

# ATLAS *IP*

## PORTABLE ANALYZER FOR IP ENVIRONMENTS



-0 MI2253-



## NOTES ABOUT THE MANUAL

Read the user's manual before using the equipment, mainly **SAFETY RULES** paragraph.

The symbol  on the equipment means "**SEE USER'S MANUAL**". In this manual may also appear as a Caution or Warning symbol.

**WARNING AND CAUTION** statements may appear in this manual to avoid injury hazard or damage to this product or other property.

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## ELECTRONIC MANUAL VERSION

You can access instantly to any chapter by clicking on the title of the chapter in the table of contents.

Click on the arrow  at the top right page to return to the table of contents.

At Index, click on a page number to access the related content.

Click on the **link** or scan the **QR code** inside de video boxes  in order to play a video tutorial.

In some **video tutorials**, there may be differences between the interface shown in the video and the equipment current interface. Always follow the instructions in the manual and use the video only as supplementary reference material.

## USER'S MANUAL VERSION

| Manual Version | Web Publication Date | Firmware Version |
|----------------|----------------------|------------------|
| F1.0           | June 2026            | 4.2.4            |

■ Please update your equipment to the latest firmware version available.

- Last firmware download: <https://www.promax.es/go/atlas-ng-firmware/>
- Updating instructions: ["Updating the meter" on page 13](#)

## SAFETY RULES

- \* The safety could not be assured if the instructions for use are not closely followed.
- \* Use this equipment connected only to systems with their negative of measurement connected to ground potential.
- \* The AL-103 external DC charger is a Class I equipment, for safety reasons plug it to a supply line with the corresponding ground terminal.
- \* This equipment can be used in Overvoltage Category I installations and Pollution Degree 2 environments.
- \* External DC charger can be used in Overvoltage Category II, installation and Pollution Degree 1 environments.
- \* When using some of the following accessories use only the specified ones to ensure safety:
  - Rechargeable battery
  - External DC charger
  - Car lighter charger cable
  - Power cord
- \* Observe all specified ratings both of supply and measurement.
- \* Remember that voltages higher than 70 V DC or 33 V AC rms are dangerous.
- \* Use this instrument under the specified environmental conditions.
- \* When using the power adaptor, the negative of measurement is at ground potential.
- \* Do not obstruct the ventilation system of the instrument.
- \* Use for the signal inputs/outputs, specially when working with high levels, appropriate low radiation cables.
- \* Follow the cleaning instructions described in the Maintenance paragraph.

## SAFETY SYMBOLS

|                                                                                   |                        |                                                                                   |                                            |
|-----------------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------------|--------------------------------------------|
|  | DIRECT CURRENT         |  | ON (Supply)                                |
|  | ALTERNATING CURRENT    |  | OFF (Supply)                               |
|  | DIRECT AND ALTERNATING |  | DOUBLE INSULATION<br>(Class II protection) |
|  | GROUND TERMINAL        |  | CAUTION<br>(Risk of electric shock)        |
|  | PROTECTIVE CONDUCTOR   |  | CAUTION REFER TO MANUAL                    |
|  | FRAME TERMINAL         |  | FUSE                                       |
|  | EQUIPOTENTIALITY       |  | EQUIPMENT OR COMPONENT<br>TO BE RECYCLED   |

## DESCRIPTIVE EXAMPLES OF OVER-VOLTAGE CATEGORIES

- \* **Cat I**: Low voltage installations isolated from the mains.
- \* **Cat II**: Portable domestic installations.
- \* **Cat III**: Fixed domestic installations.
- \* **Cat IV**: Industrial installations.

**CAUTION:** The battery used can present danger of fire or chemical burn if it is severely mistreat. Do not disassembly, cremate or heat the battery above 100 °C under no circumstances.

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# PORTABLE ANALYZER FOR IP ENVIRONMENTS

## ATLAS IP

### 1 INTRODUCTION

#### 1.1 Description

The new **ATLAS IP** is the eighth generation of field meters that **PROMAX** launches. As each new generation, it represents an evolution from the previous, since it integrates the latest technological innovations and develops applications for the new demands and needs that have emerged in recent years.

The **ATLAS IP** has been created with the aim to make easy the user experience. Everything has been designed so the equipment can be fully operated using the 10" multitouch display (even using wearing gloves). The friendly interface has been designed so the user has a simple tool to use but powerful. The new outer frame offers extreme ruggedness maximizing grip and ease of handling.



Figure 1.

The PROMAX **ATLAS IP** establishes itself as the essential professional measurement tool for the All-IP transition within the broadcast industry. This multifunction portable IPTV analyzer is designed for engineers requiring critical monitoring of transport streams in contribution and distribution environments. Featuring native support for IP Multicast/Unicast, 3G-SDI, and ASI-TS interfaces, it enables comprehensive validation of both compressed and uncompressed signals.

As a benchmark in professional video instrumentation, the ATLAS IP integrates advanced decoding for 10-bit 4K UHD H.265 (HEVC) codecs and Dolby AC4



audio systems. Its advanced diagnostic capabilities include eye diagram analysis for SDI signals and monitoring of low-latency transport protocols such as SRT (Secure Reliable Transport).

Ready for the future of IP production, it offers optional support for the SMPTE ST 2110 standard, ensuring precise synchronization with the network's PTP Master Clock. Its intuitive multi-touch interface allows for customizable dashboard management, facilitating real-time error detection in T2MI, BTS, and MPEG-TS streams. Optimize the efficiency of your live broadcasts and studio workflows with the most versatile broadcast analyzer on the market.

In an effort to facilitate its work to professionals, our long experience ensures an after sales quality service. In addition, there are software updates periodically released, that add functions and improvements to the equipment.

The **ATLAS IP** has been designed and developed entirely in the European Union. A multidisciplinary team of highly qualified professionals has dedicated effort and commitment to the development of a powerful, efficient and reliable tool. During the manufacturing process, all used materials have been subjected to a strict quality control.



## 2 SETTING UP

### 2.1 Package Content

Check that your package contains the following elements:

- **ATLaS IP** Portable Analyzer.
- External DC charger.
- Mains cord for external DC charger.
- Car cable for external DC charger.
- WiFi-USB dual-band dongle.
- Transport belt.
- Carrying bag.
- Transport suitcase.
- Handle.
- Monopod.
- Quick reference guide.

**NOTE:** Keep the original packaging, since it is specially designed to protect the equipment. You may need it in the future to send the analyzer to be calibrated.

### 2.2 Power

The **ATLAS IP** is powered by a 7.4 V built-in rechargeable LiPo battery of high quality and long operation time. This equipment can operate on battery or connected to the mains using a DC adapter. An adapter is also supplied to use with the power connector car (cigarette lighter).



### 2.2.1 First Charge

The equipment comes with the battery half charged. Depending on the time elapsed from first charge and environmental conditions may have lost some of the charge. You should check the battery level. It is advisable a first full charge.

### 2.2.2 Charging the Battery

Connect the DC power adapter to the equipment through the power connector on the left side panel (see figure).



Figure 2.

Then connect the DC power adapter to the mains via the mains cord. Ensure that your mains voltage is compatible with the adapter voltage.

For a fast charging is necessary to switch off the equipment.

If the equipment is ON, the battery charge will be slower, depending on the type of work you are doing. When connecting the equipment to the mains the mains connected symbol appears inside the battery icon.

The charger led indicates the battery status:

- **Red**: Charging.
- **Green**: Charge finished.
- **Blinking**: Battery not detected.
- **Off**: Battery discharging.

When switching on the equipment, the battery voltage is checked. If the tension is too weak to start, the equipment does not start up. In this case please charge the battery immediately.



### 2.2.3 Charge / Discharge Times

Average charging time with the equipment off (fast charge):

- 5 hours to achieve an 80% charge.
- 7 hours to achieve a 100% charge.

Battery life:

- With a 100% battery, the average duration is 4:00 hours.
- In SDI mode: More than 4 hours (mode: video + audio + video/audio parameters + audio level).
- In IPTV mode: More than 3:45 hours (mode: TV + audio, signal parameters, measurements).

### 2.2.4 Energy Saving

This option is available in the menu **Settings -> Appearance**.

- **Screen timeout:** User can select a time after which the TFT screen turns off, but the equipment is still running normally. The equipment can measure (for example, making a datalogger or channel exploration) and the battery will last longer, about 10% more. The screen turns on by pressing any key. Time options are: off, 1, 5, 10, 30 or 60 minutes.

### 2.2.5 Smart Control Battery

The built-in battery of the equipment is of the "smart" type, which means that reports its state of charge. This information can be shown on screen by enabling the "**Show battery remaining time**" option. It shows the average time available next to the battery icon. In this way the user knows at any time the remaining battery level.

The remaining time charge that appears is calculated according to the work that has been doing. If the external supply is working, the average time would be reduced according to the increase in consumption that occurs.

### 2.2.6 Usage Tips

The battery is losing storage capacity as you go through its life. Contact your **PROMAX** distributor when necessary to replace the battery.



To extend battery life the user should follow these tips:

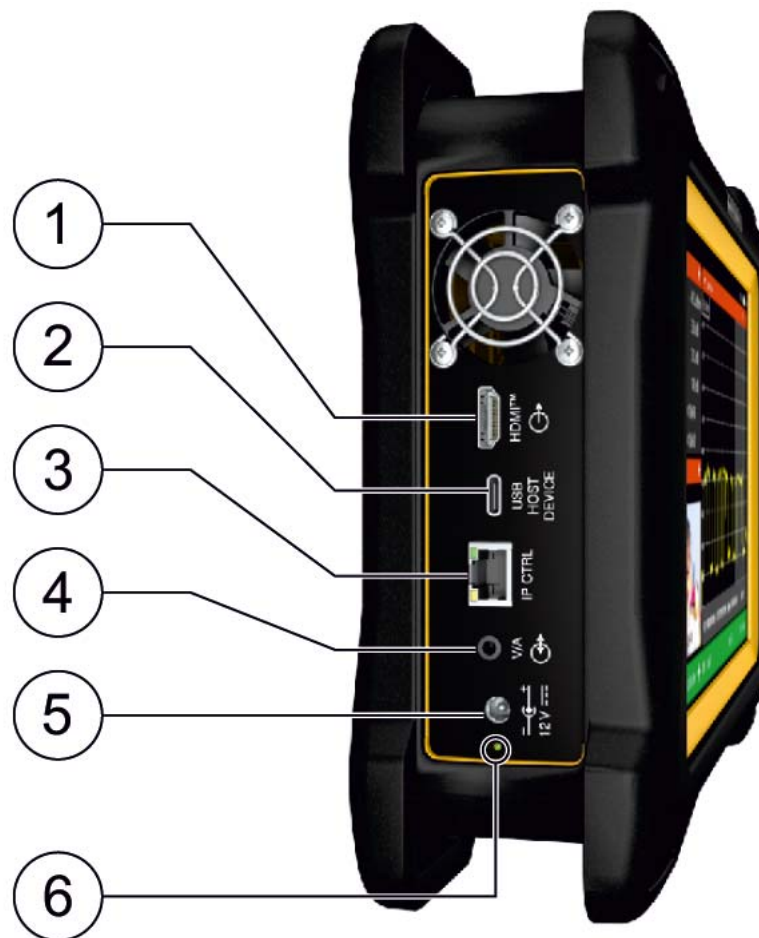
- In case of providing a long inactivity period of the equipment it is advisable to make every 3 months a charge / discharge cycle and a subsequent partial charge (40% aprox.).
- It is advisable to keep it in a cool place and away from heat.
- You should avoid keeping the battery for a long period of time at full load or fully discharged.
- There is not necessary to wait to fully discharge before a charge because these batteries have no memory effect.



## 2.3 Equipment Details

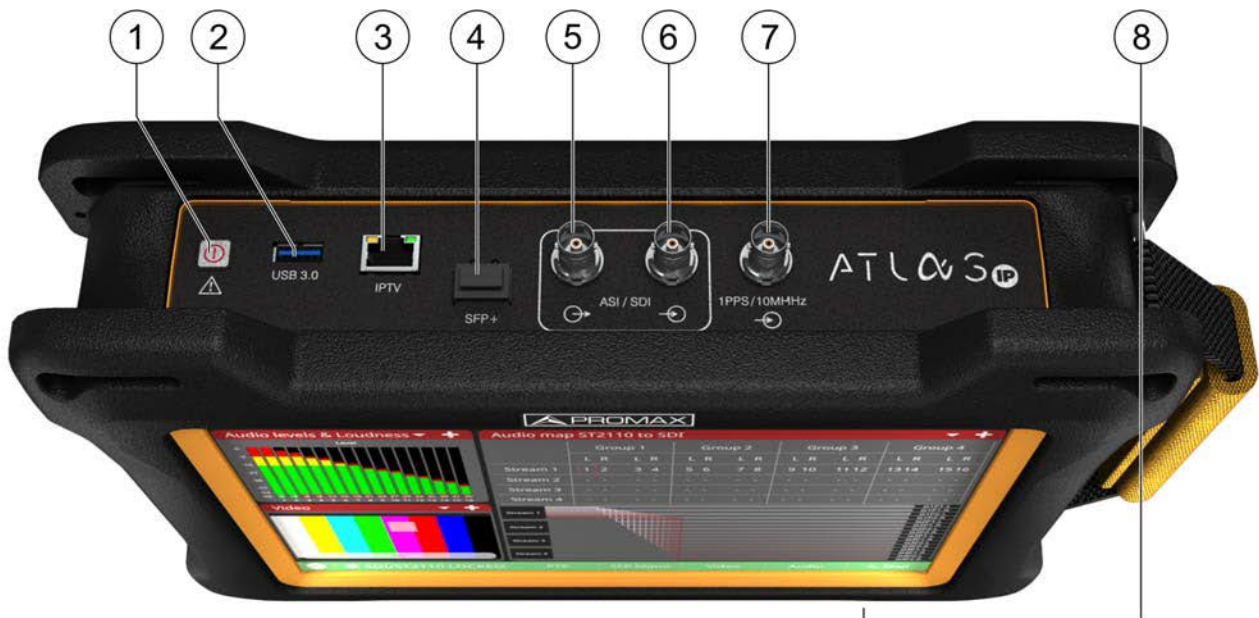


Figure 3. Front View.



**Figure 4. Left Side View.**

- 1** Output with HDMI™ technology (supports HDMI 1.4b with 2.9 Gb/s and up to 3840x2160 @ 30 Hz).
- 2** USB-C Host/Device connector (selectable).
- 3** RJ45 connection for remote management / OTT.
- 4** Analogue Video/Audio input/output.
- 5** Power input connector.
- 6** LED indicator for battery charge level.



**Figure 5. Top View.**

- 1** ON/OFF. Press for an instant to switch on/off.
- 2** USB 3.0 port for WiFi dongle or USB drive.
- 3** RJ45 connector. For IPTV signal analysis.
- 4** SFP+ transceiver compatible with Gigabit Ethernet and fiber optics.
- 5** ASI/SDI output signal.
- 6** ASI/SDI input signal.
- 7** Input for reference synchronism signal 1PPS or 10 MHz.
- 8** Slot for CAM module.



## 2.4 Switching On / Off

### ► Switching On:

- 1 Press the power on/off button located at the top of the device for a few moments. The SFP+ connector's LED lights will turn on, and the fans will start running to indicate that the device is booting up.
- 2 The boot screen appears and also a progress bar that indicates the system is loading.
- 3 After the system loads, it shows the same status before power off.

### ► Switching Off by software (recommended):

- 1 Press the switching off icon  at the home screen.
- 2 Select **Power Off** or **Reboot**.

### ► Switching Off by button:

- 1 Press the ON/OFF button placed on the top of the equipment.

**NOTE:** The equipment keeps its last status (mode and screen) which is recovered when power on.

## 2.5 Reset

How to **RESET**: Hold down the ON/OFF key for 10 seconds until the equipment switches off.

When to **RESET**:

- When it crashes and does not respond to any key.
- When it does not switch on.
- When it does not finish the boot process.
- When it does not complete the shutdown process.



## 2.6 Icons

Icons on screen provide useful information about the equipment:

| Icon                                                                                | Description                             | Icon                                                                               | Description                 |
|-------------------------------------------------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------|-----------------------------|
|    | Enabled folder.                         |   | Correct quality of signal.  |
|    | Battery charging.                       |   | Quality close to threshold. |
|    | Battery in use.                         |   | Not acceptable quality.     |
|   | Low battery. It will shut down shortly. |  | Recording.                  |
|  | Streaming service enabled.              |                                                                                    |                             |

## 2.7 Home Menu

To access the **Home** menu from any other screen press the PROMAX logo  at the left bottom corner.

From the Home menu you can access the work modes as described below.

-  IPTV: Tool to inspect in detail IPTV streams (for more details refer to ["IPTV " on page 23](#)).
-  SDI / 2110: Tool to analyze SDI (SD-SDI, HD-SDI, 3G-SDI; for more details refer to ["SDI " on page 76](#)) and ST2110 (optional; for more details refer to ["SMPTE ST2110 OPTION" on page 111](#)).
-  Streaming Analyzer: Tool to analyze OTT services (for more details



refer to [“STREAMING ANALYZER” on page 58](#)).

-  ASI: Tool to analyze Transport Streams (for more details refer to [“ASI” on page 43](#)).
-  Player: Tool to play Transport Streams recorded from different modes (ASI or IPTV).
-  Manual: Access the complete user's manual.
-  Settings: Access the settings menu (for more details refer to [“SETTINGS AND PREFERENCES” on page 15](#)).

## 2.8 Top Menu

To access the **Top menu** from any screen, swipe down from the top of the screen.

From the Top menu, you can access various management options. Some options are only available in certain modes.

The available options are:

- **Workspace**: Management of work folders.
- **Task Planner**: Management of scheduled tasks.
- **USB**: Management of USB connection type.
- **WiFi**: Management of WiFi network through the USB-WiFi adapter.
- **HDMI™**: Management of HDMI™ technology interface.
- **CAM**: Management of CAM card.
- **ASI**: For enable/disable the ASI input/output.
- **SDI**: For enable/disable the SDI input/output.
- **Volume**: Management of audio volume.
- **Brightness**: Management of screen brightness.
- **Notification area**: Latest notifications displayed on screen.

For more details refer to [“Top Menu” on page 19](#).



## 2.9 Screenshot

The **Screenshot** function captures an image of what appears on the screen. The image is saved in PNG format.

There are 2 capture methods:

- Press and hold the PROMAX logo  located in the bottom-left corner for one second.
- Swipe 3 fingers horizontally from right to left across the screen.

When the capture is done, a virtual keyboard will appear to name the file of the captured image. Pressing **Enter** will save the image to the workspace folder, and a screenshot notification will appear.

**NOTE:** The PROMAX icon  may not appear on all screens; in such cases, you can try the second method.

### ► How to access the screenshots

- 1 Access the **Top menu** by swiping down from the top of the screen.
- 2 Select the **Workspace** option and choose your workspace folder. If you haven't created one, click on **Default**.
- 3 In the dropdown menu, select the mode (Home, IPTV...) in which the capture was taken.
- 4 Next, click on the **Screenshots** icon to list the captured images.
- 5 Tap briefly on an image to display it on the screen.
- 6 Tap and hold an image to view the options menu, which allows you to rename the image, delete it, preview it or copy it to a USB..

## 2.10 Updating the meter

In order to update your **ATLAS** follow these steps:

- 1 Download the firmware from [the ATLAS datasheet at the PROMAX website](#) in order to obtain the latest version of the update file.
- 2 The downloaded file has the UPDATE extension. Copy this file to the root of a USB memory.



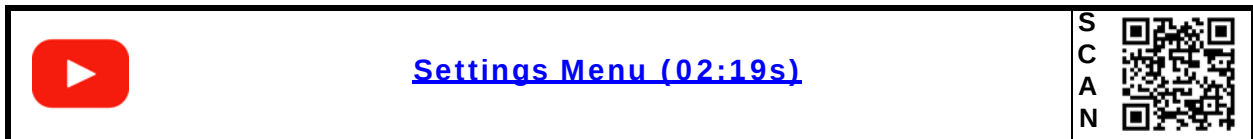
- 3 Restart the **ATLAS** and connect it to the mains to avoid draining the battery during the update process.
- 4 Go to the **Settings**  menu.
- 5 Press **Update**  to enter the update screen.
- 6 The update screen shows in the field **Current software version** the current release installed on the meter.
- 7 At this time (not before), insert the USB drive into the USB port. The meter will detect the USB and analyse the file it contains.
- 8 After few moments (it can change according to the file size) if the update file is correct, the **Update** button turns green and shows the release number.
- 9 Press the **Update** button and confirm to start the update process. A bar and a percentage indicates the update progress. Wait a few minutes.
- 10 Once finished, a pop-up window will appear informing that the software is up to date. **Disconnect the USB memory** and press OK. The meter will restart.
- 11 During the boot process, it shows the message "booting new update" in the upper left corner, indicating that the update has been successfully installed. If, on the other hand, it displays the message "rolling back" it will indicate that there has been an issue during the update (corrupt file, damaged USB drive, etc.), and the previous version will be restored.
- 12 At the end of the update process, check that the new release has been installed correctly. Verify that the **Release** field (in **Settings -> Equipment Info**) reflects the newly installed software version.



## 3 SETTINGS AND PREFERENCES

### 3.1 Settings Menu

Press **Settings**  on the **Home** Menu to access the Settings menu.



#### Video 1.

Settings are classified according to these categories:

- **General:** Equipment information and customizing options.
- **IPTV:** IPTV settings.

#### 3.1.1 General Settings

##### ► Equipment Information



- **Provider:** Provider's name.
- **Name:** Equipment's name.
- **Serial number:** Unique identification number for this equipment.
- **Release:** Version of software installed on the equipment.
- **Free memory:** Free size of the flash memory installed on the equipment / Size of the flash memory installed for data (dataloggers, screenshots, service recording and so on...).
- **Company:** Name of the company which owns the equipment (set by user; protected by PIN code).
- **User:** Name of the equipment's user (set by user; protected by PIN code).
- **Change PIN:** It allows user to change the pin code. The default PIN is 1234.
- **Product ID:** Identifier name of the equipment.
- **Licenses:** Information about the software licenses used.
- **Generate report:** It generates a report of the current status of the meter and it is exported to a pendrive that must be connected to the USB port.



## ► Appearance



- **Language:** Language used on menus, messages and screens. Available languages are: English, Spanish, German, French, Polish, Portuguese and Catalan. Once the new language is selected, the equipment changes automatically to the new language.
- **Screen off:** User can select a time after which the TFT screen turns off, but the equipment is still running normally. The screen turns on by pressing any key. Time options are: off, 1, 5, 10, 30 o 60 minutes.
- **Theme:** It is the colour palette used on screen (dark or light).
- **Accent color:** It allows the user to select the secondary colour used to highlight certain interface elements such as bars, menus, etc. Available options: dark\_red, deep\_blue and explorer\_green.
- **Colorized icons:** It enables colouring of the icons according to the selected accent colour.
- **Show battery remaining time:** It hides or shows the remaining battery time. Remaining battery time is displayed next to the battery level icon.
- **Show hidden menu indicators:** It activates the display of bars on the sides, indicating the presence of hidden menus. You need to drag from the bar toward the centre of the screen to display the menu.

## ► Date & Time



- **Time Format:** It allows the user to change the time format (12 or 24).
- **Continent/Ocean:** It allows the user to select continent where the meter is in order to determine if it is necessary to apply DST (Daylight Saving Time).
- **City/Region:** It allows the user to select the capital of the country or the region where the meter is.
- **Network time:** It allows you to enable or disable date and time synchronization with an internet time server.

## ► Network



Network parameters identify the equipment into a data network. It is necessary to connect to a PC via ethernet.

- **MAC:** Physical address of the equipment. It is unique and cannot be



edited.

- DHCP: Enable this option to get the proper IP address when the unit is first connected to a network. That feature contributes to make things easier to installers when debugging network access.
- IP: IP Address of the equipment into the local network.
- IP NetMask: Subnet mask of the equipment (by default 255.255.255.0).
- Gateway: IP Address of the router into the local network (by default 10.0.1.1).
- DNS 1: Option 1 of DNS (by default 8.8.8.8). DNS stands for Domain Name System and translates domain names into IP addresses so that computers can communicate with each other over the Internet.
- DNS 2: Select DNS2 (by default 8.8.4.4).

### ► Options



It shows all the options that have been installed and also allows installing new options. To install a new option press on “+” and enter the option code. Available options are:

- ST2110 option.
- Optical output for SDI/ASI signals.
- Optical input for SDI/ASI signals.

For more details about the **ST2110** option refer to [“SMPTE ST2110 OPTION” on page 111.](#)

For more details about the **SDI / ASI optical** option refer to [“SDI/ASI OPTICAL OPTION” on page 109.](#)

If you are interested in any of these options please contact PROMAX (<https://www.promaxelectronics.com/ing/contact-promax/>).

### ► Wizard



- Show wizard at next start: It allows enabling or disabling the assistant that helps the user to set the meter. When enabled, the device will turn off, and when turned back on, it will display the assistant.
- Input name: User's name.



- Input e-mail: User's e-mail.
- Input phone number: User's phone.
- Subscription status: It allows the user to subscribe or unsubscribe from the updating service to keep the meter updated to the last software version available.

#### ► Software Update



- Current software version: It shows information about the current update installed on the meter.
- Update: It shows if there is an update available for download and install.

For more details about the updating process refer to [“Updating the meter” on page 13](#).

### 3.1.2 IPTV Settings

#### ► Network



Network parameters to receive IPTV signal.

- DHCP: Enable this option to get the proper IP address when the unit is first connected to a network that uses this protocol. That feature contributes to make things easier to installers when debugging network access.
- IP: IP Address of the equipment into the local network.
- Mask: Subnet mask of the equipment (by default 255.255.255.0).
- Gateway: IP Address of the router into the local network (by default 10.8.8.1).
- MAC: Physical address of the equipment. It is unique and cannot be edited.

#### ► IGMP



- IGMP Versions: Protocol for multicast transmissions used by the router. In case of use it, version must be selected:



- IMGPy1: IGMP version 1. Each time user selects a multicast address, meter asks for the new multicast stream.
- IMGPy2: IGMP version 2. Each time user selects a multicast address, meter stops receiving the current stream and asks for receiving the new one.
- IMGPy3: IGMP version 3. Each time user selects a multicast address, meter stops receiving the current stream and asks for receiving the new one, from the servers approved by the user.
- Off: It does not send any IGMP messages and discards the received ones.

## 3.2 **Top Menu**

To access the **Top menu** from any screen, swipe down from the top of the screen.

From the **Top menu**, you can access various management options. Some options are only available in certain modes.

- Workspace
- Task planner
- USB
- WiFi
- HDMI™
- CAM
- ASI
- SDI
- Volume
- Brightness
- Notifications area

These options are described below.



### 3.2.1 Top Menu Options

#### ► Workspace Settings

It allows you to manage the workspace folders where data and resources are stored.

For more information refer to ["WORKSPACES" on page 82.](#)

#### ► Task Planner

It allows scheduling certain tasks to run at a specific date and time. It is currently available for screenshots.

Selecting this option opens a window with the available scheduled tasks. Pressing **Add Task** opens a window that allows scheduling a task with the following settings:

- Type: Select the type of task to schedule.
- Run every (min): If the task is repetitive, select the interval between tasks.
- Start date: Start date and time of the task.
- Expiration date: End date and time of the task.

When a task is scheduled, a calendar icon appears in the top information bar, indicating that there are pending tasks to be executed.

#### ► USB Settings

It allows managing the devices connected to the **USB 3.0** port and the **USB 2.0 Type-C** port.

The USB 2.0 Type-C port supports two types of connections: **host** or **slave**. The appropriate option must be selected based on the connected device and its interaction with the meter.



It also allows safely unmounting the memory connected to the USB 3.0 port by pressing SDA in order to prevent damage to the memory and its data.

### ► WiFi Settings

It manages the Wi-Fi connection through the USB-WiFi adapter connected to the USB port.

- 1 Connect the USB Wi-Fi adapter (provided with the device) to the USB 3.0 connector located at the top of the device. The adapter detects available WiFi networks.
- 2 Access the **Top** menu by swiping down from the top of any screen and tapping on the Wi-Fi option to open the Wi-Fi settings window with access parameters.
- 3 The Wi-Fi configuration window displays the Wi-Fi networks detected by the USB Wi-Fi adapter. It also allows enabling/disabling the DHCP protocol, which automatically assigns an IP to the device. If not using this protocol, the IP, mask, and gateway must be entered manually.

### ► HDMI™ Settings

It allows you to view the resolution and other details of the interface with HDMI™ technology.

### ► CAM Settings

It allows you to manage the CAM card.

### ► ASI Settings

It allows you to select the ASI input by BNC or SFP+ (MSA).

It allows you to enable/disable the ASI output by BNC and/or SFP+ (MSA).



For more details refer to [“SDI/ASI OPTICAL OPTION” on page 109](#).

### ►SDI Settings

It allows you to select the SDI input by BNC or SFP+ (MSA).

It allows you to enable/disable the SDI output by BNC and/or SFP+ (MSA).

For more details refer to [“SDI/ASI OPTICAL OPTION” on page 109](#).

### ►Volume Settings

It allows you to increase or decrease the audio volume using a sliding bar.

Clicking on the icon on the left side of the slider mutes the audio output. Clicking on the icon on the right restores the volume to the level before it was muted.

### ►Brightness Settings

It allows you to increase or decrease the screen brightness using a sliding bar.

Clicking on the icon to the left of the slider lowers the brightness to the minimum, while clicking on the icon to the right increases the brightness to the maximum.

### ►Notification Area

It allows you to view the most recent notifications that have appeared on the screen.



## 4 IPTV

### 4.1 Introduction

IPTV stands for TV over IP networks. It actually means TV over any type of IP packet based distribution network. They can be referred to as LAN (Local Area Network), ethernet, computer networks, etc. With the growth of LAN based TV distribution systems, having an IPTV input in your field strength meter becomes a handy feature.

The equipment allows you to receive television programmes coming from IPTV networks. The multicast IPTV stream should carry MPTS or SPTS in order to be analyzed and decoded. It is also able to work with networks where there are redundant SPTS multicast streams with the same IP but different source.

Those programmes can be displayed on the screen together with other important service information. Although some concepts are similar, signal quality assessment metrics is not the same in IPTV as it is in digital TV over RF..

|                                                                                     |                                        |                                                                                       |      |
|-------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------|------|
|  | <a href="#">IPTV analyzer (06:41s)</a> |  | SCAN |
|-------------------------------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------|------|

#### Video 2.

The equipment offers you the measurements you need to understand, identify and correct the new problems that can be found in this new type of television distribution networks.

### 4.2 Operation

- 1 Connect the **IPTV** input/output signal to the equipment through the **IPTV** interface located on the top side of the meter.
- 2 Press the **Settings**  option from the **Home** menu.
- 3 At **IPTV settings**, press on the option **Network** and **IGMP** to set configuration (for more details refer to ["IPTV Settings" on page 18](#)).
- 4 Back to the **Home** menu and press on the **IPTV**  option to enter the IPTV tool.
- 5 To display the IPTV settings swipe right from the left side of the screen or press on any field related on the Status bar.



**6** Streaming settings show information and allows user to select one multicast/ unicast and other parameters:

- Multicast Group / Unicast IP address and port.
- Transport Stream standard.
- SAPSDP info: It shows info contained in the multicast (Session Announcement Protocol and Session Description Protocol).
- Discovered Multicast: It shows all multicast discovered in the network. For each one shows IP address, port, bitrate and source IP.
- VLAN: It allows entering the VLAN tag to identify data packets belonging to a specific virtual network. Otherwise, select **All traffic**.
- TS capture mode: Select TS or T2-MI.

**7** If the received IPTV signal is correct and the meter successfully locks onto the TS or T2MI, the tuning bar turns green and some data from the streaming is displayed: stream address, Ethernet connection icon, received standard, name that identifies the stream and bitrate. The meter automatically identifies if it is an RTP/UDP protocol.

**8** Now some tools can be used to obtain more information about the signal. The IPTV Analyzer screen is divided into 3 windows:

- main window
- left top window
- left bottom window

Each one of these windows can show a tool selected by the user. Press on the inverted triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window. Press on '+' to zoom in the window or '-' to zoom out.

