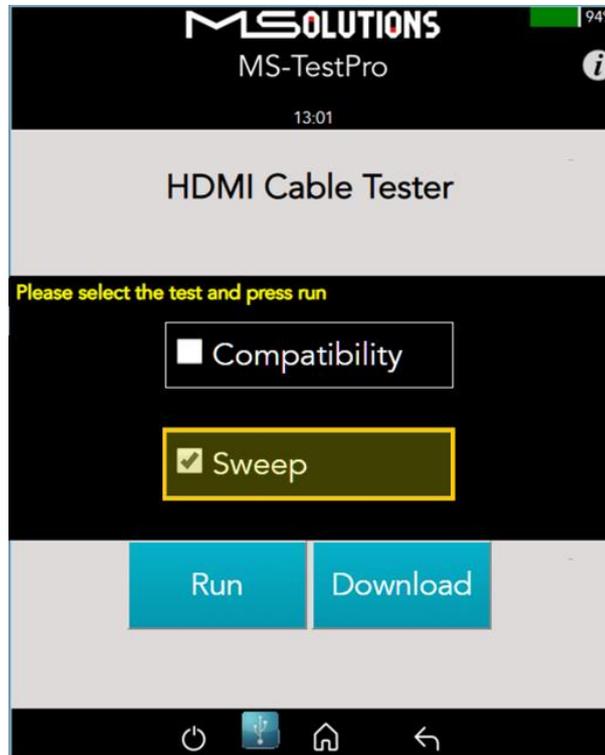


Figure 124: Run Sweep Tests

8. Check the **Sweep** box and tap **Run**.

NOTE

In this description, the Compatibility and Sweep tests are presented separately. You can check *both* the **Compatibility** and **Sweep** boxes to run the two tests simultaneously.

9. The MU-M4SOL begins to test the quality of each of the wires in the cable. If needed, tap **Run** to perform another Sweep test.

The existence of each wire tested is indicated by a color, as listed in the table below:

Table 8: Wire Quality Color Code

Color	Severity
	Wire exists
	Wire is missing
	Wire is shorted
	Test in progress

The figure below shows the sweep test in progress. If necessary, you can tap **Stop** to cancel the test.

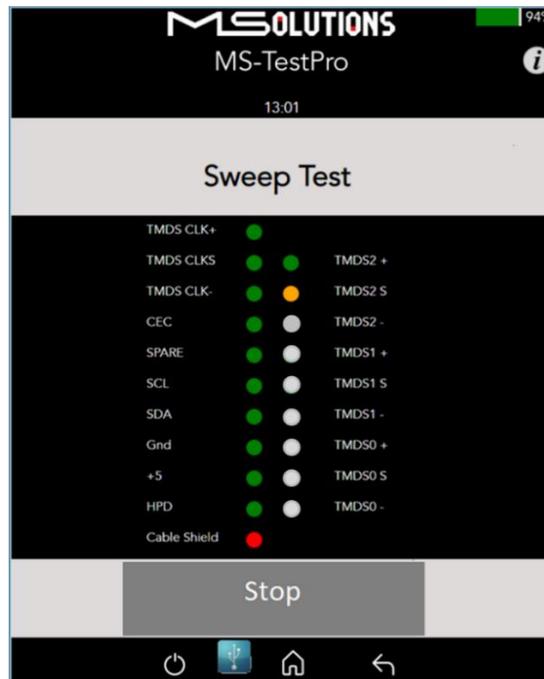


Figure 125: Sweep Test in Progress

- At the end of the test, the **Run** button appears. Click on the button if you wish to run another Sweep test.

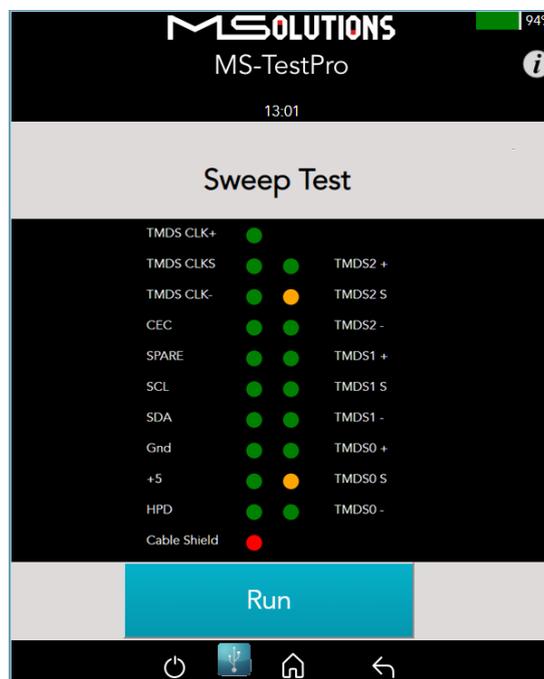


Figure 126: Sweep Test Complete

5.3.5 IP Network Analyzer

To access the IP option, tap on the **IP Analyzer** button, as shown in the figure below.

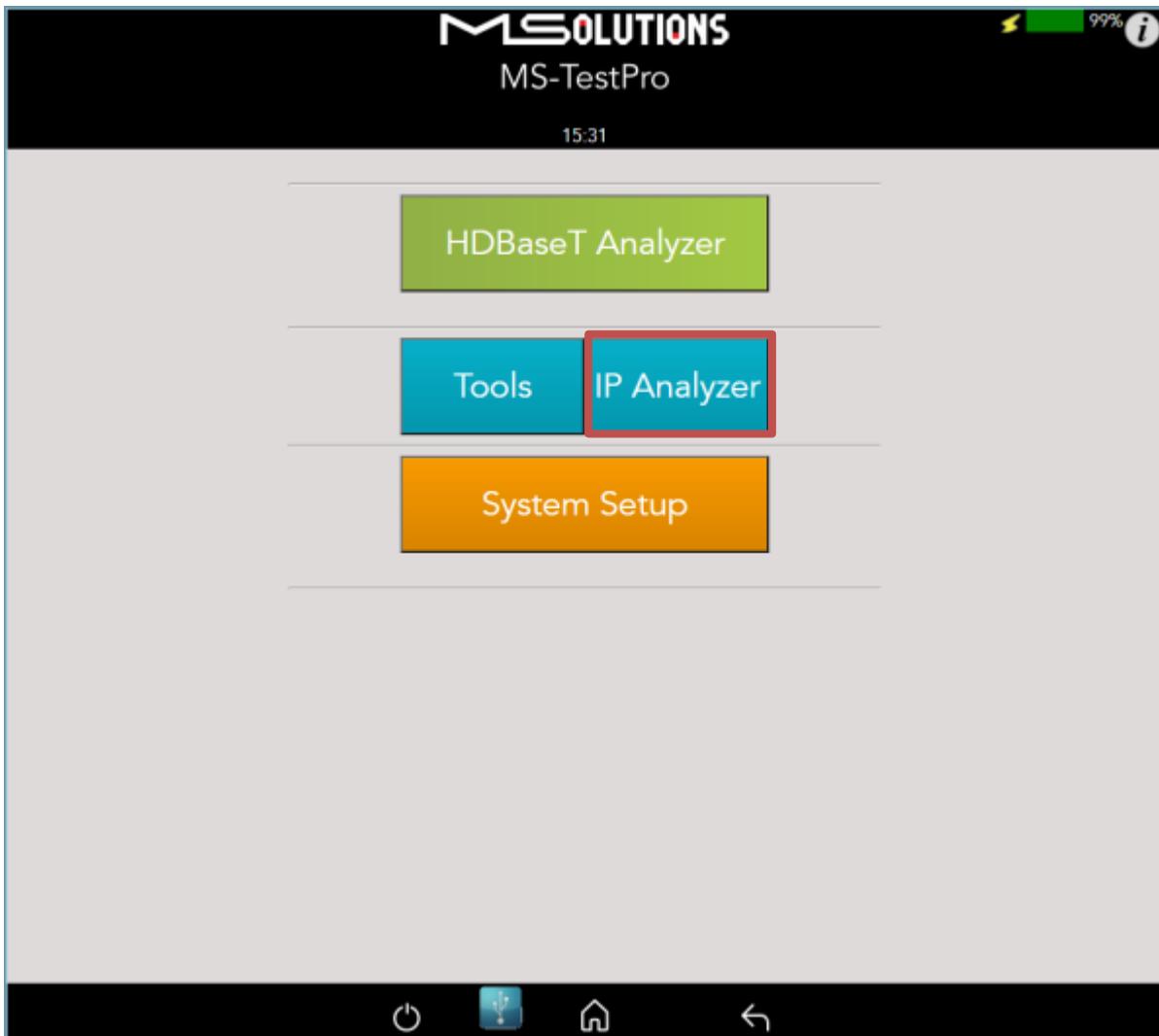


Figure 127: Selecting IP Module

5.3.5.1 Enabling license

All the MU-M4SOL units, are IP ready, but require a license needs to activate.

