64-Channel Real-Time TS Analyzer

User manual

for the built-in

web-based user interface

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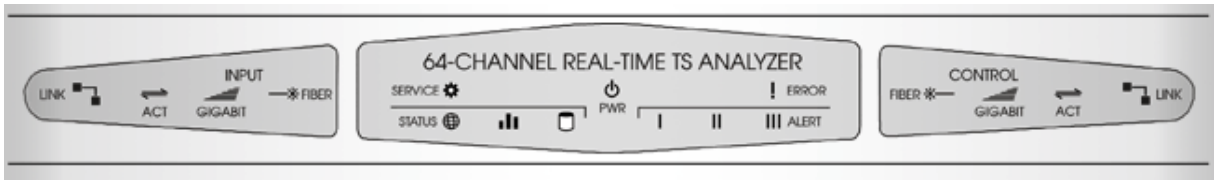
Frequently Asked Questions

Links

L1. www.cableworld.eu
L2. www.dvb.org

1. Install

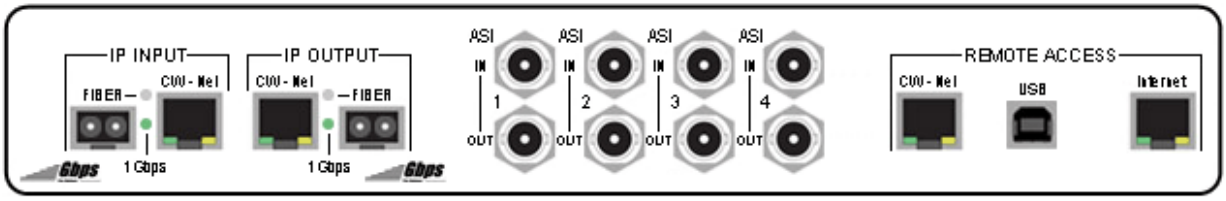
1.1 Device overview



Front panel of the device

⏻	Power	Indicates the power on status.
	Ethernet Link	Indicates the existence of the Ethernet connection at the TS Analyzer Input and the Device Controller interfaces.
⇄	Ethernet Act	Indicates the Ethernet communication over the TS Analyzer Input and the Device Controller interfaces.
	1000 Mbps	Indicates the gigabit Ethernet connection at the TS Analyzer Input and the Device Controller interfaces.
—✳	Fiber	Indicates the existence of the optical Ethernet connection at the TS Analyzer Input and the Device Controller interfaces.
✿	Service Required	Indicates if the analyzer settings are not appropriate.
🌐	Web Server Status	Indicates the existence of the Ethernet connection and in case of DHCP the successful request for the dynamic IP address of the Internet interface. The LED flashes to indicate Ethernet communication.
▮▮▮	Analyzer Status	Indicates the existence of the Ethernet connection and the successful linking between the Ethernet interface and the analyzer module.
▯	Storage Status	Indicates that all the settings of the analyzer are appropriate for recording on the SD memory card.
!	Error	Indicates the current status of the analyzer Alert & Log function.
I	Alert Level I	
II	Alert Level II	
III	Alert Level III	

Front panel LEDs



Rear panel of the device

Interface	Connector type	Data rate	Description
TS Analyzer Input	RJ-45 or SFP	10/100/1000 Mbps	Ethernet measuring input of the analyzer.
ASI Input 1..4	75 Ohm BNC	max. 200 Mbps	ASI measuring input of the analyzer.
ASI Output 1..4	75 Ohm BNC	max. 200 Mbps	ASI outputs of the analyzer.
Device Controller	RJ-45 or SFP	10/100/1000 Mbps	Control input of the Real-Time Analyzer module.
Ethernet	RJ-45	10/100 Mbps	Interface of the Remote Control module connected to the internal LAN network.
Internet	RJ-45	10/100 Mbps	Interface of the Remote Control module connected to the external public network.
USB	USB type B		Reserved for future development.

Rear panel connectors

1.1.1 Hardware requirements

Microsoft Windows system[1]

- Intel Pentium IV, EM64T or AMD Athlon XP, Athlon 64, Opteon or better
- min. 512 MBytes of system memory
- min. 100 MBytes storage[2]
- Ethernet 10/100 network card

Linux system[1]

- Intel Pentium IV, EM64T or AMD Athlon XP, Athlon 64, Opteon or better
- min. 512 MBytes of system memory
- min. 58 Mbytes storage[2]
- Ethernet 10/100 network card

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[1] www.java.com/en/download/help/sysreq.xml
[2] The minimum storage required by the Java virtual machine, the device does not need to use separate management software to download and install.

1.1.2 Software requirements

Microsoft Windows system

- Windows XP, Windows Vista or Windows 7 32/64-bit operating system
- Google Chrome 4.0, Internet Explorer 8 or Firefox 3.5.x browser
- Java Version 6 Update 24 or later version[1]

Linux system

- Oracle Enterprise, Red Hat Enterprise or SUSE 9/10/11 32/64-bit Linux operating system
- Firefox 3.5.x browser
- Java Version 6 Update 24 or later version[1]

