



MS-TestPro  **HDBT**™ Test Device
Model MS102TD/MS103TDs

User's Manual

Rev. A5

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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

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1. Introduction

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

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

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

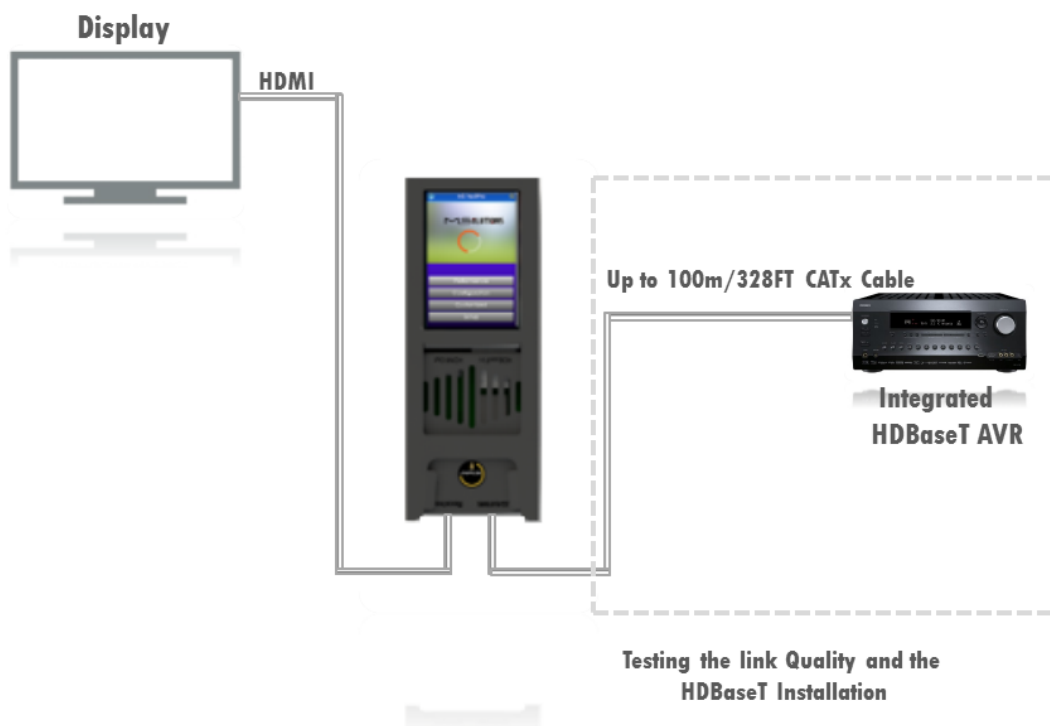


Figure 1: The MS-TestPro HDBaseT Test Device

MS-TestPro 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 MS-TestPro 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.**

Why you need the MS-TestPro HDBaseT test device

You've 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 don't 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 MS-TestPro test device, you can identify faulty cabling and systems **before installing them**, saving time and money.

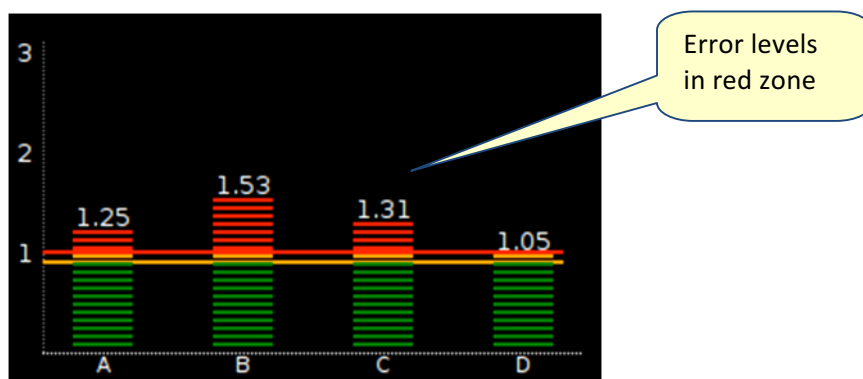


Figure 2: Faulty Link

MS-TestPro Models

Users can choose between two MS-TestPro models:

- Touch Screen Model, with a built-in 3.5" touch screen (MS102TD)
- Wi-Fi Client Model, with 3.5" screen, built-in HDMI pattern generator, and Wi-Fi interface for browser-based management (MS103TDs)



Figure 3: Left: Touch Screen Model, Right: Wi-Fi Client Model

2. Product Description

2.1 Models

The MS-TestPro HDBaseT Test Device is supplied in a variety of models:

Table 1: MS-TestPro Models

Model	Description
MS102TD	HDBaseT 1.0 tester with 3.5" touch display
MS103TDs	HDBaseT 1.0 tester with 3.5" touch display, built-in HDMI pattern generator, and Wi-Fi connection for smart devices

2.2 Overview

The MS-TestPro HDBaseT test device is composed of 3 units:

- Main unit – the MS-TestPro 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.

2.3 Subsystems

Table 2 below describes the MS-TestPro test device's subsystems.

Table 2: MS-TestPro Subsystems

Subsystem	Description
Main unit	<ul style="list-style-type: none"> • Power supply, 48V, 0.5A, positive polarity • USB 2.0 – for memory stick connectivity • PSE (PoH, power source emitter) • Ethernet connection for remote login • HDMI Pattern generator (MS103TDs only)
Transmitter module	<ul style="list-style-type: none"> • HDBaseT output port • HDMI input, supporting pixel clock speed of up to 340 MHz (4K/60 Hz, 4:2:0) • PD (PoH, powered device)
Receiver module	<ul style="list-style-type: none"> • HDBaseT input port • HDMI output, supporting pixel clock speed of up to 340 MHz (4K/60 Hz, 4:2:0) • PD (PoH, powered device)

2.4 HDBaseT Support

The MS-TestPro test device integrates a Valens VS100 HDBaseT Class A chipset, including transmit and receive ICs. The 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 3: MS-TestPro 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 MS-TestPro	

NOTE

Valens Semiconductor's proprietary Long Reach mode (a non HDBaseT-standard operating mode providing transmission over longer CATx cables) will be supported by MS-TestPro at a future date.

3. Installation

3.1 Unpacking the Unit

The optional MS-TestPro HDBaseT Test Device kit is depicted in Figure 4 below



Figure 4: MS-TestPro HDBaseT Test Device Kits (Optional)



Figure 5: MS-TestPro HDBaseT Test Device Kit Contents

The TestPro system is supplied with the following components:

Table 4: MS-TestPro Components

Number	Component
1	Main unit
2	Transmitter module
3	Receiver module
4	External 48 VDC power supply
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 (Only in MS103TDs)

NOTE

Please contact Media Solutions if any of the items listed is missing or damaged.

4. Operation

4.1 Test Setup

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

- Testing MS-TestPro Modules
- Connection to System Under Test (SUT)

IMPORTANT

Make sure that you complete all cable connections **before** powering up the MS-TestPro test device.

4.1.1 MS-TestPro Modules Test Setup

In the MS-TestPro Modules test setup mode, the transmitter and receiver modules of the MS-TestPro device are directly connected to each other using a CATx cable of up to 100 meters in length, as shown in Figure 6 below.



Figure 6: MS-TestPro Modules Test Setup

➔ **To setup the system for MS-TestPro modules testing:**

1. Insert the Transmitter or receiver module into the MS-TestPro 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 MS-TestPro main unit. The upper slot is used for module storage only.

2. Using a CATx cable, connect the HDBaseT port (RJ-45) 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 7: Pluggable PoH Adapter on Remote Module

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

NOTE

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

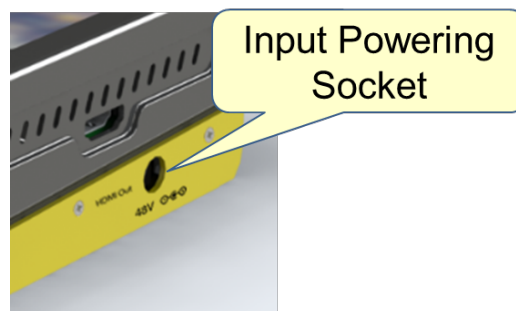


Figure 8: Input Powering Socket

4.1.2 Connection to System Under Test (SUT)

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

➔ **To test an HDBaseT source device:**

1. Insert the receiver module into the MS-TestPro main unit in the lower slot – the module will be defined as the local module.
2. 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 HDBaseT output port in the source device.
 - Connecting the CATx cable to the MS-TestPro transmitter module, and connecting the transmitter module to the source device with an HDMI cable.
3. Insert the 48 VDC power supply into the designated socket in the main unit to power the device.

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


➔ **To test an HDBaseT sink device:**

1. Insert the transmitter module into the MS-TestPro main unit in the lower slot – the module will be defined as the *local* module.
2. 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 MS-TestPro receiver module, and connecting the receiver module to the sink device with an HDMI cable.
3. Insert the 48 VDC power supply into the designated socket in the main unit to provide power.

4.2 Performing the Tests

4.2.1 Main Screen

The main screen (see Figure 9 below) offers the following functionalities:

- **Performance.** Real-time access to HDBaseT cable performance.
- **Configuration.** Read-only access to system configuration.
- **Basic Test.** Basic Pass/Fail report, EDID analyzer, cable analyzer, and HDMI Pattern Generator (MS103TDs only)
- **Setup.** Used to perform system upgrade and maintenance operations.
- **Exit.** Using the on/off icon  in the upper-right corner of the screen. To safely exit the system, see the shutdown instructions in section 4.6.

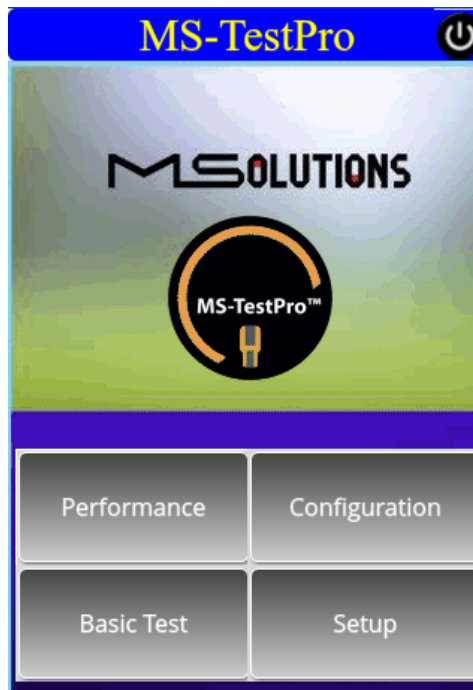


Figure 9: MS-TestPro Main Screen

4.2.2 Basic Tests

The Basic Test function is used to report on HDBaseT link quality. It also includes the following capabilities:

- EDID analyzer (MS103TDs only).
- HDBaseT cable analyzer.
- HDMI Pattern Generator (MS103TDs only).

To perform basic tests, tap on the **Basic Test** button, as shown in the figure below.

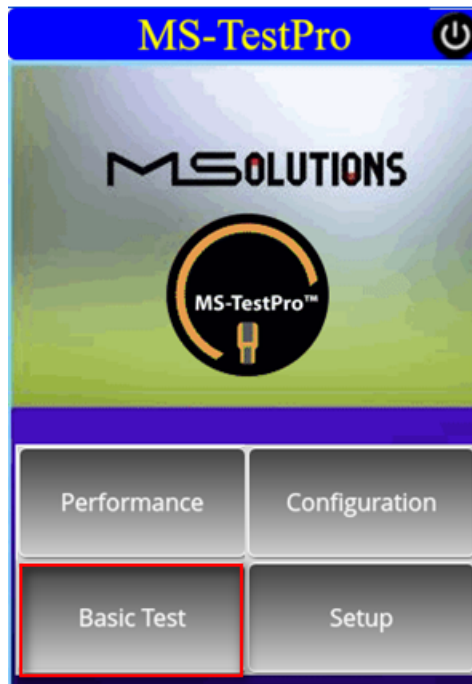


Figure 10: Selecting Basic Tests

The Basic Tests page appears as shown below in Figure 11 below.