When you first select IP Analyzer you will be presented with the screen below.

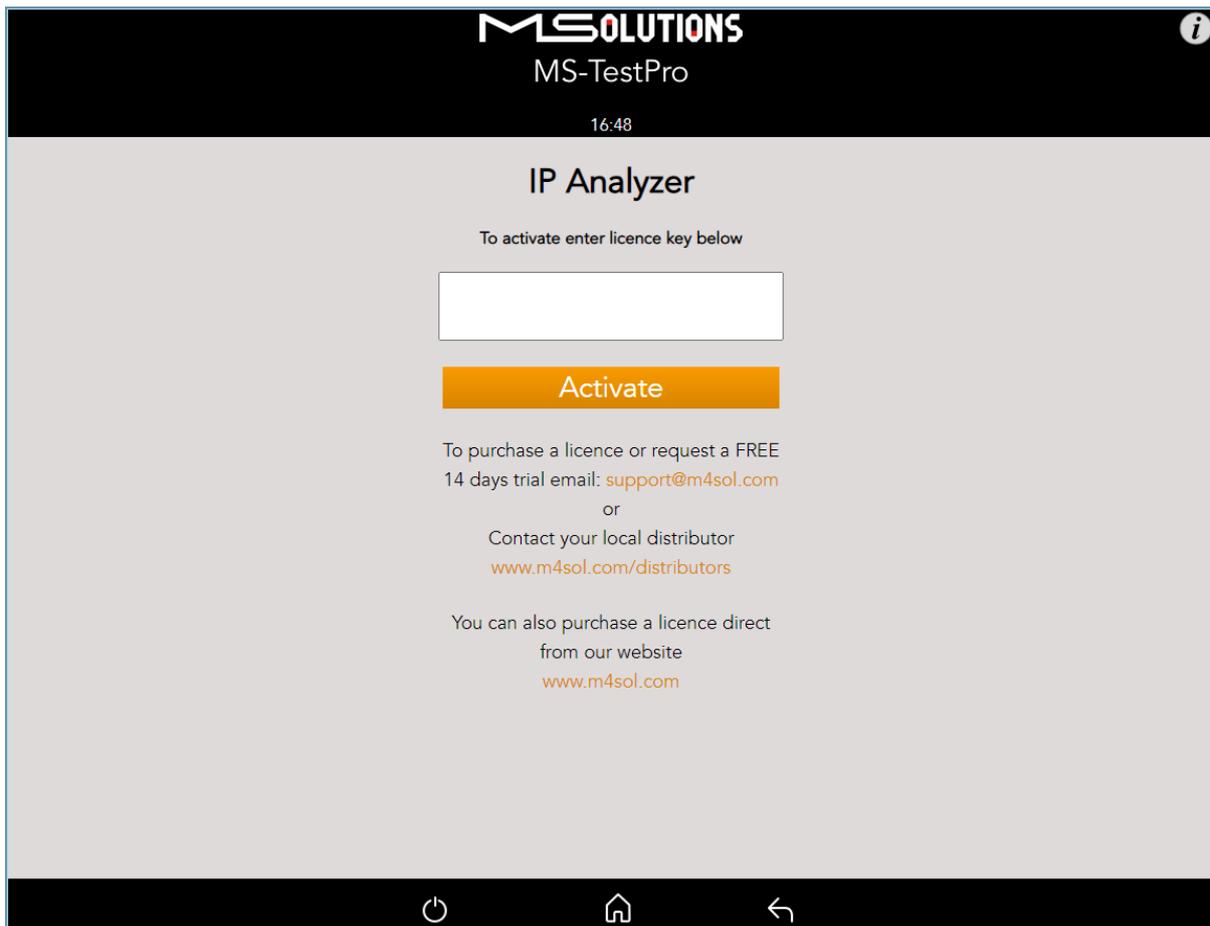


Figure 128: IP Analyzer licensing window

All our IP License subscriptions include a 14-day free trial, after which you have the option to buy the license.

Then proceed with the following steps: -

9. Plug in a USB memory stick into one of the USB ports on the rear of the tester.

10. NOTE

Please ensure the USB stick is formatted as “standard FAT format”
The License activation is done only on local GUI

11. Generating the "Device.conf" file can be done only on the touch screen to the USB stick as seen in Figure 129

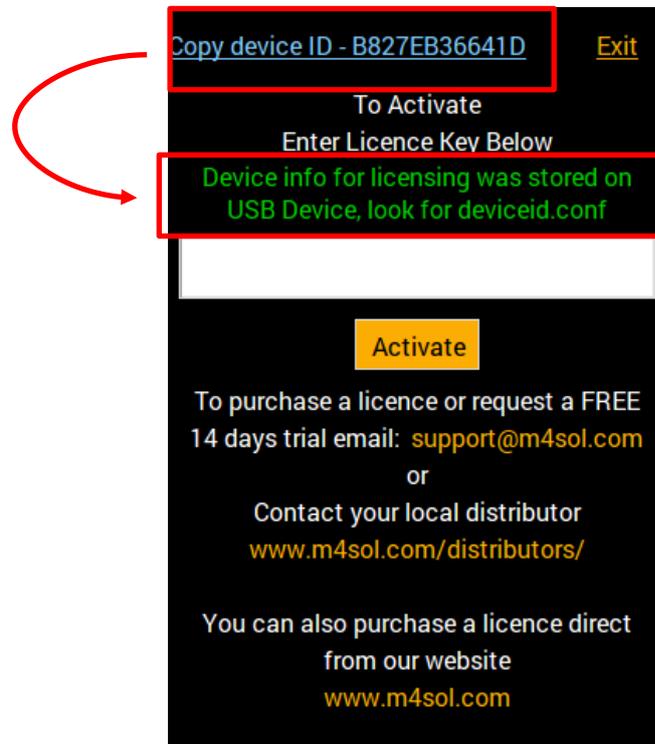


Figure 129: generating device configuration file

12. Please email the stored file stored to Support@m4sol.com
13. Within up to 24 hours you will be emailed with a license 'key' from our support team which will include a file called 'ip module.lic'
14. You need to copy that 'ip module.lic' file to the root directory of your USB stick

15. Then Plug the USB stick back into one of the free rear USB ports and, once again click on the "IP analyzer' button.
16. The system will automatically enable the Ip window as seen in the illustration below



Figure 130: IP Module main Screen

5.3.5.2 IP Module information

The IP analyzer provides the installer snapshot of the AVoIP switch configuration

5.3.5.2.1 IP module main screen information

The window highlighted in Figure 67 contains general information about the network