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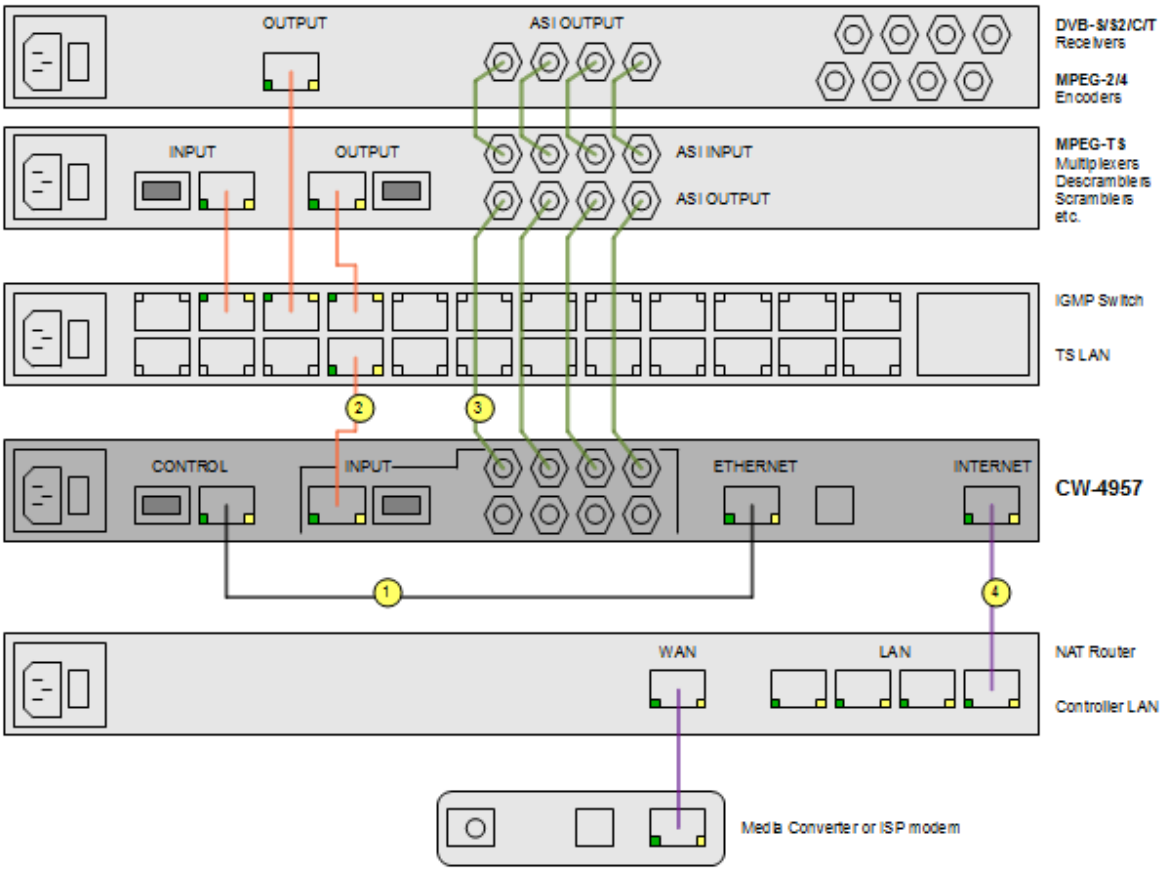
[1] http://www.java.com/en/download/index.jsp

1.2 Connecting to the network

1. Connect the **Device Controller** and the **Ethernet** connectors with the UTP cable supplied with the device.[1]
2. Check, whether the default IP addresses of the analyzer can cause an IP address conflict in the network to be measured.[2]
3. Connect the **Internet** connector to the central router of the control network.
4. For remote access set the NAT in the central router of the control network.
5. Connect **TS Analyzer Inputs** to the central switch of the transport stream network at the **CW-Net** or the **FIBER** connector.
6. Connect the ASI signals to be analysed to the loop-through ASI inputs.