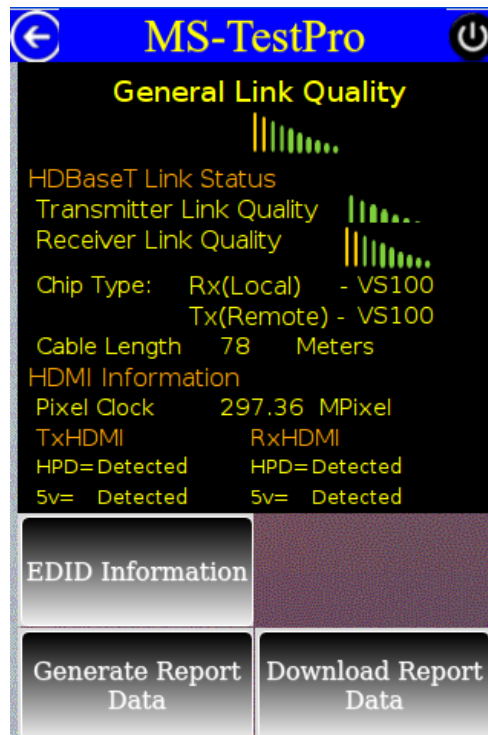
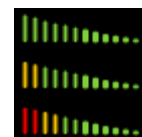


Figure 11: Basic Test Page

The basic tests 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 faulty.
 - **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.

The following operations can be performed from the Basic Tests page:

- **EDID Info.** Access information on the display capabilities of HDMI sink devices.
- **Generate Report Data.** Collect the data required to perform the HDBaseT test report.
- **Download Report Data.** Send the report data to a USB memory stick.

4.2.2.1 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 MS-TestPro test device to an HDMI sink device using an HDMI cable.
- Connecting the MS-TestPro test device to an HDMI sink device via an HDBaseT link.

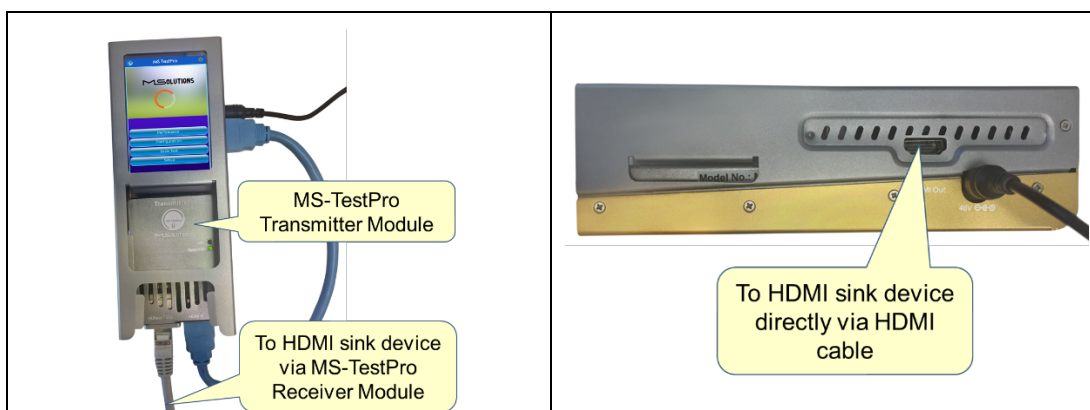


Figure 12: Connecting the MS-Test Pro to the HDMI Sink Device

➔ To access display capabilities using EDID:

1. Connect the MS-Test Pro test device to the HDMI sink device using one of the methods described above and depicted in Figure 12.

2. Tap on the **EDID Info** button to access information on the display capabilities of the HDMI sink device. The following page appears, displaying the current resolution, sink device display capabilities, and supported display resolutions.

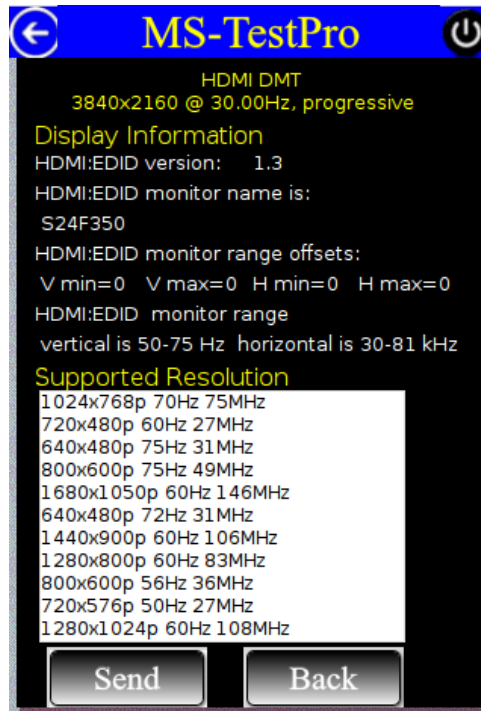


Figure 13: EDID Information Page

3. To save EDID data, connect USB memory stick and tap Send button. Two files will be saved - tvendid.bin and tvlist.txt.

4.2.2.2 HDBaseT Report Data Collection

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:**

1. Connect the MS-TestPro test device to both ends of the CATx cable, as shown below in Figure 14:
 - The “local” side of the cable is attached to either the transmitter or receiver module, housed in the MS-TestPro chassis.
 - The “remote” side of the cable is attached to the other MS-TestPro module.



Figure 14: Cable Test Setup

- 2. Select **Basic Tests >> Generate Report Data**, as shown below in Figure 15:

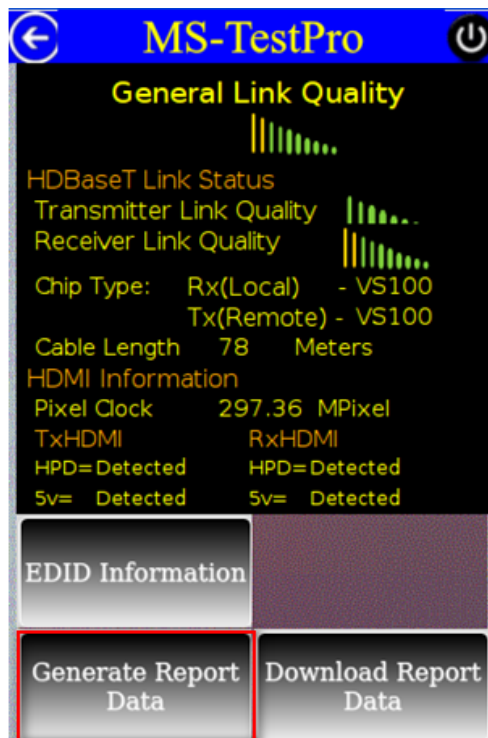


Figure 15: Generate Report Data

The following message appears in the window:

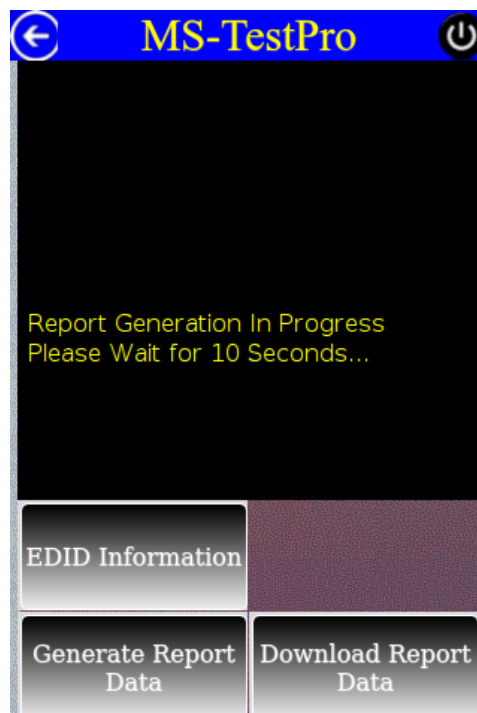


Figure 16: Message - Generating Report Data

- When the message disappears, the data is ready to download. Click on the **Download Report Data** button. The window depicted below in

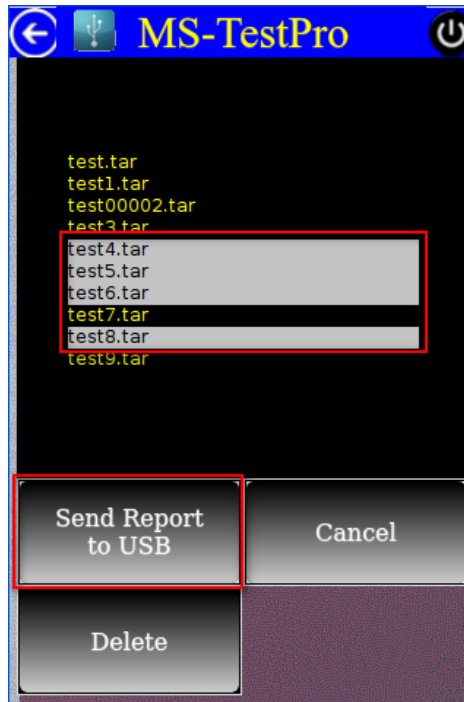


Figure 17: Downloading Report Data

- Insert a USB memory stick into one of the USB ports of the MS-TestPro device. Select a report data file or files from the list, and click **Send Report to USB** to download the file to the memory stick. The following message appears in the window:

Report saving in progress
please wait.....

Figure 18: Message - Downloading Report Data

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

4.2.3 Performance Management

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



Figure 19: 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 20.

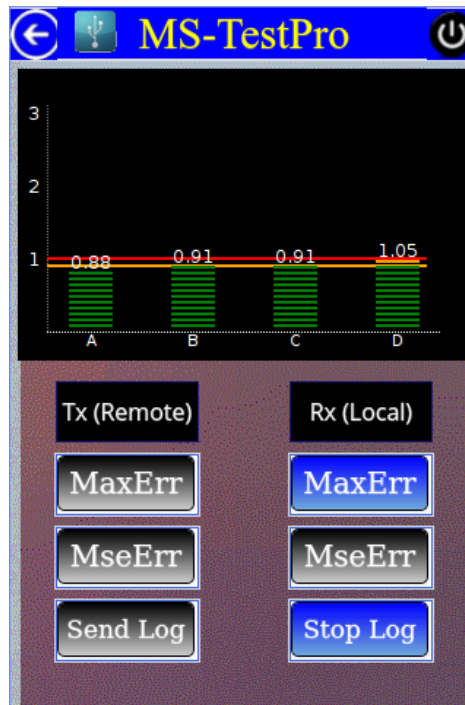


Figure 20: Performance Monitoring Screen

The screen appears, displaying *transmitter* data. To display receiver data, tap on the **Receiver** button.

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

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

Two types of measurements are tracked by the system:

- **MaxErr.** The per-channel maximum recorded value of the residual error for PAM-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.
- **MSE.** The per-channel mean square of the residual error for PAM-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 **MSE** button on the Transmitter or Receiver side. The background of the tapped button appears in blue.

The data appear in the graph that is displayed on the top of the screen, as shown in Figure 21 below. The graphical display is continuously updated.

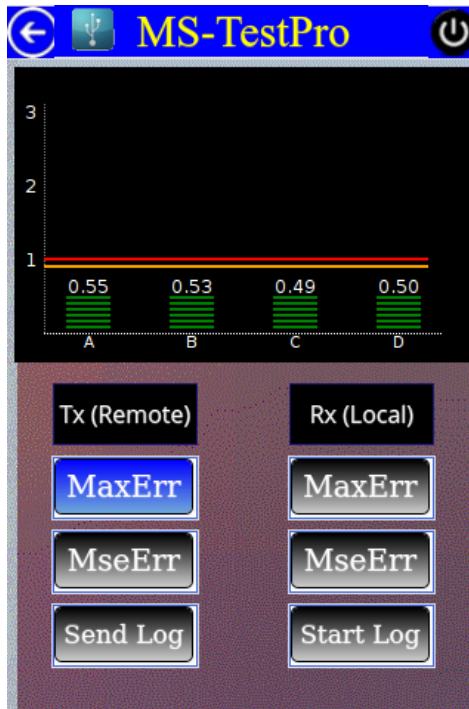


Figure 21: MaxErr Screen – Displaying Graph & Data

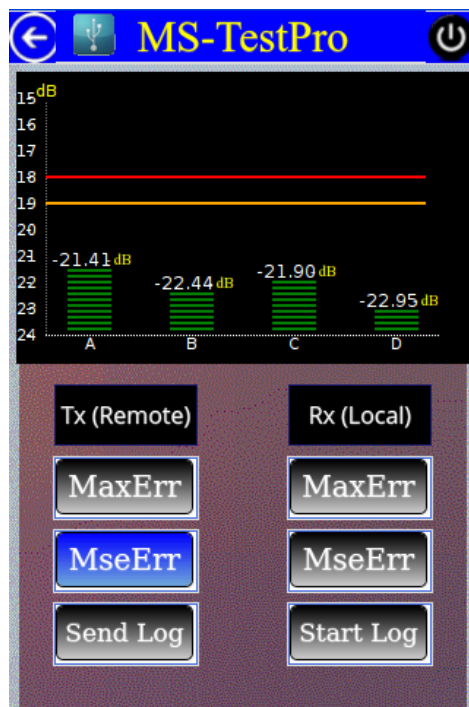


Figure 22: MseErr Screen – Displaying Graph & Data

4.3 Log System

MS-TestPro allows you to generate logs, and to distribute log files for analysis on a USB memory stick.