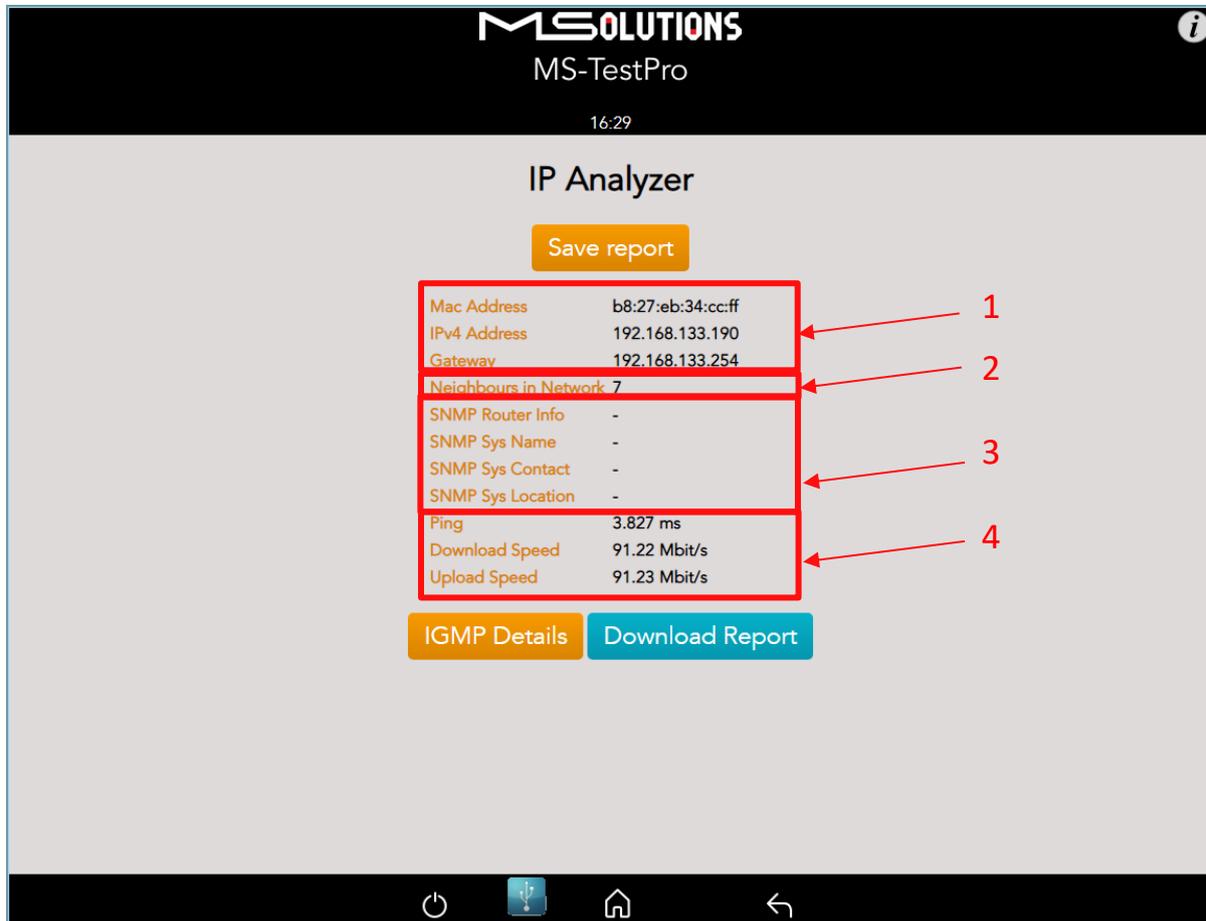


Figure 131: IP analyzer main screen information

The information contains

5. General information e.g. MAC and IP addresses
6. Neighbors in the network – This is a very IMPORTANT parameter within the AVoIP network, as it represents how many end nodes are in the network, which will impact traffic speed and throughput.
7. Simple Network Management Protocol (SNMP) e.g. SNMP router info, name etc....
8. Ping time and current download/upload speeds

5.3.5.2.2 IP Analyzer Internet Group Management Protocol (IGMP)

This window provides the IGMP information with critical parameters of the AVoIP network like the VLAN setup, fast leave support and more.

Please select the switch vendor, switch base IP, username and password as seen below in Figure 68

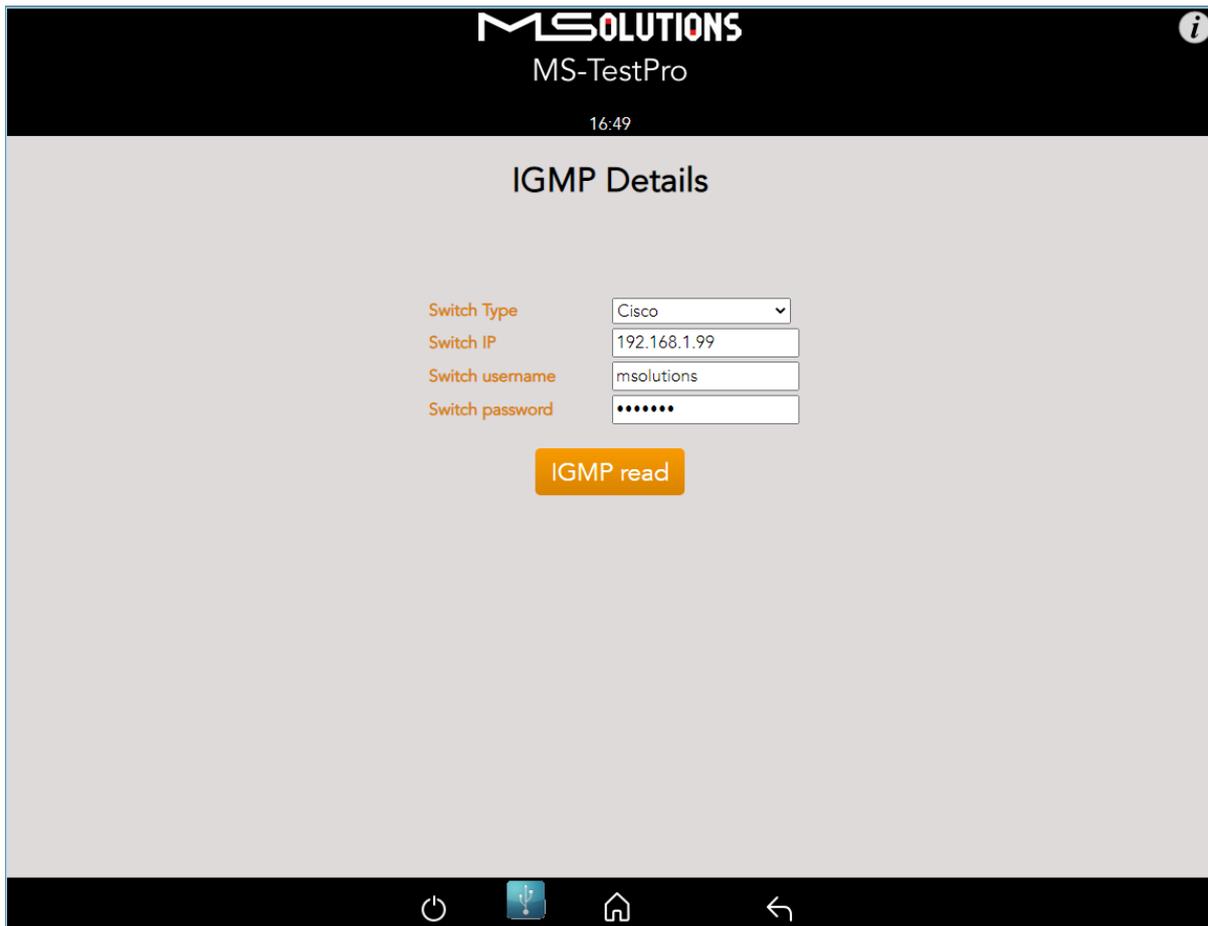


Figure 132: IP module IGMP interface

Once you select the “IGMP read” button, the IGMP information will be extracted from the switch and presented in the following format below in Figure 133.



Figure 133: IGMP information

5.3.5.2.3 Generating report

Once all the data has been collected, the “Save report” will appear, and then press the ‘Save report’ and a PDF report file will be generated.

There are two reports available, the IP module main screen report or the IGMP screen report.

The main difference between the two reports that the IP main module report will only store the general network information as see on Figure 134.

When you generate a report within the IGMP screen, as well as the general network information, you will also be presented with further detailed information including IGMP and VLANs configuration?



Figure 134: IP Module report

5.3.5.3 IP Module Report

An example of the detailed report generated by the MU-M4SOL below in Fig 71

Test Number: Net-00001
 Tester ID: MSolutions-641d
 Date: 05/31/20 15:36:56

MSOLUTIONS

General Network Information

General Info

MAC address: b8-27-eb-63-31-48
 IP V4: 192.168.1.51
 Gateway: 192.168.1.1
 Neighbours in network: 9
 Ping: 15.887 ms
 Download speed: 87.96 Mbit/s
 Upload speed: 5.13 Mbit/s

SNMP

SNMP Router Info: -
 SNMP Sys Name: -
 SNMP Sys Contact: -
 SNMP Sys Location: -

IGMP

Global IGMP Snooping configuration:

 IGMP snooping : Enabled
 IGMPv3 snooping (minimal) : Enabled
 Report suppression : Enabled
 TCN solicit query : Disabled
 TCN flood query count : 2
 Last member query interval : 1000

Vlan 1:

 IGMP snooping : Enabled
 Immediate leave : Disabled
 Multicast router learning mode : pim-dvmrp
 Source only learning age timer : 10
 Last member query interval : 1000
 CGMP interoperability mode : IGMP_ONLY

Vlan 11:

 IGMP snooping : Enabled
 Immediate leave : Disabled
 Multicast router learning mode : pim-dvmrp
 Source only learning age timer : 10
 Last member query interval : 1000
 CGMP interoperability mode : IGMP_ONLY