**9** The tools available to analyze the IPTV signal are:

- Video
- IPTV measurements
- IPTV signal parameters
- IPTV packet rate
- IPTV IPAT
- Ping request
- Video/audio parameters
- Audio levels & loudness
- Recording
- Network delay
- TS analyzer
- SFP parameters

**10** Select one tool for each panel to analyze the signal.

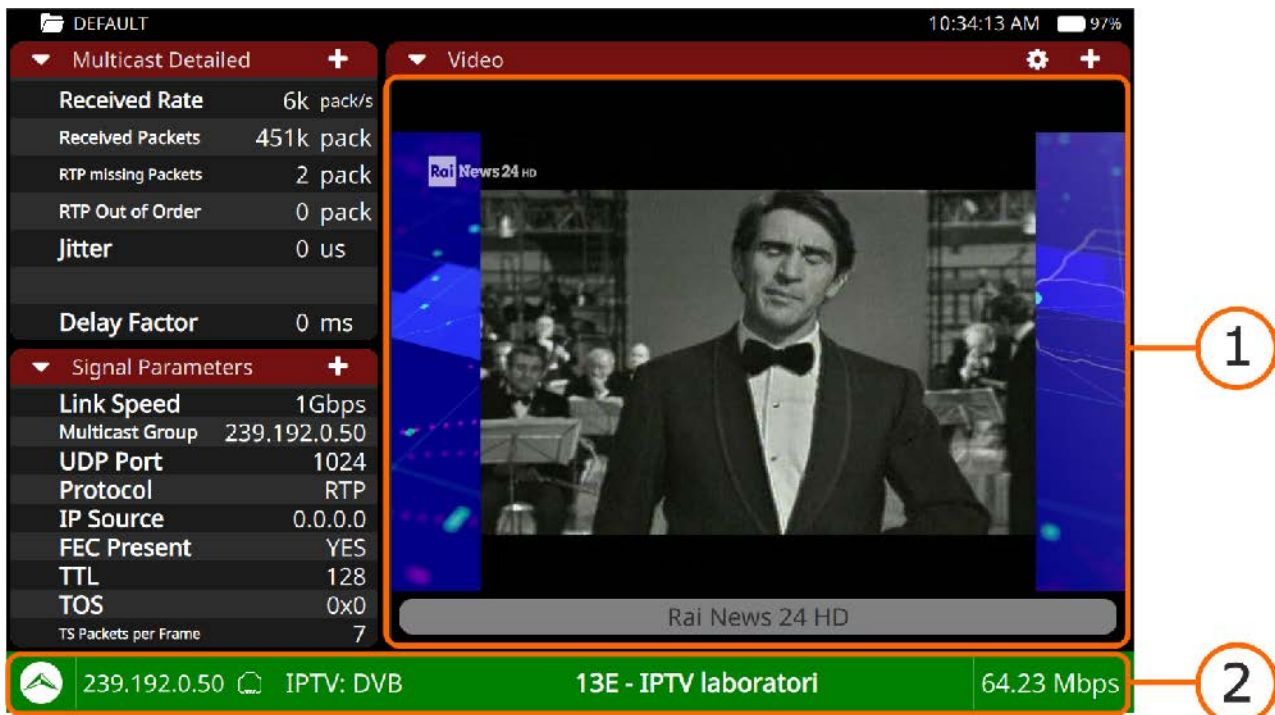
In the next sections each IPTV Analyzer tool is explained in detail.



### 4.3 Video

The video tool decodes and visualizes the image for the selected multicast/unicast service.

#### ► Screen



**Figure 6.**

- 1** Video image. At the bottom shows the name of the service. When you press on the image, the name of the service being viewed will appear. Tapping again, a list of services available in the multiplex will appear.
- 2** Status bar: It displays streaming parameters such as IP, modulation, network name, and total bitrate of the Transport Stream. It also provides access to streaming settings. The Promax icon returns to the Home screen.

#### ► Touch gestures



Tap: When you tap on the image it shows the service name. Pressing again it opens a list of available services in the multiplex.



## ► Settings

Press on the gear  to display the tool settings:

- Audio: Select one of the audio layers available for the service.

## 4.4 IPTV Measurements

It shows measurements of the received multicast IP traffic.

### ► Screen

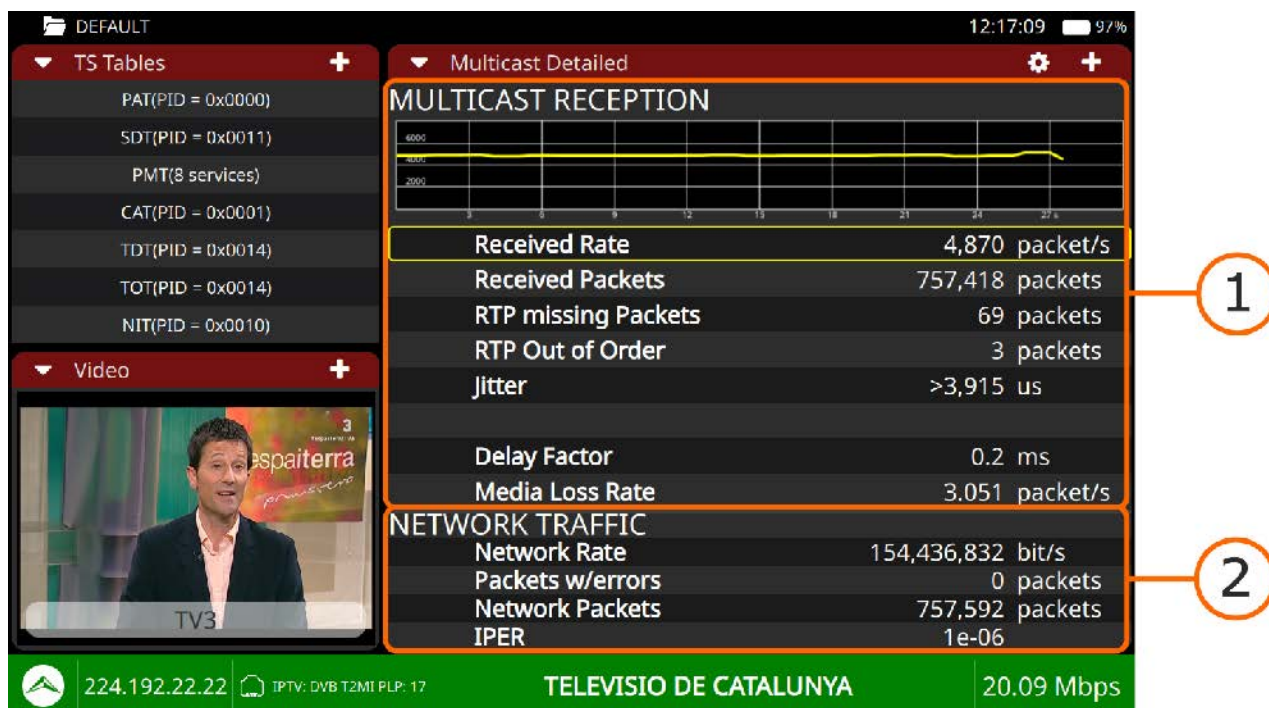


Figure 7.

- 1 Multicast reception: It displays several measurements about the received multicast and a graph of one selected measurement over time. To visualize all the measurements and two graphs, you have to view it in full screen. The available measurements are:

- Received rate
- Received packets
- RTP missing packets
- Duplicated RTP
- RTP out of order
- Jitter
- Delay factor (max amount of time that a packet waits in the buffer before being released)



- Media loss rate (the higher this number the worse the overall viewing experience; only for RTP traffic)
- Max IPAT (max interarrival packet time)
- FEC status (Forward Error Correction)
- Reordered FTP
- Fixed packets
- Overflow
- TS packets per frame

**2** Network traffic: It displays several measurements about the network traffic:

- Total network bitrate
- IPER (packet error rate)
- Packets with errors
- Total network packets.

#### ► Touch gestures



Tap: Select the multicast measurement to be drawn on the graph.

#### ► Settings

Press on the gear  to display the tool settings:

- Reset: It restarts all the measurements.

## 4.5 **IPTV Signal Parameters**

The IPTV signal parameters tool displays all data related to the IPTV signal.



## ► Screen

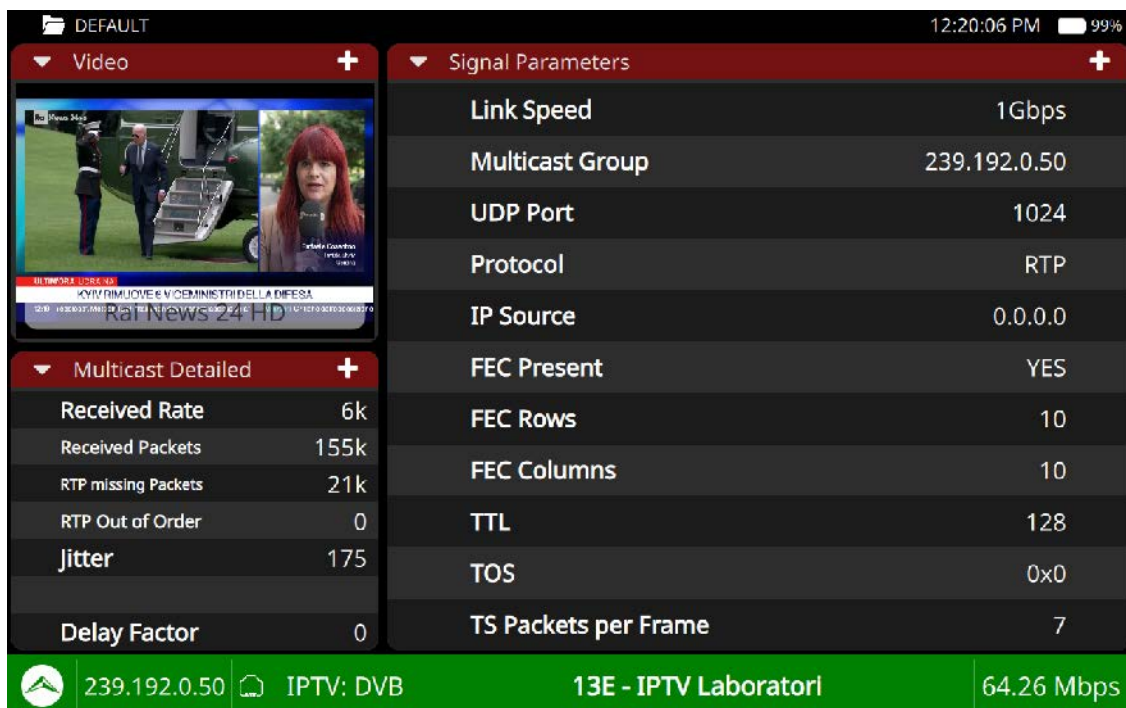


Figure 8.

### 1 Available parameters:

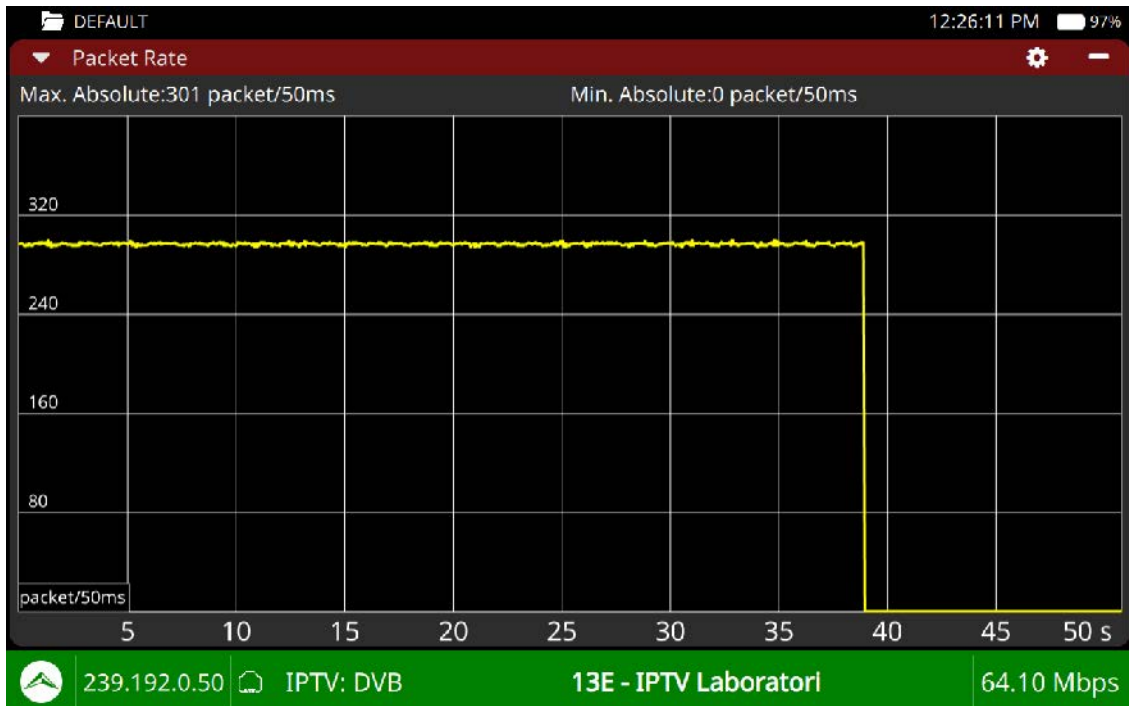
- Link speed
- Multicast group
- UDP port
- Protocol
- IP Source
- FEC
- FEC rows
- FEC columns
- TTL
- TOS
- TS packets per frame

## 4.6 IPTV Packet Rate

The IPTV Packet Rate tool shows the number of IP packets being received from the current multicast/unicast stream over time.



## ► Screen



**Figure 9.**

- 1 Graph showing the reception of packets over time. The top fields show the amount absolute of maximum and minimum packets received per unit of resolution.

## ► Settings

Press on the gear to display the tool settings:

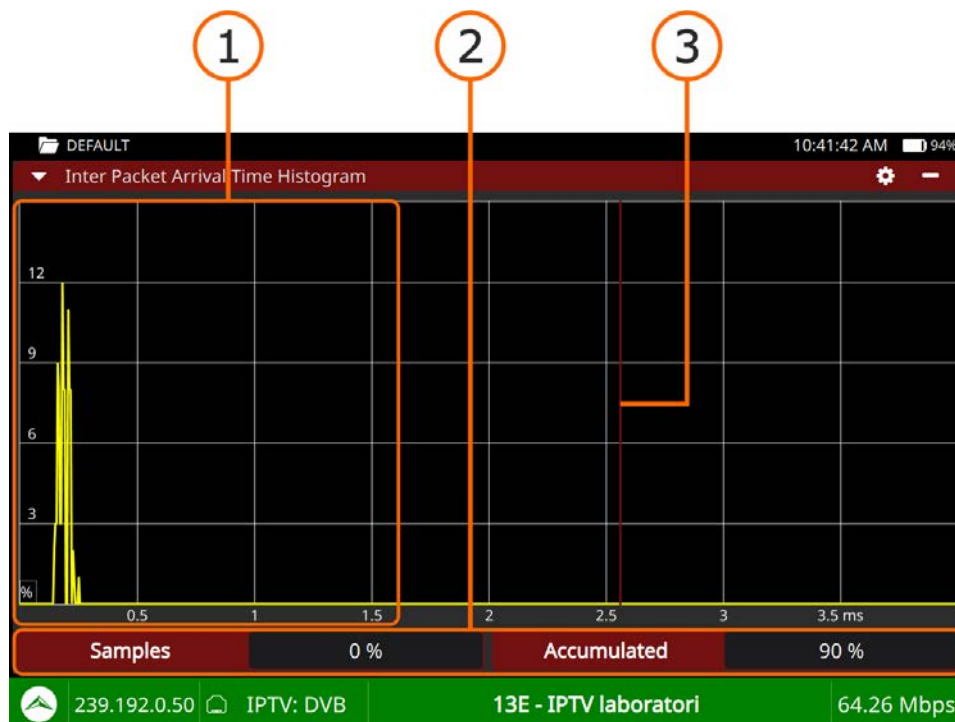
- Resolution: It allows you to change graph resolution. Available values are: 1, 5, 10, 50, 200 and 1000 ms.

## 4.7 IPAT - Inter Packet Arrival Time

The IPAT tool displays a graph with the percentage of IP packets that are received and the time between them in order to check the continuity of the reception of the selected stream.



## ► Screen



**Figure 10.**

- 1** Histogram that represents the percentage of IP packets received on the vertical axis and the time between packet arrivals on the horizontal axis. Most values should be around small values, otherwise there may be a network problem.
- 2** Information: The "Samples" field refers to the percentage of packets used for the graph that are equal to or below the threshold. The "Accumulated" field shows the cumulative percentage of packets that are above the threshold.
- 3** Red vertical line: Selected threshold for time between packet arrival. Press left or right to change the threshold.

## ► Settings

Press on the gear  to display the tool settings:

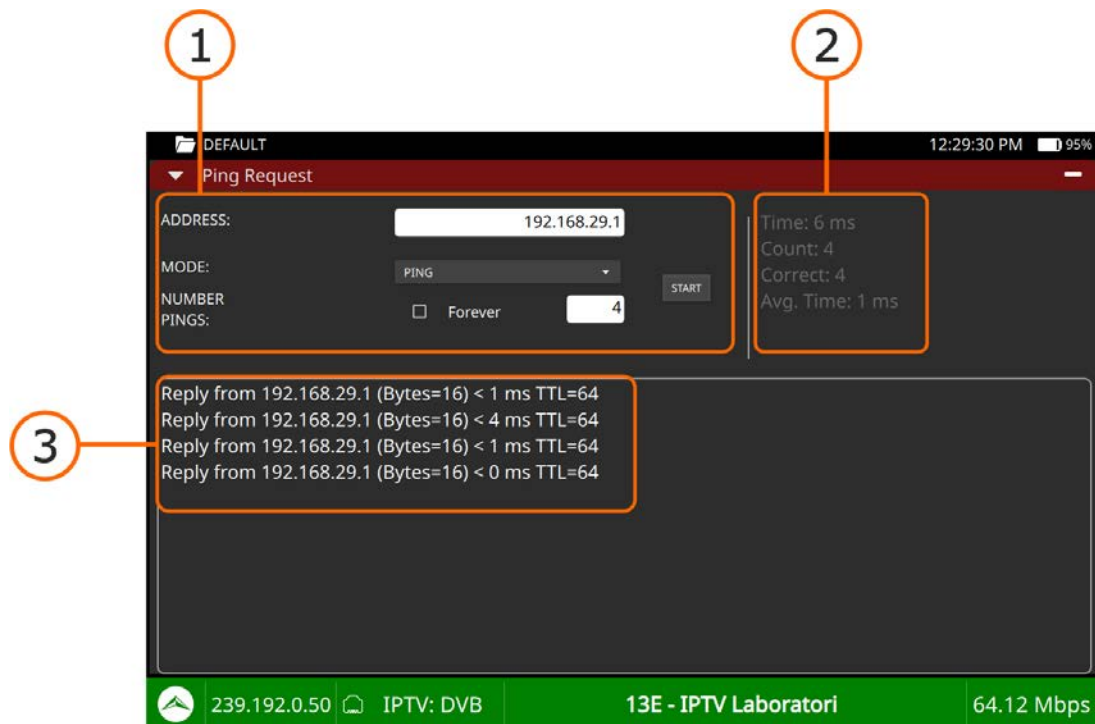
- Erase: It deletes all data received and starts over.
- Span: It allows to change the span. Available values are: 4, 8, 40, 200, 400 and 1920 ms.



## 4.8 PING Request

The **PING Request** tool It allows sending one or several PINGs to other devices in the network.

### ► Screen



**Figure 11.**

**1** Data fields: It shows several parameters to set previously to use it.

- Address: IP where to send the PING.
- Mode: PING, trace or average. PING mode confirms if a given unit can get any response from another machine in the same network or external network. TRACE mode shows all routers between the meter and the IP address measuring transit delays of packets across the network. Average mode shows average delay between two points in the network and also changes in this delay.
- Number of PINGs: Select a number of PINGs to send or check the "forever" box to send PINGs continuously.
- Start: It starts sending PINGs.

**2** Results: It shows the data report after sending pings.

- Time
- Pings count
- Correct pings
- Average time

**3** Ping replies: It shows the replies from the pings sent.



## ► Touch gestures



Tap: Press on the fields to select an option or edit a value.

## 4.9 Video / Audio Parameters

The **Video / Audio Parameters** tool displays all metadata related to the video and audio layers and other services (teletext, apps, hybrid TV, etc.).

### ► Screen



Figure 12.

#### 1 General Parameters:

- Service / Provider / Network
- SID; LCN; TSID; NID; ONID
- Scrambled; languages; subtitles; audio desc; teletext
- APP; URL

#### 2 Video / Audio Parameters:

- Video: PID; bitrate; codec
- Audio: PID; bitrate; codec; language

#### 3 (at full screen) Information about PID (packet identifier) of video, audio and other services (teletext, hybrid, etc.).



## ► Touch gestures



Tap: Press on an icon to obtain more information about audio, video and others services.

### 4.10 Audio levels & loudness

The **Audio levels & loudness** tool allows the user to measure and visualize audio levels and loudness.

The **audio level** of each channel is measured in dBs and displayed in a bar graph. If the TS carries multiple audio channels (stereo left and right, 5.1, 7.1), up to 8 channels can be displayed on screen simultaneously..

**Audio loudness** is measured according to LUFS (Loudness Units relative to Full Scale), a measurement standard used to quantify perceived loudness, mimicking the way the human ear naturally perceives volume.

[Audio levels \(01:33s\)](#)

SCAN

Video 3.

## ► Screen



Figure 13.



## 1 Audio loudness:

- *Momentary* (LUFS; *Loudness Units relative to Full Scale*): SPeceived loudness over a very short time interval (400 ms) for measuring volume peaks and transients..
- *Short-term* (LUFS): Perceived loudness over a short time interval (3 s) for measuring the loudness of sections..
- *Integrated* (LUFS): Perceived loudness over a long time interval for measuring the loudness of a complete audio file (song, program, podcast, etc.).
- *Loudness Range* (LU; *loudness units*): Variation in perceived loudness throughout an entire audio file.

## 2 The bars display the real-time audio level of each channel. The red horizontal markers indicate the maximum peak reached. The colour of the bar indicates the audio level as follows:

- Red: High volume (0 dB <-> -9 dB).
- Yellow: Medium volume (-9 dB <-> -18 dB).
- Green: Appropriate volume (-18 dB <-> -54 dB).

## ► Settings

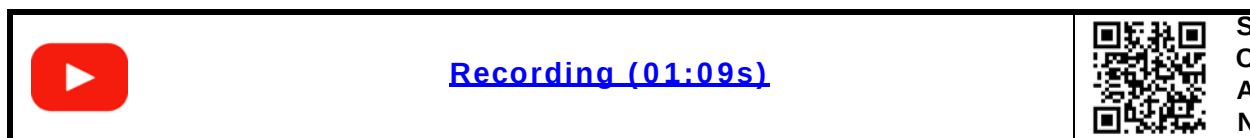
Press on the gear  to display the tool settings:

- Audio: It allows the user to change the audio track in case there is more than one available.

## 4.11 Recording

The recording tool allows recording the full transport stream from the demodulated signal being tuned.

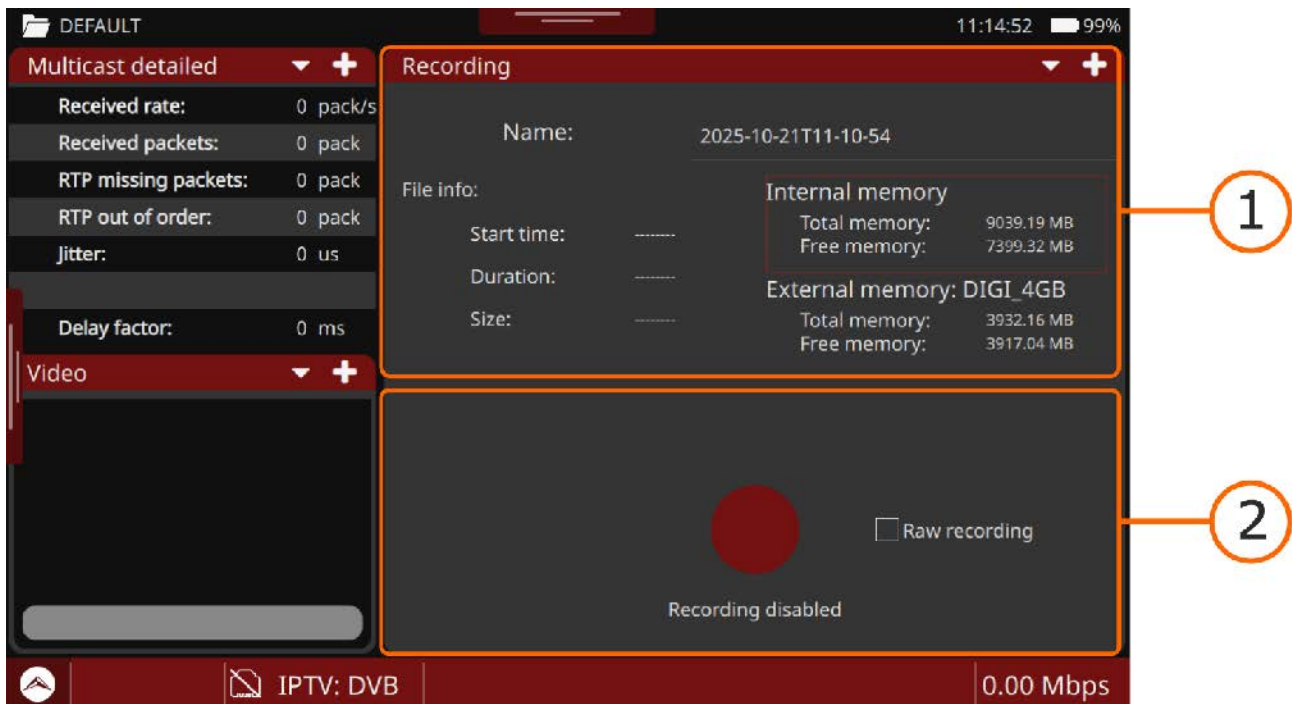
It also has the option to record raw signal in order to be analysed in case there was any problem locking the signal.



Video 4.



## ► Screen



**Figure 14.**

- 1** File information Panel: On the left you can see start time, duration and file size. On the right side there is the total memory and free memory available.
- 2** On/Off button: It shows a red button to start/stop recording. If pressing when the button is a circle it starts recording and when it is square it stops recording.

Recordings are saved in the current workspace from where it can be exported to a pendrive (for more details refer to [“WORKSPACES” on page 82](#)). To access it, open the **Top** menu and select **Workspace**. Then select the current **Workspace** and the **IPTV** mode. Next, tap **Recordings**.

## ► Raw Recording Procedure

Raw recording is useful to analyze the signal in order to find any problems in the data stream. It is very important to follow these steps to generate a proper raw record:

- 1** Disconnect the signal.
- 2** Check the **Raw recording** option.
- 3** Start recording.
- 4** Connect the signal.



- 5 After a while, stop recording.
- 6 Access the Workspace (for more details refer to [“WORKSPACES” on page 82](#)) to get the recording.
- 7 Press on the file to access the options menu and copy it to an USB.
- 8 Now the file can be analysed or send in order to find any problems.

### ► Touch gestures



Tap: Tap the on/off button to start/stop recording or to check the raw recording checkbox.

## 4.12 Network Delay

The **Network Delay** function displays the time delay of the transport stream from its origin to its arrival at the destination.

All transmitters in an SFN (Single Frequency Network) must be synchronized. The responsibility for ensuring that each bit of the transport stream is transmitted at exactly the same time lies with the modulators located at the transmitters. Since the transport stream is sent to transmitters at different locations, typically via satellite or IP links, it will arrive at each destination with a variable delay. This delay is referred to as “network delay.”

### ► Screen

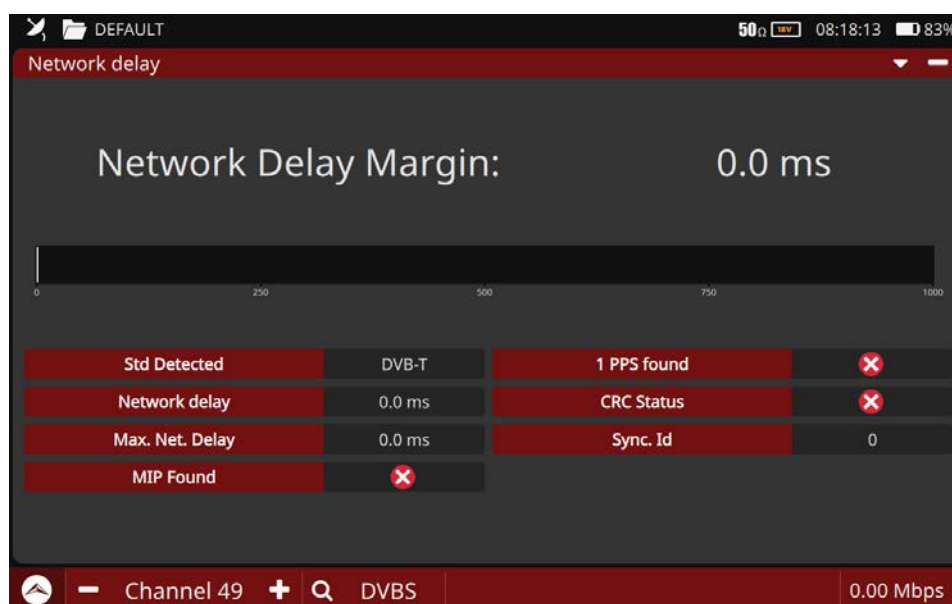


Figure 15.



- 1 Network Delay Margin: Time difference (numeric and graphical) between the maximum acceptable delay and the measured network delay. This difference is the network delay margin.
- 2 Left panel (Signal Detection): Transmission standard; Measured network delay; Maximum acceptable delay; Detected MIP (Mega-Frame Initialization Packet for network synchronization).
- 3 Right panel (Signal Status): 1PPS detected (OK/NOK); CRC status (cyclic redundancy check); synchronization identifier.

**NOTE:** Use the equipment 1PPS input to feed the synchronization signal.

#### 4.13 TS Analyzer

The TS Analyzer tool performs a detailed analysis of the embedded transport stream. This tool includes these functions:

- Tables Analyzer
- Bitrate
- PIDs
- Alarms - TR 101 290

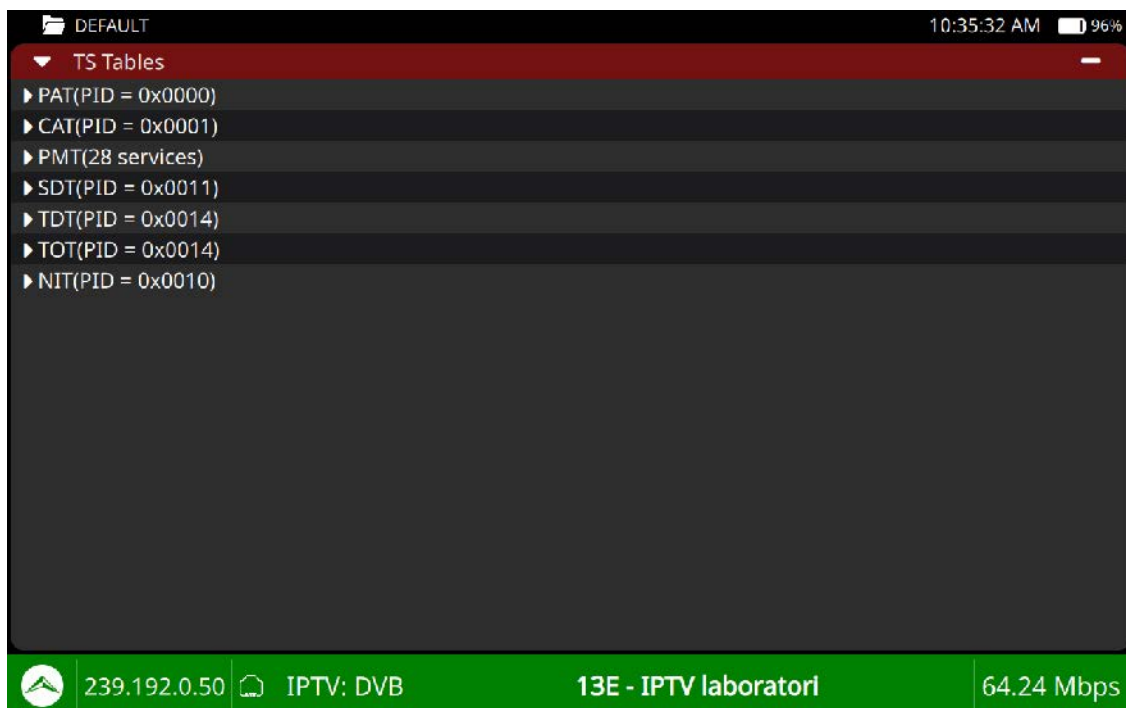
In the following sections, each of them is described.