4.3.1 Log Generation

➔ **To perform log generation:**

1. To begin log generation, tap on the **Start Log** button, shown in Figure 23 below. The system generates transmitter *and* receiver logs.

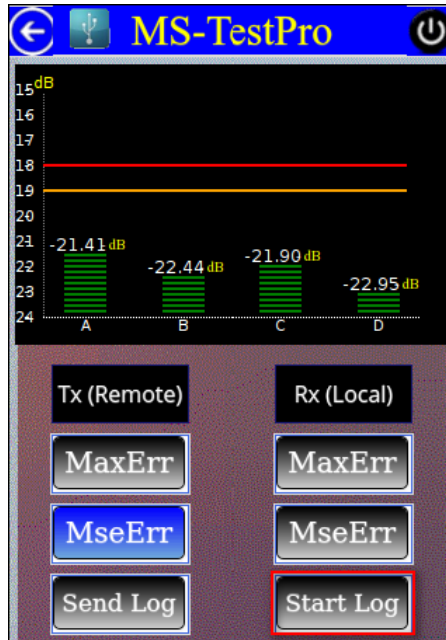


Figure 23: Starting Log Generation

2. To manually end log generation, tap on **Stop Log**.

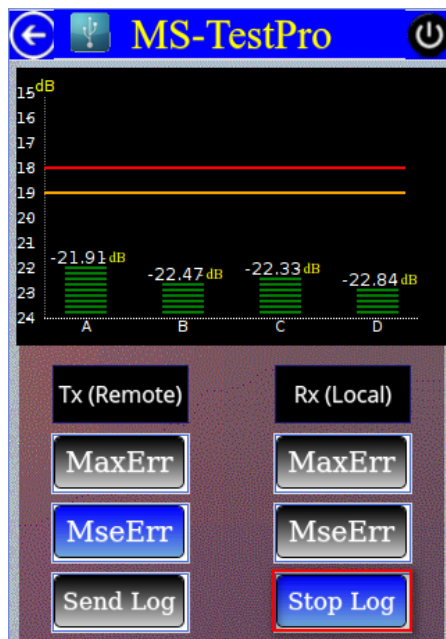


Figure 24: Stopping Log Generation

4.3.2 Log Distribution

You can export logs 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, as shown in the figure below.

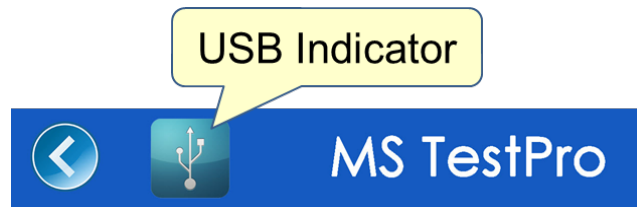


Figure 25: USB Connection Indicator

2. To distribute a log for analysis, tap **Send Log**. The transmitter and receiver logs that you just 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.

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

NOTE

Log files that are copied to the USB memory stick are *automatically deleted* from the main unit.

4.4 System Configuration

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

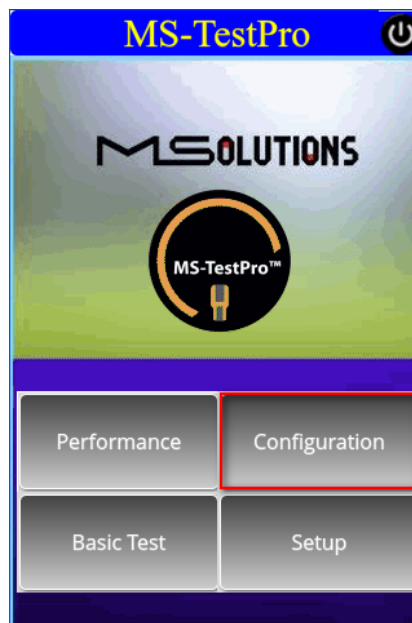


Figure 26: Selecting Configuration Management

The configuration screen appears as shown in the figure below:

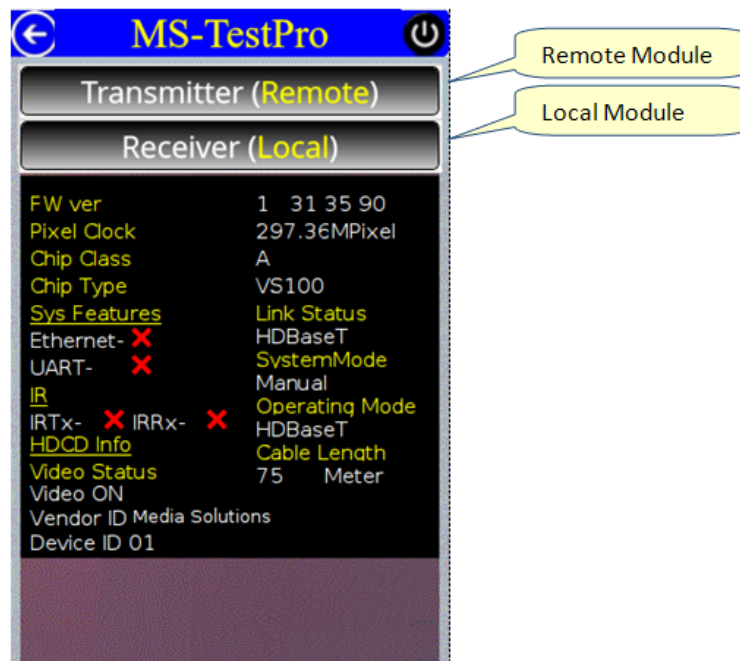


Figure 27: Configuration Screen

The remote and local HDBaseT transceivers are identified – as 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 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 2.0 Standard.
- **Chip Type.** The chip model/part number.
- **Supported Features.** The flow types that are extended by the chip over the HDBaseT link, such as: HDMI, Ethernet, RS232.
- **IR.** Infrared support provided by the chip.
- **HDCD Information.** Vendor and Device ID, as specified in the HDBaseT standard.
- **USB.** USB support provided by the chip (according to the HDBaseT 2.0 standard).
- **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.** HDMI with/without HDCP content.

4.5 Setup

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



Figure 28: Selecting System Setup

The Setup page is depicted in the figure below.



Figure 29: Setup Screen

The setup page provides the following information on the MS-TestPro system:

- Application software version
- List of supported features
- Device AP name for Wi-Fi connectivity.

The setup page offers the following functionalities.

- **Start System Upgrade.** Upgrades the MS-TestPro system software.
- **Reboot Sys.** Restarts the MS-TestPro test device.
- **Send Log to USB.** Allows you to export logs to a USB memory stick for further processing.
- **Download Rep. Gen Software.** Allows you to download **Report Generator** installation file to produce certification reports based on the HDBaseT data collection.

➔ **To upgrade the MS-TestPro System Software:**

1. Prepare a USB memory stick with the upgrade file *update.mst* in the root folder of the stick.
2. Connect the stick to one of the USB ports in the MS-TestPro device.
3. Tap on the **Start System Upgrade** button (see Figure 29 above). The system performs the upgrade and reboots using the new version in approximately 10 seconds.

IMPORTANT

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

4.5.1 Send Log


This function allows you to export logs to a USB memory stick. It is identical to the Send Log function in the **Performance** screen

To export logs to a USB memory stick, follow the instructions in section 4.3.2.

4.6 Shutdown

This section describes how to safely shut down the MS-TestPro 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:

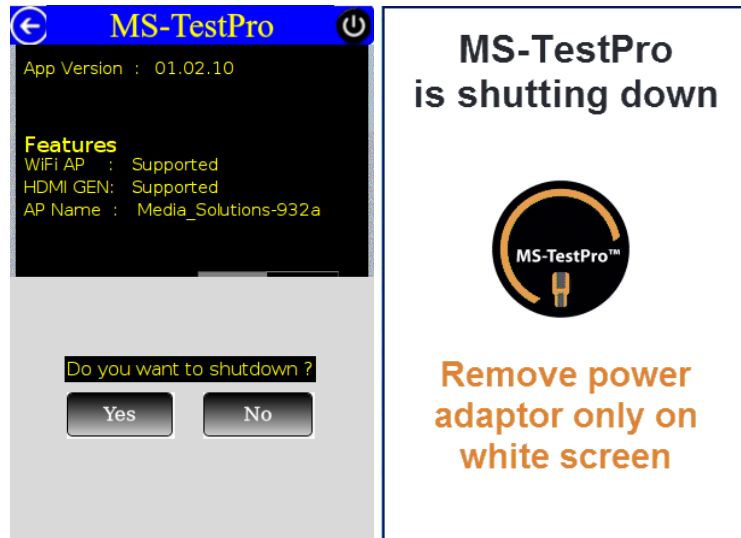


Figure 30: Confirmation and Shutdown Screens

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

NOTE

This chapter is relevant for MS-TestPro Model MS103TDs only.

You can manage the MS-TestPro 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 MS-TestPro test unit.

- ➔ **To connect your Wi-Fi device to the MS-TestPro test unit:**
1. Power on the MS-TestPro test unit.
 2. 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 31 below.

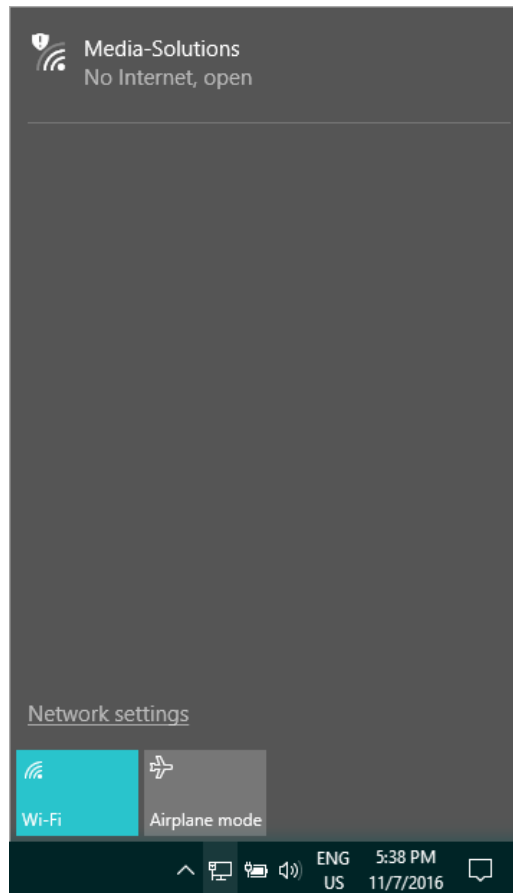


Figure 31: Scanning for Available Wi-Fi Networks

3. Select the "**Media-Solutions**" network from the list, and tap on the **Connect** button that appears on the screen (see Figure 32 below).