Page 1/2

Test Number: Net-00001
 Tester ID: MSolutions-641d
 Date: 05/31/20 15:36:56

MSOLUTIONS

Vlan 71:

 IGMP snooping : Enabled
 Immediate leave : Disabled
 Multicast router learning mode : pim-dvmrp
 Source only learning age timer : 10
 Last member query interval : 1000
 CGMP interoperability mode : IGMP_ONLY

Vlan 72:

 IGMP snooping : Enabled
 Immediate leave : Disabled
 Multicast router learning mode : pim-dvmrp
 Source only learning age timer : 10
 Last member query interval : 1000
 CGMP interoperability mode : IGMP_ONLY

Vlan 100:

 IGMP snooping : Enabled
 Immediate leave : Disabled
 Multicast router learning mode : pim-dvmrp
 Source only learning age timer : 10
 Last member query interval : 1000
 CGMP interoperability mode : IGMP_ONLY

Vlan 101:

 IGMP snooping : Enabled
 Immediate leave : Disabled
 Multicast router learning mode : pim-dvmrp
 Source only learning age timer : 10
 Last member query interval : 1000
 CGMP interoperability mode : IGMP_ONLY

Vlan 200:

 IGMP snooping : Enabled
 Immediate leave : Disabled
 Multicast router learning mode : pim-dvmrp
 Source only learning age timer : 10
 Last member query interval : 1000
 CGMP interoperability mode : IGMP_ONLY

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Figure 135:IP module report

5.4 System Setup

To perform setup functions, tap on the **System Setup** main screen button, as shown in the figure below.

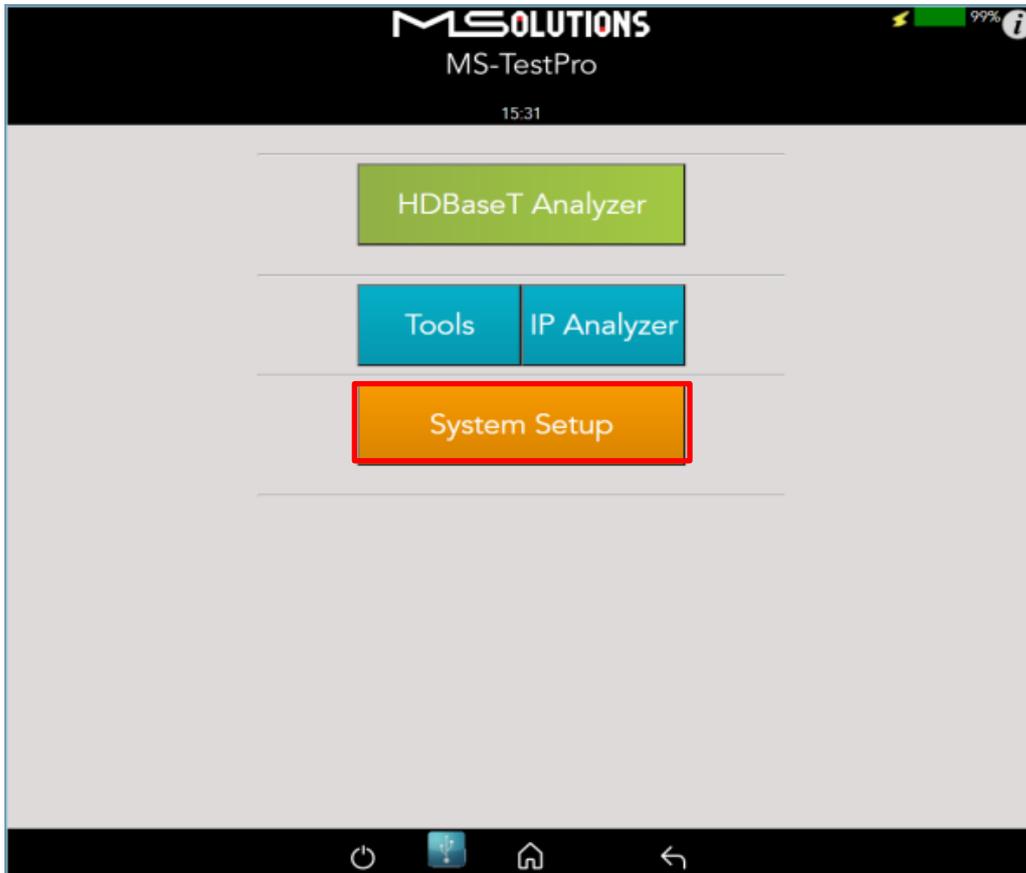


Figure 136: Selecting System Setup

The System Setup screen (see Figure 73 below) offers the following information and functionalities:

- **MU-M4SOL Application Software Version.**
- **System upgrade.** Upgrades the MU-M4SOL system software.
- **System Settings.** Provides information about main system features.
- **System Reboot.** Restarts the MU-M4SOL test device.

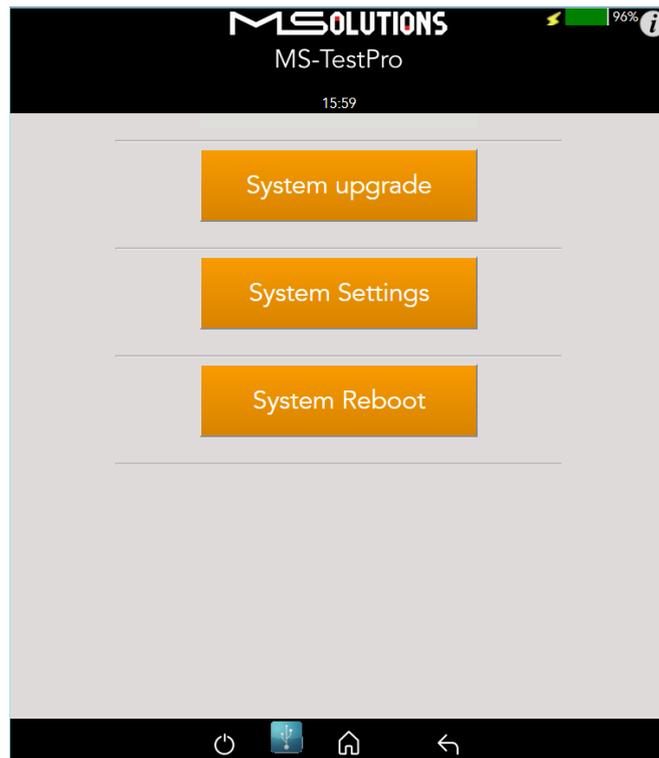


Figure 137: System Setup screen

5.4.1 System Upgrade

To upgrade the MU-M4SOL System Software:

Prepare a USB memory stick with the upgrade file **updateXXX.mst** in the root folder or copy the file to the PC directory.

Connect the stick to one of the USB ports in the MU-M4SOL device.

Select the **updateXXX.mst** file and tap on the **Upgrade** button (see the picture below). The system performs the upgrade and reboots using the new version in approximately 10 seconds.

IMPORTANT

* For firmware version 2.00.30 or earlier, the file name is **update.mst**.

* Do not switch off the device's power during the upgrade!

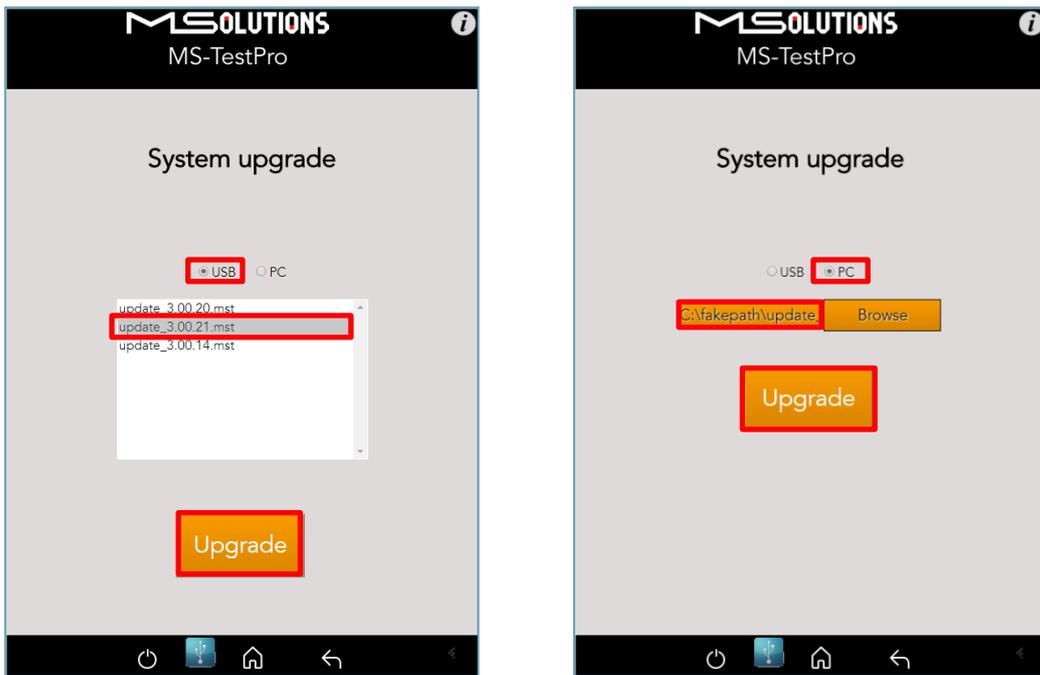


Figure 138: System Upgrade

5.4.2 System Reboot

To restart the MU-M4SOL test device, tap the **System Reboot** button and **OK**, as shown in the figure below.