#### 4.14 Tables Analyzer

The Tables Analyzer tool shows the PSI/SI tables from the TS. All components and contents of tables can be consulted by deploying the nodes. So the user can analyse the tables and see in detail what is being transmitted and if the information is properly encapsulated.



### ► Screen



**Figure 16.**

- 1 Main window: It shows all metadata extracted from the transport stream. These are the PSI (Program Specific Information) and SI (Service Information) tables and all their related fields. They can be unfolded to see its subfields.

### ► Touch gestures



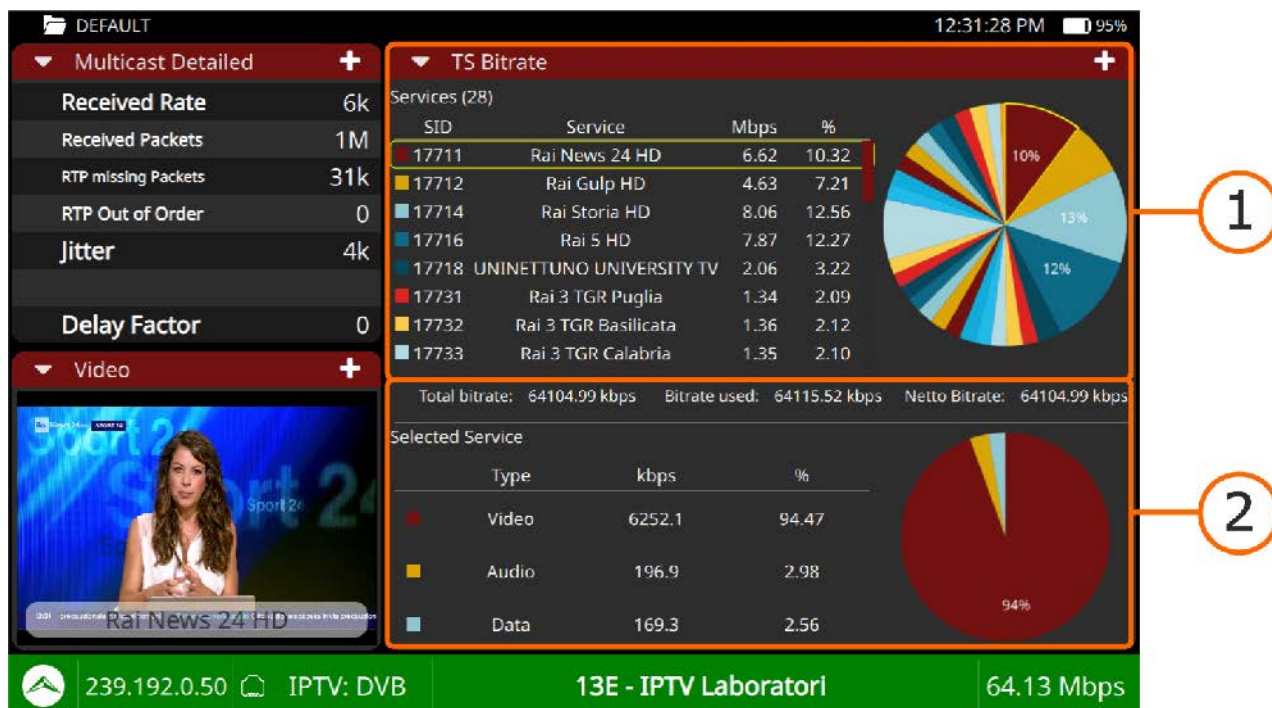
Tap: Tap on the table name to unfold it and see its sub-fields.

## 4.15 TS Bitrate

The TS Bitrate tool shows in a graphical way, and also by numbers and percentage the TS bitrate. A pie chart, which is updated in real time, shows the evolution of the bitrate distribution for each one of the services in the tuned multiplex. It also allows selecting any of the services to check its composition, which is also shown on a pie chart.



## ► Screen



**Figure 17.**

- 1** Services window: It shows all services in the transport stream in real time. The "Others" service indicates the amount of bitrate used by the PSI/SI tables. The pie chart indicates the percentage contribution in bitrate per service in respect to the total TS bitrate, including null packets, which are displayed in black. Under the chart, the total bitrate of the TS is shown, along with the total used bitrate (the sum of the bitrate for all PIDs in the TS) and the net bitrate (total bitrate minus null packets). If there is no reuse of PIDs, the used bitrate should match the total bitrate.
- 2** Selected service window: It shows bitrate for video, audio and data for the selected service in real time, both in percentage and absolute value. The pie chart shows this information graphically.

## ► Touch gestures



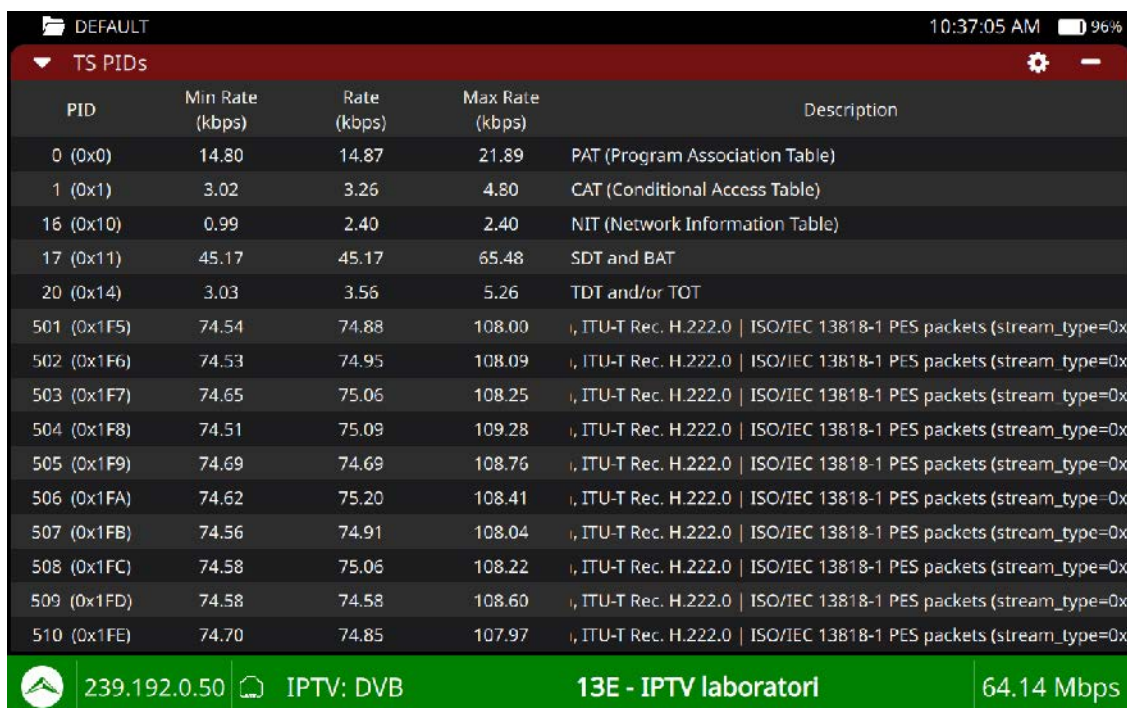
Tap: Select a service.



## 4.16 PIDs Analyzer

The PIDs Analyzer tool shows an ordered PID list with a short explanation of each PID and its minimal, maximum and average bitrate. Bitrate is refreshed continuously to help in understand bandwidth usage.

### ► Screen



| PID         | Min Rate (kbps) | Rate (kbps) | Max Rate (kbps) | Description                                                        |
|-------------|-----------------|-------------|-----------------|--------------------------------------------------------------------|
| 0 (0x0)     | 14.80           | 14.87       | 21.89           | PAT (Program Association Table)                                    |
| 1 (0x1)     | 3.02            | 3.26        | 4.80            | CAT (Conditional Access Table)                                     |
| 16 (0x10)   | 0.99            | 2.40        | 2.40            | NIT (Network Information Table)                                    |
| 17 (0x11)   | 45.17           | 45.17       | 65.48           | SDT and BAT                                                        |
| 20 (0x14)   | 3.03            | 3.56        | 5.26            | TDT and/or TOT                                                     |
| 501 (0x1F5) | 74.54           | 74.88       | 108.00          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 502 (0x1F6) | 74.53           | 74.95       | 108.09          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 503 (0x1F7) | 74.65           | 75.06       | 108.25          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 504 (0x1F8) | 74.51           | 75.09       | 109.28          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 505 (0x1F9) | 74.69           | 74.69       | 108.76          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 506 (0x1FA) | 74.62           | 75.20       | 108.41          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 507 (0x1FB) | 74.56           | 74.91       | 108.04          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 508 (0x1FC) | 74.58           | 75.06       | 108.22          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 509 (0x1FD) | 74.58           | 74.58       | 108.60          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 510 (0x1FE) | 74.70           | 74.85       | 107.97          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |

Figure 18.

- 1 PID window: It shows all the PIDs of the analyzed TS. For each PID it shows its content and minimum, average and maximum bitrates.

### ► Settings

Press on the gear  to display the tool settings:

- Order by: This options allows you to sort PIDs by name, bitrate, max bitrate, min bitrate or description.
- Reset: It restarts PID analysis.



### ► Touch gestures



Drag: To move along the PID list.

## 4.17 TS Alarms - TR 101 290

The TS Alarms (TR 101 290) tool displays in real time the evolution of the TS and the alarms that may occur. The list of alarms are classified in three priority levels, according to TR 101 290 guidelines by DVB group.

### ► Screen



**Figure 19.**

- 1** Alarms window: It shows all the alarms classified by priority. Press on any of these alarms to enter in a specific screen for the alarm that shows a log with a list of events, a description and an option to enable/disable the alarm.
- 2** Events window: It shows a graph for each alarm with all the events that have happened. Errors are shown as a red strip lasting as long as the error.

### ► Settings

Press on the gear to display the tool settings:

- Reset alarms: It initiates the alarm analysis from scratch.



- Reset alarms and TS: It initiates the capture of PSI/SI table info again followed by the alarm analysis.

### ► Touch gestures



Tap: When tapping on an alarm it shows log, description and settings menu.

### ► Icons

Besides each alarm there is an icon which is explained in the following table.

| Icon                                                                                | Description                                                                      |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|    | No errors occurred for this alarm.                                               |
|  | There has been an event for this alarm in the last 5 seconds.                    |
|  | The event for this alarm just happened.                                          |
|                                                                                     | The alarm is still being evaluated or there is no info in the TS to evaluate it. |



## 5 ASI

### 5.1 Introduction

Asynchronous Serial Interface (ASI), also known as DVB-ASI or TS-ASI, is a method of transmitting digital and cable television signals. It is responsible for transporting an MPEG transport stream (MPEG-TS) through a coaxial cable or optical fiber, being especially used in broadcasting.

The ASI standard is defined by CENELEC and is part of the DVB standards. Regarding its technical specifications, ASI transports MPEG data serially at a constant speed of up to 270 Mbps. The most common packet size in ASI is 188 bytes, although a size of 204 bytes is also supported that includes Reed error correction -Solomon.

ASI is used in ATSC, DVB-T, DVB-S and other broadcast signals. It works as a unidirectional transmission designed for coaxial cable at speeds ranging up to 200 Mbps and has the capacity to transport one or several already compressed SD, HD, UHD or audio programs, the ASI signal being the final result of video compression and audio for later distribution or transmission.

In summary, the Asynchronous Serial Interface (ASI) plays a fundamental role in the transmission of digital and cable television signals. Its robustness and flexibility make it an indispensable tool for transporting a wide variety of video and audio formats.

### 5.2 Operation

- 1 Connect the ASI signal to the meter through the ASI/SDI input connector.
- 2 From the **Home** menu press on **ASI** .
- 3 Access the **Top Menu** by swiping down from the top of the screen and select the ASI option. From there you can:
  - select the ASI input.
  - enable/disable ASI output.
- 4 Access the **Settings Sidebar** by swiping right from the left side of the screen or press on the status bar.
- 5 Settings show information and allows selecting these parameters:
  - Transport Stream standard: Select if it is DVB, ISDB or ATSC.
  - TS capture mode: Select TS or T2-MI.



- 6** If the received ASI signal is correct and the meter successfully locks onto the TS or T2MI, the status bar turns green and displays the signal standard, the name that identifies the stream and its bitrate.
- 7** Now tools can be used to obtain more information about the signal. The ASI Analyzer screen is divided into 3 windows:
- main window
  - left top window
  - left bottom window

Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any panel to display the tools menu. Select one tool to be shown on the window. Press on '+' to **zoom in** the window or '-' to **zoom out**.

- 8** The tools available to analyze the ASI signal are:

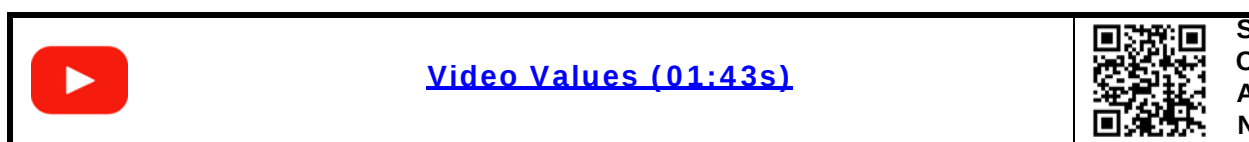
- Video/Audio Parameters.
- Video.
- Recording.
- Audio levels.
- Eye diagram.
- Network delay.
- TS Analyzer.
- SFP Parameters.

- 9** Select one tool for each window to analyze the signal.

In the next sections each ASI Analyzer tool is explained in detail.

### 5.3 Video / Audio Parameters

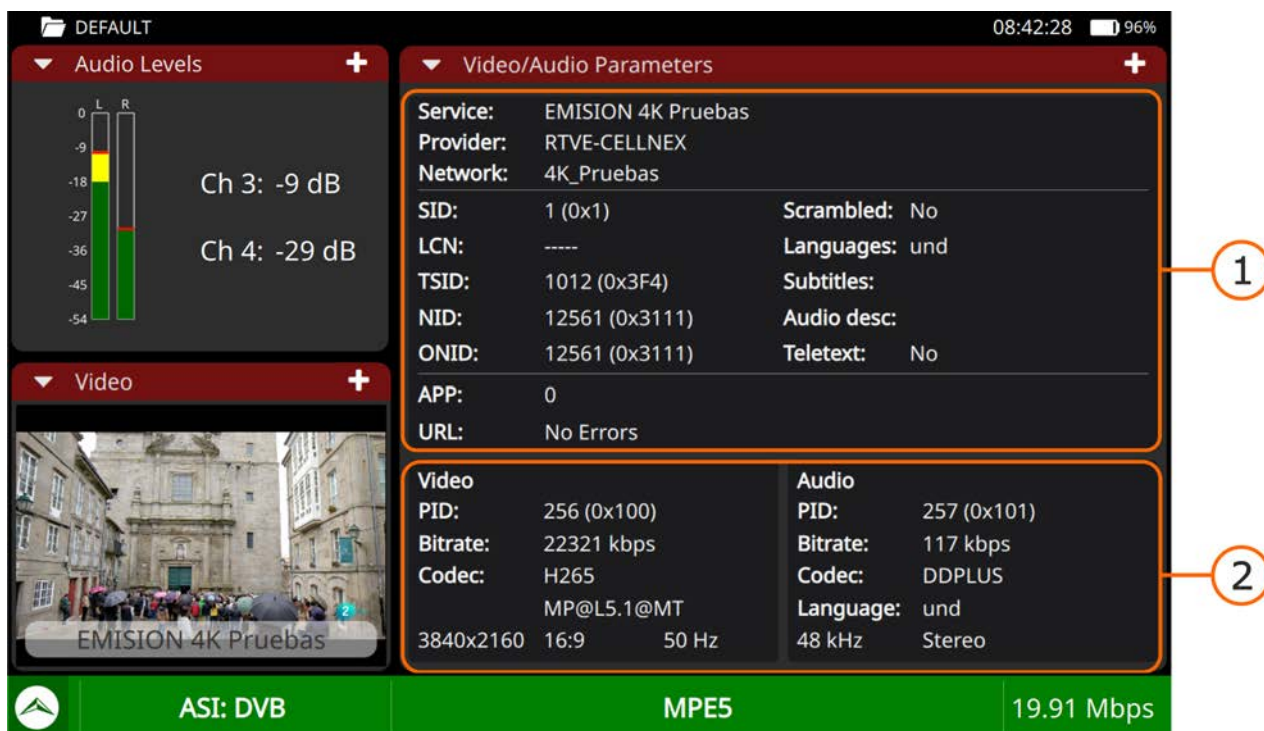
The Audio/Video tool shows all metadata related to the video and audio layers.



**Video 5.**



## ► Screen

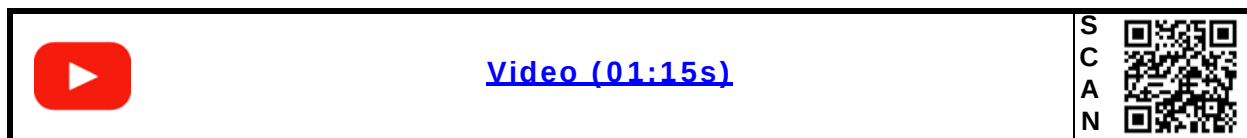


**Figure 20.**

- 1** General panel: It provides service information: name, provider and network name. Also Service ID, Logical Channel Number, transport stream ID, Network ID, original network ID, if the service is scrambled, audio language, subtitles language and some others.
- 2** Video/audio panel: On the left side shows video layer details: PID, bitrate, codec, resolution, aspect ratio and scanning rate. On the right side shows audio layer details: PID, bitrate, codec, language, sampling rate and format.

## 5.4 Video

The video tool displays one of the services carried by the transport stream.



**Video 6.**



## ► Screen

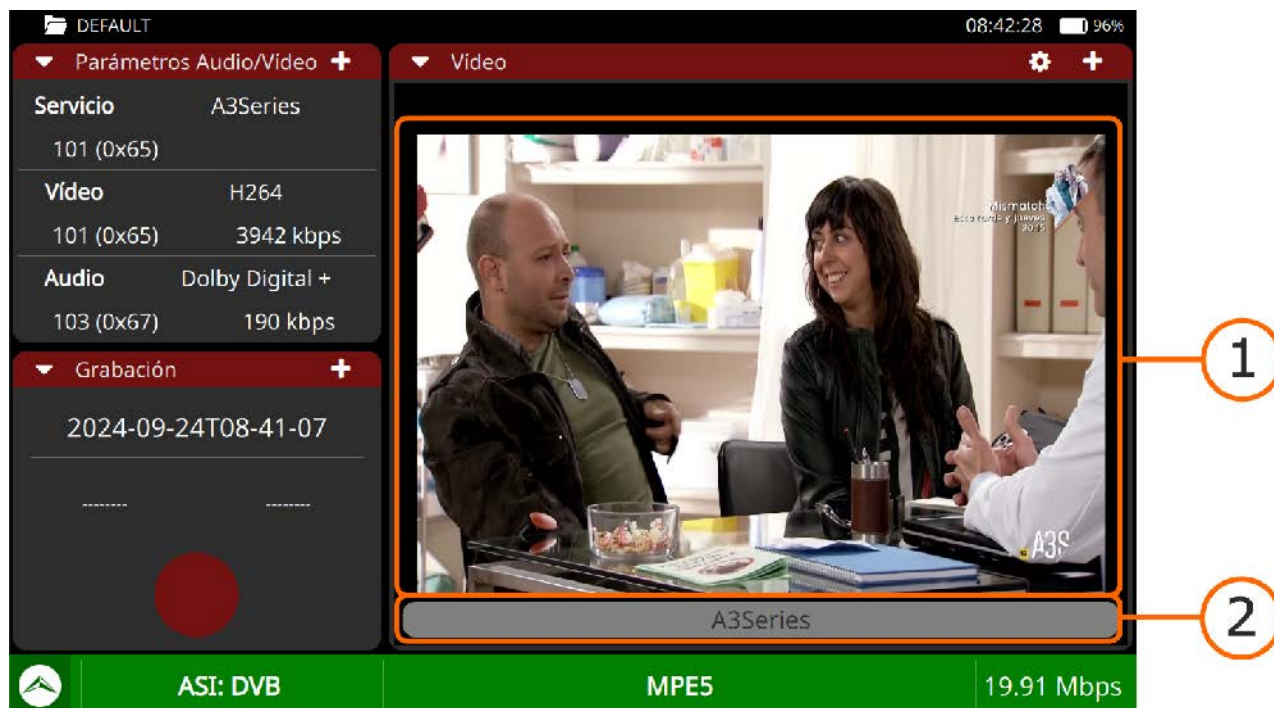


Figure 21.

- 1 Video Panel: It displays one service from the transport stream.
- 2 Service bar: It shows the name of the service. If pressing, it opens a new window that shows all services available for the transport stream. Select one service to be displayed on screen. Each service is identified by its ID and name and it shows if it is video, audio or data.

## ► Settings

Press on the gear  to display settings:

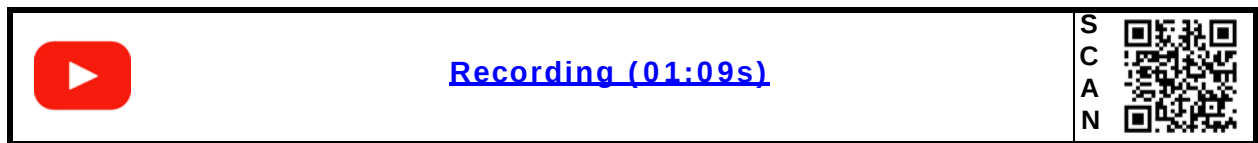
- Audio: It allows the user to change language of the service in case there is more than one available.



## 5.5 Recording

The recording tool allows recording the full transport stream.

It also has the option to record raw signal in order to be analysed in case there was any problem locking the signal.



Video 7.

### ► Screen

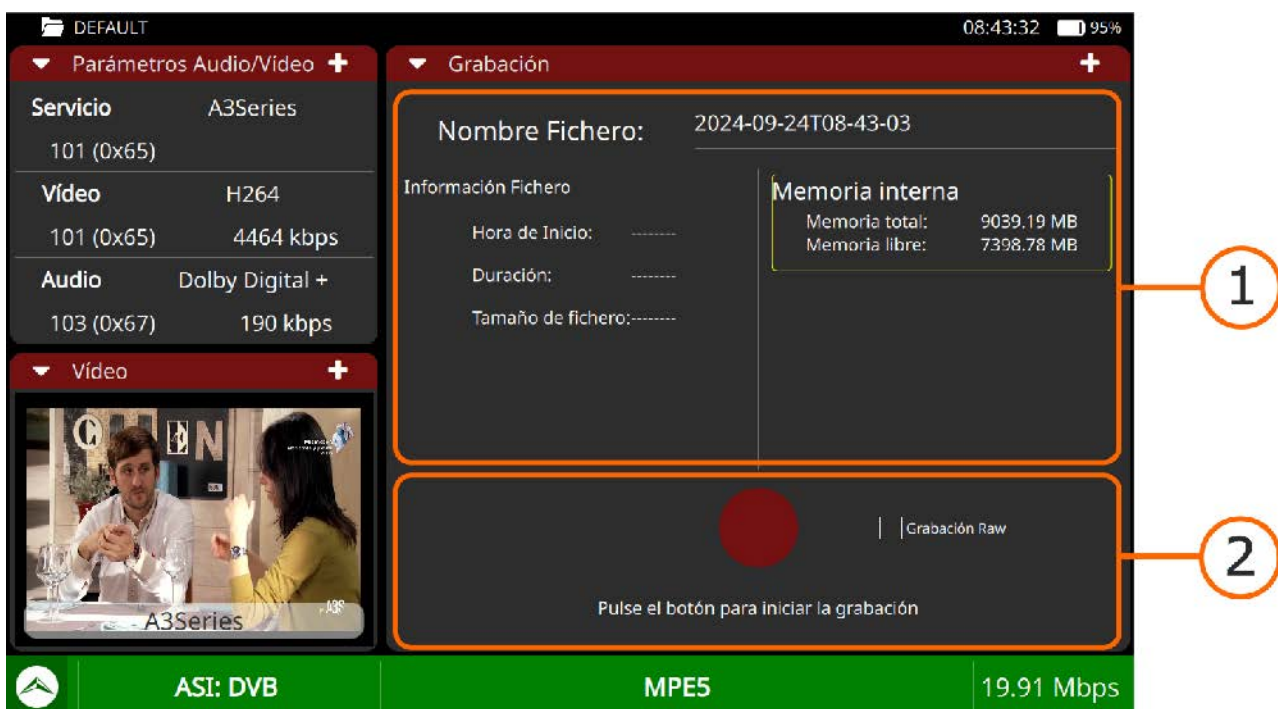


Figure 22.

- 1** File information Panel: On the left you can see start time, duration and file size. On the right side there is the total memory and free memory available.
- 2** On/Off button: It shows a red button to start/stop recording. If pressing when it is a round button it starts recording and when it is square it stops recording.



Recordings are saved in the current workspace from where it can be exported to a pendrive (for more details refer to [“WORKSPACES” on page 82](#)). To access it, open the **Top** menu and select **Workspace**. Then select the current **Workspace** and the **ASI** mode. Next, tap **Recordings**.

### ► Raw Recording Procedure

It is very important to follow these steps to generate a proper raw recording:

- 1** Disconnect the signal.
- 2** Check the raw recording checkbox.
- 3** Start recording.
- 4** Connect the signal.
- 5** After a while, stop recording.
- 6** Access the Workspace (for more details refer to [“WORKSPACES” on page 82](#)) to get the recording.
- 7** Deploy the Top Menu and select Workspace. Now select your current workspace and on “Mode” select “ASI”. Then press “Recording”.
- 8** Press on the file to access the options menu and copy it to an USB.
- 9** Now the file can be analysed or send to find any problem.

### ► Touch gestures



Tap: Tap the on/off button to start/stop recording or to check the raw recording checkbox.

## 5.6 Audio levels & loudness

The **Audio levels & loudness** tool allows the user to measure and visualize audio levels and loudness.

The **audio level** of each channel is measured in dBs and displayed in a bar graph. If the TS carries multiple audio channels (stereo left and right, 5.1, 7.1), up to 8 channels can be displayed on screen simultaneously..



**Audio loudness** is measured according to LUFS (Loudness Units relative to Full Scale), a measurement standard used to quantify perceived loudness, mimicking the way the human ear naturally perceives volume.

[Audio levels \(01:33s\)](#)

S  
C  
A  
N

Video 8.

### ► Screen



Figura 23.

### 1 Audio loudness:

- **Momentary (LUFS; Loudness Units relative to Full Scale):** SPerceived loudness over a very short time interval (400 ms) for measuring volume peaks and transients..
- **Short-term (LUFS):** Perceived loudness over a short time interval (3 s) for measuring the loudness of sections..
- **Integrated (LUFS):** Perceived loudness over a long time interval for measuring the loudness of a complete audio file (song, program, podcast, etc.).
- **Loudness Range (LU; loudness units):** Variation in perceived loudness throughout an entire audio file.



2 The bars display the real-time audio level of each channel. The red horizontal markers indicate the maximum peak reached. The colour of the bar indicates the audio level as follows:

- Red: High volume (0 dB <-> -9 dB).
- Yellow: Medium volume (-9 dB <-> -18 dB).
- Green: Appropriate volume (-18 dB <-> -54 dB).

### ► Settings

Press on the gear  to display the settings menu:

- Audio: It allows the user to change the audio track in case there is more than one available.

## 5.7 Eye Diagram

The **Eye diagram** tool is a visual representation of a digital signal voltage over time. A wide, clear “eye” indicates a strong, low-noise signal, while a closed or distorted eye indicates signal degradation, which can cause errors in the received SDI stream.

### ► Screen

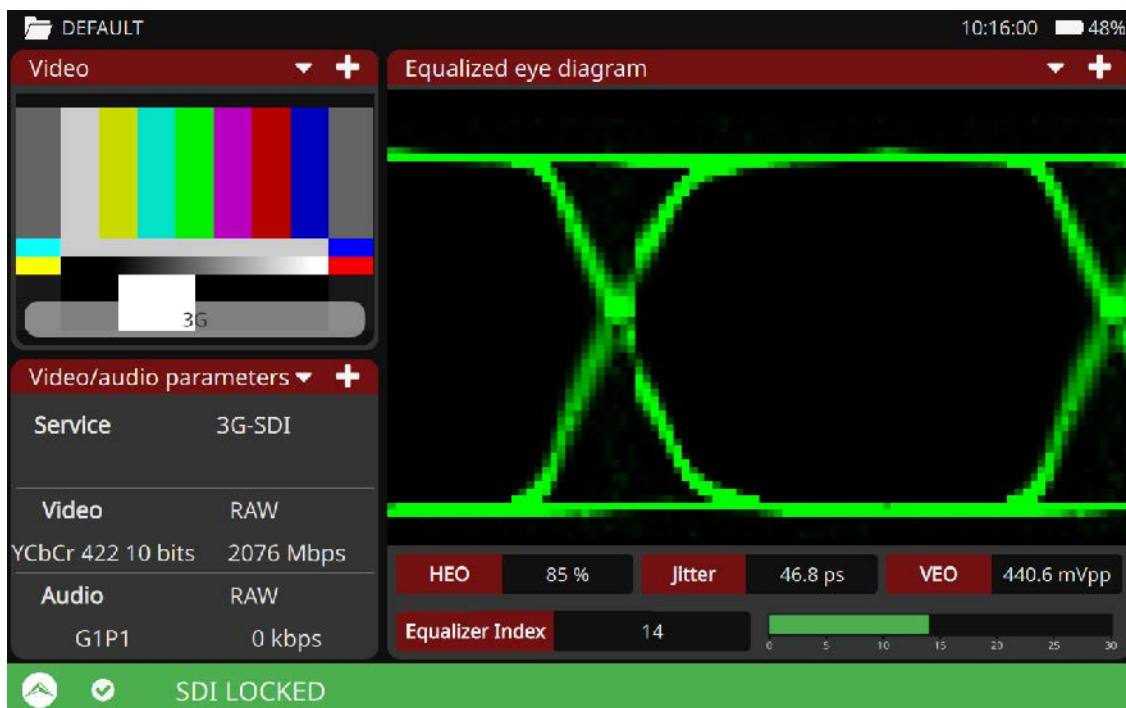


Figure 24.



**1** Eye Diagram. The more open the eye, the better the signal is being received. If the area closes, it indicates a problem with the reception.