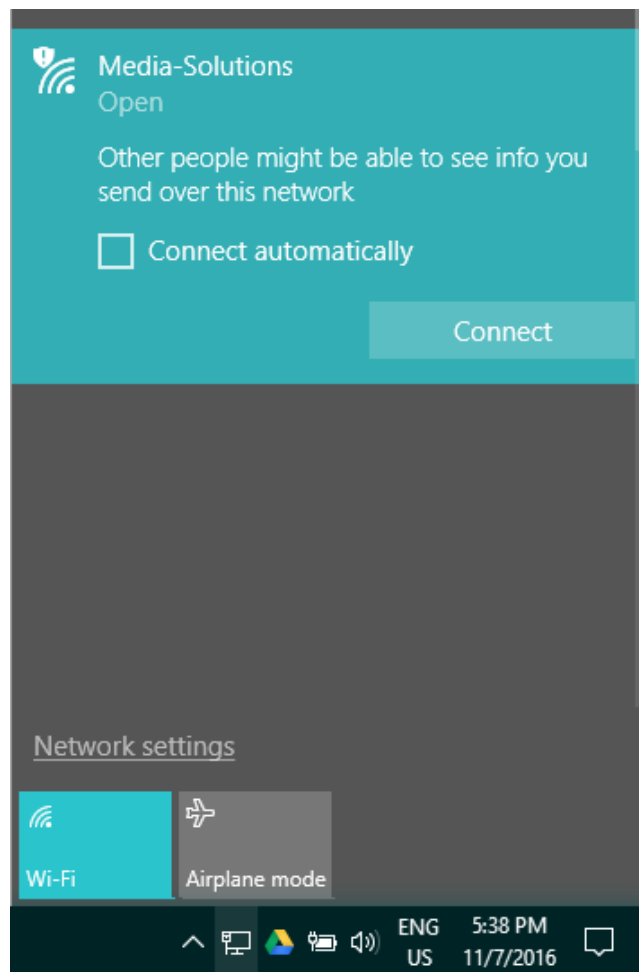


Figure 32: Connecting to the Media-Solutions Network

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

5.2 System Initialization

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

➔ **To initialize the MS-TestPro system on your Wi-Fi client:**

1. Open your browser and enter the URL of the MS-TestPro System: **192.168.11.1** as shown in the figure below.



Figure 33: Entering the MS-TestPro System URL

The MS-TestPro home page is displayed.

In *wide* devices with pixel width > 767 (such as a PC or large tablet), the home page and main menu items appear as shown in Figure 34 the figure below.



Figure 34: MS-TestPro Home Page on Wide Devices

In *narrow* devices with pixel width < 767 (such as a mobile phone), the home page appears as shown in Figure 34 the figure below. Tap on **Menu** to display the main menu items.

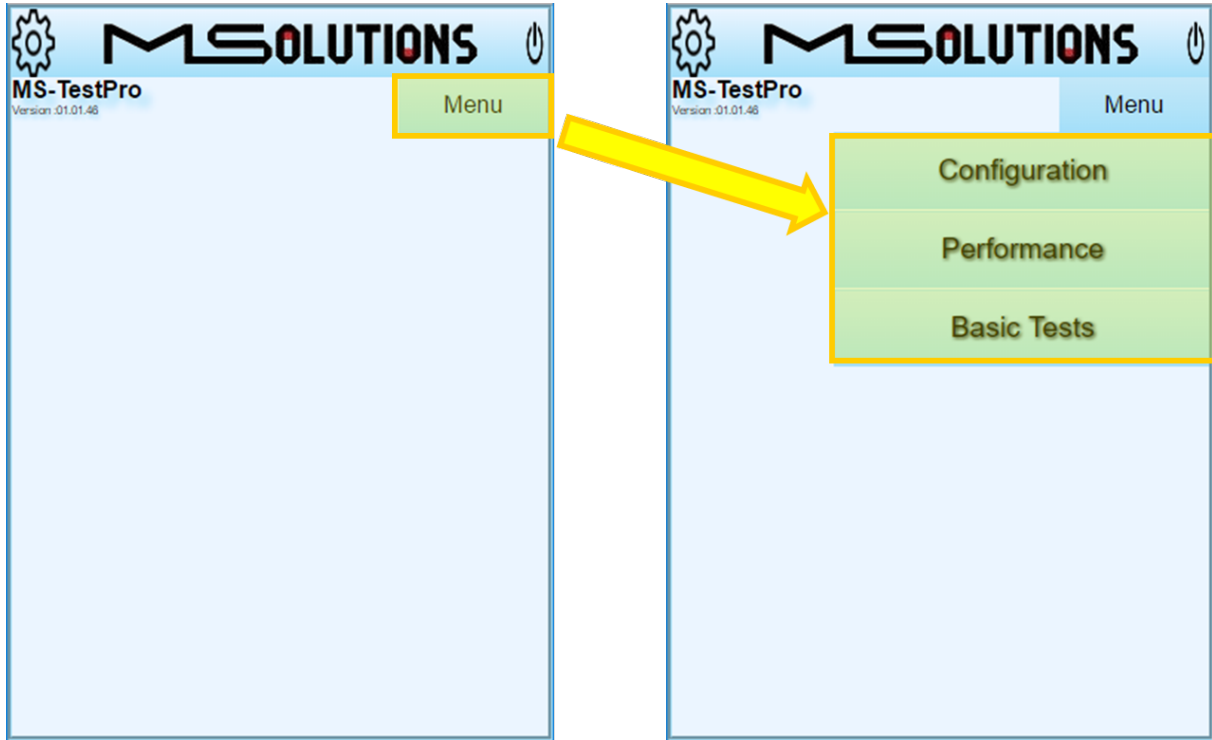




Figure 35: MS-TestPro Home Page on Narrow Devices

NOTE

For the purposes of this manual, PC-based screenshots and instructions will be used.

The home page offers the following functionalities:

- **Configuration.** Read-only access to system configuration.
- **Performance.** Real-time access to HDBaseT cable performance.
- **Basic Tests.** Overall Performance, Overall Feedback, Certification Report, HDMI Generator and EDID Info.
- **Setup.** Click on the  icon to perform one of the following operations:
 - **Admin.** For administrator internal use
 - **System Upgrade.** Upgrade the test unit with a new software version residing on a USB memory stick.
 - **Units of Measurement.** To change the cable length measurement units
 - **Download Report Generator Tool.** To download Report Generator installation file for Windows PC.
 - **Reboot.** Restart the unit.
- **Shutdown.** Click on the  icon to power down the unit.

5.3 Basic Tests

The Basic Test function is used to report on HDBaseT link quality (Overall Performance). It also provides access to the overall Feedback, preparing data file for Certification Report, HDMI Pattern Generator and EDID analyzer .

5.3.1 Overall Performance

To perform HDBaseT link quality tests, tap on the **Basic Tests** button and **Overall Performance** which appear in drop down menu, as shown in the figure below.

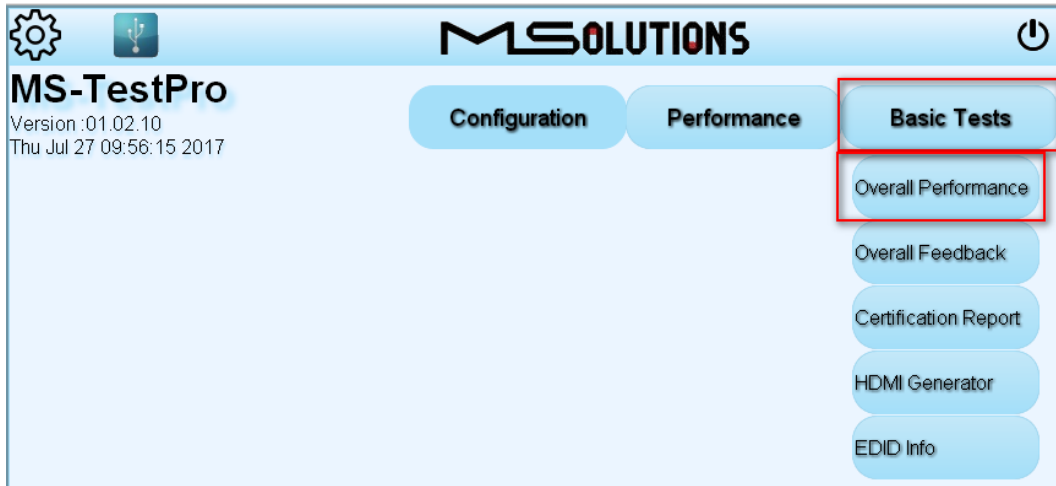


Figure 36: Selecting Basic Tests



Figure 37: Overall Performance page

The Overall Performance 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 faulty.
 - **Red.** The link is faulty with a high probability of failure.
- **Chip Type.** The chip model/part number.
- **Cable Length.** Approximate cable length calculation (accuracy level $\pm 10\%$), in meters.
- **Pixel Clock.** The clock frequency of the video transmission. The Pixel Clock values in the receiver and transmitter screens should be similar.
- **Tx HDMI and Rx HDMI status**



The basic test page provides access to the following capabilities.

- **EDID Analyzer.** Provides info on the display capabilities of HDMI sink devices.
- **HDMI Pattern Generator.** Provides the ability to inject a variety of HDMI display patterns in a wide range of resolutions.

5.3.2 Overall Feedback

The Overall Feedback page displays the link diagnostic information



Figure 38: Overall Feedback page

5.3.3 HDBaseT Cable Analyzer

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

➔ **To access data for HDBaseT cable certification:**

1. Connect the MS-TestPro test device to both ends of the CATx cable, as shown below in figure 39 :
 - The “local” side of the cable is attached to either the transmitter or receiver module, housed in the MS-TestPro chassis.
 - The “remote” side of the cable is attached to the other MS-TestPro module.



Figure 39: Cable Test Setup

2. Select **Basic Tests >> Certification Report**, as shown in the figure below. Error! Reference source not found.:



Figure 40: Generate Report Data

The following screen appears:



The screenshot shows the MS-TestPro application interface. At the top, there is a header with a gear icon, a USB icon, the MSOLUTIONS logo, and a power icon. Below the header, the application name "MS-TestPro" is displayed along with the version "01.02.10" and the date "Thu Jul 27 11:32:28 2017". There are three navigation buttons: "Configuration", "Performance", and "Basic Tests". The main content area is titled "Certification" and contains two input fields: "Cable serial Number:" with an empty text box, and "Sequential Numbering:" with radio buttons for "Yes" and "No". At the bottom, there are two buttons: "Generate Report Data" and "Download Report Data".

Figure 41: Data preparation sheet for Certification Report

Fill in the **Cable serial Number**, mark **Sequential Numbering** (Yes, No) checkbox and tap **Generate Report Data** button.

The following message appears in the window:



The screenshot shows the MS-TestPro application interface with a processing message. The header and navigation buttons are the same as in Figure 41. The main content area is titled "Certification" and displays the message "Report Data creation in progress Please Wait for 10 seconds". Below the message, the "Cable serial Number:" field now contains the value "123456654". The "Sequential Numbering:" radio buttons are still present. At the bottom, the "Generate Report Data" button is now labeled "Processing Report Data" and is highlighted with a red border. The "Download Report Data" button remains the same.

Figure 42: Processing Report Data

3. After **Processing Report Data** button stops blinking and caption changed to **Generate Report Data**, the data is ready to be downloaded. Click on the **Download Report Data** button. The window below appears, including a list of report data files.



Figure 43: Downloading Report Data

4. Select a report data file or a group of files from the list, choose a target device for the download (**USB** memory stick or **PC** radio button), and click **Send**.

NOTE

The USB radio button remains disabled until you insert a USB memory stick in the MS-TestPro test device.

5. To clear the list, mark a file or a group of files and tap **Delete** button.
6. To generate a printed certification report based on the downloaded data, see Appendix D: *Generating an HDBaseT Certification Report*.

5.3.4 HDMI Generator

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

The HDMI pattern generator page appears as shown below in Figure 44.