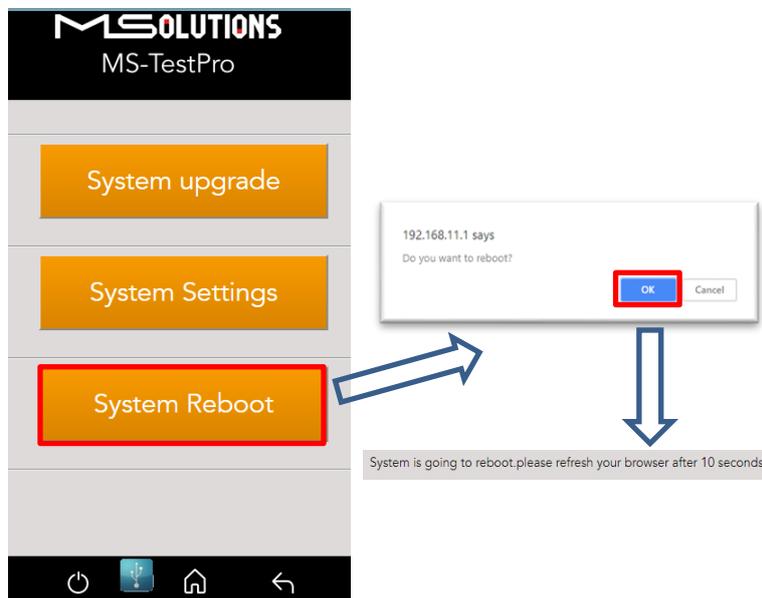


Figure 139: System Reboot Screens

The system will reboot in about 10 seconds.

5.4.3 System Settings

The System Settings screen provides access to the system configuration. The System Settings screen is depicted in the figure below. The upper part of the screen displays read-only system information.

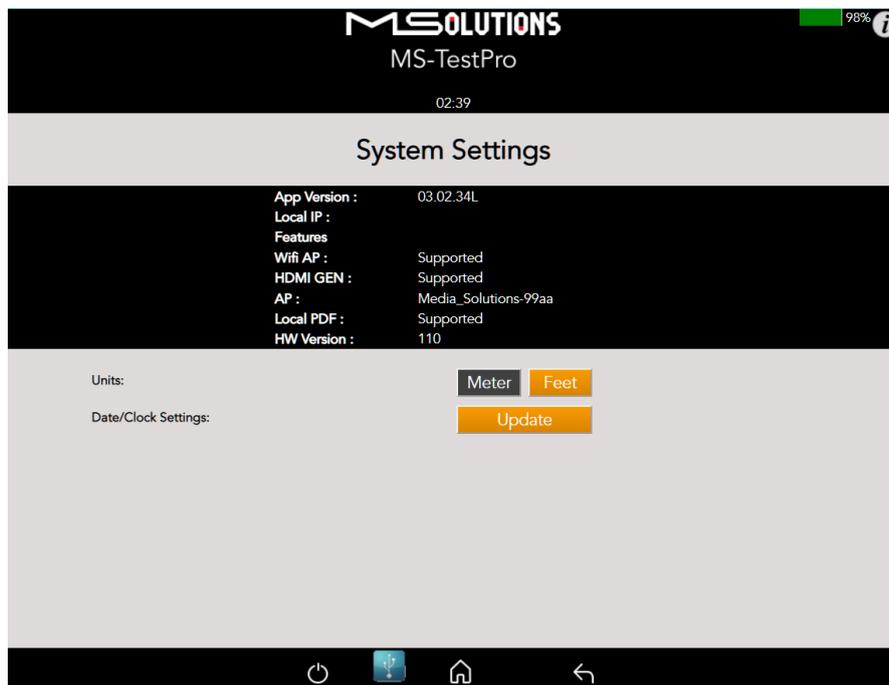


Figure 140: System Settings Screen

The System Settings page provides the following information and configuration options for the MU-M4SOL system:

- **App Version.** Tester firmware version.
- **Local IP.** Allocated IP address (for future use).
- **Features.** A list of supported features:
 - **Wi-Fi AP.** Whether Wi-Fi connectivity is supported.
 - **HDMI Gen.** Whether the HDMI traffic generation feature is supported.
 - **AP.** The name of the AP (access point) used to establish Wi-Fi connectivity.
 - **Local PDF.** Indicates where the unit is capable for creating a PDF report file locally
 - **HW Version.** Internal use
- **Units.** Tap to select the unit of measure to be used (feet/meters). The current selection appears on a dark gray background.
- **Date/Clock Settings.** Tap on the button configure date and time settings.

5.4.3.1 Date/Clock Setting

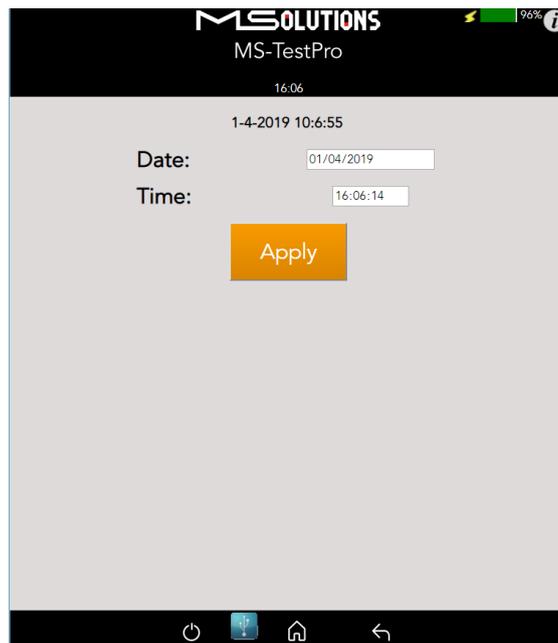


Figure 141: Date/Clock settings screen

Set Date/Time values and press the Apply button.

Note: Date and time will be set automatically when connecting Tester to a smart device using a Wi-Fi connection.

5.5 Shutdown

This section describes how to safely shut down the MU-M4SOL test device.

➔ **To shut down the test device:**

1. Tap on the on/off icon  to exit the system. The following message appears on the screen:

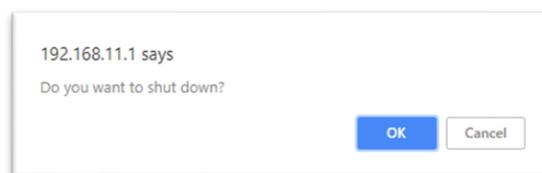


Figure 142: Shutdown confirmation message

2. Tap OK button
3. Wait for the tester's screen to turn white.
4. Remove the power supply connector from the input powering socket.

6. Use Cases

This chapter contains use cases for a variety of deployment scenarios.

6.1 Cable Test

Using the MU-M4SOL, you can test the ability of a CATx cable (CAT5e and above) to transmit HDBaseT signals over lengths of 100m and more.

- A Basic Analysis window indicating the ability to carry HDBaseT traffic, and indicating:
 - Overall cable performance.
 - Calculation of the cable length according to the HDBaseT standard
 - Report generator for issuance of HDBaseT cable certification.
- Performance screen indicating per-pair signal quality indications:
 - **MaxErr** predicts the likelihood that a data link (cable) will have a bit error.
 - **MseErr** essentially describes the signal to noise ratio of the data link. Signal attenuation over length.