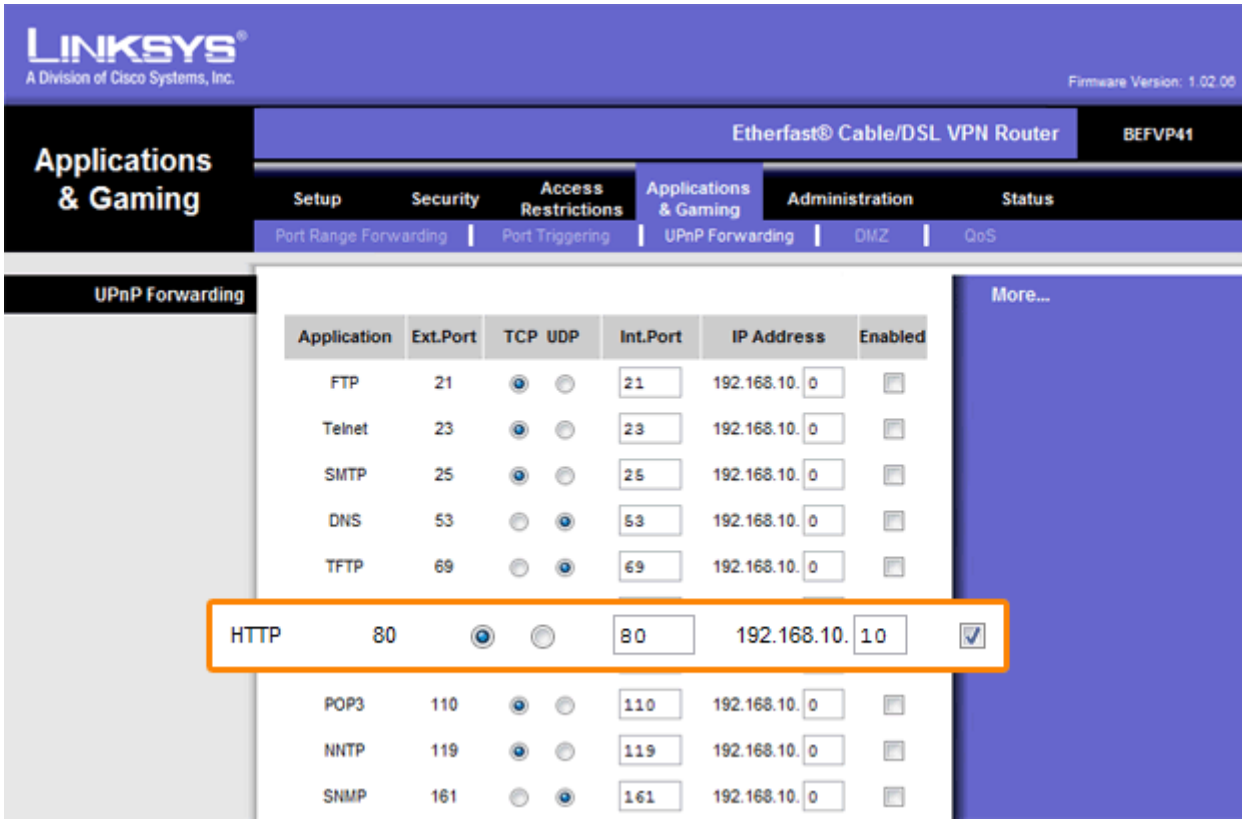
Installing the CW-4957 type TS Analyzer

Interface	IP address
Device Controller	10.123.13.101
TS Analyzer Inputs	10.123.13.102
Ethernet	10.123.13.103
Internet	192.168.10.10

Default IP addresses

Interface	HTTP port number
Internet	80

Default HTTP port number



Setting the NAT in the Linksys BEFVP41 router

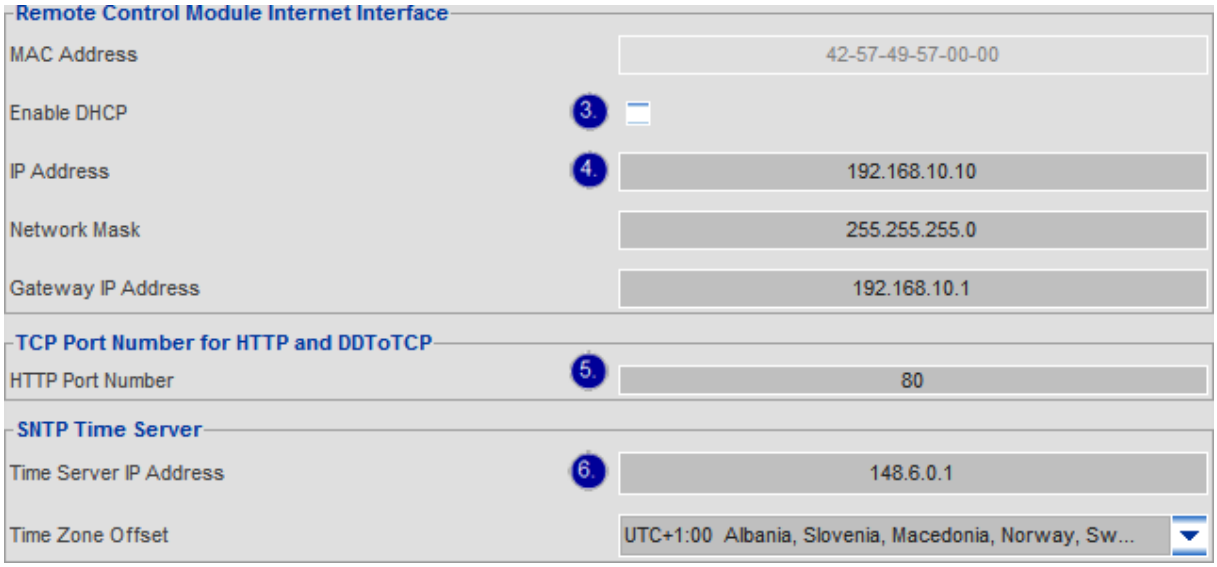
1.3 Setup wizard

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **Setup wizard** function from the **Start** menu.
3. Click **Next** to continue.
4. Enter the missing data.
5. Click **Apply** to validate the settings.
6. Click **Next** to continue.

The setup wizard will guide you through the setup step by step. Before starting the setup wizard check the proper connections of the device.

1.3.1 Web server and SNTP client settings

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **Web Server Settings** function from the **Settings** menu or use the setup wizard.
3. To use dynamic IP address, check the **Enable DHCP** check box.
4. To use **static IP address** enter the IP address and the netmask of the Internet interface, and the gateway IP address.
5. Enter the **TCP port number** assigned to the HTTP. The default value is 80.
6. Enter the **Time Server** [1] IP address and time zone offset used for the synchronization.
7. Click Apply to validate the settings.



Web server and SNTP client settings

The Web interface has a valid, unique MAC address that can not be changed. An arbitrary IPv4 IP address can be assigned to the interface.

The analyzer communicates with a time server. Use the PING command to find the Time Server IP address.

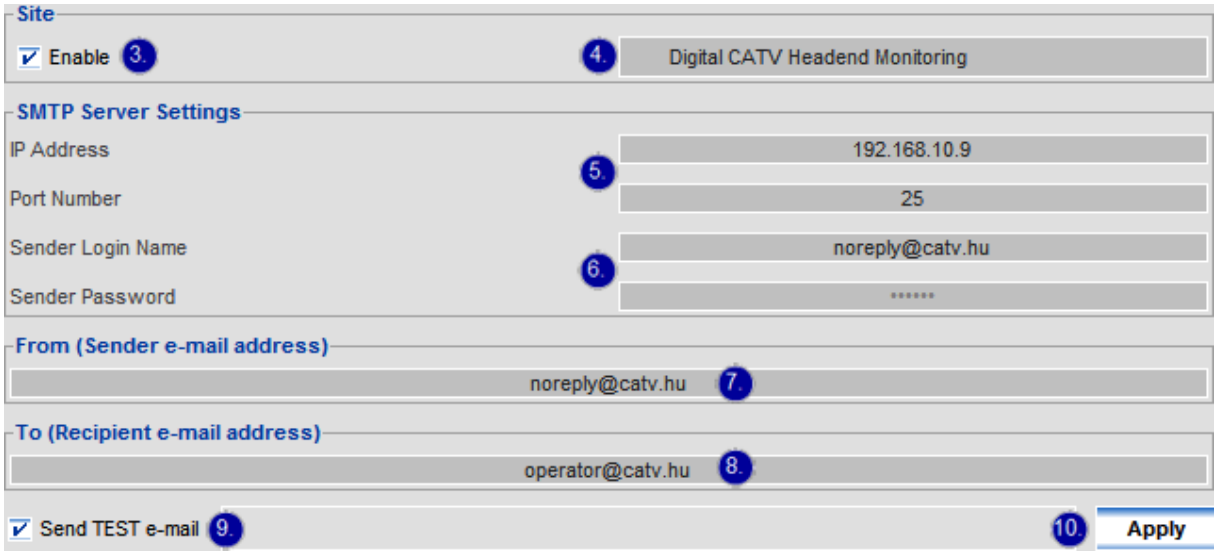
```
C:\>ping pool.ntp.org

Pinging pool.ntp.org [195.228.45.175] with 32 bytes of data:
Reply from 195.228.45.175: bytes=32 time=41ms TTL=58
Reply from 195.228.45.175: bytes=32 time=14ms TTL=58
Reply from 195.228.45.175: bytes=32 time=25ms TTL=58
Reply from 195.228.45.175: bytes=32 time=14ms TTL=58

Ping statistics for 195.228.45.175:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 14ms, Maximum = 41ms, Average = 23ms

C:\>_
```