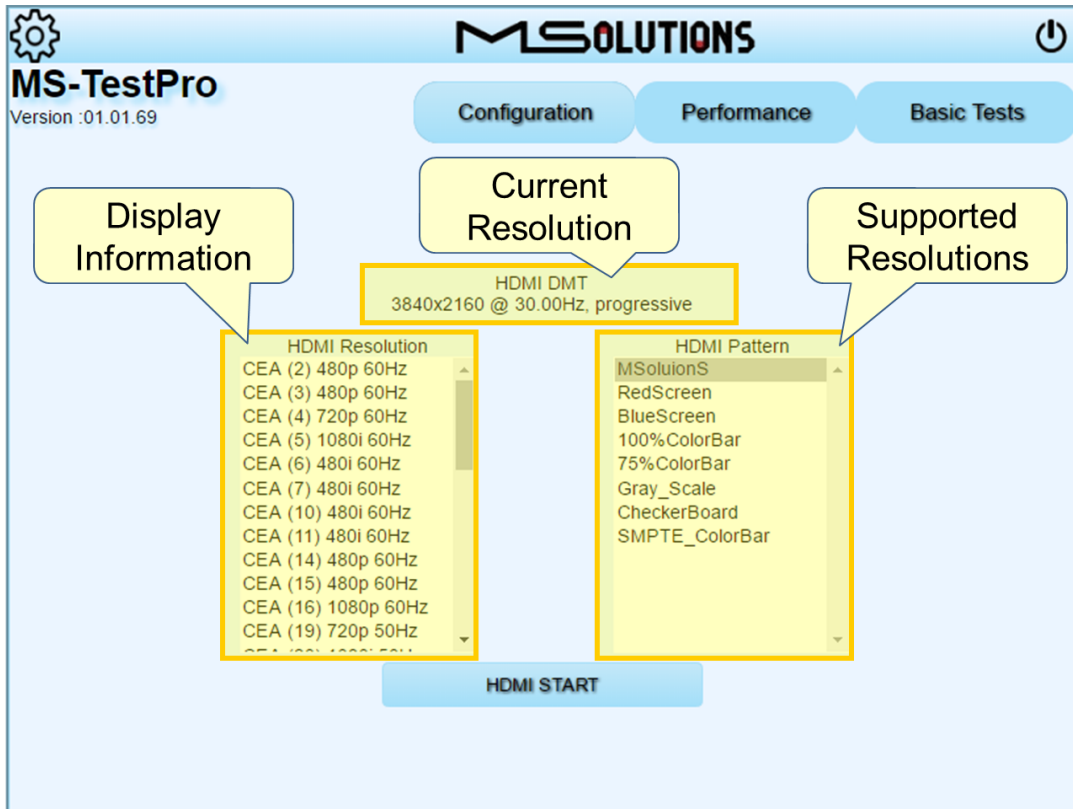


Figure 44: HDMI Generator Page

The resolution currently supported by the HDMI sink device is displayed at the top of the page.

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

Table 5: 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.

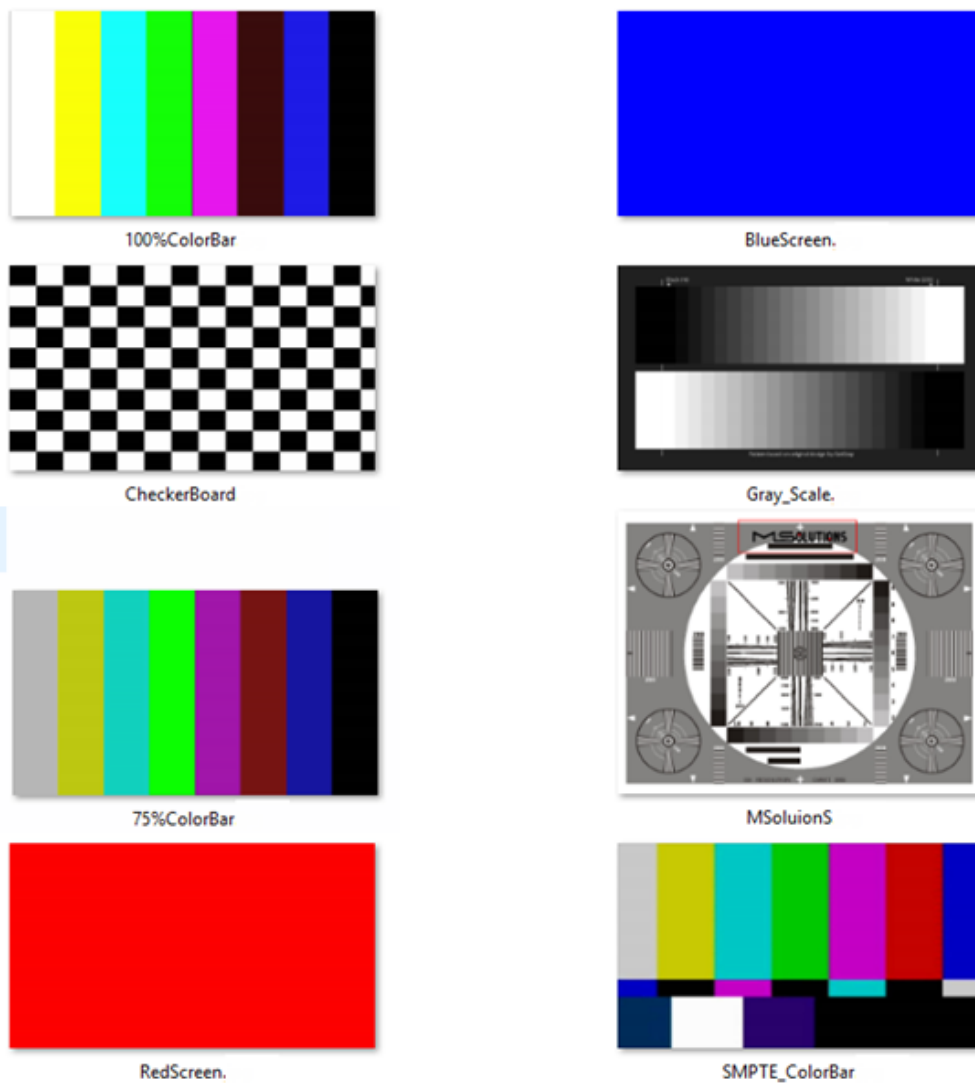


Figure 45: Supported HDMI Patterns

5.3.5 EDID Analyzer

The EDID analyzer queries the HDMI sink device and reports on the device's display characteristics, including display parameters and supported resolutions.

➔ **To access display capabilities using EDID:**

1. Connect the MS-Test Pro test device to the HDMI sink device using one of the methods described in section 4.2.2.1 and depicted in Figure 12.
2. Tap on the **EDID Info** button on the **Basic Tests** page to access information on the display capabilities of the HDMI sink device. The following page appears, displaying the current resolution, sink device display capabilities, and supported display resolutions.

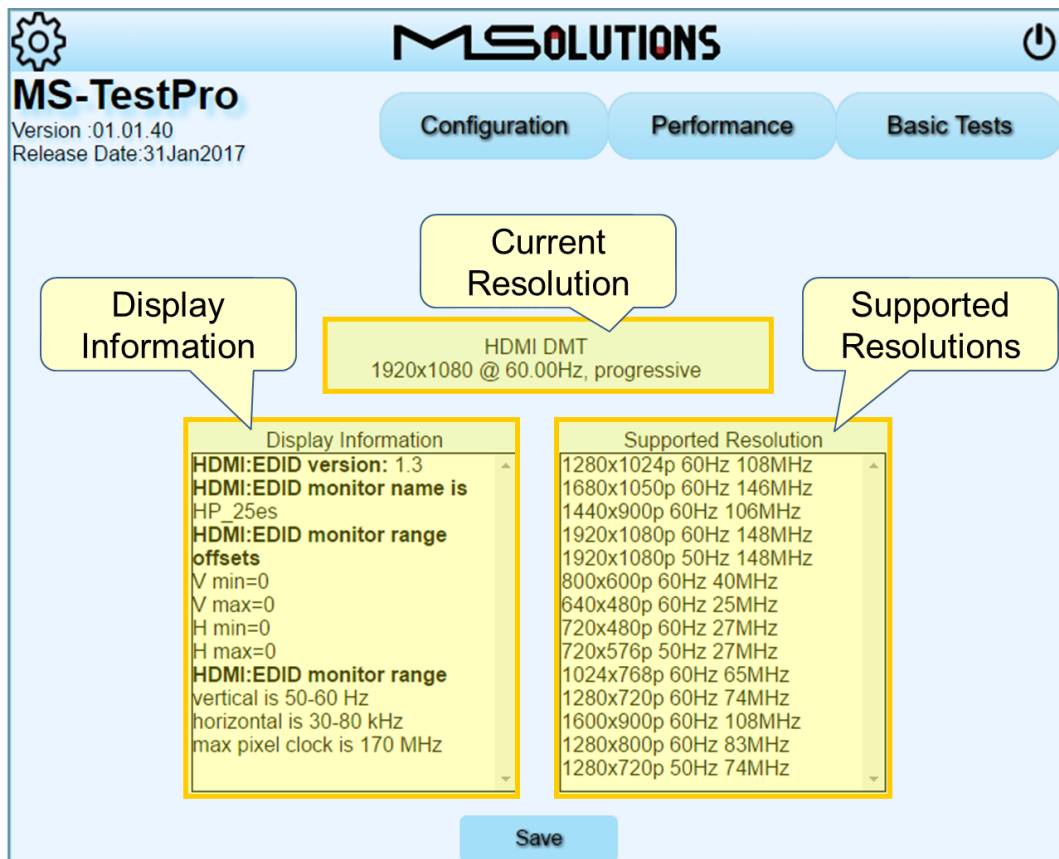


Figure 46: EDID Information Page

The resolution currently supported by the HDMI sink device is displayed at the top of the page.

Click on Save button to save the EDID data in both binary and parsed formats.

5.4 Performance Management

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



Figure 47: Selecting Performance Management

NOTE

When monitoring performance, the transmitter controls are always displayed on the left side, the receiver controls are always displayed on the right side, as shown below in Figure 48 below.

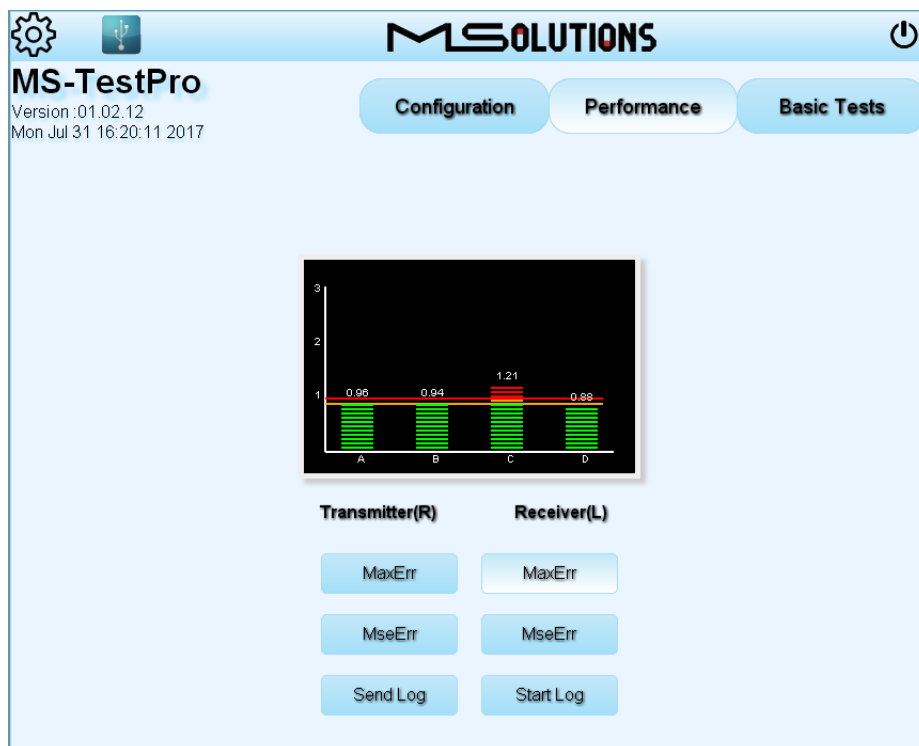


Figure 48: Performance Monitoring Screen

Two types of performance measurements are tracked by the system:

- **MaxErr.** The maximum recorded value of the residual error.
- **MSE.** The mean square of the residual error.

5.4.1 MaxErr

MaxErr is the maximum recorded value of the PAM-16 residual error, measured for channels A, B, C, and D. Sample transmitter and receiver MaxErr data are displayed in the figures below.