**2** Measurements:

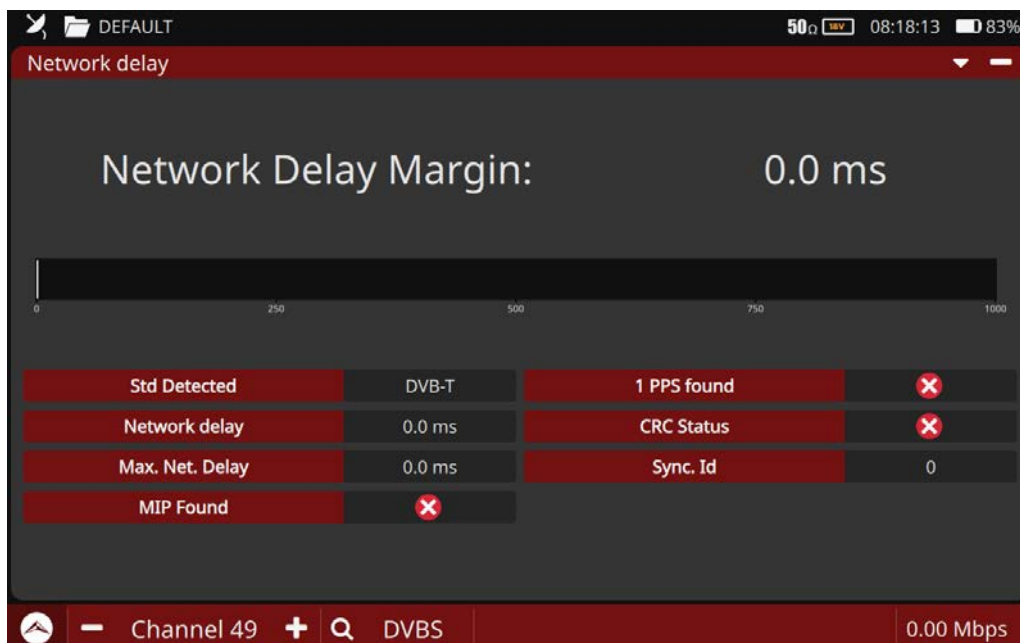
- HEO (Horizontal Eye Opening): Horizontal eye opening index.
- jitter: If the jitter value is high, the eye closes horizontally, indicating signal degradation.
- VEO (Vertical Eye Opening): Vertical eye opening index.
- Índice de ecualización (0 - 55%): Indicates the level of effort the receiver must make to keep the eye open. A high value indicates significant signal degradation and increased effort to correct it.

## 5.8 Network Delay

The **Network Delay** function displays the time delay of the transport stream from its origin to its arrival at the destination.

All transmitters in an SFN (Single Frequency Network) must be synchronized. The responsibility for ensuring that each bit of the transport stream is transmitted at exactly the same time lies with the modulators located at the transmitters. Since the transport stream is sent to transmitters at different locations, typically via satellite or IP links, it will arrive at each destination with a variable delay. This delay is referred to as “network delay.”

### ► Screen



**Figure 25.**



- 1 Network Delay Margin: Time difference (numeric and graphical) between the maximum acceptable delay and the measured network delay. This difference is the network delay margin.
- 2 Left panel (Signal Detection): Transmission standard; Measured network delay; Maximum acceptable delay; Detected MIP (Mega-Frame Initialization Packet for network synchronization).
- 3 Right panel (Signal Status): 1PPS detected (OK/NOK); CRC status (cyclic redundancy check); synchronization identifier.

**NOTE:** Use the equipment 1PPS input to feed the synchronization signal.

## 5.9 Transport Stream Analyzer

The **Transport Stream Analyzer** is a set of tools that provides the user with a comprehensive analysis of the transport stream.



[Transport Stream Tools \(05:29s\)](#)

  
SCAN

### Video 9.

The TS Analyser has these tools:

- TS Tables
- TS Bitrate
- TS PIDs
- TS Alarms

In the next sections each one of these tools are explained in detail.

### 5.9.1 Transport Stream Tables

The Tables Analyzer tool shows the PSI/SI tables from the TS. All components and contents of tables can be consulted by deploying the nodes. So the user can analyse the tables and see in detail what is being transmitted and if the information is properly encapsulated.



## ► Screen

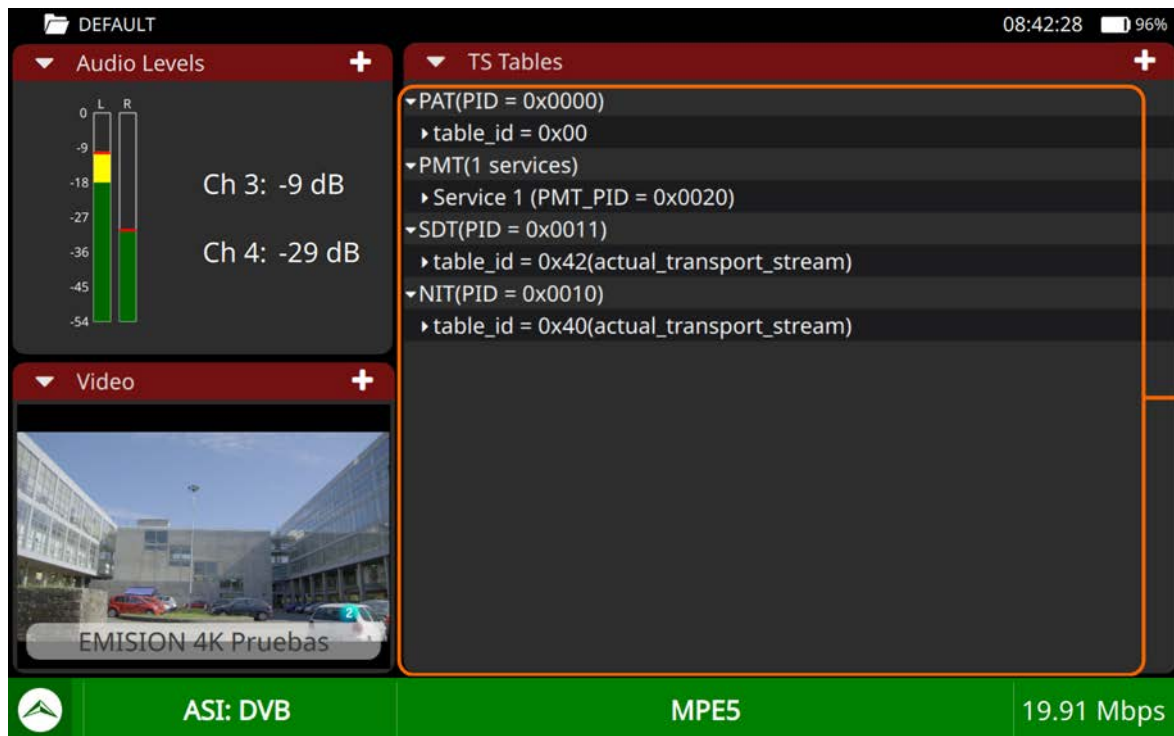


Figure 26.

- 1 General Panel: It shows all metadata extracted from the transport stream. These are the PSI (Program Specific Information) and SI (Service Information) tables and all their related fields. They can be unfolded to see its subfields.

## ► Touch gestures



Tap: To unfold tables and see its sub-fields.

### 5.9.2 Transport Stream Bitrate

This function shows the TS bitrate in a graphical way, and also by numbers and percentage. A pie chart, which is updated in real time, shows the evolution of the bitrate distribution for each one of the services in the transport stream. It also allows selecting any of the services to check its composition, which is also shown in a pie chart.

## ► Screen

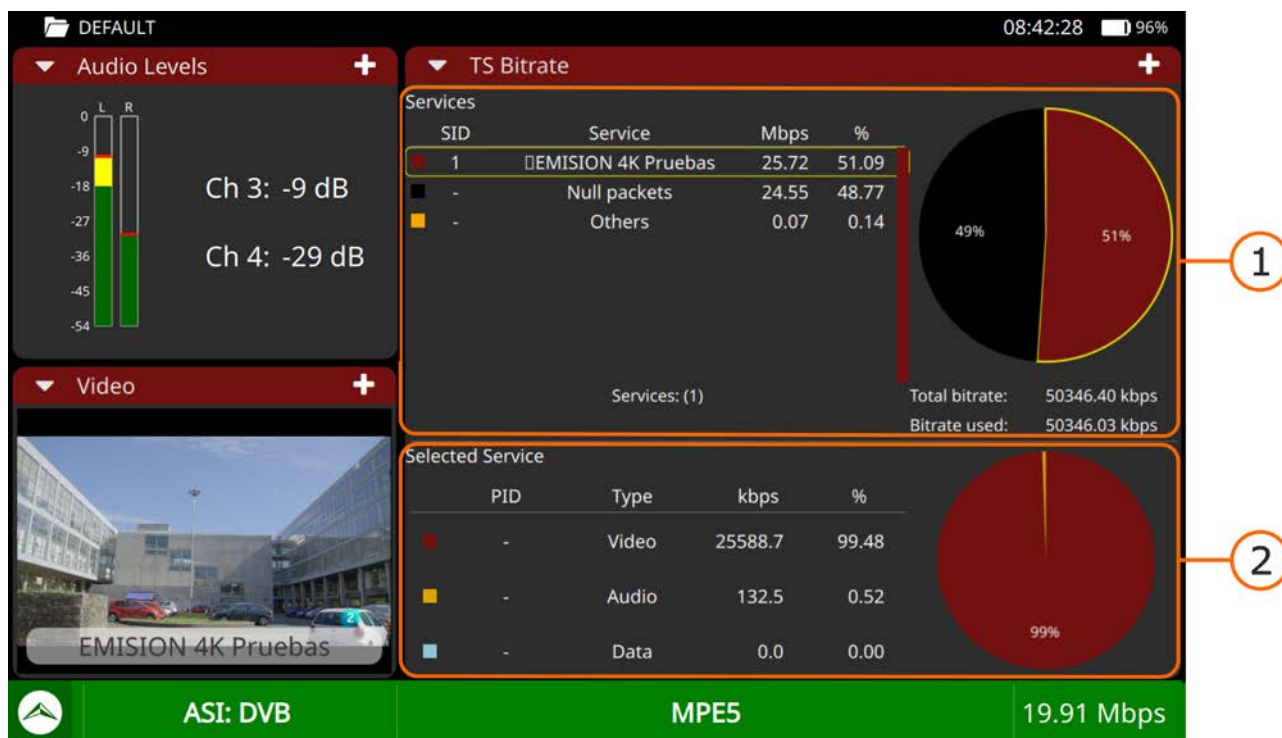


Figure 27.

- 1 Services panel: It shows all services in the transport stream in real time. The "Others" service indicates the amount of bitrate used by the PSI/SI tables. The pie chart indicates the percentage contribution in bitrate per service in respect to the total TS bitrate, including null packets, which are displayed in black. Below the pie chart there is the total TS bitrate and total bitrate used.
- 2 Selected service panel: It shows video, audio and data bitrate for the selected service in real time, both in percentage and absolute value. The pie chart shows this information graphically.

## ► Touch gestures



Tap: To select a service.



### 5.9.3 Transport Stream PIDs

The Transport Stream PIDs tool shows an ordered PID list with a short explanation of each PID and its bitrate. Bitrate is refreshed continuously to help in understand bandwidth usage.

#### ► Screen

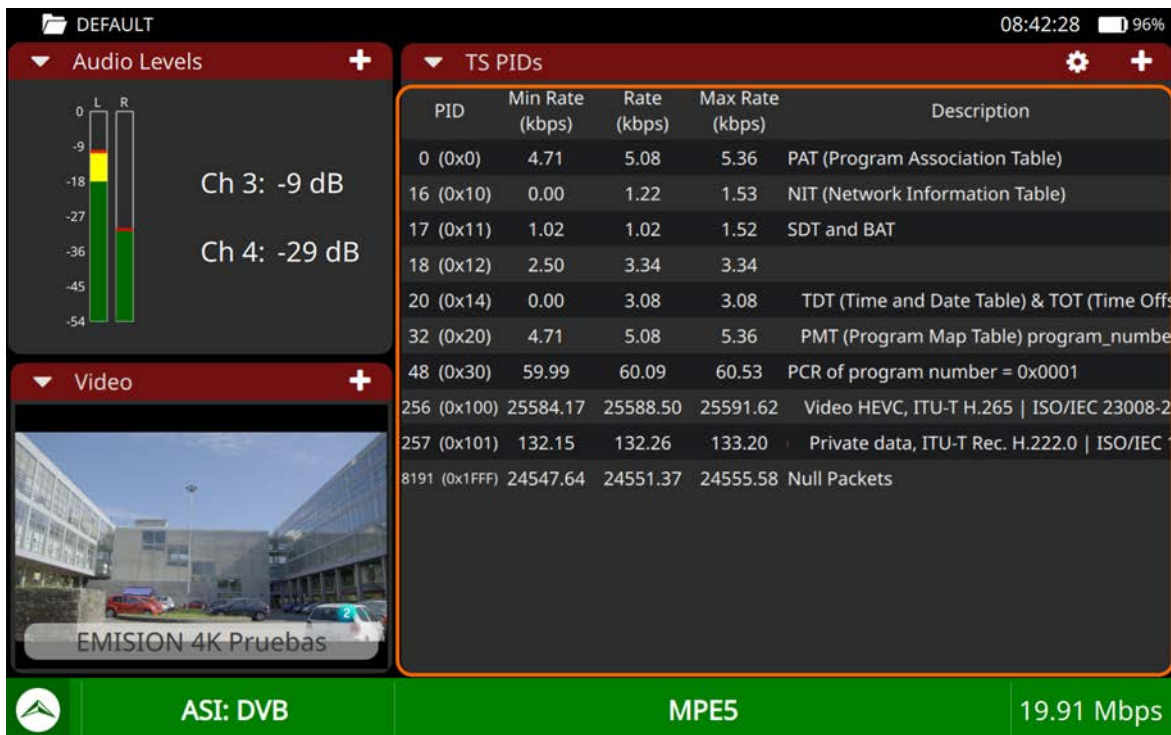


Figure 28.

- 1 PID Panel: It displays all the PIDs in the analyzed TS. For each PID describes its content and their minimum, average and maximum bitrates.

#### ► Touch gestures



Drag: It moves along the PID list.

#### ► Settings

Press on the gear to display settings:

- Order by: It allows ordering by PID, bitrate, max. bitrate, min. bitrate or description.

- Reset: It resets and captures the PID list.

### 5.9.4 Transport Stream Alarms

The TS Alarms tool is a dynamic tool that displays in real time the evolution of the TS and the alarms that may occur. The priority levels of alarms are set according to the recommendations by technical standards TR 101 290 from the DVB group.

#### ► Screen

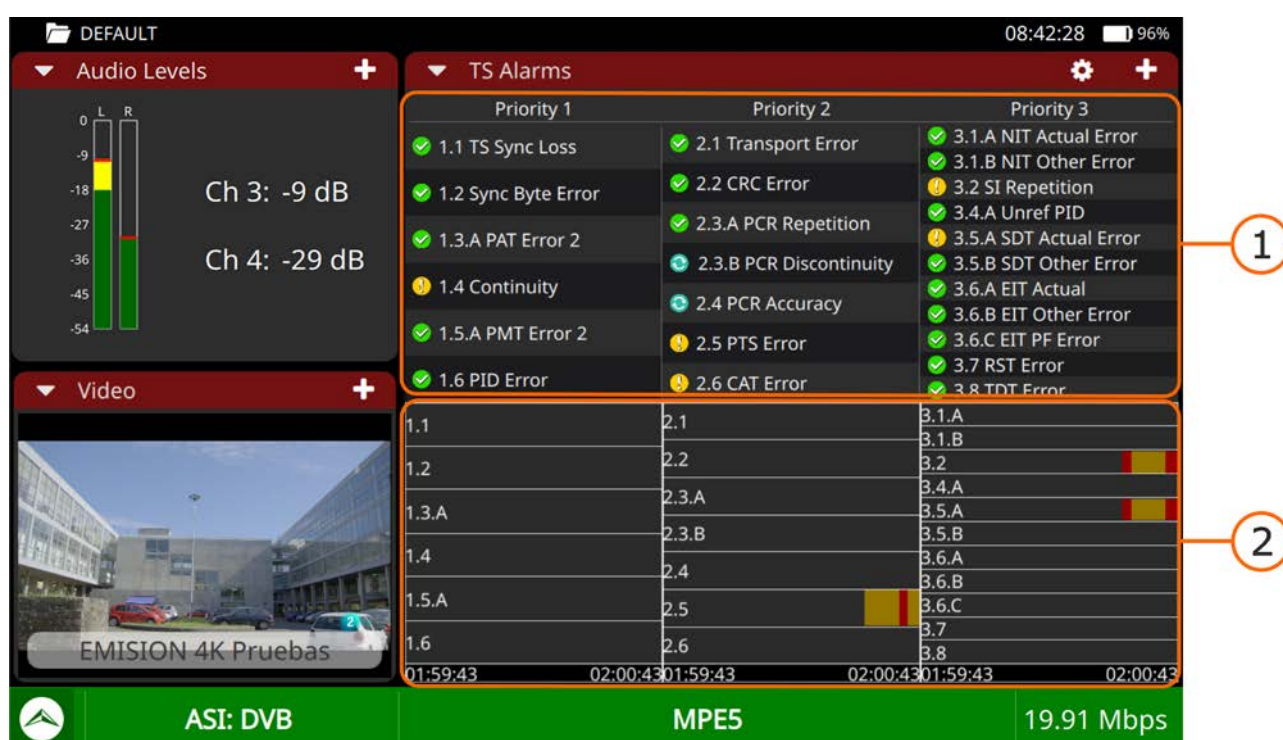


Figure 29.

- 1** Alarms Panel: It shows all the alarms classified by priority. Press on any of these alarms to enter in a specific screen for the alarm that shows a log with a list of events, a description and an option to enable/disable the alarm.
- 2** Events panel: It shows a graph for each alarm with all the events that have happened. Errors are shown as a red strip lasting as long as the error.

#### ► Touch gestures



Tap: It opens an alarm to show log, description and settings menu.



## ► Settings

Press on the gear  to display settings:

- Reset alarms: It initiates the alarm analysis from scratch.
- Reset alarms and TS: It initiates the capture of PSI/SI table info again followed by the alarm analysis.

## ► Icons

Besides each alarm there is an icon which is explained in the following table.

| Icon                                                                                | Description                                                                      |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|    | No errors occurred for this alarm.                                               |
|   | There has been an event for this alarm in the last 5 seconds.                    |
|  | The event for this alarm just happened.                                          |
|                                                                                     | The alarm is still being evaluated or there is no info in the TS to evaluate it. |



## 6 STREAMING ANALYZER

### 6.1 Introduction

OTT (Over The Top) is a set of streaming protocols and technologies used to deliver video, audio, and other multimedia content directly to the end user over the Internet, either through VoD (Video On Demand) services or live broadcasts.

Among the most widely used standards for OTT transmission are SRT, DASH, HLS and EDI. All of them share a common goal: to minimize interruptions or “buffering” that occur during playback due to fluctuations in network quality.

Below is a detailed explanation of how the analysis tool works for each one of these protocols.

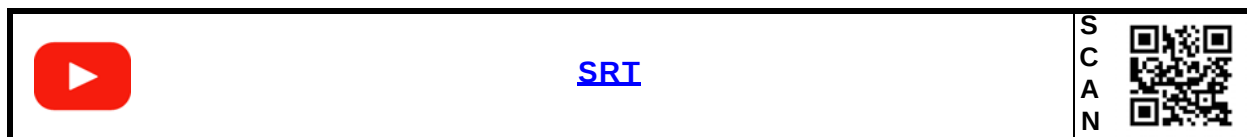
### 6.2 Protocol Selection

- 1 Connect the **OTT** input/output signal to the device through the Ethernet connector labeled **IP CTRL**, located on the side of the device.
- 2 Press the **Settings**  option from the **Home** menu.
- 3 In **Network Settings**, verify that the network parameters are correct for connecting to the data network (for more details, refer to [“▶ Network” on page 18](#)).
- 4 Return to the **Home** menu and press on **Streaming Analyzer**  option to access the OTT protocol analysis tool.
- 5 To display the Streaming settings, swipe right from the left side of the screen or tap any related field in the status bar.
- 6 In the **Network Protocol** field, select the OTT protocol to be analyzed: SRT, HLS, DASH or EDI.
- 7 The following section describes the operation for each protocol.



### 6.3 SRT Protocol

SRT (Secure Reliable Transport Protocol) is a protocol developed by Haivision that enables the distribution of video and audio as Transport Stream (SPTS or MPTS) packets encapsulated in IP packets and transmitted over the Internet.



#### Video 10.

- 1 From the **Streaming Analyzer**, swipe right from the left side of the screen or tap any related field in the status bar.
- 2 In the **Network Protocol** field, select the SRT protocol.
- 3 To receive SRT traffic, the first step is to configure the type of communication (or handshake) between the transmitter and receiver. To do this, in the **Mode** field, select one of the three options:
  - **Caller**: The device initiates the communication, and therefore the user must enter the IP address and UDP port of the listening device.
  - **Listener**: The device is in listening mode, so the device initiating the communication must know the IP address and UDP port of the listening device.
  - **Rendez-vous**: Either device can initiate the handshake, so both must know each other IP address and UDP port.
- 4 Next, in the **Encrypted** field, you must define whether the IP traffic is encrypted (On/Off). If it is encrypted, the password to decrypt it must be provided.
- 5 If the received SRT signal is correct and the meter successfully receives the TS, the status bar will turn green and display some data about the incoming stream: the stream IP address, the received standard, the stream identifier name, and the bitrate.
- 6 Now tools can be used to obtain more information about the signal. The ASI Analyzer screen is divided into 3 windows:
  - main window
  - left top window
  - left bottom window

Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any panel to display the tools menu. Select one tool to be shown on the window. Press on '+' to zoom in the window or '-' to zoom out.



7 The tools available are:

- SRT measurements
- Video ([“Video” on page 66](#))
- Audio levels & loudness ([“Audio levels & loudness” on page 67](#))
- Video/audio parameters ([“Video/Audio Parameters” on page 68](#))
- ETI Analyzer ([“ETI Analyzer” on page 69](#))
- TS Analyzer ([“TS Analyzer” on page 70](#))

8 Select one tool for each window to analyze the signal.

The **SRT Measurements** tool is specific to SRT traffic and protocol and is described below. The rest of the tools are equivalent to those used for RF signals and are explained in the chapter dedicated to the TV Analyzer.

## 6.4 SRT Measurements

### ► SRT Measurements screen

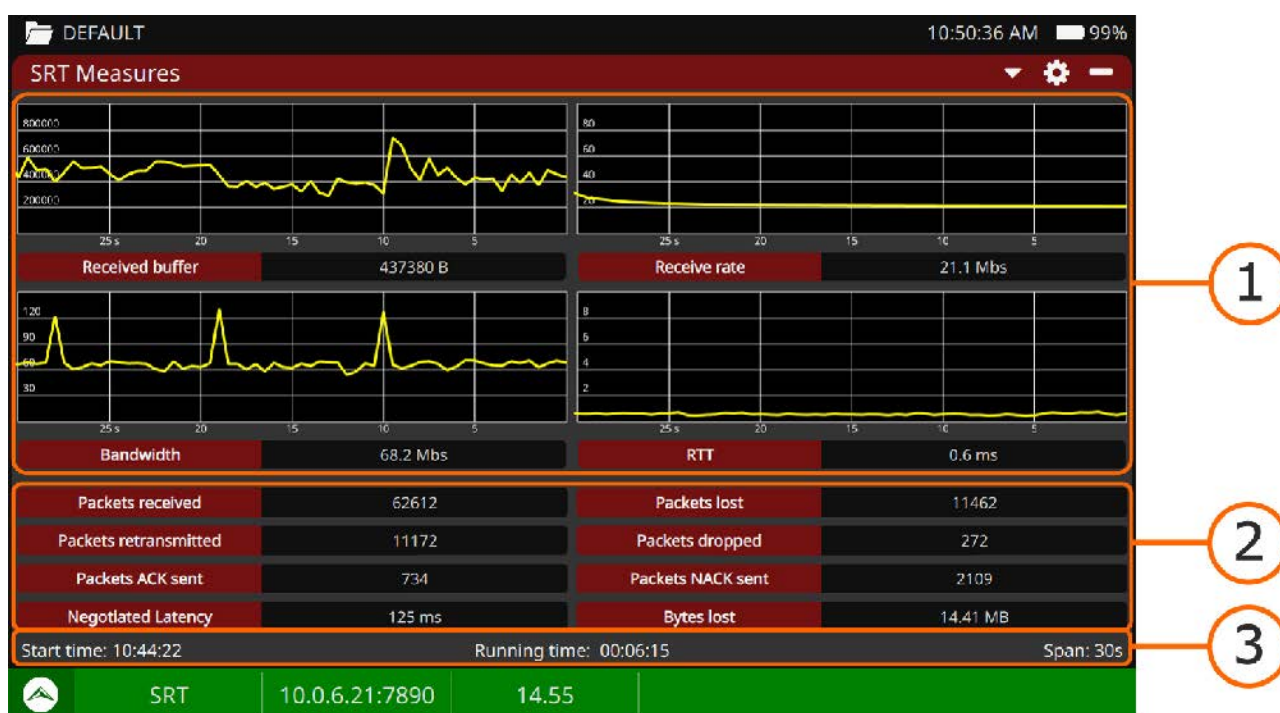


Figure 30.

1 Upper panel. It shows 4 graphs (from up to down):

- Received buffer: payload of the buffer from the receiver (bytes).
- Received rate: bandwidth used by the SRT traffic.
- Bandwidth: estimation of the available bandwidth on the network.
- RTT: half the time it takes for a packet to go to its destination and back.



**2** Bottom panel. It shows several measurements related to the overall network traffic (from top to bottom):

- Packets received: packets successfully received.
- Packets lost: packets that have not been received.
- Packets retransmitted: packets resent because the receiver did not acknowledge their reception the first time they were sent.
- Packets dropped: packets discarded for reasons such as corruption or delay.
- Packets ACK sent: acknowledgment that informs the sender about the packet reception (this number is lower than the number of packets received because acknowledgments are not sent until all packets are received).
- Packets NACK sent: the receiver informs the sender about packets that were not received (they were lost or arrived out of order).
- Negotiated latency: maximum time a packet can be waited for before being discarded. This is a time negotiated between the device initiating the communication and the one listening.
- Bytes lost: Total size of the lost packets.

**3** Info bar: Start time / Running time / Span.

### ► Settings

Press on the gear  to display settings:

- Reset: It restarts the signal analysis process.

## 6.5 HLS / DASH protocol

The DASH and HLS standards are among the most widely used thanks to their ability to minimize interruptions or “buffering” during video playback, even when network conditions fluctuate. To achieve this, it is essential to know the server availability, allowing the media player to adapt the content quality in real time.

This information is included in specific files such as the HLS Manifest or the DASH MPD. The device can retrieve and display these files, as well as download the selected content segments, graphically representing the download bitrate for an accurate analysis of transmission performance.

- 1** From the **Streaming Analyzer**, swipe right from the left side of the screen or tap any related field in the status bar.
- 2** In the **Network Protocol** field, select the **HLS** or **DASH** protocol.
- 3** Tap the **URL** option on the status bar. A window will open displaying a list of all available URLs (to import URLs, follow the steps in the next section, [“Importing URLs for OTT Services” en página 63](#)).

- 4 Select a URL. The device will download from that URL the MANIFEST or MPD file containing the description of all the content available on the server.
- 5 Now tools can be used to obtain more information about the signal. The ASI Analyzer screen is divided into 3 windows:
- main window
  - left top window
  - left bottom window

Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any panel to display the tools menu. Select one tool to be shown on the window. Press on '+' to zoom in the window or '-' to zoom out.

- 6 These are the tools available for HLS or DASH. Select one for each panel:
- OTT measurements ([“OTT measurements” on page 62](#))
  - OTT file ([“OTT File” on page 63](#))
  - Audio levels ([“Audio levels & loudness” on page 67](#))
  - TS analyzer ([“TS Analyzer” on page 70](#))
- 7 **OTT measurements** and **OTT files** are specific to DASH and HLS and are detailed below. The rest of the tools are equivalent to those used for RF signals and are described in the chapter dedicated to the TV Analyzer.

## 6.6 OTT measurements

### ► OTT measurement screen

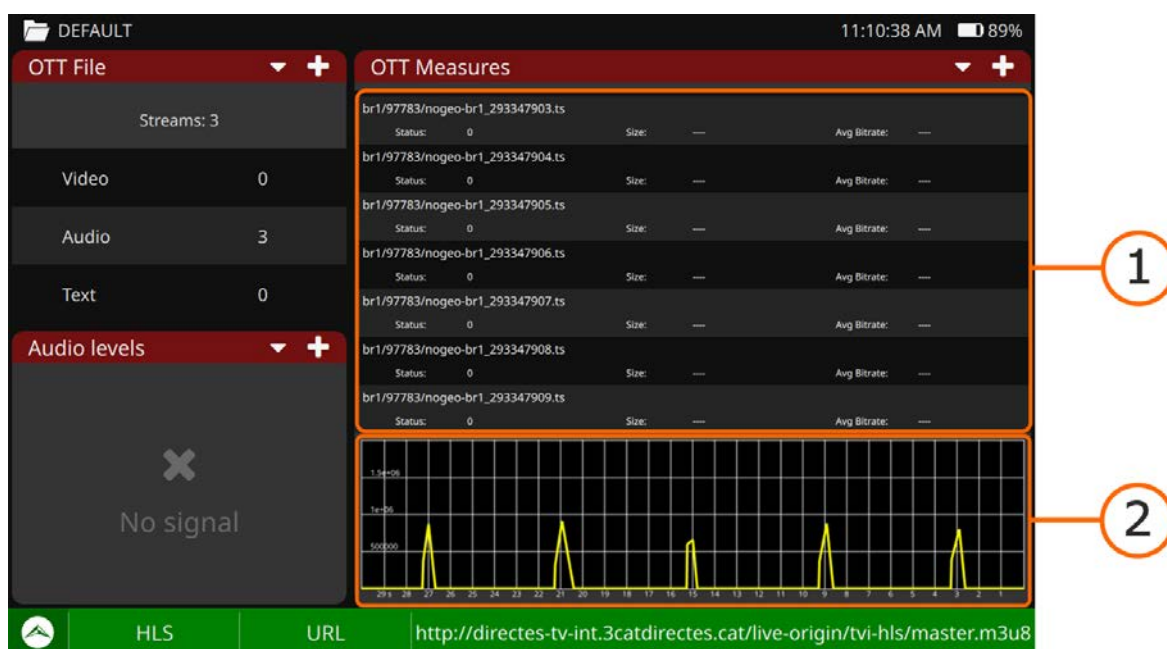


Figure 31.



- 1 Downloaded segments, size and average bitrate.
- 2 Graph of segment download bitrate over time.

## 6.7 OTT File

### ► OTT File screen

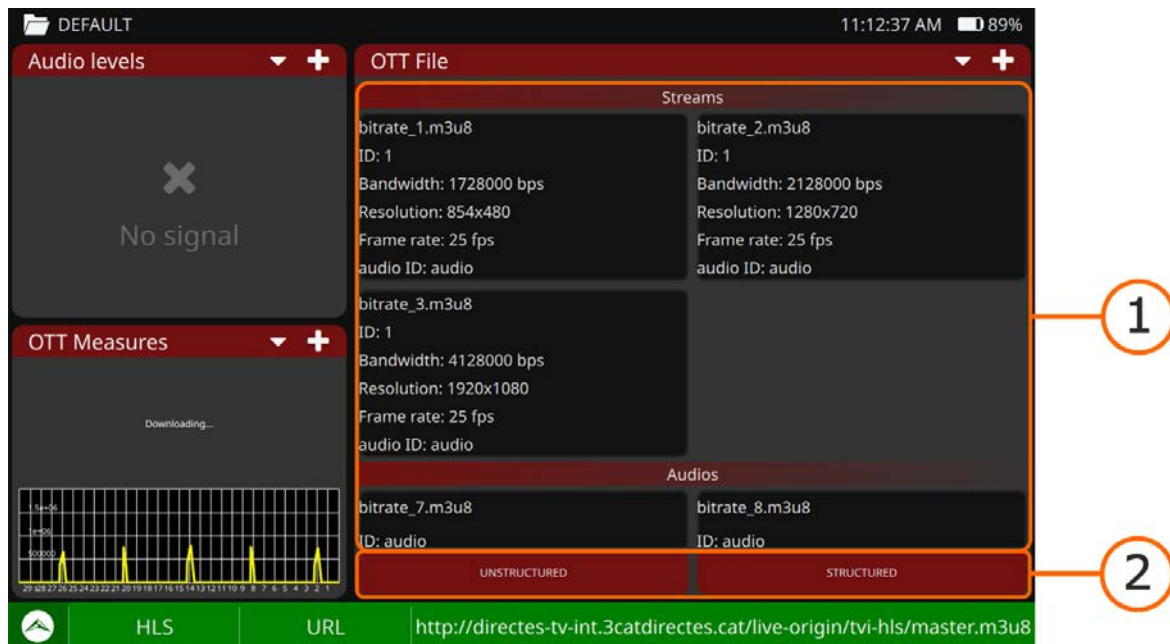


Figure 32.