Finding the Time Server IP address

- [1] www.ntp.org

1.3.2 SMTP client settings

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **SMTP Client Settings** function from the **Settings** menu or use the setup wizard.
3. Check **Enable** to send mail.
4. Give a brief **description** on the monitoring site, which will appear as the subject of the message to send.
5. Enter the **SMTP Server** IP address and port number. The default port number is 25.
6. Enter your login information.
7. Enter the **sender's e-mail address**.
8. Enter the **recipient's e-mail address**.
9. Check the **Send TEST e-mail** checkbox to send a message.
10. Click **Apply** to validate the settings and send the test message.



SMTP client settings

The analyzer can also send alarm e-mail via the Internet interface. For this service an active e-mail account is required. The SMTP client of the analyzer uses the 'AUTH LOGIN' procedure to authenticate the user. If the test message is not received, check if the 'AUTH LOGIN METHOD' is enabled in your mail server. Use the PING command to find the SMTP Server IP address.

```
C:\>ping mail.t-online.hu

Pinging mail.t-online.hu [84.2.46.3] with 32 bytes of data:
Reply from 84.2.46.3: bytes=32 time=19ms TTL=119
Reply from 84.2.46.3: bytes=32 time=14ms TTL=119
Reply from 84.2.46.3: bytes=32 time=14ms TTL=119
Reply from 84.2.46.3: bytes=32 time=39ms TTL=119

Ping statistics for 84.2.46.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 14ms, Maximum = 39ms, Average = 21ms

C:\>_
```

Finding the SMTP Server IP address

1.3.3 Setting up the control network

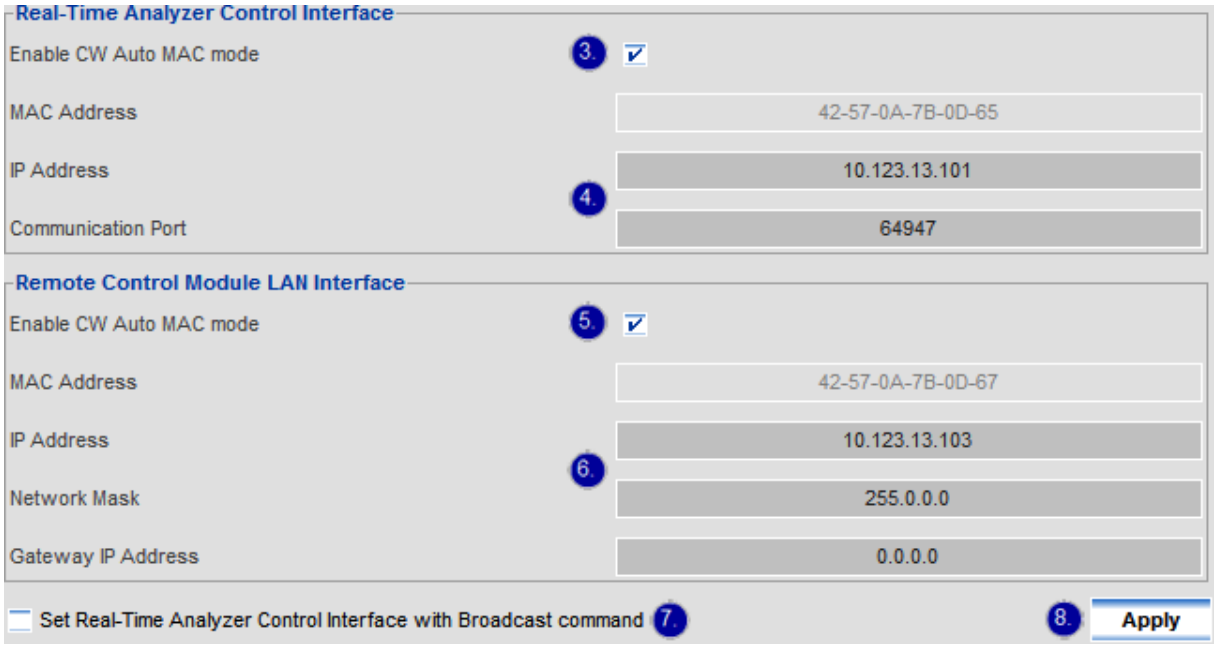
1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **LAN Settings** function from the **Settings** menu or use the setup wizard.

Setting up the **Control interface** of the **Real-Time Analyzer** module

3. For the automatic MAC address setting, enable the CW Auto MAC mode function.
4. Enter the interface's **IP address** and **communication port number**. The default port number is 64947.