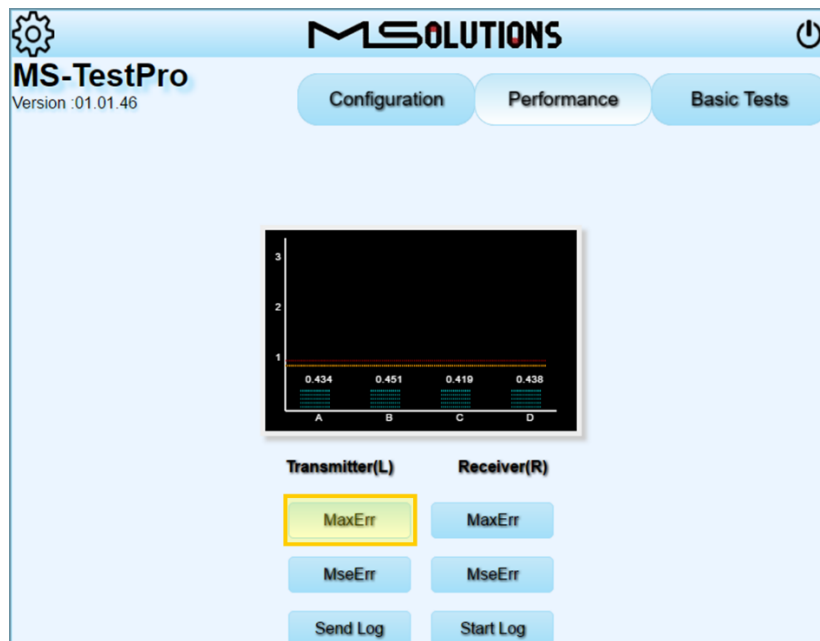


Figure 49: Max Err Page – Transmitter Side

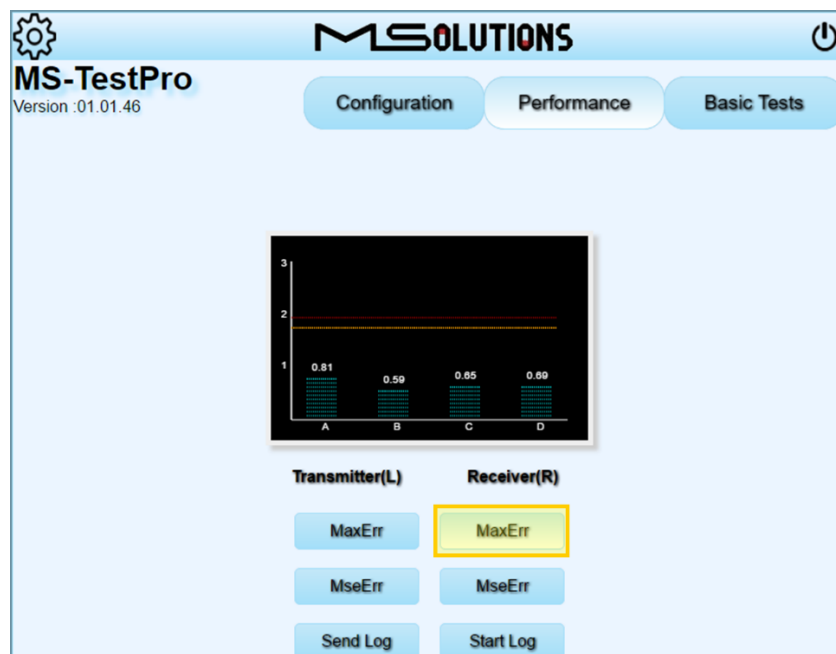


Figure 50: MaxErr Page – Receiver Side

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.

5.4.2 MSE

MSE is the mean square of the PAM-16 residual error, measured in dB for channels A, B, C, and D. Sample transmitter and receiver MSE data are displayed in the figures below.

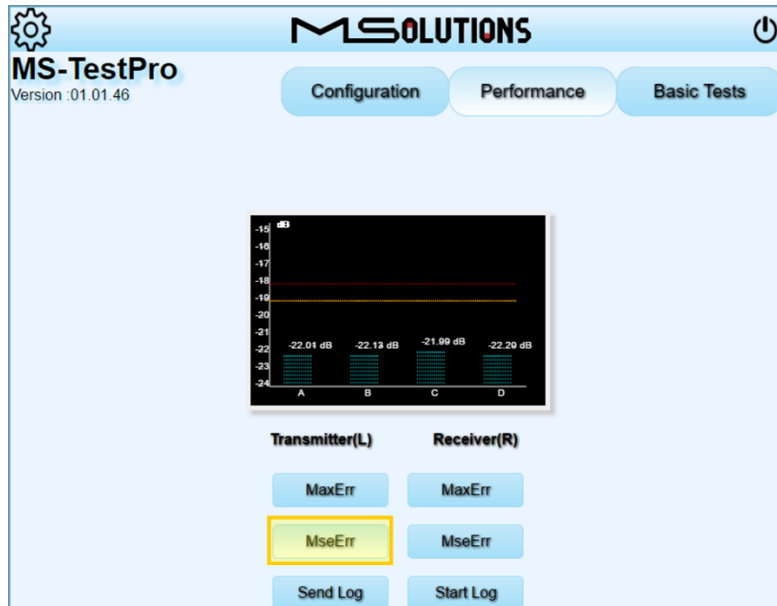


Figure 51: MSE Page – Transmitter Side

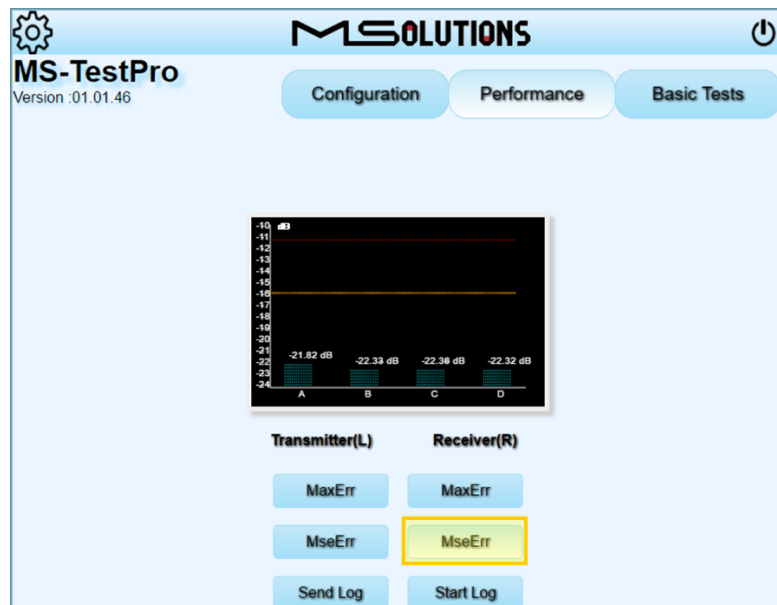


Figure 52: MSE Page – Receiver Side

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 **MSE** button on the Transmitter or Receiver side. The background of the tapped button appears in a bright blue color.

The data for the four channels, A, B, C, and D, appear in the graph that is displayed on the top of the screen. The graphical display is continuously updated.

5.5 Log System

MS-TestPro allows you to generate log files, and to distribute the files on a USB memory stick. Log file 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.

When log files are sent to a USB memory stick, the files are automatically deleted from the system.

5.5.1 Log Generation

➔ **To perform log generation:**

1. To begin log generation, tap on the **Start Log** button, as shown in Figure 53 below. The system generates transmitter *and* receiver logs.



Figure 53: Starting Log Generation

2. To manually end log generation, tap on **Stop Log**.



Figure 54: Stopping Log Generation

5.5.2 Log Distribution

➔ To distribute the log via the Wi-Fi client:

1. To distribute a log for analysis, tap **Send Log**.



Figure 55: Send Log Button

A list of the logs stored in the system appears, as shown in Figure 56 below.



Figure 56: List of Log Files in the System

Select one or more files to be distributed, and tap on the **Send** button.



Figure 57: Selecting Log Files to Distribute

You can export logs 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, as shown in the figure below.

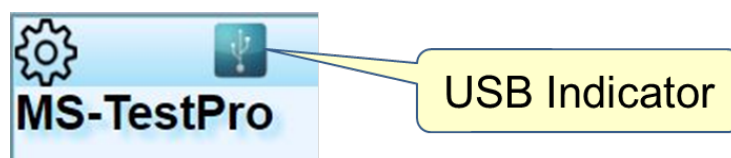


Figure 58: USB Connection Indicator

2. To distribute a log for analysis, tap **Send**. The transmitter and receiver logs that you just 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.

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

NOTE

Log files that are copied to the USB memory stick are *automatically deleted* from the main unit.

5.6 System Configuration

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



Figure 59: Selecting Configuration Management

The configuration page appears as shown below in Figure 60 below.

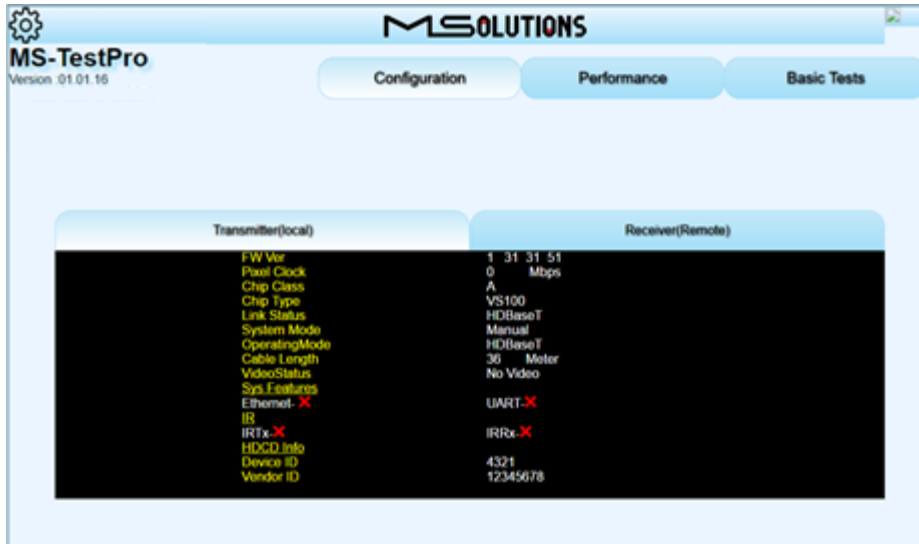


Figure 60: Configuration Page

The configuration page displays the following information (read only):

- **FW Ver.** The 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 2.0 Standard.
- **Chip Type.** The chip model/part number.
- **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.** HDMI with/without HDCP content.
- **Sys. Features.** The flow types that are extended by the chip over the HDBaseT link, such as: HDMI, Ethernet, RS232.
- **IR.** Infrared support provided by the chip.
- **HDCD Information.** Vendor ID and Device ID, as specified in the HDBaseT standard.

The page displays either the current transmitter or receiver configuration. Tap on **Transmitter** or **Receiver** to display the desired information.

5.7 Setup


The Setup menu allows you to upgrade the test unit software and reboot the system. To access the Setup menu, click on the setup  icon. The Setup menu is displayed as shown in Figure 61 below.



Figure 61: Setup Menu

You can access the following information on the Setup page:

- **Wi-Fi AP.** Whether the test device supports Wi-Fi connectivity for smart devices.
- **HDMI Gen.** Whether the HDMI Pattern Generator feature is supported.
- **AP.** The ID of the Wi-Fi access point for connectivity with the test device.

You can perform the following operations from the Setup menu:

- **Admin.** For manufacturer internal use.
- **System Upgrade.** Upgrade the test unit with a new software version residing on a USB memory stick.
- **Units of Measurement.** Allows you to choose length measurements in meters or feet.
- **Download Report Generator Tool.** Allows to download Report Generator application executable file.
- **Download User Manual.** Allows to download User manual in PDF format.
- **Reboot.** Restart the MS-TestPro test unit.

5.7.1 System Upgrade

➔ **To upgrade the MS-TestPro System Software:**

1. Prepare a USB memory stick with the upgrade file *update.mst* in the root folder of the stick.
2. Connect the stick to one of the USB ports in the MS-TestPro device.
3. Tap on the **System Upgrade** button on the home page (see Figure 62 below).