- 1 Structured information of the downloaded streams (video/audio/text).
- 2 Select the data display:
  - Structured: Displays the information grouped by data type (video, audio, text).
  - Unstructured: Displays the raw information of the downloaded file.

## 6.8 Importing URLs for OTT Services

Below is a step-by-step explanation of how to import into the device the URL addresses required to connect to DASH or HLS services.

- 1 On a PC, a text file named **OTT.txt** must be created containing the URLs that provide access to DASH and/or HLS services (these URLs should be provided by the service providers).
- 2 The **OTT.txt** file will contain the URLs in the following format:
  - For services using the **HLS** protocol (**m3u8** extension):  
Example: <https://www.example1.com/service1.m3u8>



- For services using the **DASH** protocol (**mpd** extension)

Example: `https://www.example2.com/service2.mpd`

- For descriptive text or comments (put **#** in front of the text):

Example: `#Name of service`

DASH and HLS service URLs can be mixed, as the device will filter them later.

- 3** An example of the **OTT.txt** file content could be:

`#BBC service`

`http://rdmedia.bbc.co.uk/client_manifest.mpd`

`#3cat service`

`http://directes-tv-int.3catdirectes.cat/live-origin/tvi-hls/master.m3u8`

- 4** Once completed and saved, the file extension must be changed **from txt to URL**, resulting in a file named **OTT.URL** (it is important that this exact name is used in uppercase, otherwise the device will not recognize it).

- 5** Copy the **OTT.URL** file to a USB flash drive and connect it to the device USB port.

- 6** From the device, access the **Top** menu by swiping down from the top of the screen.

- 7** Tap the **Workspace** option. The **Workspace** screen will appear.

- 8** In the left-hand sidebar, the **name of the USB flash drive** connected to the device should appear. If it does not, it means the device has not detected the flash drive correctly, and it should be reconnected or replaced with another one.

- 9** Tap on the name of the flash drive to display its contents in the main window. The **OTT.URL** file should appear.

- 10** Tap and hold the OTT.URL file until the pop-up menu appears. Choose the **Import to folder** option. The URLs will be imported into the active folder. Once the import is complete, a confirmation notification will appear.

- 11** The OTT.URL file will also be stored in the workspace, under the URLs category in Streaming Analyzer mode (for more details refer to [“WORKSPACES” on page 82](#)).

- 12** From this point on, the URLs from the OTT.URL file will be available under the **HLS** and **DASH** protocols in **Streaming Analyzer** mode.

- 13** Tap the USB flash drive eject icon and disconnect it from the device.



- 14** You can now use the URLs to connect to the corresponding server and download the data files.

## 6.9 EDI protocol

EDI (Encapsulation of DAB Interfaces) is a protocol that allows to transport ETI (the data format for DAB/DAB+ digital radio) over the internet or private IP networks.

- 1** From the **Streaming Analyzer**, swipe right from the left side of the screen or tap any related field in the status bar.
- 2** In the **Network Protocol** field, select the **EDI** protocol.
- 3** In the **IP EDI** field, enter the sender IP.
- 4** In the **EDI port** field, select the port used by the sender (by default, EDI streams typically use ports 1234 or 5000).
- 5** If the configuration parameters are correct and the unit is properly receiving the EDI stream, the status bar will turn green and will display some data about the received stream: the stream IP address, the received standard, the stream identifier name, and the bitrate.
- 6** Now tools can be used to obtain more information about the signal. The screen is divided into 3 windows:
  - main window
  - left top window
  - left bottom window

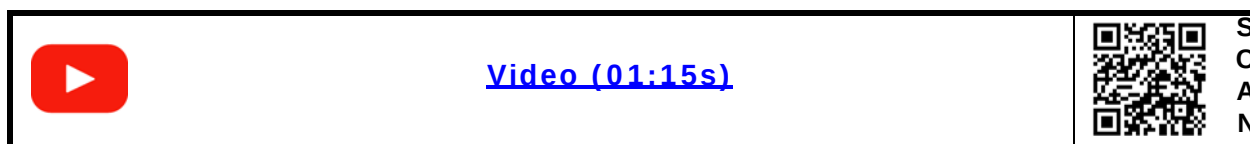
Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any panel to display the tools menu. Select one tool to be shown on the window. Press on '+' to zoom in the window or '-' to zoom out.

- 7** These are the tools available for EDI/ETI. Select one for each window:
  - Video
  - Audio levels & loudness
  - Video/audio parameters
  - ETI analyzer.

Next each one of these tools are explained.

## 6.10 Video

The **Video** tool displays one of the services carried by the signal.



Video 11.

### ►Screen

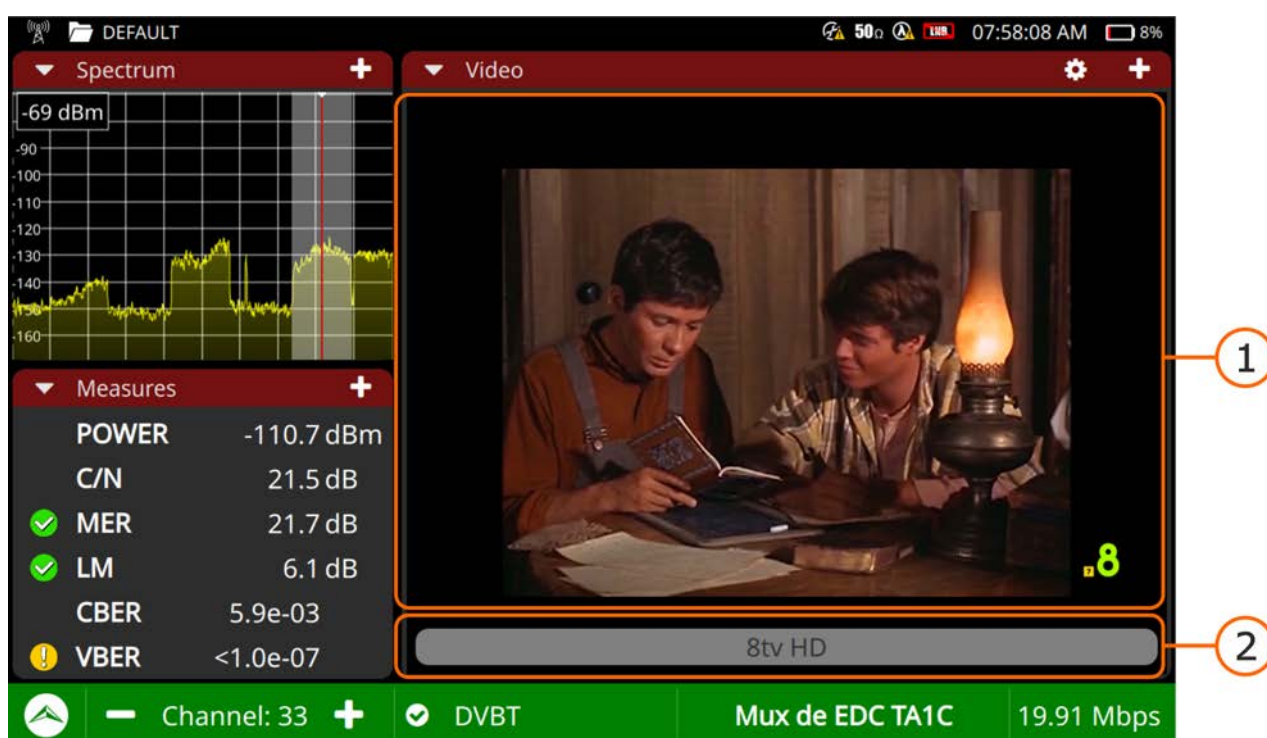


Figure 33.

- 1 Video Panel: It displays the video of the service.
- 2 Service bar: It shows the name of the service and quality. If pressing, it opens a new window that shows all services available for the ETI. Select one service to be displayed on screen. Each service is identified by its ID, LCN (if available) and name. It also shows if it is video, audio or data. In case of video it also shows resolution (SD, HD or UHD).

### ►Settings

Press on the gear  to display the settings menu:



- **Audio:** It allows the user to change language of the service in case there is more than one available.

## 6.11 Audio levels & loudness

The **Audio levels & loudness** tool allows the user to measure and visualize audio levels and loudness.

The **audio level** of each channel is measured in dBs and displayed in a bar graph. If the TS carries multiple audio channels (stereo left and right, 5.1, 7.1), up to 8 channels can be displayed on screen simultaneously..

**Audio loudness** is measured according to LUFS (Loudness Units relative to Full Scale), a measurement standard used to quantify perceived loudness, mimicking the way the human ear naturally perceives volume.

[Audio levels \(01:33s\)](#)

SCAN

Video 12.

### ► Screen



Figure 34.



## 1 Audio loudness:

- *Momentary* (LUFS; *Loudness Units relative to Full Scale*): SPerceived loudness over a very short time interval (400 ms) for measuring volume peaks and transients..
- *Short-term* (LUFS): Perceived loudness over a short time interval (3 s) for measuring the loudness of sections..
- *Integrated* (LUFS): Perceived loudness over a long time interval for measuring the loudness of a complete audio file (song, program, podcast, etc.).
- *Loudness Range* (LU; *loudness units*): Variation in perceived loudness throughout an entire audio file.

## 2 The bars display the real-time audio level of each channel. The red horizontal markers indicate the maximum peak reached. The colour of the bar indicates the audio level as follows:

- Red: High volume (0 dB <-> -9 dB).
- Yellow: Medium volume (-9 dB <-> -18 dB).
- Green: Appropriate volume (-18 dB <-> -54 dB).

## ► Settings

Press on the gear  to display the settings menu:

- Audio: It allows the user to change the audio track in case there is more than one available.

## 6.12 Video / Audio Parameters

The **Video / Audio parameters** tool shows details about the service selected and its video and audio layers.

|                                                                                                                           |                                                                                                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  <a href="#">Video Values (01:43s)</a> |  <div style="writing-mode: vertical-rl; transform: rotate(180deg);">SCAN</div> |
|---------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Video 13.**



## ► Screen

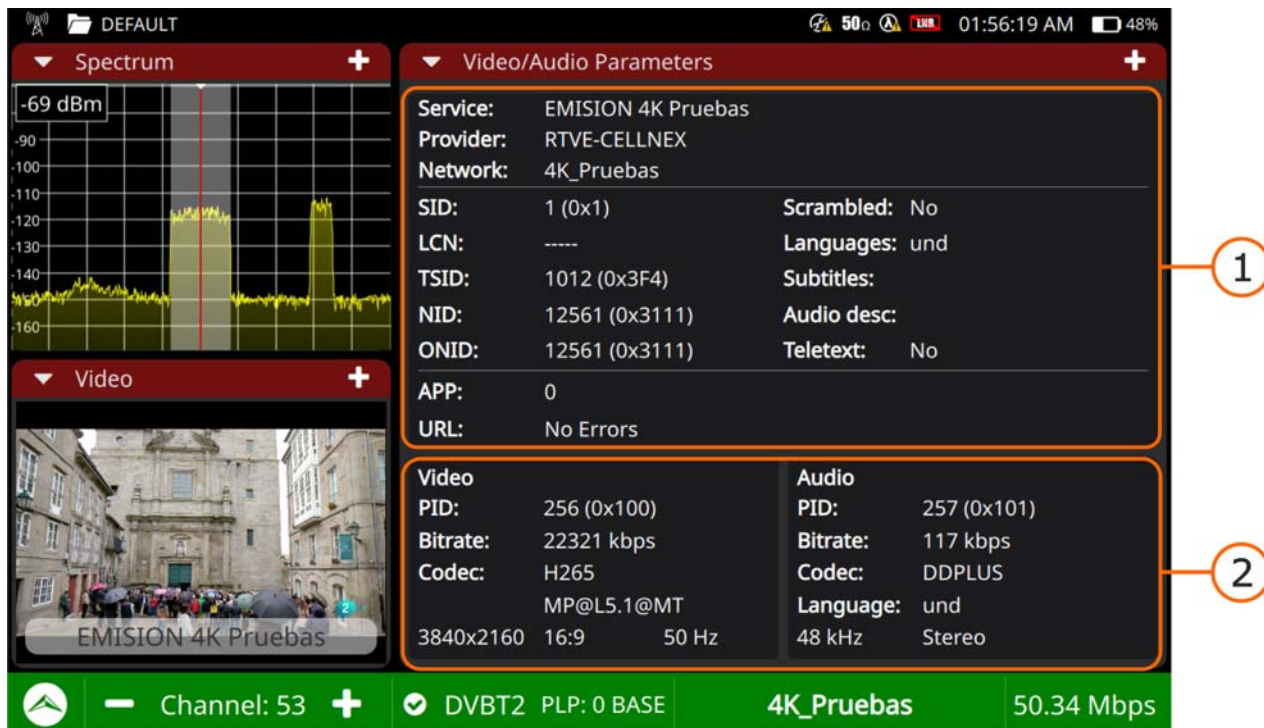


Figure 35.

- 1** General Panel: It provides service information: name, provider and network name. Also Service ID, Logical Channel Number, ID, Network ID, original network ID, app, URL, scrambled service, audio language, subtitles language, audio and teletext.
- 2** Video/audio panel: On the left side shows video layer details: PID, bitrate, codec, resolution, aspect ratio and scanning rate. On the right side shows audio layer details: PID, bitrate, codec, language, sampling rate and format.

**NOTE:** If this tool is expanded to full screen by tapping the Plus (+) sign, a new area will appear on the left side with more details about the service layers (video, audio, and data).

It will detect the MPD file if it exists. If the file contains errors, the error can be viewed along with a description and its cause.

## 6.13 ETI Analyzer

The **ETI Analyzer** tool displays FIC tables and service tables of ETI. All table components and contents can be viewed by expanding the node tree. This allows analysis of the tables and detailed inspection of what is being transmitted, as well as verification that the information is correctly encapsulated.

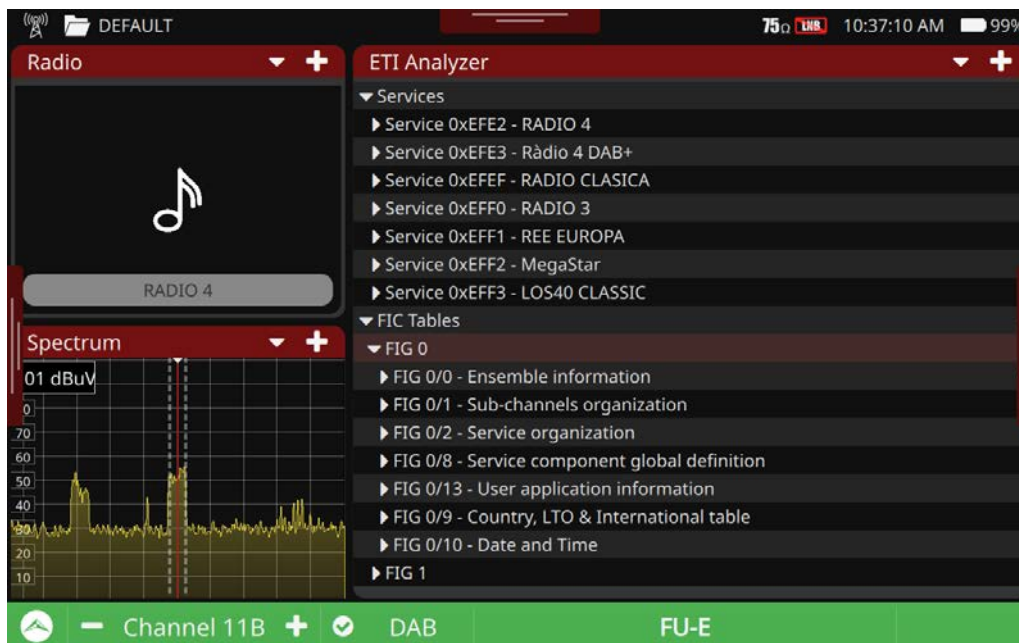


### ► Touch gestures



Tap: Tap on the table name to expand it and view subfields.

### ► Screen



**Figure 36.**

- General panel: Displays all metadata extracted from the ETI. Specifically, this includes service data and the FIC (Fast Information Channel) tables and FIG (Fast Information Group) subtables. These can be expanded to view their subfields.

## 6.14 TS Analyzer

The TS Analyzer tool performs a detailed analysis of the embedded transport stream. This tool includes these functions:

- Tables Analyzer
- Bitrate
- PIDs
- Alarms - TR 101 290

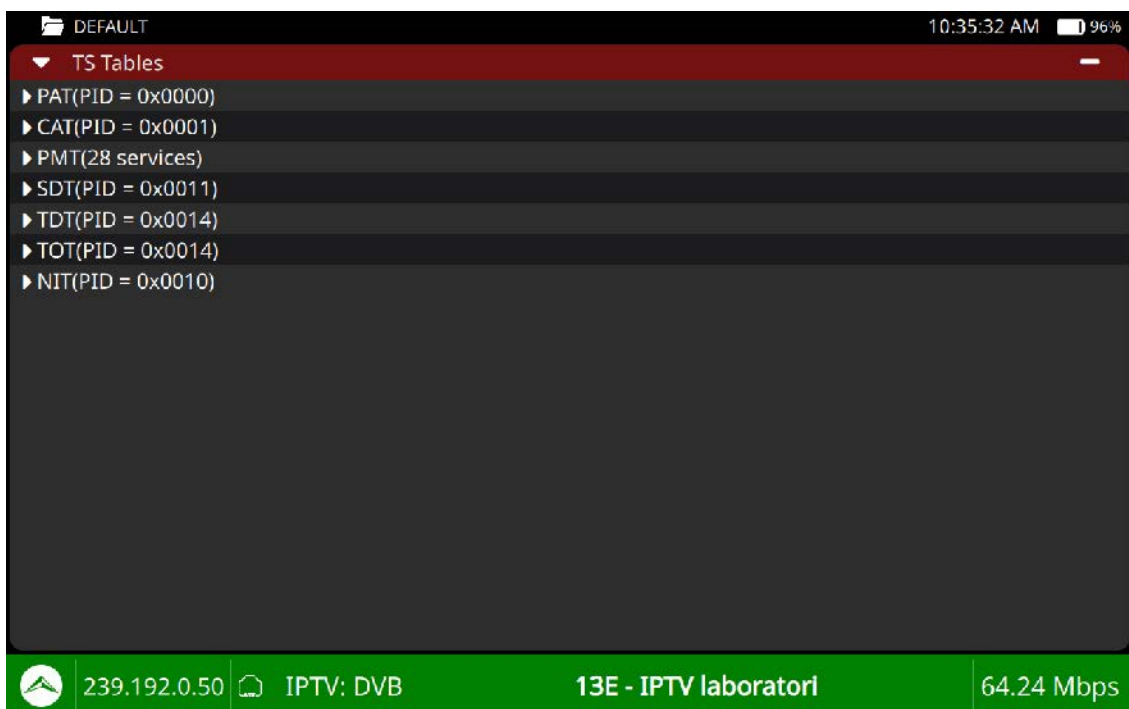


In the following sections, each of them is described.

## 6.15 Tables Analyzer

The Tables Analyzer tool shows the PSI/SI tables from the TS. All components and contents of tables can be consulted by deploying the nodes. So the user can analyse the tables and see in detail what is being transmitted and if the information is properly encapsulated.

### ► Screen



**Figure 37.**

- 1 Main window: It shows all metadata extracted from the transport stream. These are the PSI (Program Specific Information) and SI (Service Information) tables and all their related fields. They can be unfolded to see its subfields.

### ► Touch gestures



Tap: Tap on the table name to unfold it and see its sub-fields.

## 6.16 TS Bitrate

The TS Bitrate tool shows in a graphical way, and also by numbers and percentage the TS bitrate. A pie chart, which is updated in real time, shows the evolution of the bitrate distribution for each one of the services in the tuned multiplex. It also allows selecting any of the services to check its composition, which is also shown on a pie chart.

### ► Screen

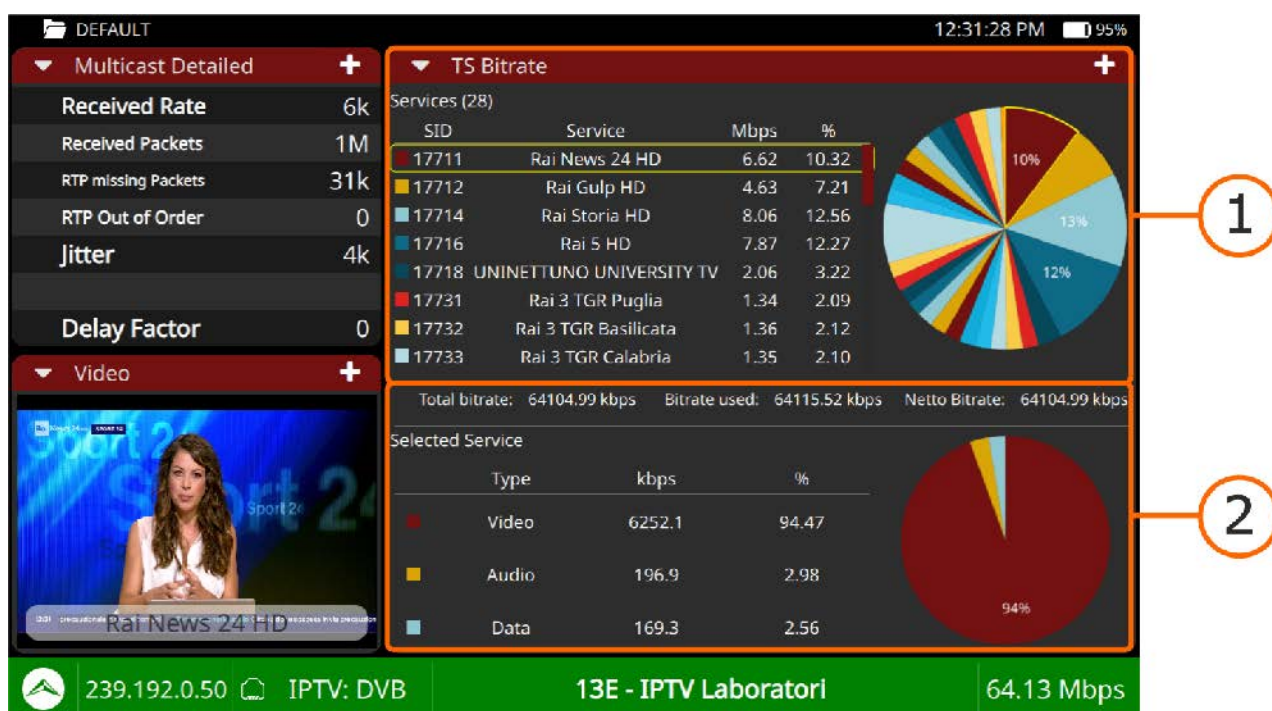


Figure 38.

- 1 Services window: It shows all services in the transport stream in real time. The "Others" service indicates the amount of bitrate used by the PSI/SI tables. The pie chart indicates the percentage contribution in bitrate per service in respect to the total TS bitrate, including null packets, which are displayed in black. Under the chart, the total bitrate of the TS is shown, along with the total used bitrate (the sum of the bitrate for all PIDs in the TS) and the net bitrate (total bitrate minus null packets). If there is no reuse of PIDs, the used bitrate should match the total bitrate.
- 2 Selected service window: It shows bitrate for video, audio and data for the selected service in real time, both in percentage and absolute value. The pie chart shows this information graphically.



## ► Touch gestures



Tap: Select a service.

## 6.17 PIDs Analyzer

The PIDs Analyzer tool shows an ordered PID list with a short explanation of each PID and its minimal, maximum and average bitrate. Bitrate is refreshed continuously to help in understand bandwidth usage.

### ► Screen

| PID         | Min Rate (kbps) | Rate (kbps) | Max Rate (kbps) | Description                                                        |
|-------------|-----------------|-------------|-----------------|--------------------------------------------------------------------|
| 0 (0x0)     | 14.80           | 14.87       | 21.89           | PAT (Program Association Table)                                    |
| 1 (0x1)     | 3.02            | 3.26        | 4.80            | CAT (Conditional Access Table)                                     |
| 16 (0x10)   | 0.99            | 2.40        | 2.40            | NIT (Network Information Table)                                    |
| 17 (0x11)   | 45.17           | 45.17       | 65.48           | SDT and BAT                                                        |
| 20 (0x14)   | 3.03            | 3.56        | 5.26            | TDT and/or TOT                                                     |
| 501 (0x1F5) | 74.54           | 74.88       | 108.00          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 502 (0x1F6) | 74.53           | 74.95       | 108.09          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 503 (0x1F7) | 74.65           | 75.06       | 108.25          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 504 (0x1F8) | 74.51           | 75.09       | 109.28          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 505 (0x1F9) | 74.69           | 74.69       | 108.76          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 506 (0x1FA) | 74.62           | 75.20       | 108.41          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 507 (0x1FB) | 74.56           | 74.91       | 108.04          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 508 (0x1FC) | 74.58           | 75.06       | 108.22          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 509 (0x1FD) | 74.58           | 74.58       | 108.60          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |
| 510 (0x1FE) | 74.70           | 74.85       | 107.97          | ITU-T Rec. H.222.0   ISO/IEC 13818-1 PES packets (stream_type=0x1) |

239.192.0.50 IPTV: DVB 13E - IPTV laboratorl 64.14 Mbps

Figure 39.

- 1 PID window: It shows all the PIDs of the analyzed TS. For each PID it shows its content and minimum, average and maximum bitrates.

### ► Settings

Press on the gear to display the tool settings:

- Order by: This options allows you to sort PIDs by name, bitrate, max bitrate, min bitrate or description.



- Reset: It restarts PID analysis.

### ► Touch gestures



Drag: To move along the PID list.

## 6.18 TS Alarms - TR 101 290

The TS Alarms (TR 101 290) tool displays in real time the evolution of the TS and the alarms that may occur. The list of alarms are classified in three priority levels, according to TR 101 290 guidelines by DVB group.

### ► Screen

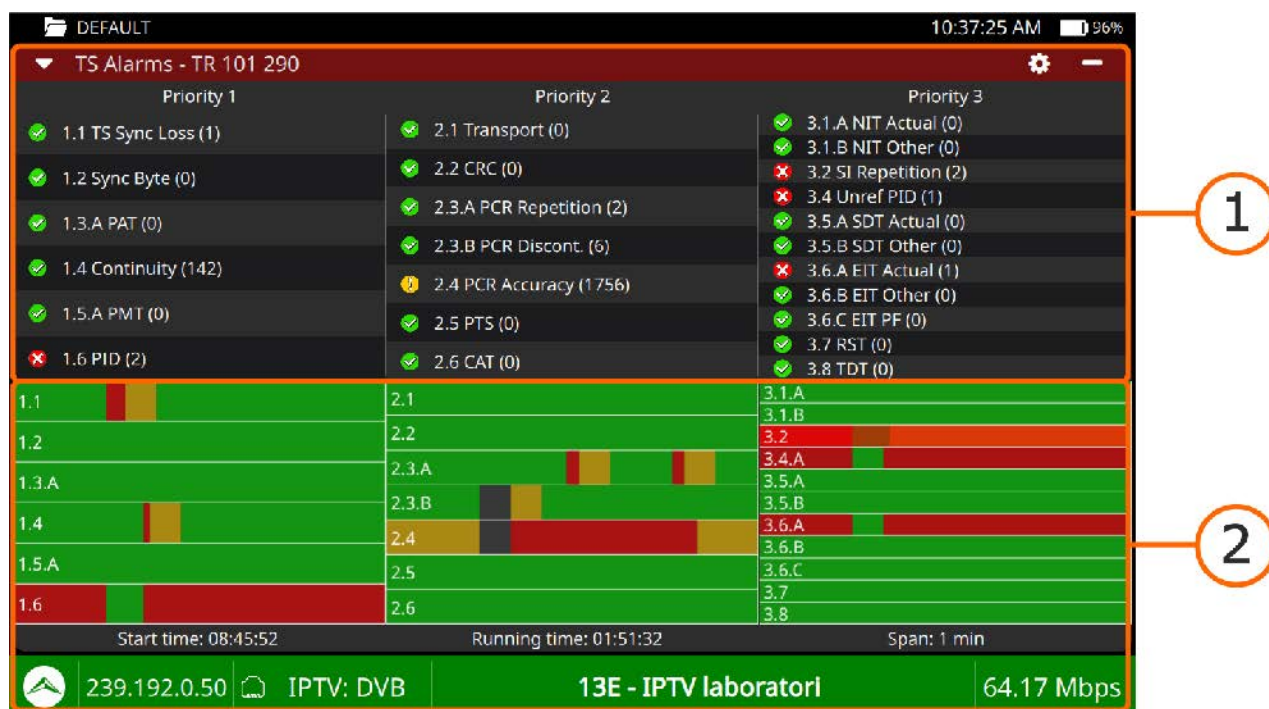


Figure 40.

- 1 Alarms window: It shows all the alarms classified by priority. Press on any of these alarms to enter in a specific screen for the alarm that shows a log with a list of events, a description and an option to enable/disable the alarm.
- 2 Events window: It shows a graph for each alarm with all the events that have happened. Errors are shown as a red strip lasting as long as the error.

### ► Settings

Press on the gear  to display the tool settings:



- Reset alarms: It initiates the alarm analysis from scratch.
- Reset alarms and TS: It initiates the capture of PSI/SI table info again followed by the alarm analysis.

### ► Touch gestures



Tap: When tapping on an alarm it shows log, description and settings menu.

### ► Icons

Besides each alarm there is an icon which is explained in the following table.

| Icon                                                                                | Description                                                                      |
|-------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
|    | No errors occurred for this alarm.                                               |
|  | There has been an event for this alarm in the last 5 seconds.                    |
|  | The event for this alarm just happened.                                          |
|                                                                                     | The alarm is still being evaluated or there is no info in the TS to evaluate it. |



## 7 SDI

### 7.1 Introduction

**SDI (Serial Digital Interface)** is a standard for transmitting digital video and audio signals. It is widely used in broadcasting environments and other professional applications for connecting cameras, video switchers, routers and other video production equipment.

SDI supports various video resolutions, from standard-definition to ultra-high definition and provides a reliable and high-quality method for transmitting video signals over relatively long distances. It can also carry embedded audio signals.

|                                                                                   |                                       |                                                                                                                    |
|-----------------------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------|
|  | <a href="#">SDI analyzer (02:56s)</a> | <div>S<br/>C<br/>A<br/>N</div>  |
|-----------------------------------------------------------------------------------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------|

#### Video 14.

SDI has evolved over time, with different versions accommodating higher resolutions and data rates to meet the demands of advancing video technologies. It continues to be a crucial standard in professional video production and broadcasting.

### 7.2 Operation

- 1 Connect the SDI signal to the equipment through the ASI/SDI input connector.
- 2 From the **Home** menu press on **SDI** .
- 3 Access the **Top Menu** by swiping down from the top of the screen and select the SDI option. From there you can:
  - select the SDI input.
  - enable/disable SDI output.
- 4 If the received SDI signal is right, the status bar turns green and shows the message **SDI locked**. Once it is locked, it shows also the signal type, if it is SDI SD, HD or 3G (it does not support higher resolutions).
- 5 Now tools can be used to obtain more information about the signal. The SDI Analyzer screen is divided into 3 windows:
  - main window
  - left top window
  - left bottom window



Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window. Press on '+' to zoom in the window or '-' to zoom out.

**6** The tools available to analyze the SDI signal are:

- Audio levels.
- Video/Audio Parameters.
- Video.
- Eye Diagram.
- SFP Parameters.

**7** Select one tool for each window to analyse the signal.

In the next sections each tool is explained in detail.

### 7.3 Video

The video tool displays the received video signal.

#### ► Screen



**Figure 41.**

**1** Video image. The version of the SDI signal is identified at the bottom (SD, HD or 3G; it does not support higher resolutions).