Setting up the **LAN interface** of the **Remote Control** module

5. For the automatic MAC address setting, enable the **CW Auto MAC mode** function.
6. Enter the interface's **IP address**, the **netmask** and the **default gateway.**
7. Check the **Set Real-Time Analyzer CI with Broadcast command** check box to configure the analyzer module for broadcast mode. [1]
8. Click **Apply** to validate the settings



Setting up the control network

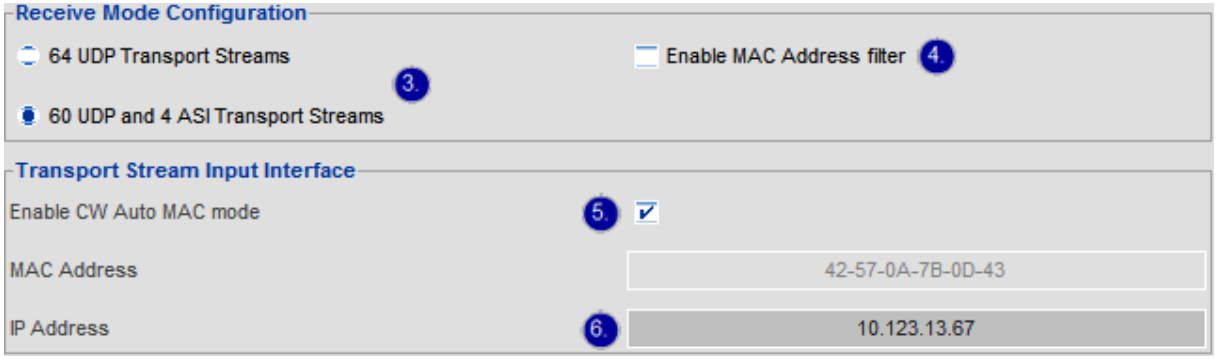
The analyzer consists of two main parts: the Real-Time Analyzer module performs the real-time measurements, the Remote Control Module evaluates the data and displays the user interface. The Ethernet connection is required between the two modules, which are directly wired or connected over the controller network. To ensure a smooth communication the direct cable connection is proposed. When connecting over the control network the IP addresses should be chosen to be in one subnet. It is mandatory with direct cable connection.

Except the Internet interface the MAC addresses of all IP interfaces of the analyzer can be changed. In the CW-Net network, the use of the CW Auto MAC mode function is recommended.

- [1] The broadcast configuration is allowed to use only in case of a direct cable connection.

1.3.4 Setting the network parameters of the transport stream input

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **TS Receiver Settings** function from the **Settings menu** or use the setup wizard.
3. Select the desired **receive mode**. [1]
4. Disable the **MAC address filter** function to enable the **Promiscuous** receive mode. [2]
5. For the automatic MAC address setting, enable the **CW Auto MAC mode** function.
6. Set the **IP address** of the ransport stream input. [3]
7. Click **Apply** to validate the settings.

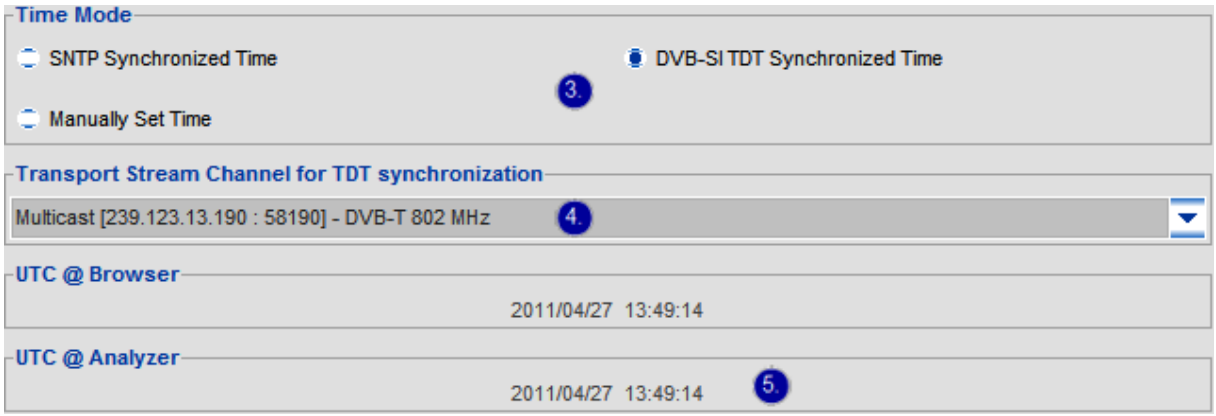


Setting the network parameters of the transport stream input

- [1] The analyzer has 64 transport stream inputs. If you only want to analyze IP signals, select the 64 UDP Transport Stream mode. For analyzing ASI signals select the 60 UDP and 4 ASI Transport Streams mode.
- [2] Besides the Unicast / Multicast / Broadcast receive modes, the analyzer supports the so-called Promiscuous receive mode, which allows analyzing Unicast streaming among other instruments without interfering the transmission. Important: The analyzer's MAC address filter function must be disabled, and the data stream to be analyzed must arrive to the analyzer's TS input (e.g. using Port Mirroring).
- [3] Except the Internet interface the MAC addresses of all interfaces in the device can be changed. In the CW-Net network, the use of the CW Auto MAC mode function is proposed.

1.3.5 Setting the date and time

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **Time Settings** function from the **Settings** menu or use the setup wizard.
3. Select the desired **time base**.
4. Select a transport stream source for the DVB-SI TDT Synchronized Time mode.
5. Click Apply to validate the settings, and then verify that the synchronization has taken place.



Setting date and time

The analyzer does not save data to the SD card and will not send alerts without knowing the exact time. The correct date and time must be set at every power on, because the machine has no internal power source to store the time.