Figure 143: Cable Test Setup

6.2 Crimping Quality Test

Check the quality of your RJ45 crimping. MU-M4SOL provides signal quality indications for each pair. A significant differential in MaxErr or MSE indicates the existence of a crimping issue.

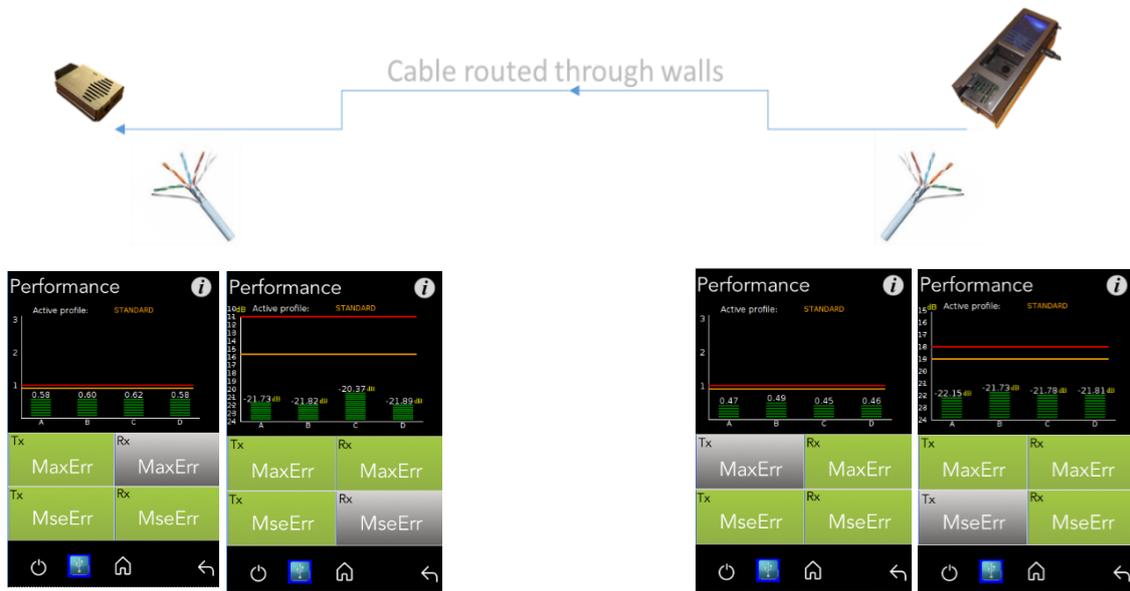


Figure 144: Crimping Test Setup

6.3 Inconsistent Video Drops – I (Source Side)

Collect source-side log data for up to 24 hours to identify time-dependent interference in the HDBaseT transmission line.

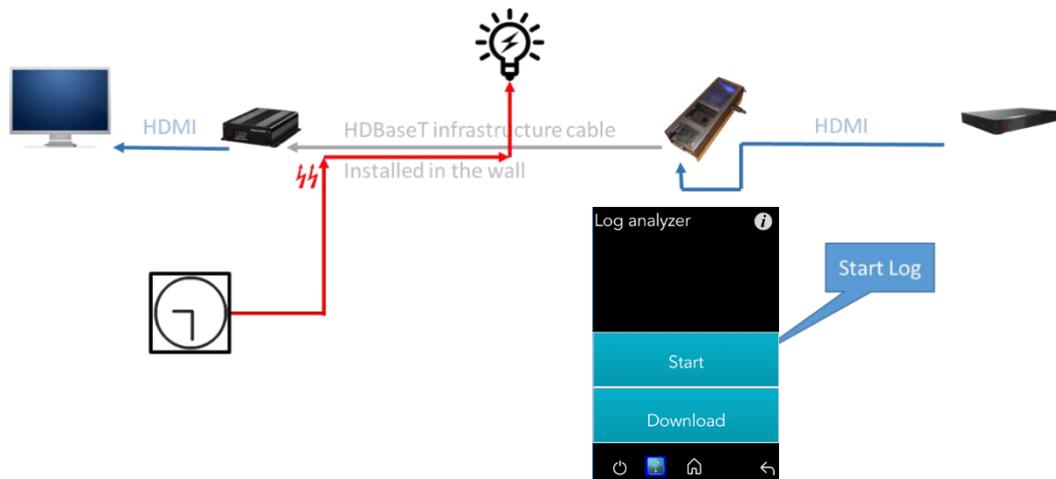


Figure 145: Inconsistent Video Drops – I (Source Side) Test Setup

6.4 Inconsistent video drops – II (Sink side)

Collect sink-side log data for up to 24 hours to identify time-dependent interference in the HDBaseT transmission line.

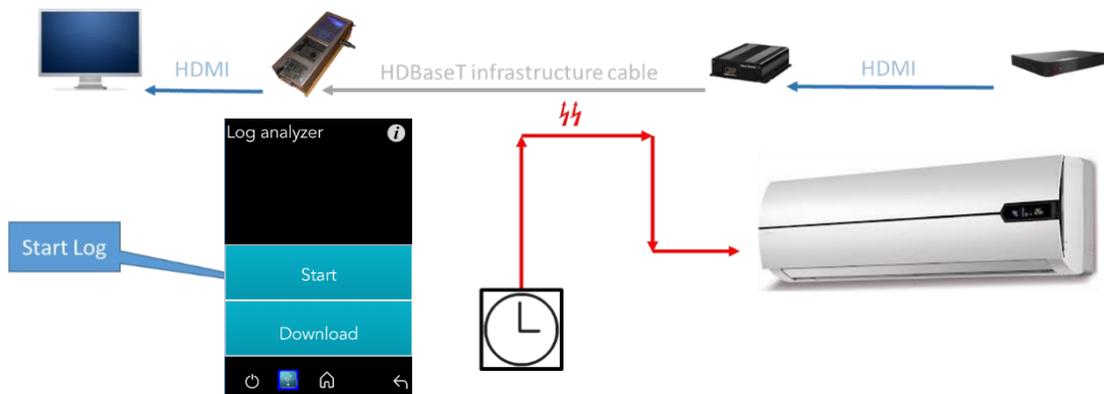


Figure 146: Inconsistent video drops – II (Sink side) Test Setup

6.5 Third-Party Product Information

Provide detailed information about devices connected to the HDBaseT receiver and transmitter ports:

- Port HDBaseT class
- Chip part number
- Supported system features (HDBaseT 5Play)
- HDBaseT operating mode
- Manufacturer ID and name
- And more...