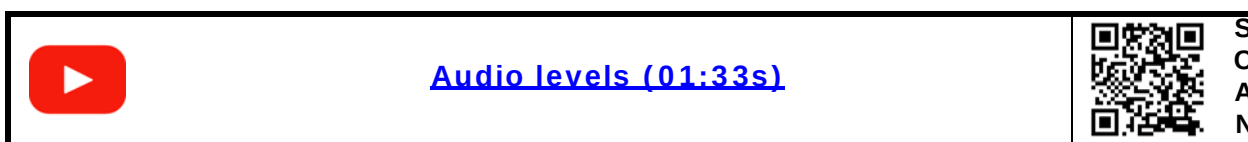


## 7.4 Audio Levels & loudness

The **Audio levels & loudness** tool allows the user to measure and visualize audio levels and loudness.

The **audio level** of each channel is measured in dBs and displayed in a bar graph. If the TS carries multiple audio channels (stereo left and right, 5.1, 7.1), up to 8 channels can be displayed on screen simultaneously..

**Audio loudness** is measured according to LUFS (Loudness Units relative to Full Scale), a measurement standard used to quantify perceived loudness, mimicking the way the human ear naturally perceives volume.



Video 15.

### ► Screen



Figure 42.

### 1 Audio loudness:

- **Momentary (LUFS; Loudness Units relative to Full Scale):** SPerceived loudness over a very short time interval (400 ms) for measuring volume peaks and transients..



- *Short-term* (LUFS): Perceived loudness over a short time interval (3 s) for measuring the loudness of sections..
  - *Integrated* (LUFS): Perceived loudness over a long time interval for measuring the loudness of a complete audio file (song, program, podcast, etc.).
  - *Loudness Range* (LU; *loudness units*): Variation in perceived loudness throughout an entire audio file.
- 2** The bars display the real-time audio level of each channel. The red horizontal markers indicate the maximum peak reached. The colour of the bar indicates the audio level as follows:
- Red: High volume (0 dB <-> -9 dB).
  - Yellow: Medium volume (-9 dB <-> -18 dB).
  - Green: Appropriate volume (-18 dB <-> -54 dB).

### ► Settings

Press on the gear  to display the tool settings:

- Audio: It allows the user to change the audio track in case there is more than one available.

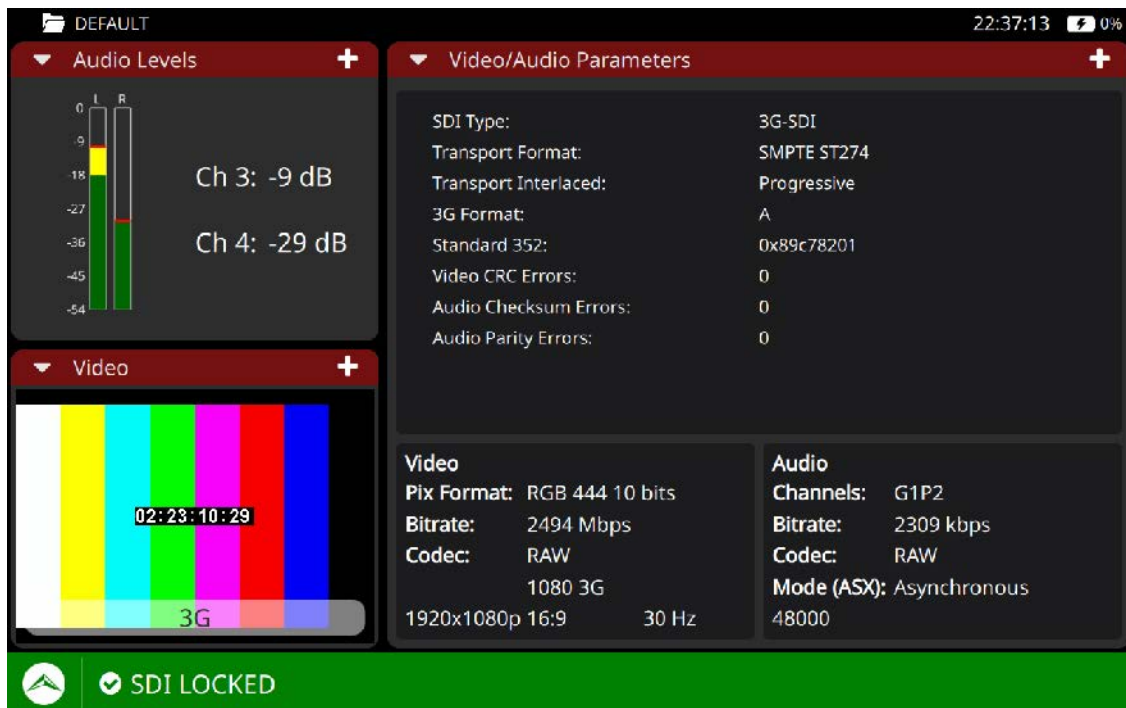
## 7.5

### Video / Audio Parameters

The **Video / Audio Parameters** tool displays all metadata related to the video and audio layers.



## ► Screen



**Figure 43.**

### 1 General Parameters:

- SDI Type (SD, HD or 3G)
- Transport format
- Transport interlaced
- Format
- Standard
- Video CRC errors
- Audio checksum errors
- Audio parity errors

### 2 Video Parameters:

- Pixel format / Bitrate / Codec

### 3 Audio Parameters:

- Channels / Bitrate / Codec / Mode



## 7.6 Eye Diagram

The **Eye diagram** tool is a visual representation of a digital signal voltage over time. A wide, clear “eye” indicates a strong, low-noise signal, while a closed or distorted eye indicates signal degradation, which can cause errors in the received SDI stream.

### ► Screen

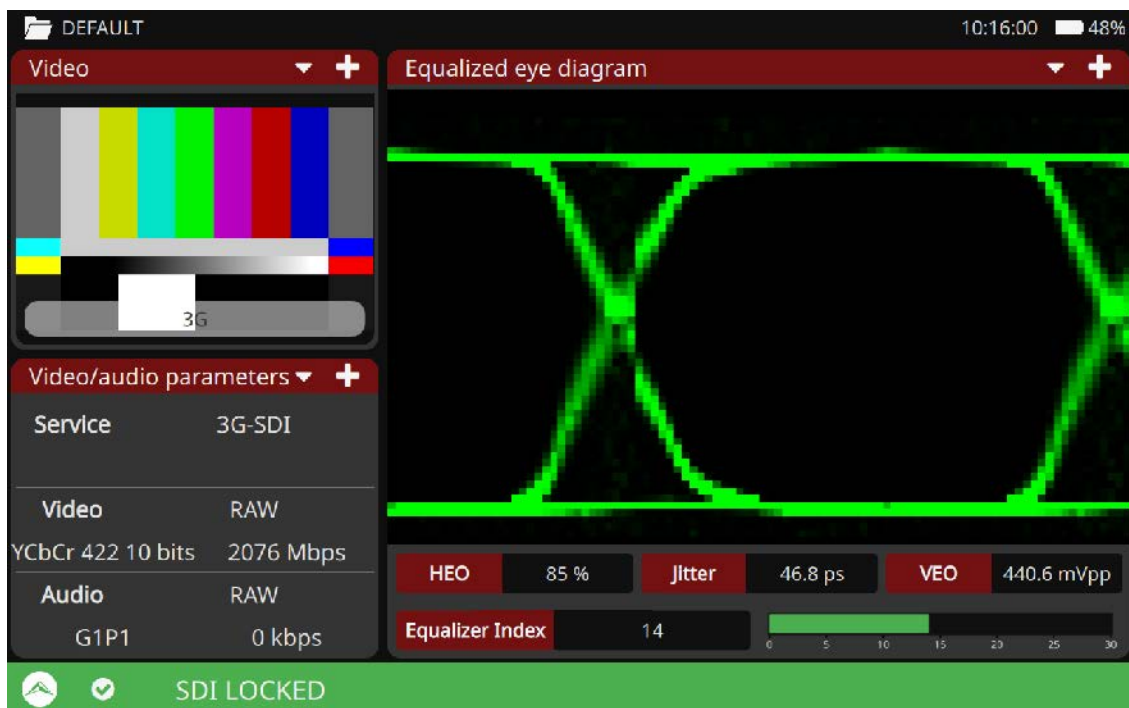


Figure 44.

- 1 Eye Diagram. The more open the eye, the better the signal is being received. If the area closes, it indicates a problem with the reception.
- 2 Measurements:
  - HEO (Horizontal Eye Opening): Horizontal eye opening index.
  - jitter: If the jitter value is high, the eye closes horizontally, indicating signal degradation.
  - VEO (Vertical Eye Opening): Vertical eye opening index.
  - Equalizer Index (0 - 55%): Indicates the level of effort the receiver must make to keep the eye open. A high value indicates significant signal degradation and increased effort to correct it.



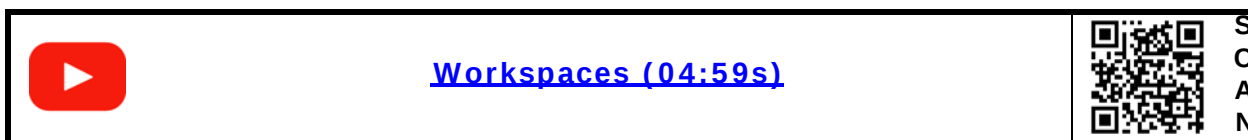
## 8 WORKSPACES

### 8.1

#### Description

The tool **Workspaces** is a function that allows the user to easily create a folder to store and manage data independently from other folders. Measurements, channel plans, screenshots and any other data associated will be stored in its folder. These data can later be exported and visualized to a PC.

Each workspace contains a subfolder for each operation mode. The files generated during the use of each mode are saved in the corresponding subfolder. For example, if a screenshot is taken in SDI mode, the file with the captured screen image will be in the SDI subfolder, whereas if the capture is done in Spectrum Analyzer mode, it will be in that other subfolder.



#### Video 16.

If the user does not create any workspace, data will be stored in the default folder (named **DEFAULT**).

### 8.2

#### Workspace Management

Next, we describe how to manage the workspaces in order to create a new one, remove, load, etc.:

- 1** The active workspace appears in the upper left corner of the screen. This is the folder where all files generated during the use of the equipment are stored.
- 2** Swipe down from the top of any screen to access the **Top menu**.
- 3** From the Top menu select **Workspaces** to access the workspaces and resources management screen.
- 4** A screen will appear showing all available workspaces. The active folder appears outlined by a box.
- 5** The side menu allows you to switch between **Workspaces** and **Resources**. Select **Workspaces**.



- 6** To access the options menu, press and hold on one workspace. A pop-up menu will appear with the following options:
- **Open**: it opens the selected folder for viewing and managing data.
  - **Load**: it loads the selected folder as a workspace. From this moment on, the workspace name will appear in the upper left corner. All data will be saved in this workspace. **It is only possible to change the workspace by accessing the option from the Top menu at the Home screen.**
  - **New Workspace**: it creates a new workspace (same function as the button **Add**).
  - **Rename**: it renames the selected workspace.
  - **Remove**: it removes the selected workspace (except for the “default” workspace that cannot be removed).
  - **Export to USB**: it copies the workspace to a memory connected to the USB port. The progress of the action will appear in the notification window until it is finished.

- 7** Select one of these options.

**WARNING!** To load a workspace into memory and make it the active workspace where all data is stored, you must **access the Top menu from the Home screen** and then enter **Workspace**, select the workspace and load it.

### 8.3 Data File Management

Next, it is described how to access and manage the files inside the workspaces:

- 1** Swipe down from the top of any screen to access the **Top menu**.
- 2** From the Top menu, tap on the **Workspace** option to access the Workspace management screen.
- 3** A screen displaying all available workspaces will appear.
- 4** The side menu allows you to switch between **Workspaces** and **Resources**. Tap on **Workspaces**.
- 5** Tap on a workspace to access the data stored.



- 6** From the workspace, select the working mode from the dropdown menu. The working mode is the mode on which the data was stored. The available working modes are:
  - Home.
  - TV Analyzer.
  - Spectrum Analyzer.
  - IPTV.
  - WiFi.
  - Streaming Analyzer.
  - TV Monitor.
  - ASI.
  - SDI.
  - Mobile (option).
- 7** Now you can find all the type of data available for the selected mode. Depending on the selected working mode different data can appear. They are:
  - Tools.
  - Channel plans.
  - Dataloggers.
  - Drive Test.
  - Recordings.
  - Screenshots.
  - URLs.
  - Quality.
  - Multicasts.
- 8** When you tap on one of these data types, it will show a list with all the related files.
- 9** Files can be selected one by one by clicking on the box next to the file, or a multiple selection can be made by clicking on the box in the header.



**10** When you long-press on a file, a menu pops up, providing the following actions:

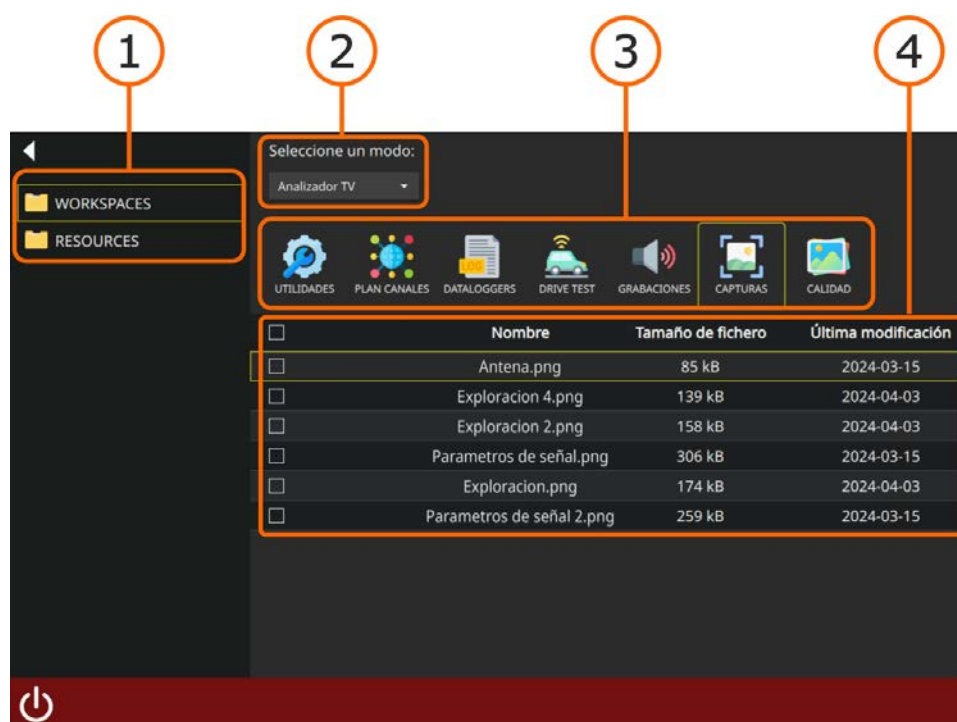
- **Rename**: It allows you to change the name using the virtual keyboard.
- **Remove**: It deletes the file after confirmation.
- **Export to USB**: It copies the file to a memory connected to the USB port. The progress of the action will appear in the notification window until it is finished.
- **Preview screenshot**: The screenshot is displayed on the screen (it will also be previewed by clicking directly on the file).

**11** Select the desired option from the menu.

**WARNING!** When exporting data, **do not disconnect the USB drive directly from the equipment**, as the information contained could be lost.

Follow the process described in the section **Data Export to USB** to ensure that the data is properly preserved.

#### ► Screen



**Figura 45.**

- 1** Left Sidebar: choose between workspaces or resources.
- 2** Dropdown menu: select the Working Mode.
- 3** Toolbar: select the type of data.
- 4** File list: select a file to export, rename or remove. These files can be sorted by name, size, or date by clicking on the corresponding column.



## 8.4 Data Export to USB

The following describes how to export data from the equipment to a USB flash drive. It is important to follow these steps to ensure that the data is exported correctly:

- 1 Access the files you wish to export as described in the previous section.
- 2 Connect a memory drive to the USB port.
- 3 When the USB drive is connected, the system scans it for compatible files. During this process, a spinning wheel will appear above the USB icon. Until this scanning process is complete, operations involving the USB drive cannot be performed.
- 4 If the USB drive is detected, a notification will appear, and the option **USB (name)** will show up in the left sidebar along with the icons for update and eject.
- 5 Open the workspace and select the file or files to export.
- 6 Press and hold the file or files to export until the option menu appears.
- 7 Select the **Export to USB** option.
- 8 The files will be copied to the USB drive. The progress of the action will appear in the notification window until it is finished.
- 9 Once copied, click on **USB (name)** in the left sidebar and then press the **Update** icon. The screen should refresh and display the files that were just copied.
- 10 If everything is correct, click on the **Eject** icon to disconnect the USB drive.
- 11 Remove the USB drive from the equipment.
- 12 Connect the USB drive to a PC to access data.

## 8.5 Resources Management

The **Resources** folder is a repository of common data for all workspaces. This folder stores a large number of files that can be exported to the currently active workspace at any given time.

For example, in the case of channel plans, we can keep in our workspace only the channel plans that we regularly use. If we ever need a different channel plan, we can simply export it from the resources folder.



To use the Resources folder:

- 1 Swipe down from the top of any screen to access the **Top** menu.
- 2 From the Top menu select **Workspace** to access the workspaces and **Resources** management screen.
- 3 The side menu allows you to switch between **Workspaces** and **Resources**. Select **Resources**.
- 4 Select the working mode from the dropdown menu. The available working modes are:
  - TV Analyzer.
  - Spectrum Analyzer.
  - IPTV.
  - WiFi.
  - Streaming Analyzer.
- 5 Now, at the toolbar, you can find all the tools with available resources. Depending on the selected working mode different resources can appear. They are:
  - Tools.
  - Channel Plans.
  - Quality.
  - Multicasts.
  - URLs.
- 6 When you tap on one of these data tools, it will show a list with all the related files.
- 7 Files can be selected one by one by clicking on the box next to the file, or a multiple selection can be made by clicking on the box in the header.
- 8 When you long-press on a file, a menu pops up, providing the following actions:
  - **Rename**: It allows you to change the name using the virtual keyboard.
  - **Remove**: It deletes the file after confirmation.
  - **Export to USB**: It copies the selected files to the USB memory plugged into the USB port. The progress of the action will appear in the notification window until it is finished.
  - **Import to workspace**: It copies the selected files to the active workspace. The progress of the action will appear in the notification window until it is finished.



- 9 Select the desired option from the menu.

## 8.6 Case of use: Accessing saved data

*I have captured the spectrum in TV Analyzer mode and saved it with the name "test". Now I want to view it on my PC. How do I do it?*

- 1 Access the **Top** menu by swiping down from the top of the screen.
- 2 Tap on the **Workspaces** option. The Workspaces screen will appear.
- 3 Tap on the workspace folder that was selected at the time of the screenshot (if no workspace was created, select the "default" option).
- 4 Connect a memory drive to the USB port.
- 5 In the **Working Mode** menu, select the **TV Analyzer** mode.
- 6 On the toolbar, click on **Screenshots**.
- 7 The list of captured files should appear, and one of them should be a file named "test". Long-press on the file name and from the popup menu, select **Export to USB** to copy the file to the USB memory.
- 8 Safely eject the USB memory from your meter and connect it to your PC in order to view the image.

## 8.7 Case of use: Loading a Workspace

*I want to load a workspace called "test" where I have saved all the measurements taken at an installation. How do I do it?*

- 1 Go to the **Home** menu by clicking on the Promax icon located in the bottom-left corner. **It is only possible to load a workspace by accessing the option Workspace from the Top menu at the Home screen.**
- 2 Access the **Top** menu by swiping down from the top of the screen.
- 3 Tap on the **Workspace** option. The **Workspace** screen will appear.
- 4 Press and hold the workspace you want to load until a pop-up menu appears.
- 5 In the pop-up menu, select the **Load** option.
- 6 A message will appear indicating that the workspace has been loaded.



- 7** From this moment, the workspace loaded is the active folder where all screenshots, measurements, and data generated is stored.
- 8** The name of the active workspace will appear at the top-left corner of all screens.



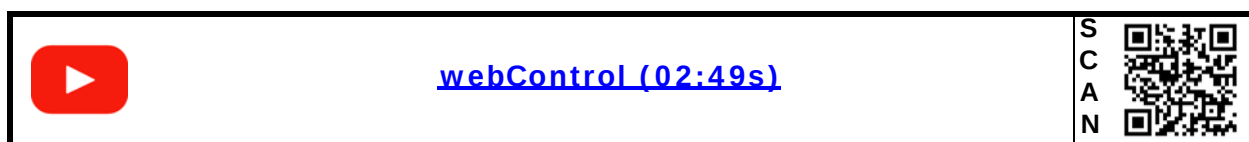
## 9 WEBCONTROL

### 9.1 Introduction

The webControl function allows you to connect remotely to the equipment in order to visualize measurements and operate on it. It must be connected to a data network. To connect to equipment from a remote access device use just a standard web browser.

webControl tools are:

- Remote Console: It emulates and allows you to interact with the equipment in first person.



Video 17.

The next section explains how to configure the meter to be able to connect remotely.

### 9.2 Settings and Remote Access

#### ► Meter Settings

- 1** The equipment can be connected to a data network via an Ethernet cable or via WiFi. To access the configuration parameters:
  - Ethernet network: From the main **Home** screen, access the network settings by pressing the **Settings** option. Go to the **Network** settings, where you will find the configuration parameters to register on the network (for more details refer to "[► Network](#)" on page 16).
  - WiFi network: Connect the USB-WiFi dongle to the USB port. Access the **Top** menu by swiping your finger from top to bottom of the screen. Select the **WiFi** option to access the WiFi network configuration settings (for more details refer to "[► WiFi Settings](#)" on page 21).
- 2** Select **DHCP enabled**, if you connect the equipment to a network with a router or server with DHCP protocol. Then the network will set automatically the parameters in the meter. If not, follow the next steps to set the meter.
- 3** On **IP Address** enter the equipment IP. Use an IP in the same range used by your PC in the local network (if you do not know these data see "find out



local network data" section). For instance, if the IP for your PC is 10.0.1.18, the equipment must have a free IP in the same range, like 10.0.1.50.

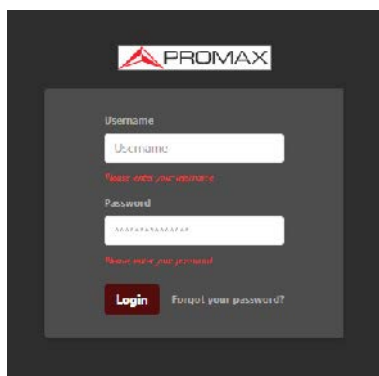
- 4 In the **Mask** box, enter the mask value, which should be the same as the one used by the local network (usually 255.255.255.0; if you do not know these data see "find out local network data" section).
- 5 To connect the equipment from an external network, fill in the **Gateway** with the info obtained from the local network. In the DNS fields, you can either leave the default values or assign others.
- 6 Connect the equipment to a data network with Internet access. You can use an Ethernet cable connected to the IP CTRL port or in case of WiFi network, connect the USB WiFi adapter to the USB port, select the network and enter the password.

#### ► Find out Local Area Network Data (LAN)

- 1 To obtain data from the Ethernet network where your meter is connected, you should use a PC connected to this same network.
- 2 From the PC click on **Start** menu in Windows. On the Search box write **CMD** and press **Enter**.
- 3 It opens a command line window. Write **IPCONFIG** and press enter.
- 4 It displays a window with some lines with info. On line "Local Network Ethernet Adapter" see line "IPv4 Address". This is the local IP for your PC. Write down this IP. Also write down "Subnet Mask" and "Default Gateway". This data is needed to configure the meter by hand.

#### ► Remote Access

- 1 From a remote access device (PC, mobile device) run a standard web browser (Chrome recommended).
- 2 On the address bar write the address to remotely access the meter. To view or edit this IP address, from **Home** go to **Settings -> Network**.
- 3 If the connection is successful, it should appear on screen the webControl access screen.



**Figure 46.**

- 4** Enter username and password and press **Login** to access the webControl.
- 5** Username and password by default are:
  - **Role: administrator**
    - Username: admin
    - Password: admin
  - **Role: guest (only for watching)**
    - Username: guest
    - Password: guest
- 6** The AD user (administrator) can interact freely with the device as if physically present. The GU user (guest) can only observe the device without being able to interact with it.

**NOTE:** The webControl uses ports 80, 8080, 9999.

In the browser, JavaScript must be enabled in order to use the webControl.

There are many ways to connect to the meter from an external network. If you have follow these instructions and you fail to connect the webControl, please contact PROMAX technical assistance and we will help you (promax@promax.es).

## 9.3 Remote Console

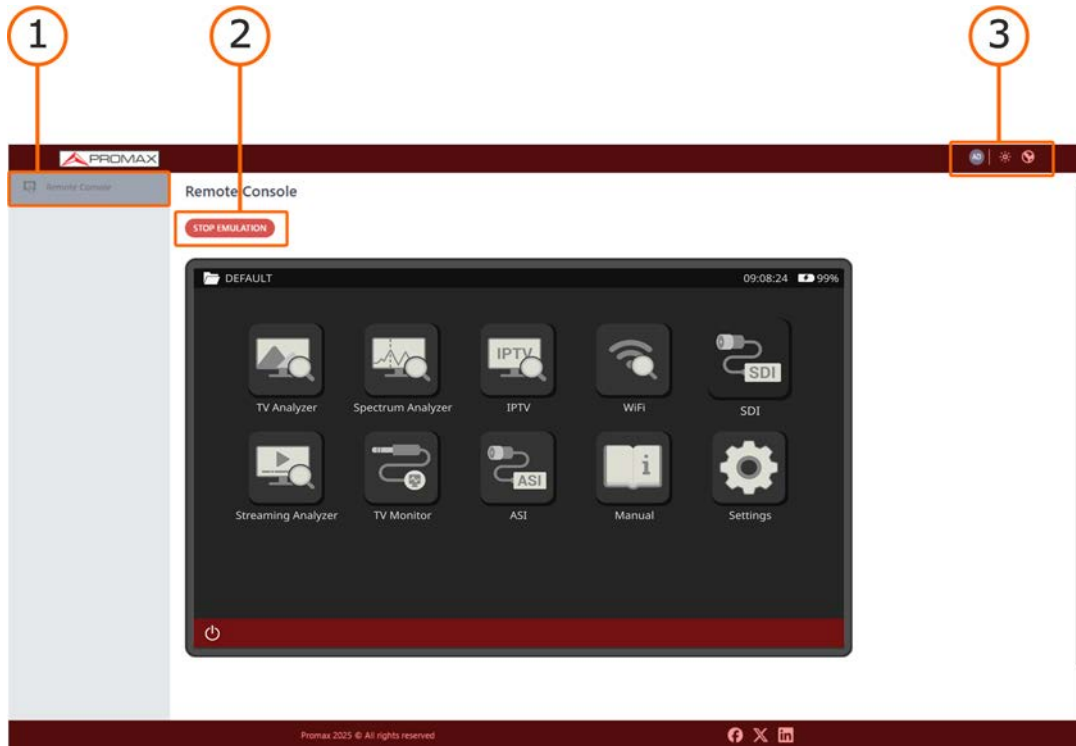
### ► Description

**Remote Console** allows you to interact remotely with the meter like you were in front of it. To interact with the meter you can use the mouse pointer as a touch on screen.



The meter can be used simultaneously both remotely and locally.

## ► Screen



**Figure 47.**

- 1 Selected function (Remote Console).
- 2 Start / Stop console emulation button. To start emulation press on **Start emulation**. To end the emulation press on **Stop emulation**.
- 3 Settings options:
  - User (AD/GU): reboot equipment / about / logout. AD means that the session has been started as an administrator. GU means that the session has been started as a guest.
  - Theme (light / dark).
  - Language (English / Spanish).



## 10 SPECIFICATIONS ATLAS IP

### 10.1 General

#### ► Inputs and Outputs

| Parameter                            | Value                                                                 | Additional Data                                                           |
|--------------------------------------|-----------------------------------------------------------------------|---------------------------------------------------------------------------|
| <b>ASI/SDI Input</b>                 |                                                                       |                                                                           |
| Connector                            | BNC female 75 $\Omega$                                                | Up to 3 Gbps                                                              |
| Electrical                           | 200 m cable length at 3 Gbps<br>Nominal 800 mVp-p<br>1.4V common mode |                                                                           |
| <b>ASI/SDI Output</b>                |                                                                       |                                                                           |
| Connector                            | BNC female 75 $\Omega$                                                | Up to 3 Gbps                                                              |
| Electrical                           | 300 mVp-p min<br>850 mVp-p max<br>8 mV common mode                    | 3 Gbps                                                                    |
| Work modes                           | Loop                                                                  | Signal goes in through the SDI input and comes out through the SDI output |
|                                      | Pattern                                                               | Genera una carta estática de 1080p                                        |
| <b>10 MHz / 1PPS Reference Input</b> |                                                                       |                                                                           |
| Connector                            | BNC female high impedance                                             | min. 150 mV; max. 5 V                                                     |
| <b>SFP+</b>                          |                                                                       |                                                                           |
| Connector                            | SFP+                                                                  | MSA                                                                       |
| <b>IPTV</b>                          |                                                                       |                                                                           |
| Connector                            | RJ45                                                                  |                                                                           |
| Type                                 | Ethernet 10 Mbps / 100 Mbps / 1 Gbps                                  |                                                                           |
| <b>Analogue Video Input</b>          |                                                                       |                                                                           |
| Input Connector                      | Multipole Jack                                                        | Zin=75 $\Omega$                                                           |
| Sensibility                          | 1 Vpp                                                                 | 75 $\Omega$ ; positive video                                              |
| <b>Analogue Audio Input</b>          |                                                                       |                                                                           |
| Input Connector                      | Multipole Jack                                                        | Zin=3 k $\Omega$ ; same input as video                                    |
| <b>Digital Video / Audio Output</b>  |                                                                       |                                                                           |
| Output Connector                     | Supports HDMI 1.4b with 2.9 Gb/s                                      | Resolution up to 3840x2160 @30 Hz                                         |
| <b>Audio Output</b>                  |                                                                       |                                                                           |
| Output Connector                     | Multipole Jack 32 $\Omega$                                            | Stereo; to connect headphones or external speakers                        |
| Speakers                             | 2 stereo speakers                                                     |                                                                           |
| <b>USB Interface 3.0</b>             |                                                                       |                                                                           |



| Parameter                        | Value                                                       | Additional Data                                         |
|----------------------------------|-------------------------------------------------------------|---------------------------------------------------------|
| Connector                        | USB type A                                                  |                                                         |
| File systems supported           | FAT32, exFAT, NTFS, ext3, ext4                              |                                                         |
| Features                         | Mass Storage Host                                           | Can read and write on a pendrive USB                    |
|                                  | USB CDC                                                     | CDC: Communication device class (GPS, probes)           |
| <b>USB Interface 2.0</b>         |                                                             |                                                         |
| Connector                        | USB type C                                                  |                                                         |
| File systems supported           | FAT32, exFAT, NTFS, ext3, ext4                              |                                                         |
| Features                         | Two modes: master or device                                 |                                                         |
|                                  | Master: mass storage host, USB CDC                          | For GPS, probes                                         |
|                                  | Device: Virtual COM                                         | Remote control of the equipment through remote commands |
| <b>IP Interface (control IP)</b> |                                                             |                                                         |
| Connector                        | RJ45                                                        | Labeled IP CTRL                                         |
| Type                             | Ethernet 10 / 100 Mbps / 1 Gbps                             |                                                         |
| Communication Software           | webControl                                                  |                                                         |
|                                  | Remote commands                                             |                                                         |
|                                  |                                                             |                                                         |
| <b>CAM</b>                       |                                                             |                                                         |
| Connector                        | DVB-CI compliant CAM module input                           |                                                         |
| <b>WiFi Interface</b>            |                                                             |                                                         |
| Type                             | Wireless standard 802.11 abgn                               | Dongle-Wifi connected to USB port                       |
|                                  |                                                             | Dongle must be validated by PROMAX                      |
| <b>Remote control Interfaces</b> |                                                             |                                                         |
| Interfaces                       | RJ45 Ethernet;<br>WiFi                                      |                                                         |
| Remote control                   | JSON: sending and receiving remote commands with JSON files | All interfaces                                          |
|                                  | webControl: web technology using a standard browser         | RJ45, WiFi                                              |
|                                  |                                                             |                                                         |
| <b>Monitor Display</b>           |                                                             |                                                         |
| Monitor                          | 10.1" TFT touch panel                                       |                                                         |
| Aspect Ratio                     | 16:9                                                        |                                                         |
| Format                           | 1280 x 800 dots                                             | (RGB); (W) x (H)                                        |
| Brightness                       | 850 cd/m <sup>2</sup>                                       |                                                         |

## ► Operation Modes

| Parameter          | Value     | Additional Data |
|--------------------|-----------|-----------------|
| IPTV               | Available |                 |
| SDI                | Available |                 |
| Streaming Analyzer | Available |                 |
| ASI                | Available |                 |



| Parameter | Value     | Additional Data |
|-----------|-----------|-----------------|
| Player    | Available |                 |
| 2110      | Option    |                 |

### ► Mechanical Features

| Parameter  | Value               | Additional Data           |
|------------|---------------------|---------------------------|
| Dimensions | 304x218x83 mm       | (W) x (H) x (D)           |
| Weight     | 3.4 kg              | Without installed options |
| Volume     | 5,5 cm <sup>3</sup> |                           |

### ► Power Supply

| Parameter              | Value                 | Additional Data                                           |
|------------------------|-----------------------|-----------------------------------------------------------|
| Internal Battery       | 7.4 V; 18.3 Ah        | LiPo Smart battery                                        |
| Battery Operation Time | between 3 and 4 hours | With smart power management                               |
| SDI Mode               | more than 4 hours     | with video + audio + audio/video parameters + audio level |
| IPTV Mode              | more than 3:45 hours  | With TV + audio + signal parameters + measurement         |
| Charging time          | 7 h (100%)            | 5 h (80%)                                                 |
| External Voltage       | 12 ± 2 V DC           |                                                           |
| Consumption            | 40 W                  |                                                           |
| Energy saving          | Screen Off            | (Off, 1, 5, 10, 15, 30, 60 minutes)                       |

### ► Operating Environmental Conditions

| Parameter              | Value              | Additional Data                                     |
|------------------------|--------------------|-----------------------------------------------------|
| Altitude               | Up to 2000 m       |                                                     |
| Temperature Range      | From 5 °C to 45 °C | Automatic disconnection by excess of temperature    |
| Max. Relative Humidity | 80%                | Up to 31°C; decreasing lineally up to 50% at 40 °C. |

**NOTE:** Equipment specifications are set in these environmental operating conditions. Operation outside these specifications is also possible. Please check with us if you have specific requirements.