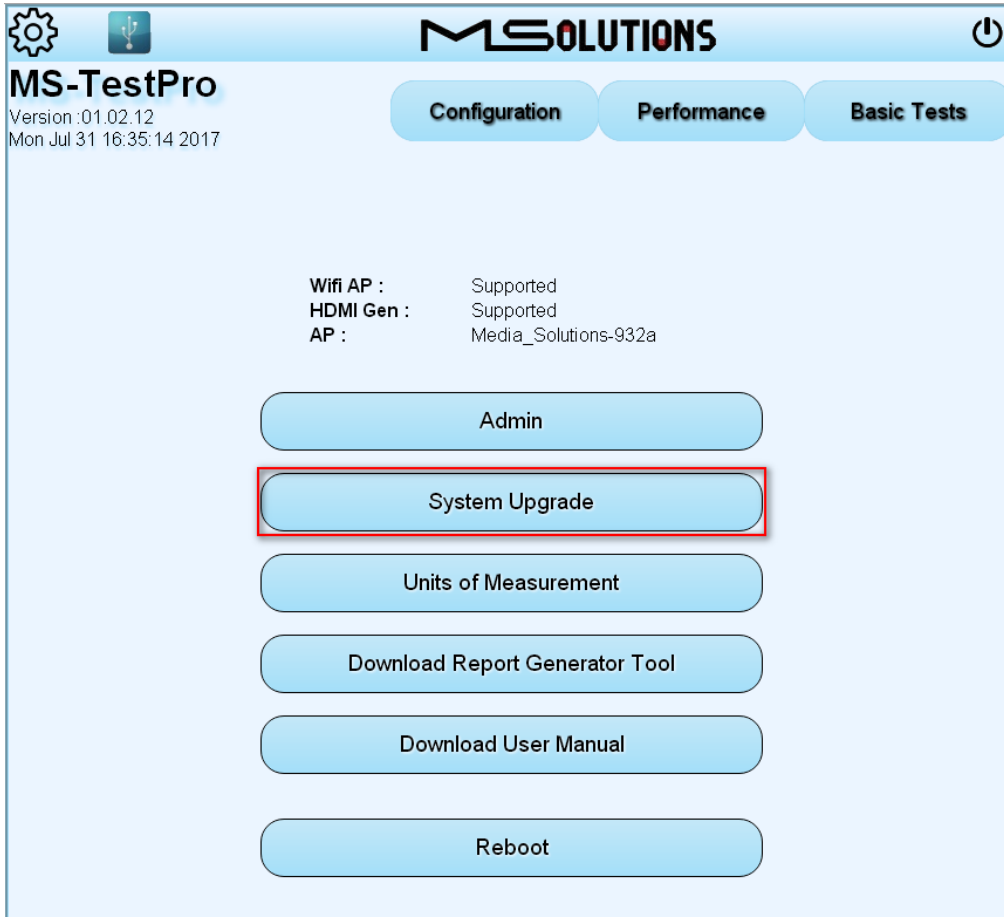


Figure 62: Upgrading the MS-TestPro System

The system performs the upgrade and reboots using the new version in approximately 10 seconds.

IMPORTANT

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

5.7.2 Units of Measurement

Click on the **Units of Measurement** button to choose cable length measurements in meters or feet.



Figure 63: Selecting a Unit of Measurement

The following page appears. Select **Meters** or **Feet**, and click **Submit**.

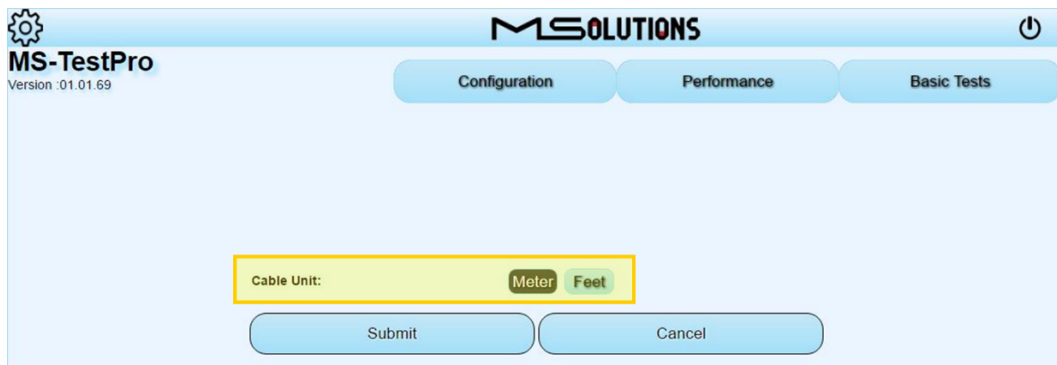


Figure 64: Select Meters or Feet

5.7.3 Reboot

Click on the **Reboot** button to reset the test unit. The following message appears on the Setup page.

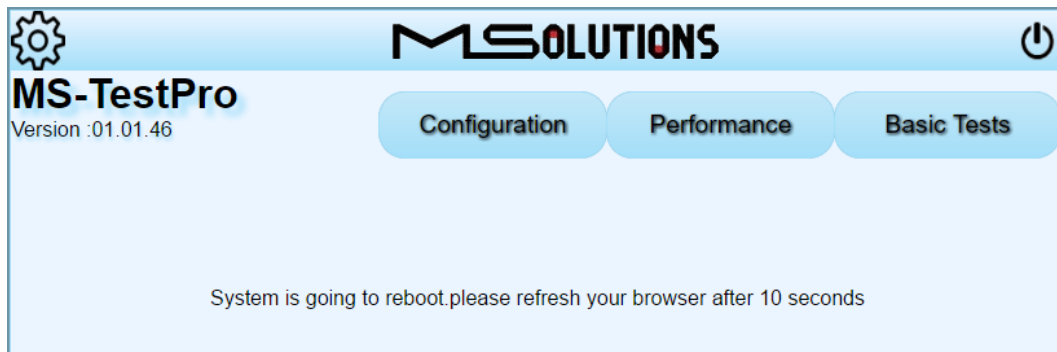


Figure 65: System is Rebooting

Following the reboot, refresh your browser in order to reconnect to the system.

6. Use Cases

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

6.1 Cable Test

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

- A Go/No-Go 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.
- Per-pair signal quality indications:
 - FMAXERR predicts the likelihood that a data link (cable) will have a bit error.
 - FMSEERR essentially describes the signal to noise ratio of the data link. Signal attenuation over length.

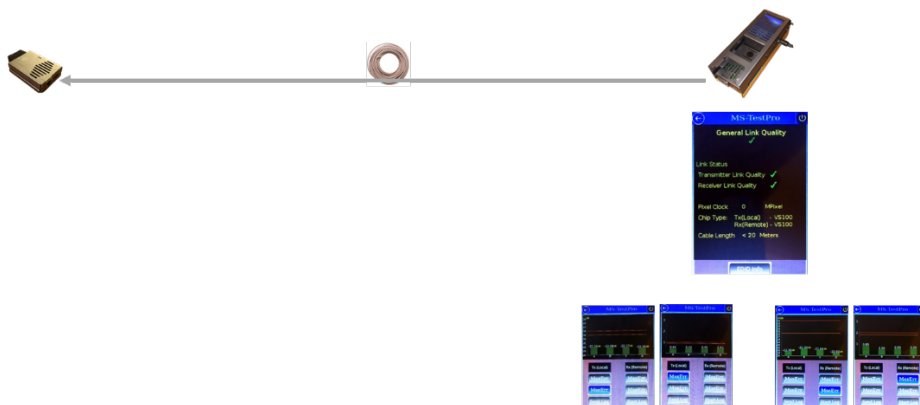


Figure 66: Cable Test Setup

6.2 Crimping Quality Test

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

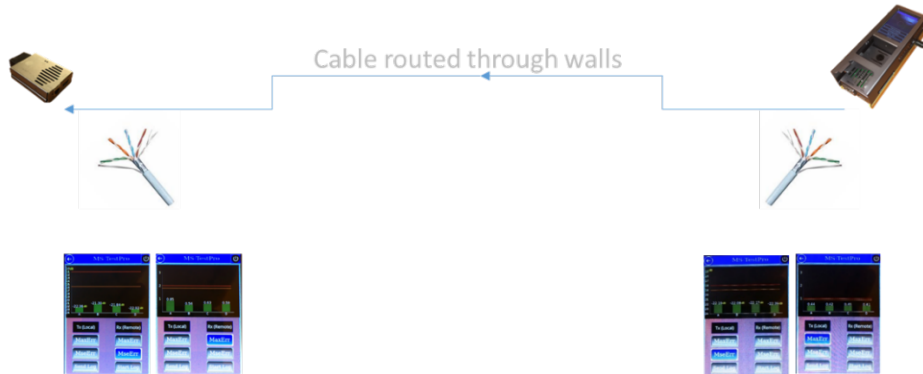


Figure 67: Crimping Test Setup

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.

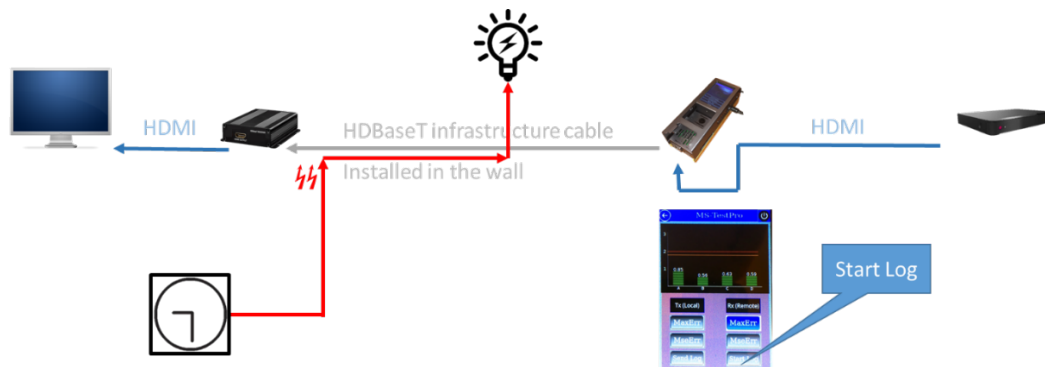


Figure 68: Inconsistent Video Drops – I (Source Side) Test Setup

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.