Transmitter-Side Device

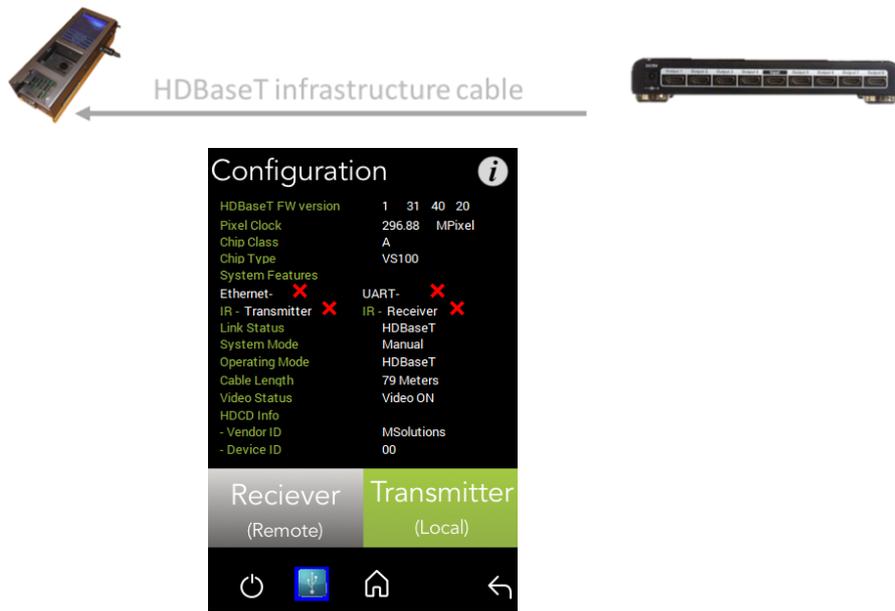


Figure 147: Product Information – 3rd Party Transmitter Side Test Setup

Receiver-Side Device

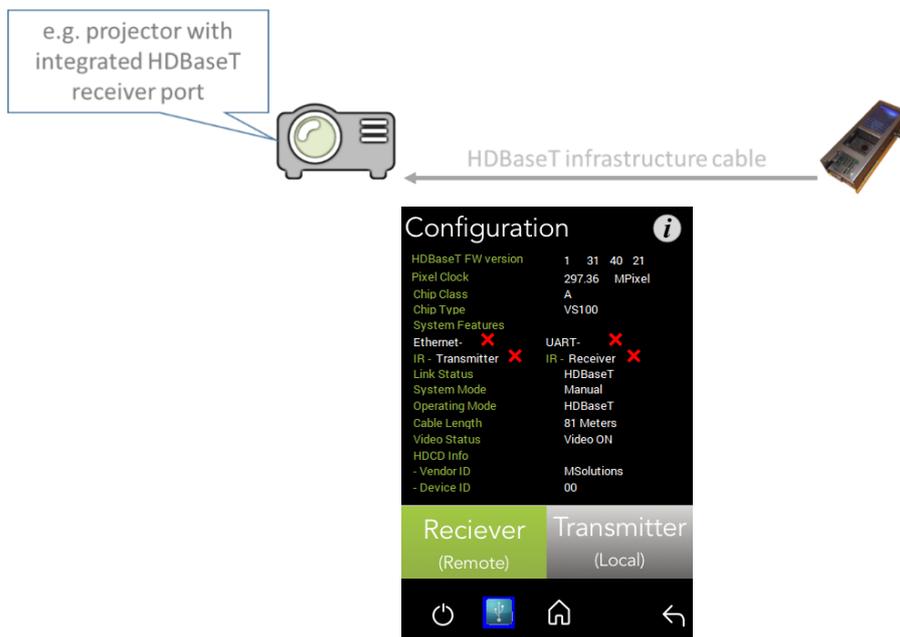


Figure 148: Product Information – 3rd Party Receiver Side Test Setup

Appendix A

Glossary

Term	Definition
HDCD	High Definition Compatible Digital
HDMI	High-Definition Multimedia Interface
IR	Infrared
MaxErr	The maximum recorded value of the residual error
MSE	The mean square of the residual error
Rx	Receive
SUT	System Under Test
Tx	Transmit
USB	Universal Serial Bus
FW	Firmware
HPD	Hot Plug Detection
DCR	DC Resistance
HCT	HDMI Cable Tester

Appendix B

Specification

Physical/Mechanical

- Chassis Construction: Aluminum
- Ingress Protection: IP54
- Size (W x L x H):
 - MS103TDs 67mm x 180mm x 55mm (2.6" x 7" x 2.1")
 - MS104B 67mm x 180mm x 79mm (2.6" x 7" x 3.1")
- Weight:
 - MS103TDs 487 Gram (1.07 Pounds)
 - MS104B 895 Gram (1.97 Pounds)

Electrical

- Power Adapter: AC to DC, 98V-250V
- Power Input:
 - MS103TDs 48V 0.5A
 - MS104B 12.6V 3A

Environment

- Operating temperature: 15°C to +40°C (59°F to 104°F)
- Storage Temperature: -20°C to 50°C (-4°F to 122°F)
- Relative Humidity: 80% max, at temperatures up to 31°C, decreasing linearly to 50% at 40°C
- Standards Compliance: CE, RoHS

Appendix C

Ordering Information

MU-M4SOL HDBaseT Testing Device

Part Number	Product Code	Product Description
MS103TDs	MS TestPro TDs	HDBaseT 1.0 tester with 3.5" touch display, built-in HDMI pattern generator, and Wi-Fi connection for smart devices.
MS104B	MS TestPro Battery	Battery-based HDBaseT 1.0 tester with 3.5" touch display, built-in HDMI pattern generator, and Wi-Fi connection for smart devices.
MS2310	Spec 2.0 Modules	HDBaseT-T SPEC 2.0 based Tx and Rx units are optional and can be used with any of the above testers.
DCR	DC Resistance	Module that enables testing of the DC Resistance unbalance both within and between twisted pairs, ensuring system integrity. The DCR is supplied with a Looper module for the remote end of the cable.
HCT	HDMI Cable Tester	Module used to test the quality of HDMI cables and indicate the existence of missing or shorted wires. The HCT is supplied with a Looper module for the remote end of the cable.

Appendix D (Only for FW 2.00.30 and below) Generating an HDBaseT Certification Report

The HDBaseT Certification Report Generator is a PC/Windows-based application used to produce certification reports based on the HDBaseT data collection described earlier in this document.

- For MU-M4SOL touch screen users, see section 34.2.4.3.
- For MU-M4SOL Wi-Fi Client users, follow the instructions in this appendix.

Operating the report generator

If you have not yet installed the report generator, follow the installation procedure that appears at the end of this appendix.

➔ To produce a report:

1. Double-click on the file “m4solReportGenerator.exe” to initialize the report generator. The report generator’s main window appears as shown in Figure 149 below.

MS-Report Tool

File Option Help

Load User Info

Please fill in the following information(* fields are mandatory)

Customer Name(*)	John Doe
Job Site(*)	New York
Date	21/04/2017
Test Time	07:59
Cable Type(*)	CAT6A
Operator Name(*)	Media Solutions

Save User Info

Select DataSource F:\test00015.tar

Save F:\00015.pdf

Open Report Generate Report

Figure 149: Report Generator Main Window

If the message depicted in Figure 150 below appears, click **OK** to start a Java Runtime Environment installation.

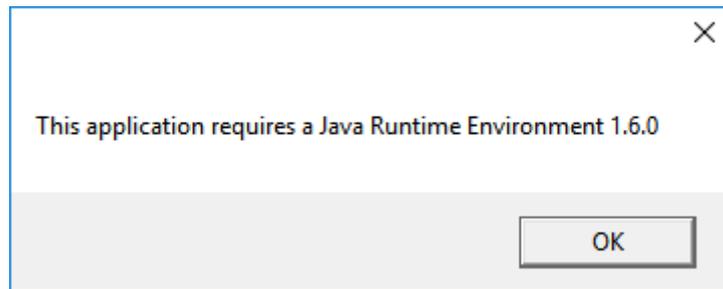


Figure 150: Java Runtime Environment Required

If the download page does not appear in your browser, enter the following address in your browser's URL box to access the page: <https://java.com/en/download/>

2. Enter user information data in the text fields in the window:

- Customer Name
- Job Site
- Cable Type
- Operator Name

Alternatively, if you have already saved your user information data, click **Load User Info**. The Open dialog box appears, as shown in Figure 151 below. Select the user info file and click **Open**. Skip to step 4 below.

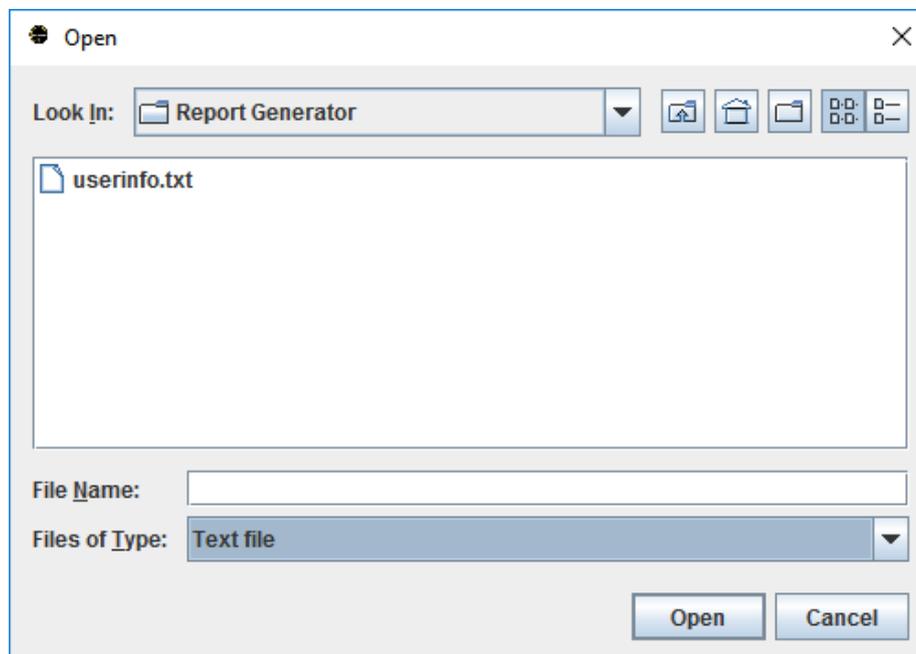


Figure 151: Open User Info Data

3. To save the user data for future use, click **Save User Info**. The Save As dialog box appears, allowing you to specify a user info file name and location.