### ► Included Accessories

| Parameter | Value                              | Additional Data          |
|-----------|------------------------------------|--------------------------|
| 1x AL-103 | External DC charger                |                          |
| 1x CA-005 | Mains cord for external DC charger |                          |
| 1x AA-103 | Car cable for external DC charger  |                          |
| 1x CB-096 | Rechargeable Li-Po battery         | 7.4 V; 18.3 Ah; built-in |
| 1x AW010  | WiFi-USB dual-band dongle          |                          |
| 1x DC-309 | Transport belt                     |                          |



| Parameter  | Value                 | Additional Data |
|------------|-----------------------|-----------------|
| 1x DC-306  | Carrying bag          |                 |
| 1x DC- 229 | Transport suitcase    |                 |
| 1x DC-308  | Handle                |                 |
| 1x MN-001  | Monopod               |                 |
| 1x DG0399  | Quick reference guide |                 |

**NOTE:** It is recommended to keep all the packing material in order to return the equipment, if necessary, to the Technical Service.

## 10.2 IPTV Mode

| Parameter                                            | Value                                                  | Additional Data                                                                                                          |
|------------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Source</b>                                        | RJ45                                                   |                                                                                                                          |
| <b>Main features</b>                                 | Supports VLAN networks                                 |                                                                                                                          |
|                                                      | Multicast discovery                                    |                                                                                                                          |
|                                                      | Audio/video service play                               |                                                                                                                          |
|                                                      | T2MI reception                                         |                                                                                                                          |
|                                                      | BTS reception                                          |                                                                                                                          |
|                                                      | TS Analyzer                                            |                                                                                                                          |
| <b>Streaming simultaneous reception in real time</b> | 1                                                      |                                                                                                                          |
| <b>Unicast</b>                                       | UDP Port<br>Protocol: RTP, UDP                         | IP Packets: it is mandatory that each ethernet packet contains an integer number of TS packets which can be from 1 to 7. |
| <b>Multicast</b>                                     | IP: 224.0.0.0 - 239.255.255.255<br>Ports: 1024 - 65535 |                                                                                                                          |
| <b>Protocols</b>                                     | IGMP v1, v2, v3<br>ARP<br>ICMP<br>DHCP                 |                                                                                                                          |



| Parameter                          | Value                                                                                                                              | Additional Data                                                                                                                                                                   |
|------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Measurement</b>                 | Received rate (packets/s)                                                                                                          |                                                                                                                                                                                   |
|                                    | Received packets                                                                                                                   |                                                                                                                                                                                   |
|                                    | RTP missing packets                                                                                                                |                                                                                                                                                                                   |
|                                    | RTP out of order                                                                                                                   |                                                                                                                                                                                   |
|                                    | JITTER                                                                                                                             |                                                                                                                                                                                   |
|                                    | Delay factor                                                                                                                       | Maximum time that a multicast stream packet is inside the receiving equipment's buffer. Measurement taken during the last second of data reception.<br>Recommended value < 100 ms |
|                                    | Media lost rate                                                                                                                    | Ratio of lost packets compared to the received packets from the multicast stream (RTP only).<br>Recommended value < 0,005 packets/s                                               |
|                                    | MAX IPAT                                                                                                                           |                                                                                                                                                                                   |
|                                    | FEC Status                                                                                                                         |                                                                                                                                                                                   |
|                                    | Reordered RTP                                                                                                                      |                                                                                                                                                                                   |
|                                    | Fixed Packets                                                                                                                      |                                                                                                                                                                                   |
|                                    | Overflow                                                                                                                           |                                                                                                                                                                                   |
|                                    | TS Packets info                                                                                                                    |                                                                                                                                                                                   |
| <b>Video play</b>                  | H265 4K UHD (MP L5.1 8b/10b hasta 4kp60)<br>H264 (CBP, MP, HP L5.2 hasta 1080p240 / 4Kp60)<br>MPEG-2 (HD, MP, HL hasta 1080p6)     |                                                                                                                                                                                   |
| <b>Audio play</b>                  | MPEG-1, MPEG-2<br>AAC, HE-AAC<br>Dolby Digital (DD), Dolby Digital + (DD+)<br>Dolby AC-4                                           |                                                                                                                                                                                   |
| <b>Charts</b>                      | Packet rate<br>Histogram with Jitter measurement<br>Inter packet arrival time                                                      |                                                                                                                                                                                   |
| <b>VLAN</b>                        | Available                                                                                                                          |                                                                                                                                                                                   |
| <b>SFP+</b>                        | The TS (ASI) received via IPTV can be transmitted to FO using the SFP+ module                                                      | EB60LC1T-MM-13F. 3G/SD-SDI SFP Optical LC 1T Medium reach MSA SM 1310nm                                                                                                           |
| <b>Network Traffic Measurement</b> | Network rate                                                                                                                       |                                                                                                                                                                                   |
|                                    | Network Packets                                                                                                                    |                                                                                                                                                                                   |
|                                    | Packets with errors                                                                                                                |                                                                                                                                                                                   |
|                                    | IPER (ITU Y.1540)<br>Recommended value (per quality service):<br>class 0-4 < 1.0 E-4<br>class 5: unspecified<br>class 6-7 < 1.0E-6 | Population of interest: all Ethernet frames received on the interface.                                                                                                            |



| Parameter         | Value                        | Additional Data                |
|-------------------|------------------------------|--------------------------------|
| Signal Parameters | Link speed                   | 10 Mbit/s, 100 Mbit/s, 1Gbit/s |
|                   | Multicast group              |                                |
|                   | UDP Port                     |                                |
|                   | Protocol: UDP, RTP           |                                |
|                   | IP source                    |                                |
|                   | FEC (present, rows, columns) |                                |
|                   | TTL (time to live)           |                                |
|                   | TOS                          |                                |
|                   | TS packets per frame         |                                |

### 10.3 ASI Mode

#### ► Transport Stream

| Parameter                   | Value                                                            | Additional Data                                                                                                                                                                                                                       |
|-----------------------------|------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reception                   | TS<br>T2MI (not decapsulated)                                    | Restricts TS to ASI input<br>Real-time decapsulation of a PLP                                                                                                                                                                         |
| Packets                     | 188 or 204 bytes                                                 | Automatic detection                                                                                                                                                                                                                   |
| Video Info                  | Type, bitrate, format, aspect ratio, frequency, profile, PID     | Bitrate info displayed in tables and pie chart                                                                                                                                                                                        |
| Service Info                | Network, provider, NID, ONID, scrambled/free, TSID, SID, LCN     |                                                                                                                                                                                                                                       |
| Audio Info                  | Type, bitrate, format, frequency, mono/stereo, language, PID     |                                                                                                                                                                                                                                       |
| Max. Recording Bitrate      | 200 Mbit/s                                                       |                                                                                                                                                                                                                                       |
| Max. bitrate input / output | 200 Mbit/s                                                       |                                                                                                                                                                                                                                       |
| Recording                   | Internal memory or external USB                                  |                                                                                                                                                                                                                                       |
| Recording Internal Memory   | 8 GB                                                             |                                                                                                                                                                                                                                       |
| SFP+                        | You can receive or transmit TS over Optical Fiber using the SFP+ | SFP+ module approved for Reception:<br>EB60LC1R-MM-P. 3G/SD-SDI SFP<br>Optical LC 1R Medium reach PIN MSA<br><br>SFP+ module approved for Transmission:<br>EB60LC1T-MM-13F. 3G/SD-SDI SFP<br>Optical LC 1T Medium reach MSA SM 1310nm |

#### ► Transport Stream Tables & Alarms

| Parameter  | Value | Additional Data           |
|------------|-------|---------------------------|
| PSI Tables | PAT   | Program Association Table |
|            | PMT   | Program Map Table         |
|            | NIT   | Network Information Table |
|            | CAT   | Conditional Access Table  |



| Parameter           | Value      | Additional Data                             |
|---------------------|------------|---------------------------------------------|
| <b>SI Tables</b>    | NIT        | Network Information Table                   |
|                     | BAT        | Bouquet Association Table                   |
|                     | SDT        | Service Description Table                   |
|                     | EIT        | Event Information Table                     |
|                     | TDT        | Time and Date Table                         |
|                     | TOT        | Time and Date Table                         |
| <b>Max. Bitrate</b> | 200 Mbit/s |                                             |
| <b>Alarms</b>       | Alarms log | According to ETSI standard TR101 290 v1.2.1 |

## 10.4 SDI Mode

| Parameter                                             | Value                                                                         | Additional Data                                                                                                |
|-------------------------------------------------------|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>Connector</b>                                      | SDI-3G                                                                        |                                                                                                                |
| <b>SDI Input</b>                                      | 3 GBit/s                                                                      |                                                                                                                |
| <b>SDI Output</b>                                     | 3 GBit/s                                                                      | Generation of static pattern 1080p60                                                                           |
| <b>SFP+</b>                                           | SDI reception via fiber optics                                                | SFP+ certified module: EB60LC1R-MM-P. 3G/SD-SDI SFP Optical LC 1R Medium reach PIN MSA                         |
|                                                       | SDI transmission (static pattern 1080p60) via fiber optics                    | SFP+ certified module: EB60LC1T-MM-13F. 3G/SD-SDI SFP Optical LC 1T Medium reach MSA SM                        |
| <b>Measurement</b>                                    | Statistical eye                                                               | Compatible with simultaneous video/audio playing                                                               |
|                                                       | CRC error                                                                     |                                                                                                                |
| <b>Audio monitoring</b>                               | Up to 16 channels AES3                                                        |                                                                                                                |
|                                                       | Channel status                                                                |                                                                                                                |
|                                                       | LPCM audio loudness meter                                                     |                                                                                                                |
| <b>Video / Audio Supported formats (autodetected)</b> |                                                                               |                                                                                                                |
| SD-SDI<br>SMPTE 259-C                                 | video standard: PAL<br>sampling structure: 4:2:2 Y'CB'CR'<br>10-bit or 8-bit  | Rate: 50                                                                                                       |
|                                                       | video standard: NTSC<br>sampling structure: 4:2:2 Y'CB'CR'<br>10-bit or 8-bit | Rate: 59.94                                                                                                    |
| HD-SDI<br>SMPTE 292                                   | video standard: SMPTE 274<br>Sampling structure: 4:2:2 Y'CB'CR'<br>10-bit     | Rate: 1080p: 23.98, 24, 25, 29.97, 30<br>Rate: 1080i: 50, 59.94, 60<br>Rate: 1080PsF: 23.98, 24, 25, 29.97, 30 |
|                                                       | video standard: SMPTE 296<br>Sampling structure: 4:2:2 Y'CB'CR'<br>10-bit     | Rate: 720p: 23.98, 24, 25, 29.97, 30, 50, 59.94, 60                                                            |
|                                                       | video standard: SMPTE 2048-2<br>Sampling structure: 4:2:2 Y'CB'CR'<br>10-bit  | Rate: 1080p: 23.98, 24, 25, 29.97, 30                                                                          |



| Parameter                           | Value                                                                                                                                          | Additional Data                                                                                                      |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|
| 3G-SDI Level A<br>SMPTE 425-A       | video standard: SMPTE 274<br>Sampling structure: 4:2:2 Y'CB'CR'<br>10-bit                                                                      | Rate: 1080p: 50, 59.94, 60                                                                                           |
|                                     | video standard: SMPTE 274<br>Sampling structure: 4:4:4 Y'CB'CR' or<br>RGB 10-bit<br>Sampling structure: 4:4:4:4<br>Y'CB'CR'A or RGBA 10-bit    | Rate: 1080p: 23.98, 24, 25, 29.97,<br>30<br>Rate: 1080i: 50, 59.94, 60<br>Rate: 1080PsF: 23.98, 24, 25, 29.97,<br>30 |
|                                     | video standard: SMPTE 296<br>Sampling structure: 4:4:4 or 4:4:4:4<br>Y'CB'CR' or RGB 10-bit                                                    | Rate: 720p: 23.98, 24, 25, 29.97, 30,<br>50, 59.94, 60                                                               |
|                                     | video standard: SMPTE 2048-2<br>Sampling structure: 4:2:2 Y'CB'CR'<br>10-bit                                                                   | Rate: 1080p: 47.95, 48, 50, 59.94,<br>60                                                                             |
|                                     | video standard: SMPTE 2048-2<br>Sampling structure: 4:4:4 Y'CB'CR' or<br>RGB 10-bit<br>Sampling structure: 4:4:4:4<br>Y'CB'CR'A or RGBA 10-bit | Rate: 1080p: 23.98, 24, 25, 29.97,<br>30<br>Rate: 1080PsF: 23.98, 24, 25, 29.97,<br>30                               |
| 3G-SDI Level B-DL<br>SMPTE 425 B-DL | video standard: SMPTE 372<br>sampling structure: Same as SMPTE<br>372                                                                          |                                                                                                                      |
| Dual Link<br>HD-SDI<br>SMPTE 372    | video standard: SMPTE 274<br>Sampling structure: 4:2:2 Y'CB'CR'<br>10-bit                                                                      | Rate: 1080p: 50, 59.94, 60                                                                                           |
|                                     | video standard: SMPTE 274<br>Sampling structure: 4:4:4 or 4:4:4:4<br>Y'CB'CR' or RGB 10-bit                                                    | Rate: 1080p: 23.98, 24, 25, 29.97,<br>30<br>Rate: 1080i: 50, 59.94, 60<br>Rate: 1080PsF: 23.98, 24, 25, 29.97,<br>30 |
|                                     | video standard: SMPTE 2048-2<br>Sampling structure: 4:2:2 Y'CB'CR'<br>10-bit                                                                   | Rate: 1080p: 47.95, 48, 50, 59.94,<br>60                                                                             |
|                                     | video standard: SMPTE 2048-2<br>Sampling structure: 4:4:4 Y'CB'CR' or<br>RGB 10-bit<br>Sampling structure: 4:4:4:4<br>Y'CB'CR'A or RGBA 10-bit | Rate: 1080p: 23.98, 24, 25, 29.97,<br>30<br>Rate: 1080PsF: 23.98, 24, 25, 29.97,<br>30                               |
| SFP+                                | Allows SDI reception over fiber optic<br>through SFP+                                                                                          | EB60LC1R-MM-P. 3G/SD-SDI SFP<br>Optical LC 1R Medium reach PIN MSA                                                   |
|                                     | Allows sending the SDI content from<br>an internal test pattern over fiber<br>optic using the SFP+                                             | EB60LC1T-MM-13F. 3G/SD-SDI SFP<br>Optical LC 1T Medium reach MSA SM<br>1310nm                                        |

## 10.5 Streaming Analyzer Mode

| Parameter          | Value             | Additional data                              |
|--------------------|-------------------|----------------------------------------------|
| Interface          | RJ45 1 Gbps       | Connect to the input labeled as "IP<br>CTRL" |
| Streaming protocol | SRT version 1.4.4 |                                              |
| Payload type       | Transport Stream  |                                              |



| Parameter             | Value                                                                        | Addotional data                                                                                                                                                                                                                         |
|-----------------------|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>TS Analysis</b>    | DVB/ATSC tables, bitrates, PID list, alarms TR 101 290                       |                                                                                                                                                                                                                                         |
| <b>TS measurement</b> | Video/Audio decoding and parameters. Audio levels                            |                                                                                                                                                                                                                                         |
| <b>Modes</b>          | Listener: sender equipment starts the SRT handshake.                         | User must specify the local port where Atlas is waiting the connection                                                                                                                                                                  |
|                       | Caller: Atlas starts the SRT handshake                                       | User must specify the IP and port of the sender (target), and optionally the local port of Atlas. This local port might be useful if firewalls in the network support Outbound NAT Source Port (that is, NAT port rewrite is disabled). |
|                       | Rendez-vous: both Atlas and sender equipment try to start the SRT handshake. | User must specify the IP and port of the sender (target). Local port must be the same as target port.                                                                                                                                   |
| <b>Encryption</b>     | AES. Passphrase from 10 up to 80 characters.                                 | must be the same used in the sender.                                                                                                                                                                                                    |
| <b>Measurements</b>   | Received buffer (graph)                                                      | acknowledged packets stored the receiver's buffer                                                                                                                                                                                       |
|                       | Receive rate (graph)                                                         | receiving rate in Mbps                                                                                                                                                                                                                  |
|                       | Bandwidth (graph)                                                            | estimated bandwidth of the network link                                                                                                                                                                                                 |
|                       | RTT (graph)                                                                  | smootheed round trip time in ms                                                                                                                                                                                                         |
|                       | Packets received                                                             | total number of packets received, including retransmitted                                                                                                                                                                               |
|                       | Packets lost                                                                 | total packets missing (reordered or lost)                                                                                                                                                                                               |
|                       | Packets retransmitted                                                        | total retransmitted packets                                                                                                                                                                                                             |
|                       | Packets ACK sent                                                             | total number of ACK control packets sent                                                                                                                                                                                                |
|                       | Packets NACK sent                                                            | total number of NACK control packets sent                                                                                                                                                                                               |
|                       | Negotiated latecy                                                            | latency of the sender                                                                                                                                                                                                                   |
|                       | Bytes lost                                                                   | total bytes missing, belonging to packets reordered or lost                                                                                                                                                                             |



## 10.6 Options

### ► SDI - ASI Optical Output

| Parameter        | Value     | Additional Data |
|------------------|-----------|-----------------|
| Descriptive Code | OP-006-OT |                 |

### ► SDI - ASI Optical Input

| Parameter        | Value     | Additional Data |
|------------------|-----------|-----------------|
| Descriptive Code | OP-006-OR |                 |

### ► SMPTE ST2110

| Parameter                             | Value                                                | Additional Data                                     |
|---------------------------------------|------------------------------------------------------|-----------------------------------------------------|
| Descriptive Code                      | OP-006-ST                                            | It requires SFP+ module                             |
| <b>SFP+</b>                           |                                                      |                                                     |
| Type                                  | Embrionix EB22LCSD-SM                                | It complies with the MSA interoperability standard. |
| Conectors                             | LC                                                   | Hot-pluggable                                       |
| TX Wavelength                         | 850 nm                                               |                                                     |
| Maximum input power                   | 0 dB                                                 |                                                     |
| Operating temperature                 | 0°C - +70°C                                          |                                                     |
| Tasa de datos                         | SD, HD, 3G                                           |                                                     |
| <b>Audio / Video</b>                  |                                                      |                                                     |
| Video reception                       | 1 primary flow<br>1 secondary flow                   |                                                     |
| Video resolution                      | HD 4:2:2                                             | 720p50/60<br>1080i25/30<br>1080p30                  |
| Audio reception                       | Up to 4 primary and secondary flows                  |                                                     |
| Audio channels                        | Up to 16 channels                                    | AES67 standard                                      |
| <b>Broadcast IP protocols</b>         | Ember+<br>BESS<br>NMS (IS-04, IS-05)                 | Supports VLAN                                       |
| <b>Precision Time Protocol (PTP)</b>  | PTP version 2<br>IEEE 1588<br>SMPTE profile ST2059-2 | The system works with 2 PTP sources                 |
| <b>SFP+ parameters / measurements</b> | Part number                                          | EB22LCSD-SM                                         |
|                                       | TX wavelength                                        | lambda used to transmit data (850 nm)               |
|                                       | TX out power                                         | power used to transmit data (mW)                    |
|                                       | Potencia de entrada receptor                         | potencia recibida (mW)                              |
|                                       | Temperature                                          | current temperature of SFP+ module (°C)             |
|                                       | Temperature alarm indicator                          |                                                     |



| Parameter                           | Value                             | Additional Data                                                                                                                                                                                                                                                              |
|-------------------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Video / audio SDI signal</b>     | Video CRC errors                  | counter of number of video packets with CRC errors                                                                                                                                                                                                                           |
|                                     | Audio Checksum errors             | counter of number of audio packets with CRC errors                                                                                                                                                                                                                           |
|                                     | Audio parity errors               | counter of number of audio packets with parity errors                                                                                                                                                                                                                        |
|                                     | Video bitrate                     |                                                                                                                                                                                                                                                                              |
|                                     | Audio bitrate                     |                                                                                                                                                                                                                                                                              |
|                                     | Audio levels                      | <ul style="list-style-type: none"> <li>- Measurement of the audio level for each received audio channel.</li> <li>- Maximum number of audio channels: 16.</li> <li>- Mixing of selected audios are audible.</li> <li>- Audios organised by groups. Total groups 4</li> </ul> |
| <b>PTP parameters / measurement</b> | PTP status                        | Not locked, coarse locked, fine locked                                                                                                                                                                                                                                       |
|                                     | Syncs                             | number of Sync packets received from master PTP                                                                                                                                                                                                                              |
|                                     | PTP mode                          | Multicast, hybrid, unicats                                                                                                                                                                                                                                                   |
|                                     | Follow ups                        | number of Follow-up packets received from master PTP                                                                                                                                                                                                                         |
|                                     | Delay requests                    | Número de paquetes Delay request enviados al master PTP                                                                                                                                                                                                                      |
|                                     | Delay requests (ms)               | 2000, 1000, 500, 250 and 125 ms                                                                                                                                                                                                                                              |
|                                     | Delay responses                   | number of Delay Responses received from master                                                                                                                                                                                                                               |
|                                     | Drop follow sync                  | Follow-up packets not received                                                                                                                                                                                                                                               |
|                                     | Drop Delay responses              | Delay Responses packets not received                                                                                                                                                                                                                                         |
|                                     | Announce timeout (intervals)      | master PTP missed announcement packets to declare PTP master as lost.                                                                                                                                                                                                        |
|                                     | Server PTP mode                   | multicast, hybrid, unicast                                                                                                                                                                                                                                                   |
|                                     | Version                           | PTP version of master PTP                                                                                                                                                                                                                                                    |
|                                     | Presence                          | Absent, Present                                                                                                                                                                                                                                                              |
|                                     | Domain (0 - 127)                  | PTP master domain number                                                                                                                                                                                                                                                     |
|                                     | VLAN ID (1 - 4094)                | PTP VLAN tag. For untagged, use VLAN 0                                                                                                                                                                                                                                       |
|                                     | Quality of Service (QoS): 0 - 63  | DSCP                                                                                                                                                                                                                                                                         |
| <b>SFP+ ST2110 management</b>       | Support for Virtual Lan (VLAN)    |                                                                                                                                                                                                                                                                              |
|                                     | Static or DHCP mode available     |                                                                                                                                                                                                                                                                              |
|                                     | Total Recived packets counter     |                                                                                                                                                                                                                                                                              |
|                                     | Total Transmitted packets counter |                                                                                                                                                                                                                                                                              |



| Parameter                      | Value                                                                                                                              | Additional Data                                                                                                                                                                                                                                                        |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Video flow</b>              | Support for Primary and Secondary (backup) video flow                                                                              |                                                                                                                                                                                                                                                                        |
|                                | Enable reception                                                                                                                   | ON / OFF                                                                                                                                                                                                                                                               |
|                                | Received Packets counter                                                                                                           |                                                                                                                                                                                                                                                                        |
|                                | RTP errors counter                                                                                                                 |                                                                                                                                                                                                                                                                        |
|                                | Destination IP address                                                                                                             | multicast IP address of video flow to receive                                                                                                                                                                                                                          |
|                                | Destination UDP port                                                                                                               | port of video flow to receive                                                                                                                                                                                                                                          |
|                                | Source IP                                                                                                                          | IP address of the server that manage the video streaming                                                                                                                                                                                                               |
|                                | Source UDP Port                                                                                                                    | port used for the server that manage the video streaming                                                                                                                                                                                                               |
|                                | VLAN ID                                                                                                                            | tag VLAN                                                                                                                                                                                                                                                               |
|                                | VLAN match                                                                                                                         | VLAN ON / OFF                                                                                                                                                                                                                                                          |
|                                | TTL                                                                                                                                | Time-to-live of received packets                                                                                                                                                                                                                                       |
|                                | sender type                                                                                                                        | <ul style="list-style-type: none"> <li>- Narrow Linear: (isochronous sender) packets received at a fixed interval</li> <li>- Narrow Gapped: packets received with SDI blanking intervals</li> <li>- Wide: received packets can have large gaps between them</li> </ul> |
|                                | RTP payload                                                                                                                        | 96 for video                                                                                                                                                                                                                                                           |
|                                | RTP SSRC                                                                                                                           | received synchronization source filtering value                                                                                                                                                                                                                        |
|                                | Resolution                                                                                                                         | 1920x1080<br>1280x720<br>2048x1080                                                                                                                                                                                                                                     |
|                                | Video scan                                                                                                                         | interlaced, progressive                                                                                                                                                                                                                                                |
|                                | Transport scan                                                                                                                     | interlaced, progressive                                                                                                                                                                                                                                                |
|                                | Rate (fps)                                                                                                                         | video interlaced (fields/s): 50, 50.94, 60<br>video progressive (frames/s): 25, 29.97, 30, 48, 50, 59.94, 60                                                                                                                                                           |
|                                | Pixel format                                                                                                                       | YCbCr: 422<br>YCbCr: 444<br>RGB                                                                                                                                                                                                                                        |
| <b>Audio map</b>               | Advanced function that allows to combine received audio channels in groups to configure the SDI audio stream.                      |                                                                                                                                                                                                                                                                        |
| <b>Seamless switch monitor</b> | Monitoring of delays between Primary and Secondary flows of each stream (one pair of video streams, and 4 pairs of audio streams). | Low delay is required to perform a seamless switch (glitch-free) between Primary and Secondary flow.                                                                                                                                                                   |
|                                | "Impaired" flag asserts if a required switching between Primary and Secondary has failed (black frames or distortion will occur).  |                                                                                                                                                                                                                                                                        |



| Parameter  | Value                                                 | Additional Data                                                                                               |
|------------|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Audio flow | Support for 4 audio streams                           | Each stream with one Primary and one Secondary (backup) flow                                                  |
|            | Enable reception                                      | ON / OFF                                                                                                      |
|            | Received Packets counter                              |                                                                                                               |
|            | RTP errors counter                                    |                                                                                                               |
|            | Destination IP address                                | multicast IP address of audio flow to receive                                                                 |
|            | Destination UDP port                                  | port of audio flow to receive                                                                                 |
|            | Source IP                                             | IP address of the server that manage the audio streaming                                                      |
|            | Source UDP Port                                       | port used for the server that manage the audio streaming                                                      |
|            | VLAN ID                                               | tag VLAN                                                                                                      |
|            | VLAN match                                            | VLAN ON / OFF                                                                                                 |
|            | TTL                                                   | Time-to-live of received packets                                                                              |
|            | AES Packet time: 1 ms, 125 us, 250 us, 333 us, 500 us | Audio time that is conveyed in one AES packet. If 16 audio channels are used, this time must be 500us or less |
|            | RTP Payload                                           | 97 for audio                                                                                                  |
|            | RTP SSRC                                              | received synchronization source filtering value                                                               |
|            | Sampling Rate (Hz)                                    | 48000 Hz                                                                                                      |
|            | Channels                                              | Up to 16 channels                                                                                             |
|            | Format                                                | ST2110-30 (PCM AES67)<br>ST2110-31 (AES3)                                                                     |



## 11 MAINTENANCE

### 11.1 Instructions for Returning by Mail

Instruments returned for repair or calibration, either within or out of the warranty period, should be sent with the following information: Name of the Company, name of the contact person, address, telephone number, receipt (in the case of coverage under warranty) and a description of the problem or the service required.

### 11.2 Considerations about the Screen

This paragraph offers key considerations regarding the use of the colour screen, taken from the specifications of the manufacturer.

In the TFT display, the user may find pixels that do not light up or pixels that are permanently lit. This should not be regarded as a defect in the TFT. In accordance with the manufacturer quality standard, 9 pixels with these characteristics are considered admissible.

Pixels which are not detected when the distance from the surface of the TFT screen to the human eye is greater than 35 cm, with a viewing angle of 90° between the eye and the screen should not be considered manufacturing defects either.

It is advisable a viewing angle of 15° in the 6.00 o'clock direction in order to obtain the optimum visualization of the screen.

### 11.3 Cleaning Recommendations

The equipment consists of a plastic case and a TFT screen. Each element has its specific cleaning treatment.

#### ► Cleaning the Screen

The TFT screen surface is VERY DELICATE. It has to be cleaned with a soft fabric cloth (cotton or silk), always making the same move from left to right and from top to bottom, without putting pressure on the screen.

The TFT screen has to be dry-cleaned or with a product specifically designed for TFT screens, by slightly dampening the cloth. NEVER use tap or mineral water, alcohol or conventional cleaning products, because they contain components that can damage the screen.

Turn off the equipment to locate dirt on the screen. After cleaning, wait a few seconds before turning on.



### ►Cleaning the Plastic Case

The equipment has to be disconnected before cleaning the case.

The case must be cleaned with a solution of neutral soap and water, using a soft cloth dampened with this solution.

Before use, the equipment has to be completely dry.

Never clean with abrasive soaps, chlorinated solvents or aromatic hydrocarbons. These products may degrade the case.



## i SDI / ASI OPTICAL OPTION

This annex contains operating instructions for the next option:

- OP-006-OT: Optical output for SDI/ASI signals.
- OP-006-OR: Optical input for SDI/ASI signals.

The Optical SDI/ASI input/output is a dedicated interface designed to transmit or receive SDI and ASI signals over fiber-optic links. This capability enables the transport of high-quality video and transport stream signals across long distances while maintaining signal integrity.

Advantage of optical transmission:

- Massive Distance Extension: Fiber optic cables can carry the exact same signal for kilometers without any loss in quality.
- Immunity to Interferences: Fiber optic signal are completely immune to Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI).