SNTP Synchronized Time

- synchronization to a Timer Server available via the Internet [1]
- continuous synchronization

Manually Set Time

- synchronization to the internal clock of the computer performing the configuration
- synchronization manually at every reboot

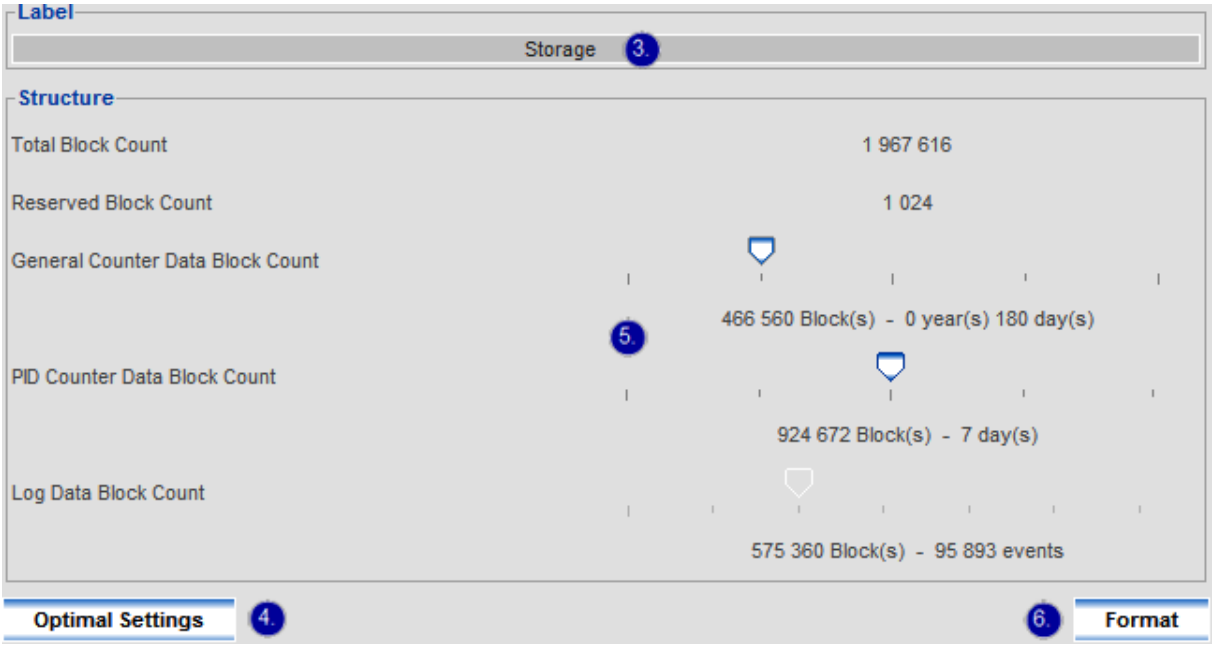
DVB-SI TDT Synchronized Time

- synchronization to the time specified in the TDT table of the selected input transport stream [2]
- use of unedited DVB-S/S2 or DVB-T source recommended
- continuous synchronization

- [1] Web server and SNTP client settings
- [2] IP channel settings, ASI channel settings

1.3.6 Formatting the built-in SD memory card

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **SD Card Settings** function from the **Settings** menu or use the setup wizard.
3. Enter the identification **label** for the memory card.
4. Click **Optimal Settings** for the default setting.
5. Use the sliders to change the default setting.
6. Click **Format**.



Formatting the built-in SD memory card

For the long-term storage of measurement data the analyzer uses a built-in SD memory card, on which it creates its own fixed data structure for the quick access (not a file system). The smallest unit of access to the SD card is the 512-byte block.

Area	Size
Structure information	1 024 blocks
Ethernet, IP and channel counters	l × 9 blocks
PID counters per channel	m × 33 024 blocks
Alarm events	n × 6 blocks

SD memory card allocation

Structure information

- fixed-size area comprising the structure identifier, the label and other indicators

Ethernet, IP and channel counters

- results of the MAC Statistics, the IP Stack Statistics and the General Statistics measurements
- the measurements are recorded every 5 minutes along with the associated time stamps

PID counters per channel

- results of the PID Statistics measurements collected continuously from all the 8192 PID of the 64 channels
- because of their big size (~16 Mbytes) the test results a will be recorded every 3 hours

Alarm events

- alert log entries
- the measurements are recorded every 5 minutes if at least one of the preset alarm conditions is met