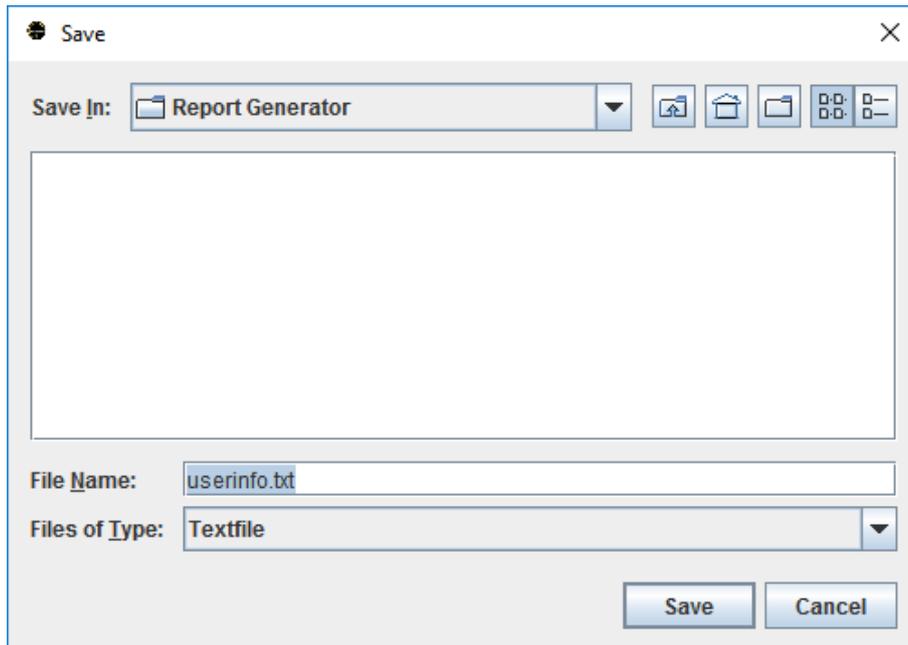


Figure 152: Saving User Info Data

4. Choose a file name and location for the user information and click **Save**. The main window reappears.
5. Click the **Select Data Source** button to specify a file containing HDBaseT certification data.
6. Click the **Save** button to specify a file name for the certification report.
7. Click **Generate Report** to create the certification report.
8. Click **Open Report** to view the certification report. A sample, 3-page report appears in the figures in the following pages.

MSOLUTIONS**HDBaseT Test Report**

Customer Name: New York
Job Site: John Doe
Test Date: 21/04/2017
Test Time: 19:59
Cable Type: CAT6A
Operator Name: Media Solutions

Page 1

Test Number: 00015

Figure 153: Sample HDBaseT Certification Report – Page 1 (User Data)



HDBaseT Test Report

Test Number: 00015 Tester ID: Media_Solutions-2e0f Test Status: **Pass**
 Date: 24/02/17 System Setup: Tx - Media Solutions
 HDBaseT Spec: 1.0

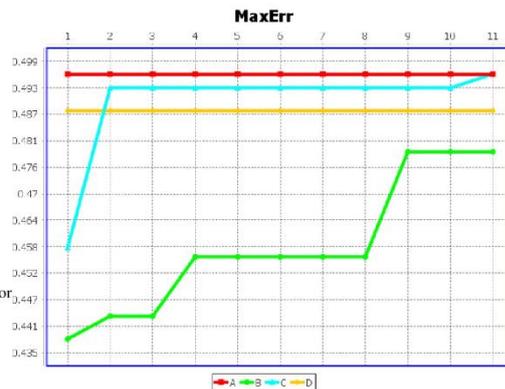
Local Setup Information

Chip Class: A
 Chip Type: VS100
 Chip FW Version: 1 31 31 51
 Vendor ID: Media Solutions
 Cable Length: < 20 Meters
 Pixel Clock Rate: 0 MPixel



Pass MaxErr			
Pair	Max	Min	Expected
A	0.496	0.496	< 1
B	0.479	0.438	< 1
C	0.496	0.458	< 1
D	0.488	0.488	< 1

* MaxErr-Predicts the likelihood that a data link(cable) will experience a bit error



Pass MseErr (db)			
Pair	Max	Min	Expected
A	-21.62 db	-21.906 db	< -18
B	-21.66 db	-22.211 db	< -18
C	-21.693 db	-22.211 db	< -18
D	-22.006 db	-22.428 db	< -18

* Mse Err-Describes the signal-to-noise ratio of the data link (cable)

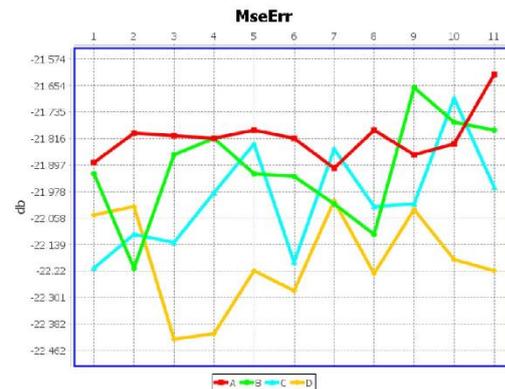


Figure 154: Sample HDBaseT Certification Report – Page 2 (Transmitter Data)



HDBaseT Test Report

Test Number: 00015 Tester ID: Media_Solutions-2e0f Test Status: **Pass**
 Date: 24/02/17 System Setup: Rx - Media Solutions
 HDBaseT Spec: 1.0

Remote Setup Information

Chip Class: A
 Chip Type: VS100
 Chip FW Version: 1 31 31 50
 Vendor ID: Media Solutions
 Cable Length: < 20 Meters
 Pixel Clock Rate: 0 MPixel



Pass MaxErr			
Pair	Max	Min	Expected
A	0.563	0.516	< 2
B	0.446	0.438	< 2
C	0.617	0.578	< 2
D	0.617	0.617	< 2

* MaxErr-Predicts the likelihood that a data link(cable) will experience a bit error



Pass MseErr (db)			
Pair	Max	Min	Expected
A	-22.659 db	-23.151 db	< -11
B	-21.235 db	-21.983 db	< -11
C	-23.013 db	-23.571 db	< -11
D	-21.743 db	-22.338 db	< -11

* Mse Err-Describes the signal-to-noise ratio of the data link (cable)



Figure 155: Sample HDBaseT Certification Report – Page 3 (Receiver Data)

Installing the Report Generator

➔ **To install the report generator:**

1. Open the downloaded **m4solReportGenerator.zip** archive file.
2. Extract the file in the archive and copy them to a directory that you select.

NOTE

Both files should be copied to the *same* directory

3. Double-click on the file “m4solReportGenerator.exe” to initialize the report generator. If the main window depicted in Figure 156 below appears, then the installation is complete, see the operating instructions at the beginning of the appendix.

MS-Report Tool

File Option Help

Load User Info

Please fill in the following information(* fields are mandatory)

Customer Name(*)	John Doe
Job Site(*)	New York
Date	21/04/2017
Test Time	07:59
Cable Type(*)	CAT6A
Operator Name(*)	Media Solutions

Save User Info

Select DataSource F:\test00015.tar

Save F:\00015.pdf

Open Report Generate Report

Figure 156: Report Generator Main Window

If the message depicted in Figure 157 below appears, click **OK** to start a Java Runtime Environment installation.

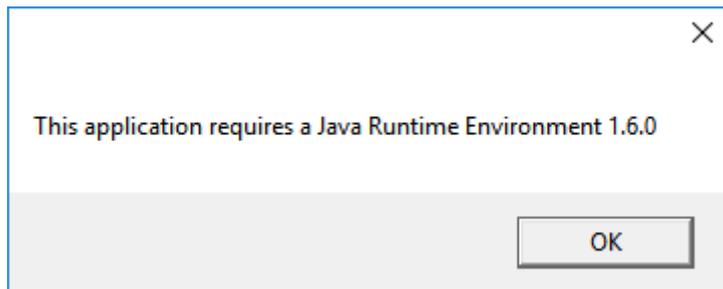


Figure 157: Java Runtime Environment Required

If the download page does not appear in your browser, enter the following address in your browser's URL box to access the page: <https://java.com/en/download/>

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