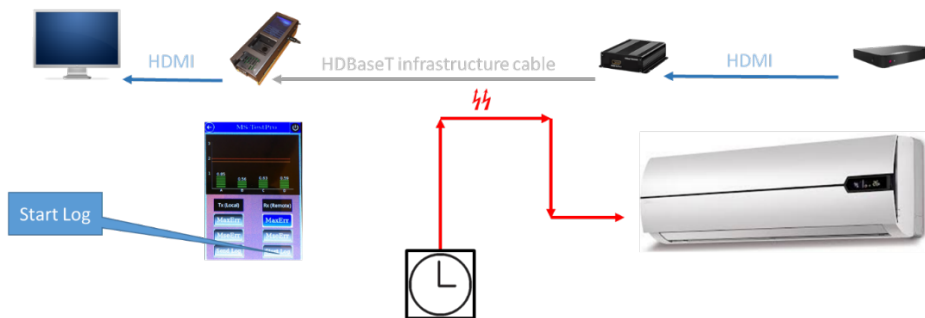


Figure 69: Inconsistent video drops – II (Sink side) Test Setup

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

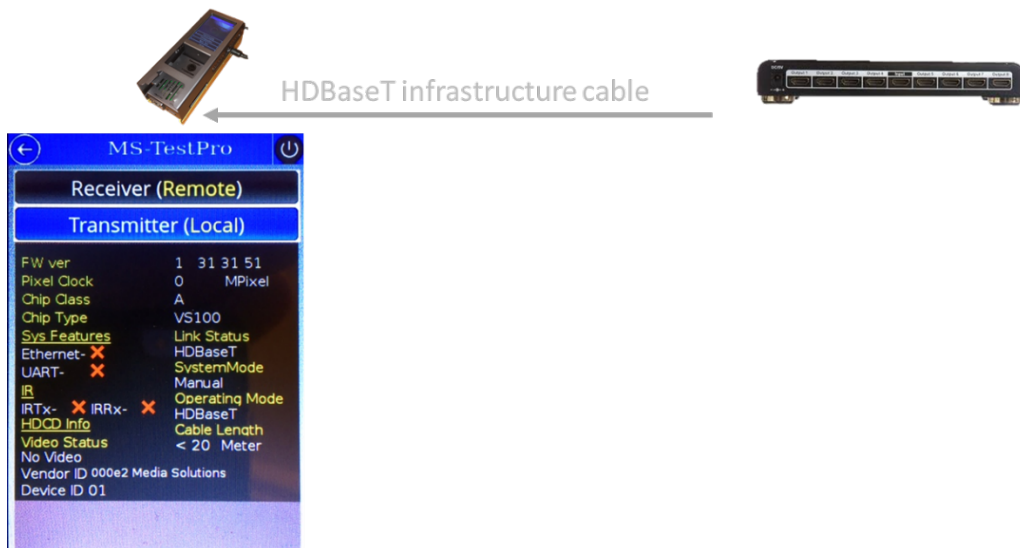


Figure 70: Product Information – 3rd Party Transmitter Side Test Setup

Receiver-Side Device

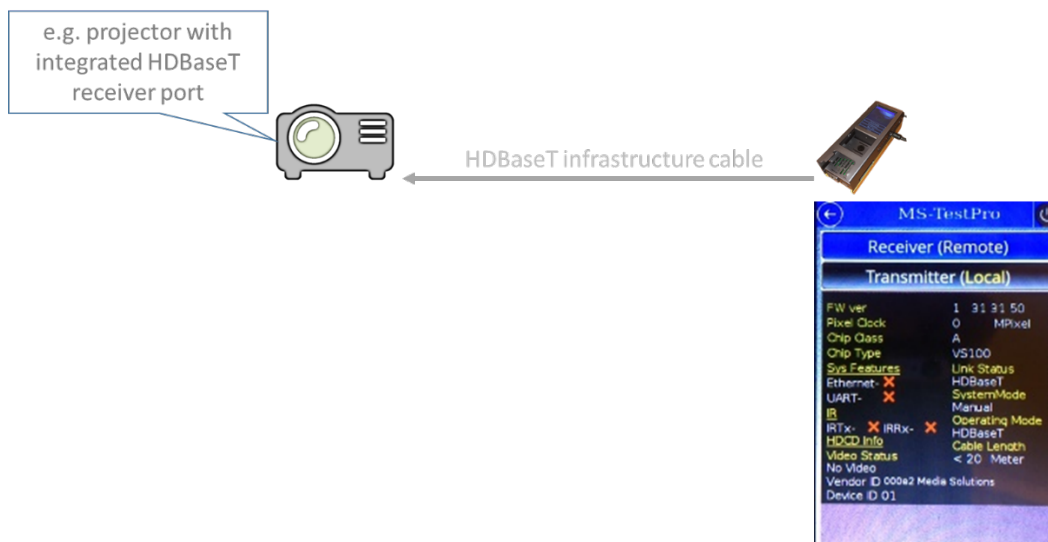


Figure 71: Product Information – 3rd Party Receiver Side Test Setup

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

Appendix B

Specification

Physical/Mechanical

- Chassis Construction: Aluminum
- Ingress Protection: IP54
- Size (W x L x H): 69mm x 180mm x 55mm (2.4" x 7.2" x 3.1")
- Weight : 761 Gram (1.67 Pounds)

Electrical

- Power Adapter: AC to DC, 98V-250V to 48V / 0.5A
- Power Input: 48V 0.5A

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

MS-Test Pro HDBaseT Testing Device

Part Number	Product Code	Product Description
MS102TD	MS TestPro TD	HDBaseT 1.0 tester with 3.5" touch display
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

Appendix D

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 MS-TestPro touch screen users, see section 4.2.2.2.
- For MS-TestPro Wi-Fi Client users, see section **Error! Reference source not found.**

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 72 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 72: Report Generator Main Window

If the message depicted in Figure 73 below appears, click **OK** to start a Java Runtime Environment installation.

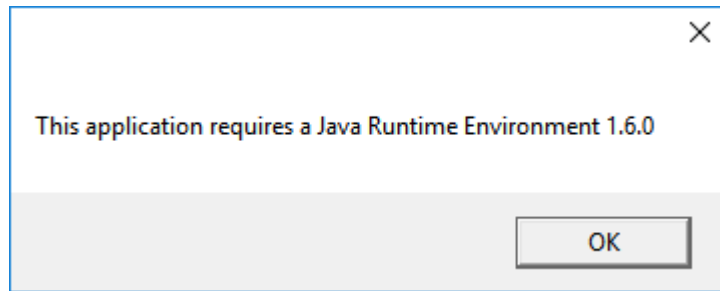


Figure 73: Java Runtime Environment Required

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 74 below. Select the user info file, and click **Open**. Skip to step 4 below.

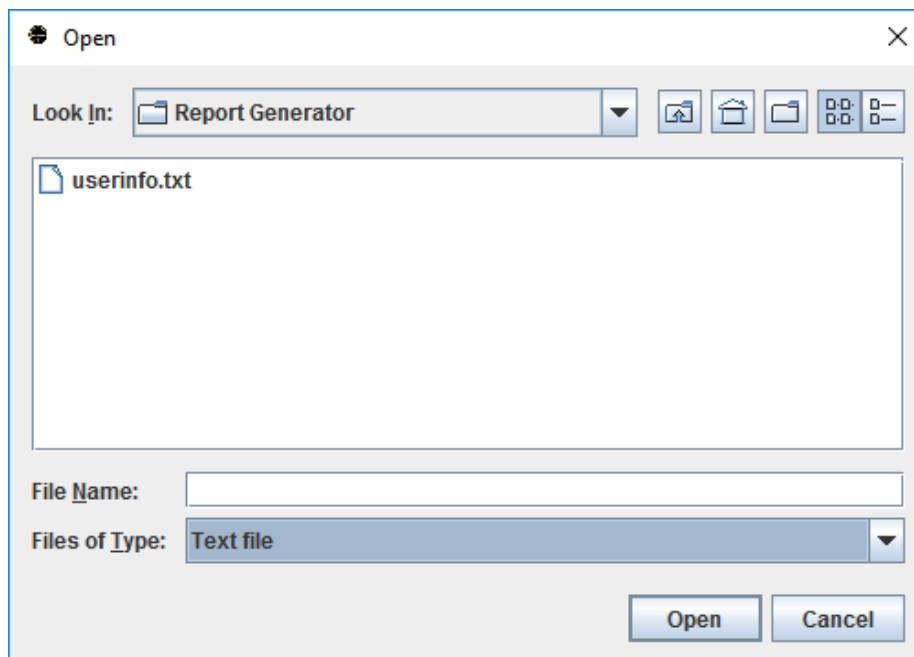


Figure 74: Open User Info Data

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.

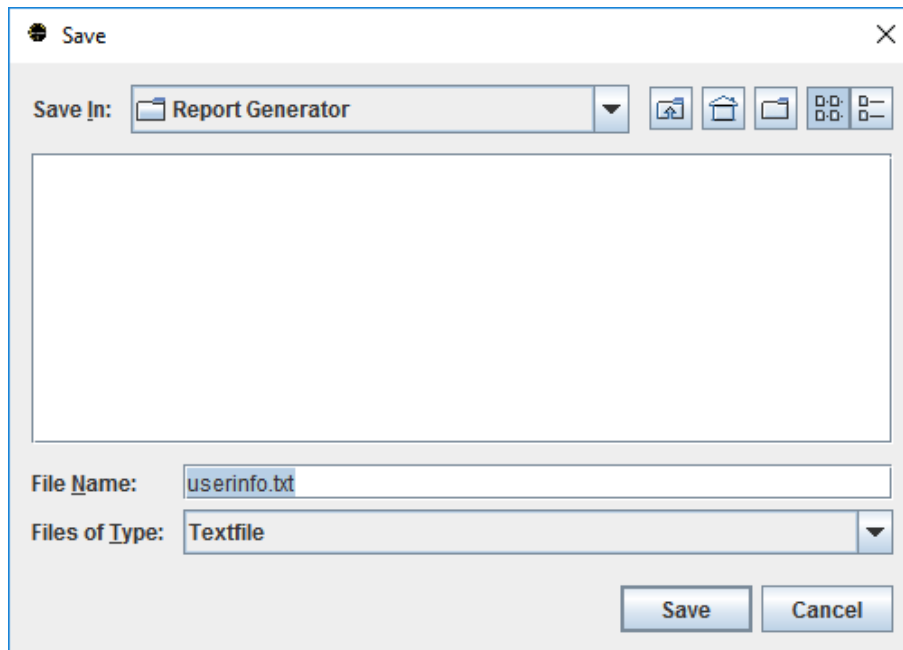


Figure 75: Saving User Info Data

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.

**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

Figure 76: 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

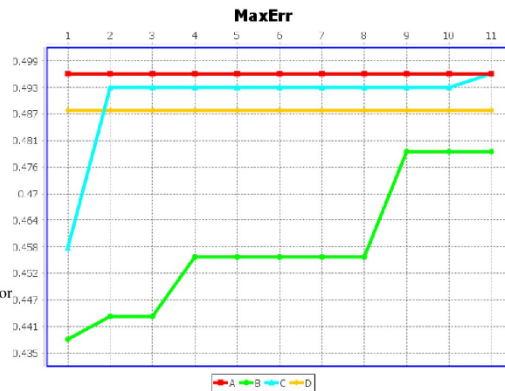
Local Setup Information

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)

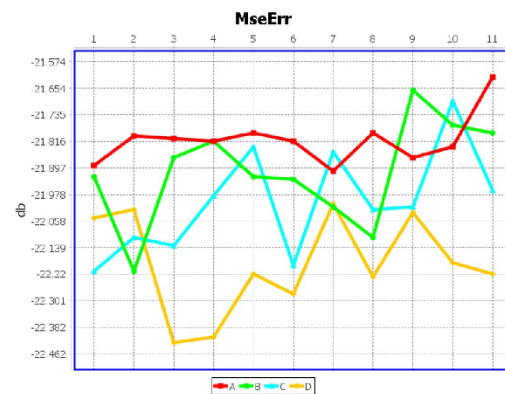


Figure 77: Sample HDBaseT Certification Report – Page 2 (Transmitter Data)



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

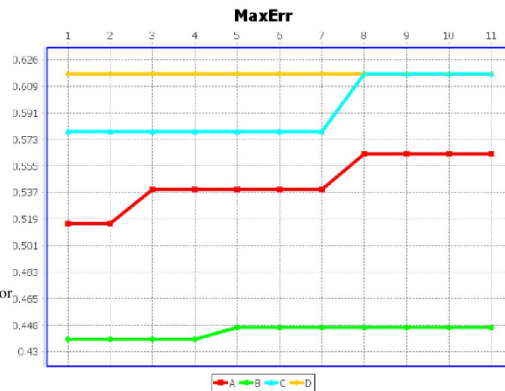
Remote Setup Information

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)

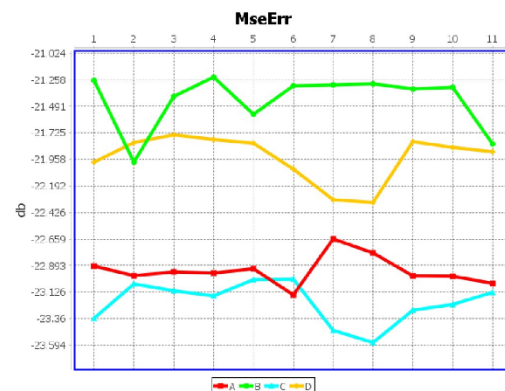


Figure 78: Sample HDBaseT Certification Report – Page 3 (Receiver Data)

Installing the Report Generator

➔ **To install the report generator:**

1. Open the .rar archive file you received from Media Solutions.
2. Extract the two files 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 79 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 79: Report Generator Main Window

If the message depicted in Figure 80 below appears, click **OK** to start a Java Runtime Environment installation.

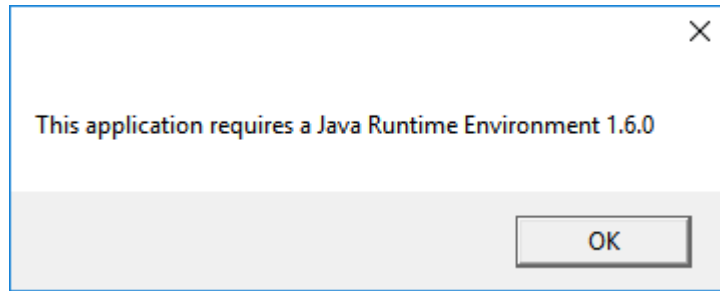


Figure 80: Java Runtime Environment Required

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/>

END OF DOCUMENT