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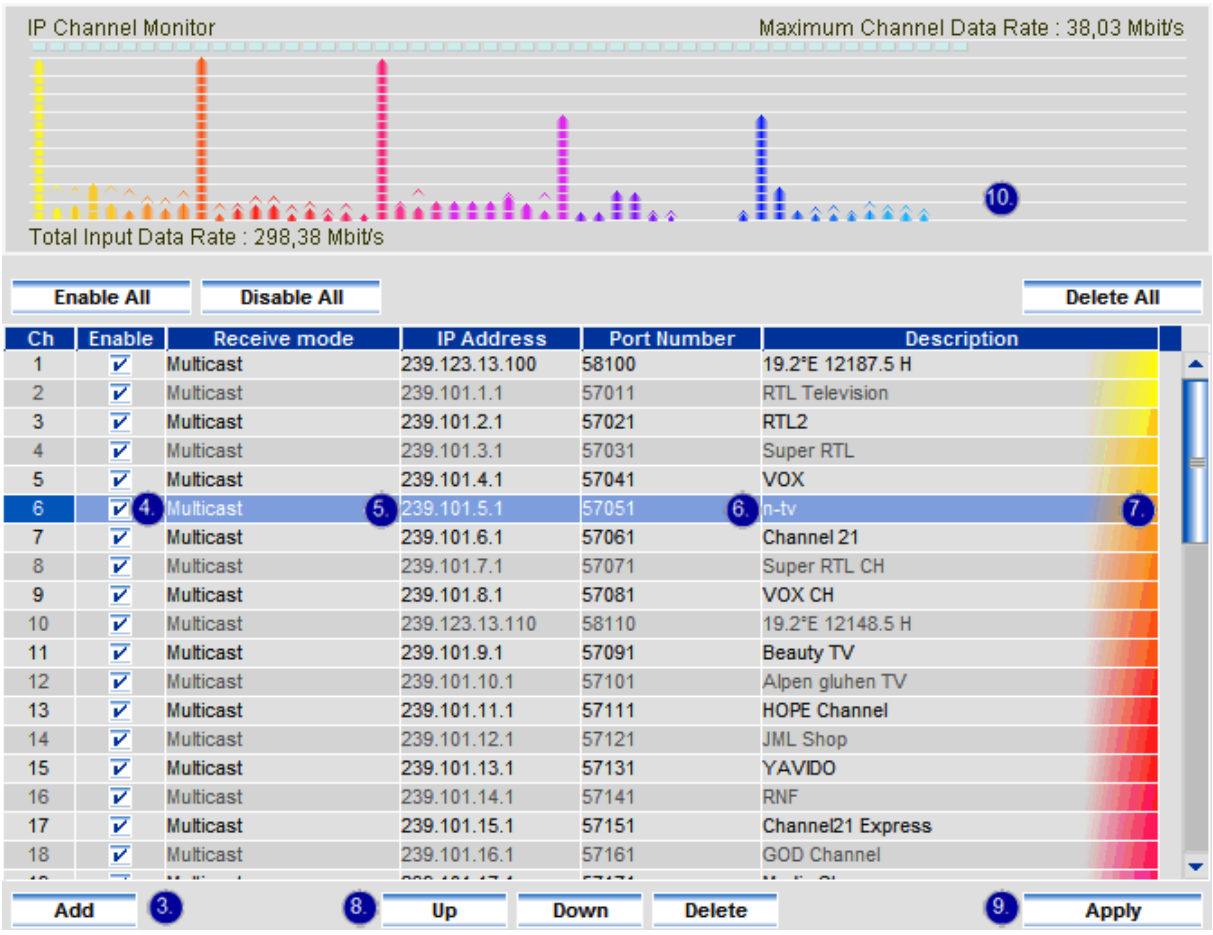
- [1] Data saved previously on the memory card will be deleted during formatting.
- [2] Although the estimated lifespan of the SD card is 10 years, it should be replaced every 5 years.

1.3.7 IP channel setup

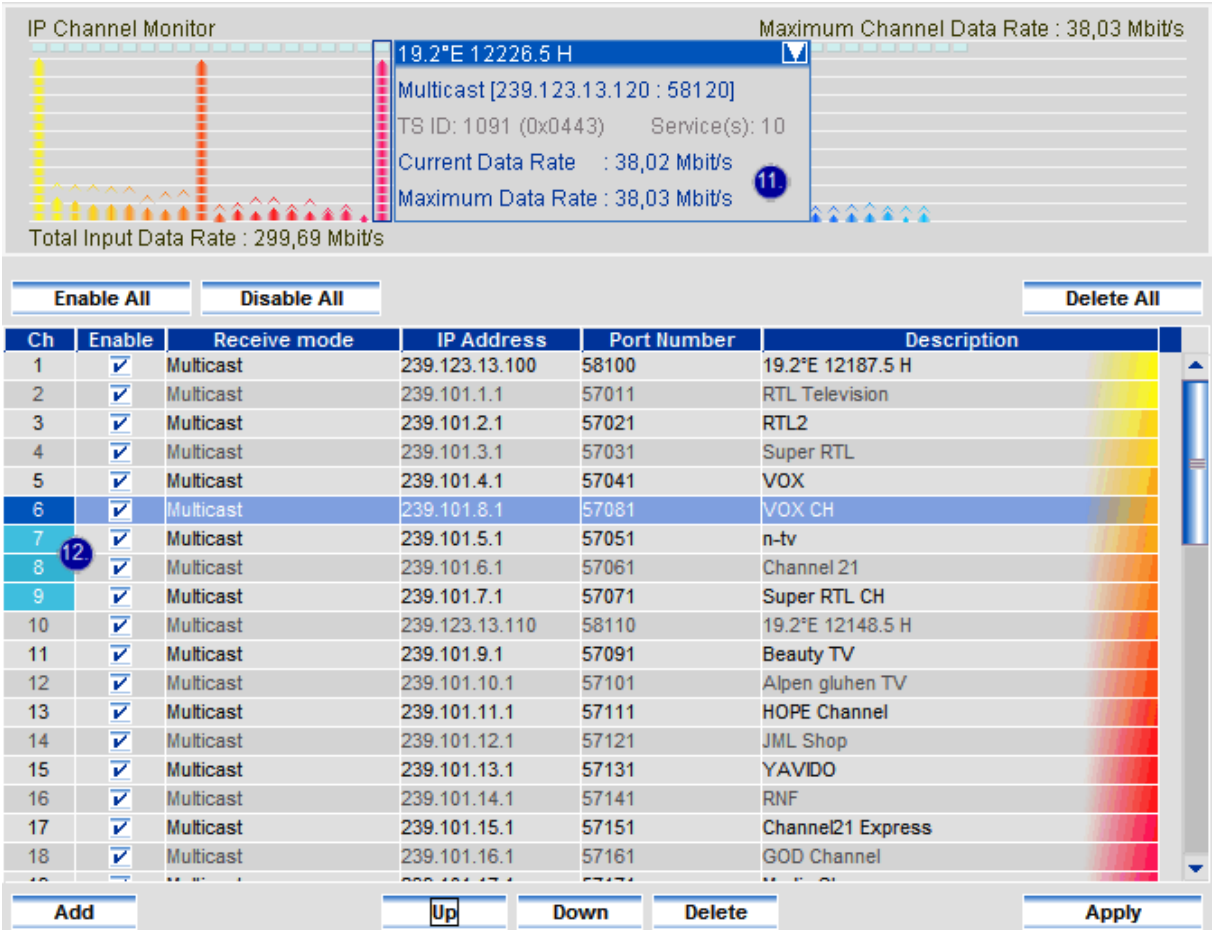
1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **IP Channel Setup** function from the **Channel Setup** menu or use the setup wizard.
3. Click **Add** to add or insert a new channel.
4. **Enable** the new channel.
5. Select from the offered modes (**Unicast**, **Promiscuous**, **Multicast**, **Broadcast**).
6. Enter the port number, an in **Promiscuous** and **Multicast** reception modes the IP address, too.
7. Type a maximum of 19 character long **description** about the channel.
8. Set the desired channel sequence with the **Up** and **Down** buttons.
9. Click **Apply** to validate settings.
10. Check the data rate measured in the selected channel in the **IP Channel Monitor** diagram.