Supported Signal Types:

- SDI (Serial Digital Interface): SDI is the industry-standard digital video interface used in broadcast environments to transport uncompressed, unencrypted digital video signals, together with embedded audio, ancillary data, and timecode (for more details refer to ["SDI " on page 76](#)).
- ASI (Asynchronous Serial Interface): ASI is a transport-stream interface commonly used to carry compressed video and audio services, such as MPEG transport streams, over broadcast and telecommunications networks. Typical applications include satellite uplinks, cable TV headends, and contribution/distribution links (for more details refer to ["ASI" on page 43](#)).

### i.1 SDI-ASI Optical Option Installation

- 1 From **Home** press on **Settings** .
- 2 Press on **Options**  on the **General** settings row.
- 3 The **Options** screen shows a list of all tools already installed from different options.
- 4 If this option does not appear on the list, then it is not installed.
- 5 To install the option, press "+" and enter the option code.



- 6 The option code is a unique code. Contact PROMAX if you are interested in this option (<https://www.promaxelectronics.com/ing/contact-promax/>).

## i.2 SDI-ASI Optical input

For the SDI-ASI optical input option, the optical signal is transmitted through a fiber-optic cable using the SFP+ optical transceiver module. The internal Electrical-to-Optical (E/O) converter transforms the optical signal into a SDI or ASI signal.

- 1 Connect the optical signal to the SFP+ optical transceiver module.
- 2 From **Home** press on **ASI**  or **SDI** .
- 3 Swipe down from the top of the screen to display the **Top** menu.
- 4 Select the **ASI** or **SDI** option from the **Top** menu. This option allows you to select the ASI or SDI input.
- 5 At **Input through** menu select **SFP+ (MSA)**.
- 6 Now go to the **Home** menu and select the **ASI** or **SDI** mode to analyze the signal.

## i.3 SDI-ASI Optical output

For the optical output option, the internal E/O converter transforms the SDI or ASI signal into an optical signal. The converted signal is then transmitted through a fiber-optic cable using the SFP+ optical transceiver module.

- 1 Connect the fiber-optic cable to the SFP+ optical transceiver module.
- 2 From **Home** press on **ASI**  or **SDI** .
- 3 Swipe down from the top of the screen to display the **Top** menu.
- 4 Select the **ASI** or **SDI** option from the **Top** menu. This option allows enabling the output.
- 5 At **Output by SFP+ (MSA)** select **On**.



## ii SMPTE ST2110 OPTION

### ii.1 Description

This annex contains operating instructions for the next option:

- OP-006-ST: Reception and analysis of standard ST2110.

SMPTE ST 2110 is a set of standards developed by the Society of Motion Picture and Television Engineers (SMPTE). Its purpose is to enable real-time transmission of video, audio, and ancillary data (such as subtitles, timecode synchronization, etc.) over IP networks. This set of standards is primarily used in professional media production and broadcast environments that aim to replace or complement traditional SDI-based setups.

The use of IP networks in broadcasting offers multiple advantages. First, scalability: an IP network allows for easy expansion of the number of channels and devices compared to traditional SDI cabling. Flexibility is another key benefit, as a single Ethernet cable can carry multiple video and audio streams simultaneously. In terms of cost, it is more efficient, as it leverages standard IT infrastructure such as switches and network cables. Additionally, interoperability is significantly improved, facilitating integration with computer systems, streaming services, and modern media platforms.

|                                                                                     |                                                    |                                                                                                |
|-------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------|
|  | <a href="#">Introducing SMPTE ST 2110 (00:56s)</a> | SC<br>AN  |
|-------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------------------------------|

#### Video 18.

The main families within the SMPTE ST 2110 standard are divided into several key sections. ST 2110-10 focuses on system and synchronization, defining the core architecture and timing mechanisms. ST 2110-20\*\* addresses uncompressed video, specifying how raw video is transported over IP networks. \*\*ST 2110-30\*\* deals with PCM audio, detailing how to transmit linear audio—typically 48 kHz PCM—over the same network. Finally, \*\*ST 2110-40\*\* covers ancillary data, including metadata, subtitles, timecodes, and other supplementary information.

### ii.2 ST 2110 option installation

- 1 From **Home** press on **Settings** .
- 2 Press on **Options**  on the **General** settings row.



- 3 The **Options** screen shows a list of all tools already installed from different options.
- 4 If ST2110 is installed, should appear on the list as **ST2110** option.
- 5 The **ST2110** option is made up of different tools that are explained next. These tools should appear in the list. If they do not appear, then the option is not installed.
- 6 To install this option press on “+” and enter the option code.
- 7 The option code is a unique code for the meter. Contact PROMAX if you are interested in this option (<https://www.promaxelectronics.com/ing/contact-promax/>).

## ii.3 **Operation**

- 1 Connect the cable carrying the ST 2110 streams to the SFP+ or BNC connector.
- 2 From the Home menu, select the **SDI / ST2110** option  to access the SDI / ST2110 analysis screen.
- 3 To configure the input and output options for ST 2110 streams, access the **Top menu** by swiping down from the top of the screen and select **SDI**. In the available options, choose the connector used for the incoming signal **SFP+ (MSA)** or **BNC** under the **Input** setting, and if necessary, enable **output through BNC or SFP+**.
- 4 Close the **Top** menu and return to the SDI / ST2110 analysis screen.
- 5 If the received SDI signal is correct, the status bar will turn green and the message **SDI/ST2110 locked** is displayed.
- 6 In the status bar, there are also shortcuts to configuration parameters for some of the available tools:
  - PTP: PTP measurements.
  - SFP Mgmt: SFP network management.
  - Video: Video flow.
  - Audio: Audio flow.
  - A. Map: ST2110 to SDI audio mapping.
- 7 Now the associated tools can be used to obtain more information about the signal. The SDI/ST2110 analysis screen is divided into 3 windows:
  - main window
  - left top window
  - left bottom window



Each one of these windows can show a tool selected by the user. Press on the triangle ▼ on any window to display the tools menu. Select one tool to be shown on the window. Click on the "+" sign to expand the panel or "-" to reduce it again.

**8** The tools related to the ST2110 signal are:

- SFP parameters (if used).
- ST2110.

**9** By clicking on ST2110, the full list of available tools will be displayed:

- PTP measurements.
- SFP network management.
- Video flow.
- Audio flow.
- Seamless switch monitor.
- Audio map ST2110 to SDI.

**10** Select a tool to display it in each panel and analyze the signal.

|                                                                                    |                                                 |                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <a href="#">Starting SMPTE ST 2110 (01:58s)</a> | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); margin-right: 5px;">SCAN</div>  </div> |
|------------------------------------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Video 19.

The following sections explain each of the tools of the ST2110 analyzer..

## ii.4 SFP Parameters

If the SFP+ connector is used for signal input, the 'SFP Parameters' tool can be used to display diagnostic information about the SFP+ module which allows the user to see whether the module is functioning properly.

|                                                                                     |                                         |                                                                                                                                                                                                                                                 |
|-------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <a href="#">SFP Parameters (00:50s)</a> | <div style="display: flex; align-items: center;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); margin-right: 5px;">SCAN</div>  </div> |
|-------------------------------------------------------------------------------------|-----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### Video 20.



## ► Screen



| SFP parameters      |                    |
|---------------------|--------------------|
| Type                | 0xc2               |
| Compatibility       | 0x1000000000000000 |
| Bitrate             | 10 Gbps            |
| Vendor name         | EMBRIONIX          |
| OUI vendor          | 00:00:00           |
| Part number         | EB22LCSD-SM        |
| TX wavelength       | 850 nm             |
| TX bias             | 0.00 mA            |
| TX out power        | 0.00 mW            |
| RX input power      | 0.00 mW            |
| Current temperature | 33 °C              |
| Temperature alarm   | No                 |

Channel44 + DVBT TELEVISIÓ DE CATALUNYA 19.91 Mbps

Figure 48.

### 1 Available SFP parameters:

- Type
- Compatibility
- Bitrate
- Vendor name
- OUI vendor
- Part number
- TX wavelength
- TX bias
- TX out power
- RX input power
- Current temperature
- Temperature alarm

## ii.5 PTP Measurements

The PTP Measurements tool allows the user to monitor and analyse the Precision Time Protocol (PTP) which is critical for synchronizing devices in professional media environments, especially for live video and audio over IP networks.



[PTP measurements \(02:59s\)](#)

SCAN

Video 21.

► Screen



Figure 49.

1 PTP measurements:

- PTS status
- PTP mode
- Syncs
- Follow ups
- Delay requests
- Delay requests (ms)
- Delay responses
- Drop follow syncs
- Drop delay responses
- Announce timeout (intervals)
- Server mode
- Version
- Presence
- Domain
- VLAN IDE



- QoS
- GM ID
- GM IP
- Delay requests IP

### ►Settings

To display the PTP measurements settings swipe right from the left side of the screen or press on PTP at the status bar.

- PTP source
- PTP VLAN status
- PTP domain
- PTP mode
- PTP QoS
- PTP VLAN Id
- PTP delay requests (ms)
- PTP time out

## ii.6 SFP Network Management

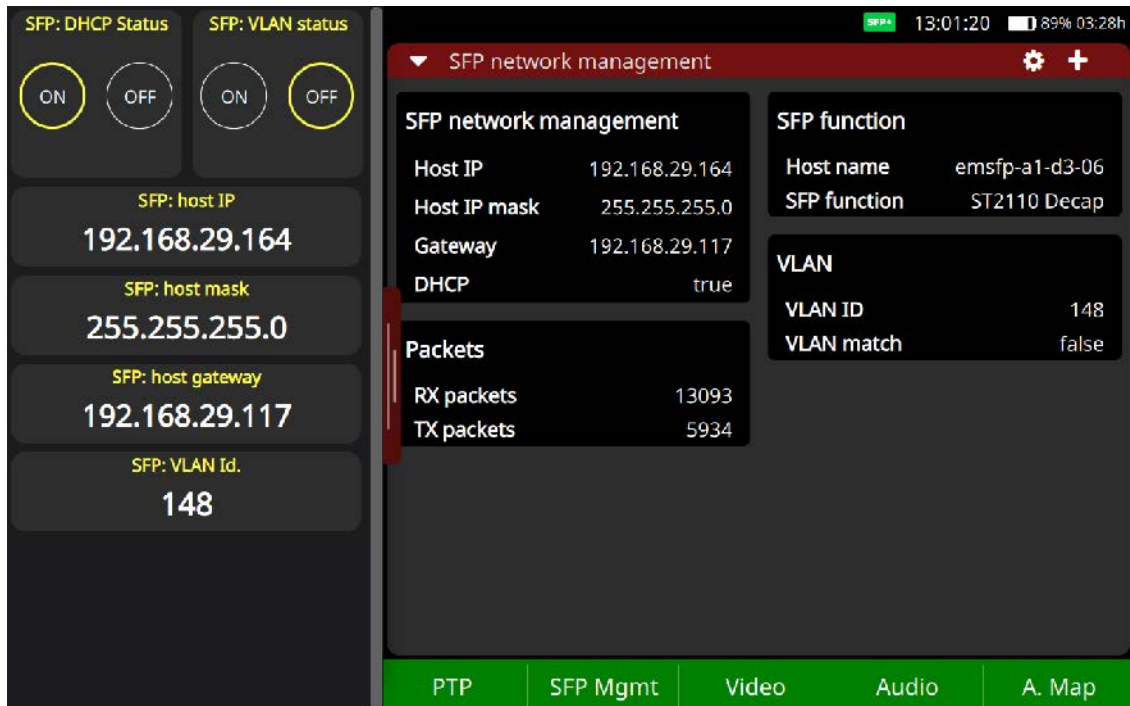
The SFP Network Management tool allows for viewing and configuring the parameters of the network through which the ST2110 signal is transmitted.

|                                                                                     |                                                        |                                                                                       |                  |
|-------------------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------|------------------|
|  | <a href="#"><u>SFP network management (01:10s)</u></a> |  | S<br>C<br>A<br>N |
|-------------------------------------------------------------------------------------|--------------------------------------------------------|---------------------------------------------------------------------------------------|------------------|

Video 22.



## ► Screen



**Figure 50.**

### 1 SFP network management:

- SFP network management
  - Host IP
  - Host IP mask
  - Gateway
  - DHCP
- Packets
  - RX packets
  - TX packets
- SFP function
  - Host name
  - SFP function
- VLAN
  - VLAN ID
  - VLAN match

## ► Settings

To display the SFP network management settings, swipe right from the left side of the screen or press on SFP Mgmt at the status bar.

### ■ DHCP status



- VLAN status
- host IP
- host mask
- host gateway
- VLAN Id

#### ► Touch gestures



Pulsar: Posiciona el cursor en el punto.

## ii.7

### Video flows

The Video flows tool allows user to analyse how uncompressed video is transmitted over IP networks using the SMPTE ST 2110 suite of standards.



[Video flows \(03:32s\)](#)



SCANN

#### Video 23.



## ► Screen



Figure 51.

### 1 Video flows (primary flow / secondary flow):

- ON/OFF
- Received packets
- RTP errors
- Destination IP
- Destination port (UDP)
- Source IP
- Source port (UDP)
- VLAN ID
- VLAN match
- TTL
- Sender type
- RTP payload
- RTP SSRC
- Resolution
- Video frame scan
- Video transport scan
- Frame rate (fps)
- Video pixel format



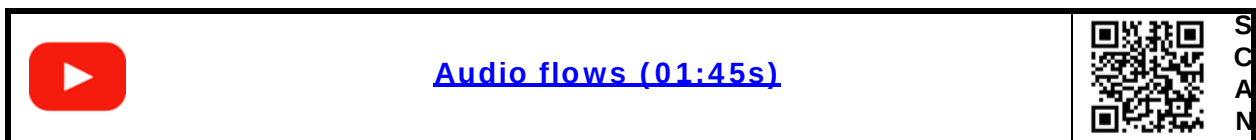
## ► Settings

To display the Video flows settings, swipe right from the left side of the screen or press on Video at the status bar.

- Video status
- Video flow
- Video destination IP
- Video destination port (UDP)
- Video source IP
- Video source port (UDP)
- Video match VLAN
- Video VLAN Id.
- Sender type
- Video resolution
- Frame scan
- Transport scan
- Video frame rate
- Pixel format

## ii.8 Audio flows

The Audio flows tool allows users to analyse how uncompressed audio is transmitted over IP networks using the SMPTE ST 2110 suite of standards.



Video 24.



## ► Screen

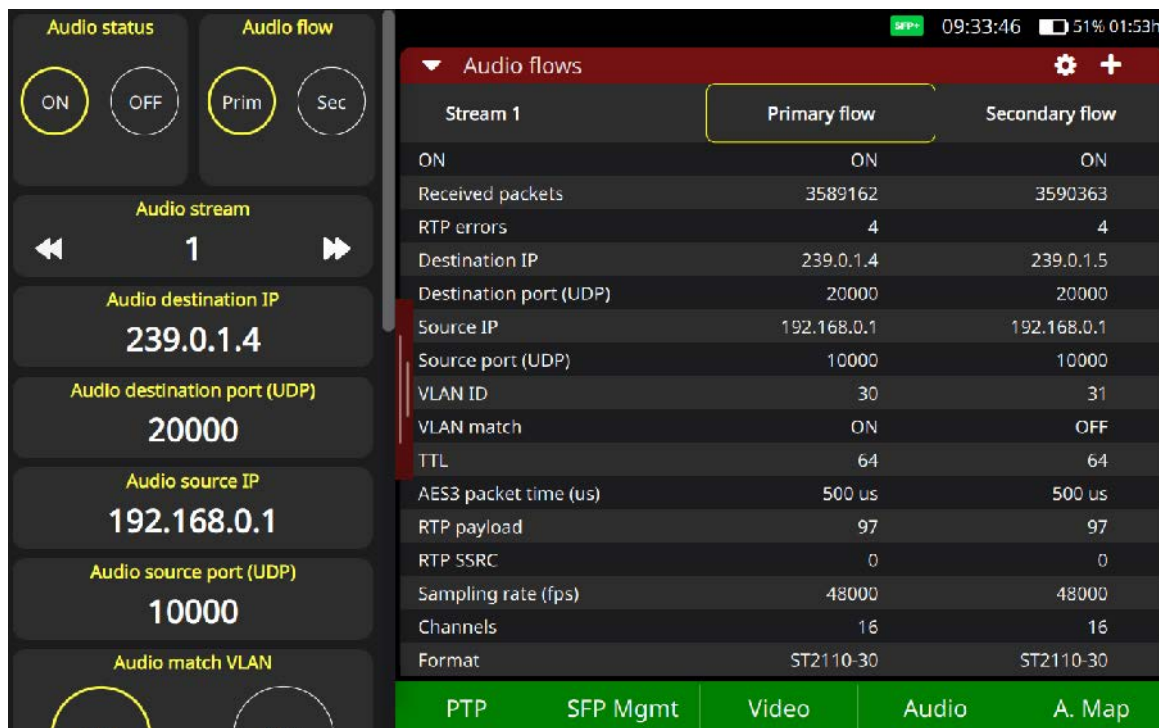


Figure 52.

### 1 Audio flows (primary flow / secondary flow):

- ON/OFF
- Received packets
- RTP errors
- Destination IP
- Destination port (UDP)
- Source IP
- Source port (UDP)
- VLAN ID
- VLAN match
- TTL
- AES3 packet time (us)
- RTP payload
- RTP SSRC
- Sampling rate (fps)
- Channels
- Format

## ► Settings

To display the Audio flows settings, swipe right from the left side of the screen or press on Audio at the status bar.



- Audio status
- Audio destination IP
- Audio destination port (UDP)
- Audio source IP
- Audio source port (UDP)
- Audio match VLAN
- Audio VLAN Id.
- Audio format
- Audio packet time
- Audio channels number

## ii.9

**Seamless Switch Monitor**

The Seamless switch monitor shows 5 graphs depicting the latency between the primary and secondary streams for the video flow and four audio flows selected.



[Monitor seamless switch \(00:30s\)](#)



S  
C  
A  
N

**Video 25.**



## ► Screen

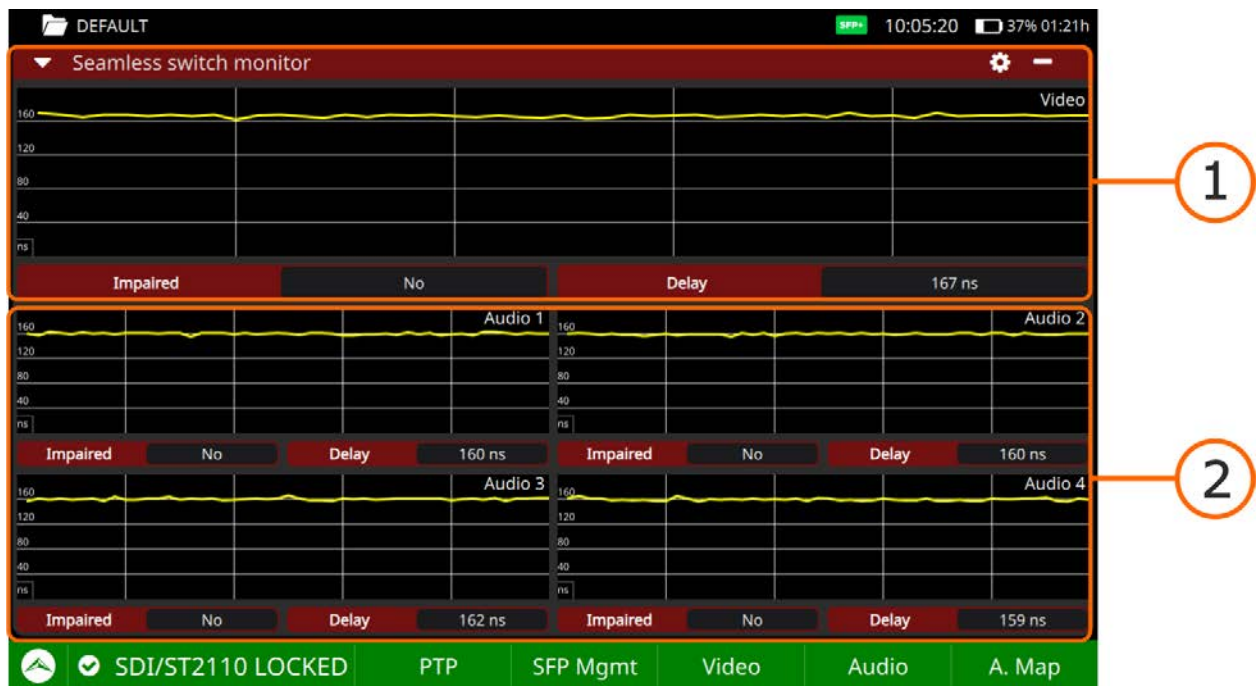


Figure 53.

- 1 Top panel: Latency (ns) between the primary and secondary video streams.
- 2 Bottom panel: Latency (ns) between the four primary and secondary audio streams.

## ii.10 Audio map ST2110 to SDI

The ST2110 to SDI Audio Map tool visualizes the audio streams and how they are embedded in each of the 16 SDI audio channels.


[Audio map ST2110 to SDI \(00:55s\)](#)

S  
C  
A  
N



Video 26.

## ► Screen

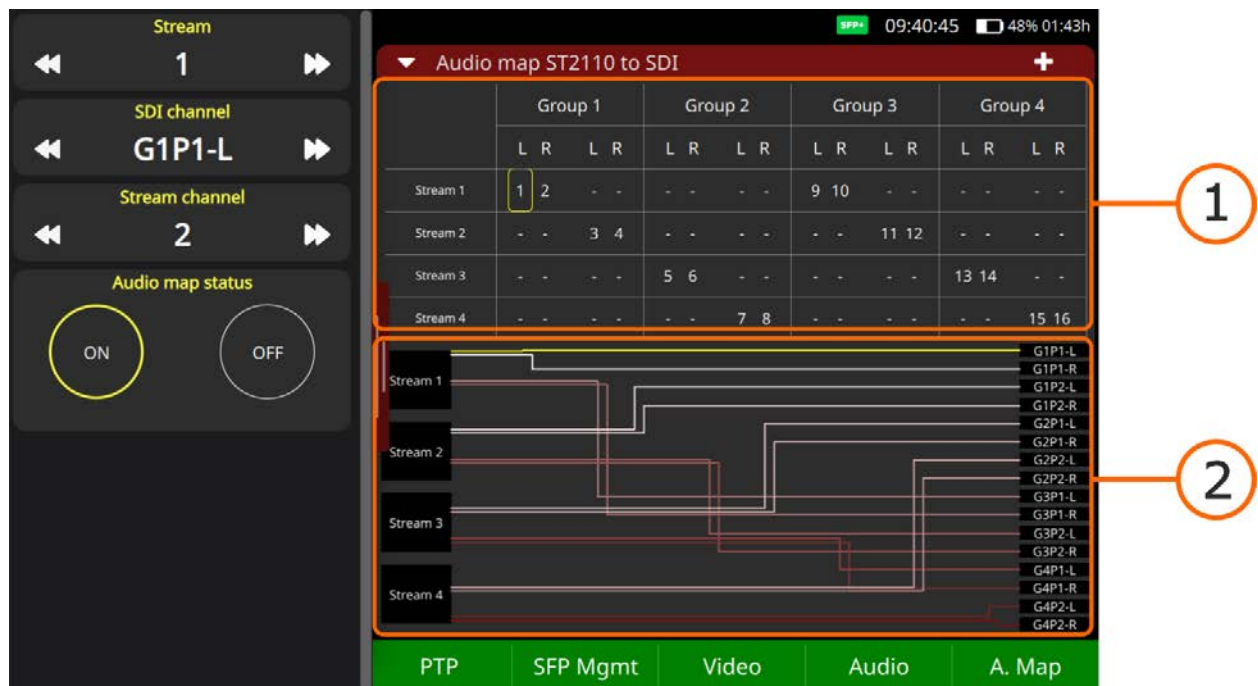


Figure 54.

- 1 Top panel: It displays the streams and the channels assigned to each group.
- 2 Bottom panel: It shows the mapping with the channel assignment of each stream.

## ► Settings

To display the Audio flows settings, swipe right from the left side of the screen or press on Audio at the status bar.

- Stream
- SDI channel
- Stream channel
- Audio map status
- Audio channels number

If the manual configuration is not used, the auto-configuration button can be pressed to automatically map the audio tracks to the SDI signal.



### iii ADDITIONAL INFORMATION

#### iii.1 Additional Documents

On the PROMAX website you can find additional information to go deeper in some aspects related to the field strength meter.

| Name                 | Description                                                                        | Link                                                                                                                                                                                                                                                                                                                        |                                                                                     |
|----------------------|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| PROMAX Download Area | Documentation related to PROMAX equipment                                          | <a href="http://www.promaxelectronics.com/ing/downloads/user-manuals">http://www.promaxelectronics.com/ing/downloads/user-manuals</a>                                                                                                                                                                                       |  |
| ATLAS IP             | Datasheet of ATLAS IP at the PROMAX website with links to all downloadable content | <a href="https://www.promaxelectronics.com/ing/products/tv-cable-satellite-signal-and-spectrum-analyzers/atlas-ip/portable-analyzer-for-broadcast-environments/">https://www.promaxelectronics.com/ing/products/tv-cable-satellite-signal-and-spectrum-analyzers/atlas-ip/portable-analyzer-for-broadcast-environments/</a> |  |
| Firmware             | Last release of the updating file for the meter                                    | <a href="https://www.promax.es/go/atlas-ng-firmware/">https://www.promax.es/go/atlas-ng-firmware/</a>                                                                                                                                                                                                                       |  |

#### iii.2 Social Networks

| Name        | Link                                                                                                                    |                                                                                       |
|-------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| X (twitter) | <a href="https://twitter.com/PROMAX_news">@PROMAX_news</a>                                                              |  |
| Linkedin    | <a href="https://www.linkedin.com/company/promax-electronica/">https://www.linkedin.com/company/promax-electronica/</a> |  |
| Facebook    | <a href="https://www.facebook.com/promaxelectronics/">https://www.facebook.com/promaxelectronics/</a>                   |  |
| YouTube     | <a href="https://www.youtube.com/user/PROMAXElectronics">https://www.youtube.com/user/PROMAXElectronics</a>             |  |



## iv MULTIMEDIA CONTENT

The following table shows all the links to video tutorials included in this manual.

**NOTE:** In some **video tutorials**, there may be differences between the interface shown in the video and the equipment current interface. Always follow the instructions in the manual and use the video only as supplementary reference material.

| Chapter                     | num | Title                     | Link                                                                    | QR Code                                                                               |                                                                                       |
|-----------------------------|-----|---------------------------|-------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 3. Settings and Preferences | 1   | Settings Menu             | <a href="https://youtu.be/H0ruPD097pM">https://youtu.be/H0ruPD097pM</a> |                                                                                       |    |
| 6. IPTV                     | 2   | IPTV Analyzer             | <a href="https://youtu.be/xJDE5p3BHf8">https://youtu.be/xJDE5p3BHf8</a> |    |                                                                                       |
| 6. IPTV                     | 3   | Audio levels              | <a href="https://youtu.be/38x7ozsjxjw">https://youtu.be/38x7ozsjxjw</a> |                                                                                       |    |
| 6. IPTV                     | 4   | Recording                 | <a href="https://youtu.be/aE4h9IktrgE">https://youtu.be/aE4h9IktrgE</a> |   |                                                                                       |
| 7. ASI                      | 5   | Video Values              | <a href="https://youtu.be/Ww84wTu9wwk">https://youtu.be/Ww84wTu9wwk</a> |                                                                                       |  |
| 7. ASI                      | 6   | Video                     | <a href="https://youtu.be/c4fA5oXJ7Go">https://youtu.be/c4fA5oXJ7Go</a> |  |                                                                                       |
| 7. ASI                      | 7   | Recording                 | <a href="https://youtu.be/aE4h9IktrgE">https://youtu.be/aE4h9IktrgE</a> |                                                                                       |  |
| 7. ASI                      | 8   | Audio levels              | <a href="https://youtu.be/38x7ozsjxjw">https://youtu.be/38x7ozsjxjw</a> |  |                                                                                       |
| 7. ASI                      | 9   | Transport Stream Analyzer | <a href="https://youtu.be/MlIPQ-T__PE">https://youtu.be/MlIPQ-T__PE</a> |                                                                                       |  |
| 9. Streaming Analyzer       | 10  | SRT                       | <a href="https://youtu.be/51uoWAdAeLk">https://youtu.be/51uoWAdAeLk</a> |  |                                                                                       |
| 9. Streaming Analyzer       | 11  | Video                     | <a href="https://youtu.be/c4fA5oXJ7Go">https://youtu.be/c4fA5oXJ7Go</a> |                                                                                       |  |
| 9. Streaming Analyzer       | 12  | Audio levels              | <a href="https://youtu.be/38x7ozsjxjw">https://youtu.be/38x7ozsjxjw</a> |  |                                                                                       |
| 9. Streaming Analyzer       | 13  | Video Values              | <a href="https://youtu.be/Ww84wTu9wwk">https://youtu.be/Ww84wTu9wwk</a> |                                                                                       |  |
| 10. SDI                     | 14  | SDI Analyzer              | <a href="https://youtu.be/tcuINH1vTZw">https://youtu.be/tcuINH1vTZw</a> |  |                                                                                       |



| Chapter         | num | Title                     | Link                                                                                                                                  | QR Code                                                                               |                                                                                       |
|-----------------|-----|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| 10. SDI         | 15  | Audio levels              | <a href="https://youtu.be/38x7ozsjxjw">https://youtu.be/38x7ozsjxjw</a>                                                               |                                                                                       |    |
| 11. Workspaces  | 16  | Workspaces                | <a href="https://youtu.be/GalvHQw5w9Y">https://youtu.be/GalvHQw5w9Y</a>                                                               |    |                                                                                       |
| 12. webControl  | 17  | webControl                | <a href="https://youtu.be/JtKQXymTRbq">https://youtu.be/JtKQXymTRbq</a>                                                               |                                                                                       |    |
| v. SMPTE ST2110 | 18  | Introducing SMPTE ST 2110 | <a href="https://youtu.be/l1QVZB-7hTs">https://youtu.be/l1QVZB-7hTs</a>                                                               |    |                                                                                       |
| v. SMPTE ST2110 | 19  | Starting                  | <a href="https://youtu.be/-rQS241DVGO">https://youtu.be/-rQS241DVGO</a>                                                               |                                                                                       |    |
| v. SMPTE ST2110 | 20  | SFP Parameters            | <a href="https://youtu.be/r7atss-x5PO">https://youtu.be/r7atss-x5PO</a>                                                               |    |                                                                                       |
| v. SMPTE ST2110 | 21  | PTP measurements          | <a href="https://youtu.be/W2e-2P98rpU">https://youtu.be/W2e-2P98rpU</a>                                                               |                                                                                       |    |
| v. SMPTE ST2110 | 22  | SFP network management    | <a href="https://youtu.be/r7atss-x5PO?si=8UJ3HZY-pp0e3pHm&amp;t=50">URL https://youtu.be/r7atss-x5PO?si=8UJ3HZY-pp0e3pHm&amp;t=50</a> |   |                                                                                       |
| v. SMPTE ST2110 | 23  | Video flows               | <a href="https://youtu.be/3szs1QO79_c">https://youtu.be/3szs1QO79_c</a>                                                               |                                                                                       |  |
| v. SMPTE ST2110 | 24  | Audio flows               | <a href="https://youtu.be/UjdUhORG3lw">https://youtu.be/UjdUhORG3lw</a>                                                               |  |                                                                                       |
| v. SMPTE ST2110 | 25  | Seamless switch monitor   | <a href="https://youtu.be/UjdUhORG3lw?si=Hr8yCkplZwQfC4cS&amp;t=160">https://youtu.be/UjdUhORG3lw?si=Hr8yCkplZwQfC4cS&amp;t=160</a>   |                                                                                       |  |
| v. SMPTE ST2110 | 26  | Audio map ST2110 to SDI   | <a href="https://youtu.be/UjdUhORG3lw?si=xkQMg8Ql06j4qE08&amp;t=105">https://youtu.be/UjdUhORG3lw?si=xkQMg8Ql06j4qE08&amp;t=105</a>   |  |                                                                                       |

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