IP channel setup

The analyzer is capable of analyzing and monitoring 60/64 IP channels simultaneously. Besides the unicast, multicast and broadcast receive modes the promiscuous receive mode is also can be selected, which allows analyzing the unicast streaming among other devices without disturbing the transmission. The premise for the promiscuous receive mode is, that the analizer's MAC Address filter function must be disabled, and the data stream to be analyzed must arrive to the analyzer's input (e.g. using port mirroring). For treating the multicast data streams the analyzer uses the IGMPv2 protocol.

11. Left click **IP Channel Monitor** diagram for detailed display.
12. When changing the channel list, the background of the sequential numbers of the channels' concerned turns red, indicating that after clicking the **Apply** button the measurements restart in the channel.

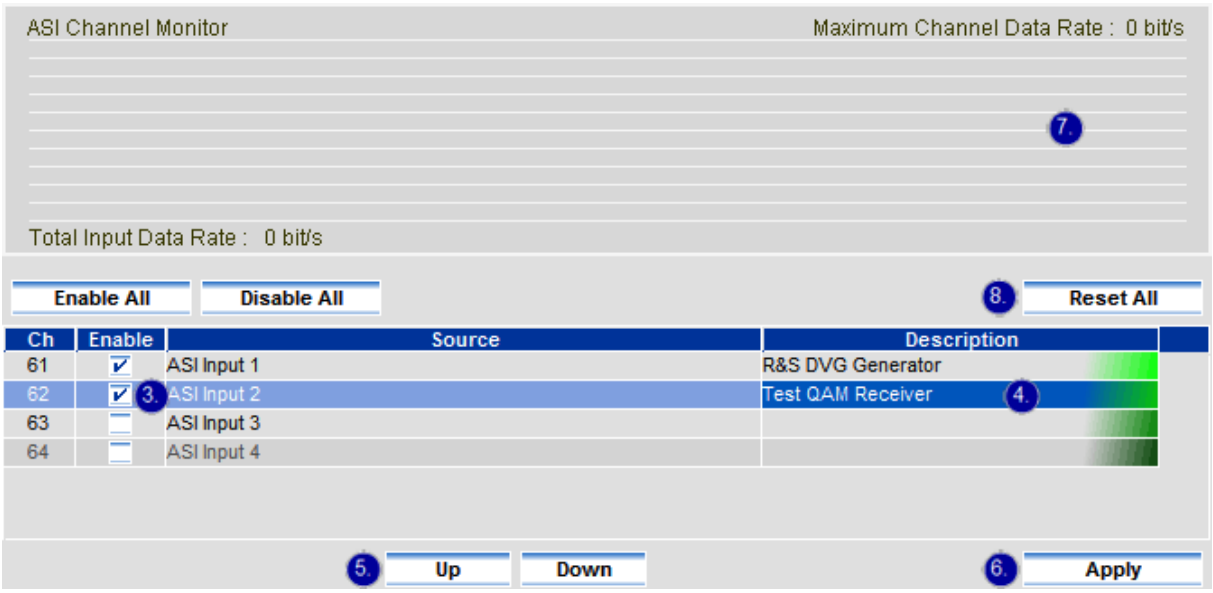


Ch	Enable	Receive mode	IP Address	Port Number	Description
1	☑	Multicast	239.123.13.100	58100	19.2°E 12187.5 H
2	☑	Multicast	239.101.1.1	57011	RTL Television
3	☑	Multicast	239.101.2.1	57021	RTL2
4	☑	Multicast	239.101.3.1	57031	Super RTL
5	☑	Multicast	239.101.4.1	57041	VOX
6	☑	Multicast	239.101.8.1	57081	VOX CH
7	☑	Multicast	239.101.5.1	57051	n-tv
8	☑	Multicast	239.101.6.1	57061	Channel 21
9	☑	Multicast	239.101.7.1	57071	Super RTL CH
10	☑	Multicast	239.123.13.110	58110	19.2°E 12148.5 H
11	☑	Multicast	239.101.9.1	57091	Beauty TV
12	☑	Multicast	239.101.10.1	57101	Alpen gluhen TV
13	☑	Multicast	239.101.11.1	57111	HOPE Channel
14	☑	Multicast	239.101.12.1	57121	JML Shop
15	☑	Multicast	239.101.13.1	57131	YAVIDO
16	☑	Multicast	239.101.14.1	57141	RNF
17	☑	Multicast	239.101.15.1	57151	Channel21 Express
18	☑	Multicast	239.101.16.1	57161	GOD Channel

Changes in the channel list

1.3.8 ASI channel setup

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **ASI Channel Setup** function from the **Channel Setup** menu or use the setup wizard. [1]
3. **Enable** the ASI channels to be used. [2]
4. Type a maximum of 19 character long **description** about the channels.
5. Set the desired channel sequence with the **Up** and **Down** buttons.
6. Click **Apply** to validate the settings.
7. Check the data rate measured in the selected channel in the **IP Channel Monitor diagram**.
8. The ASI channel measurements can be restarted with the **Reset All** button.

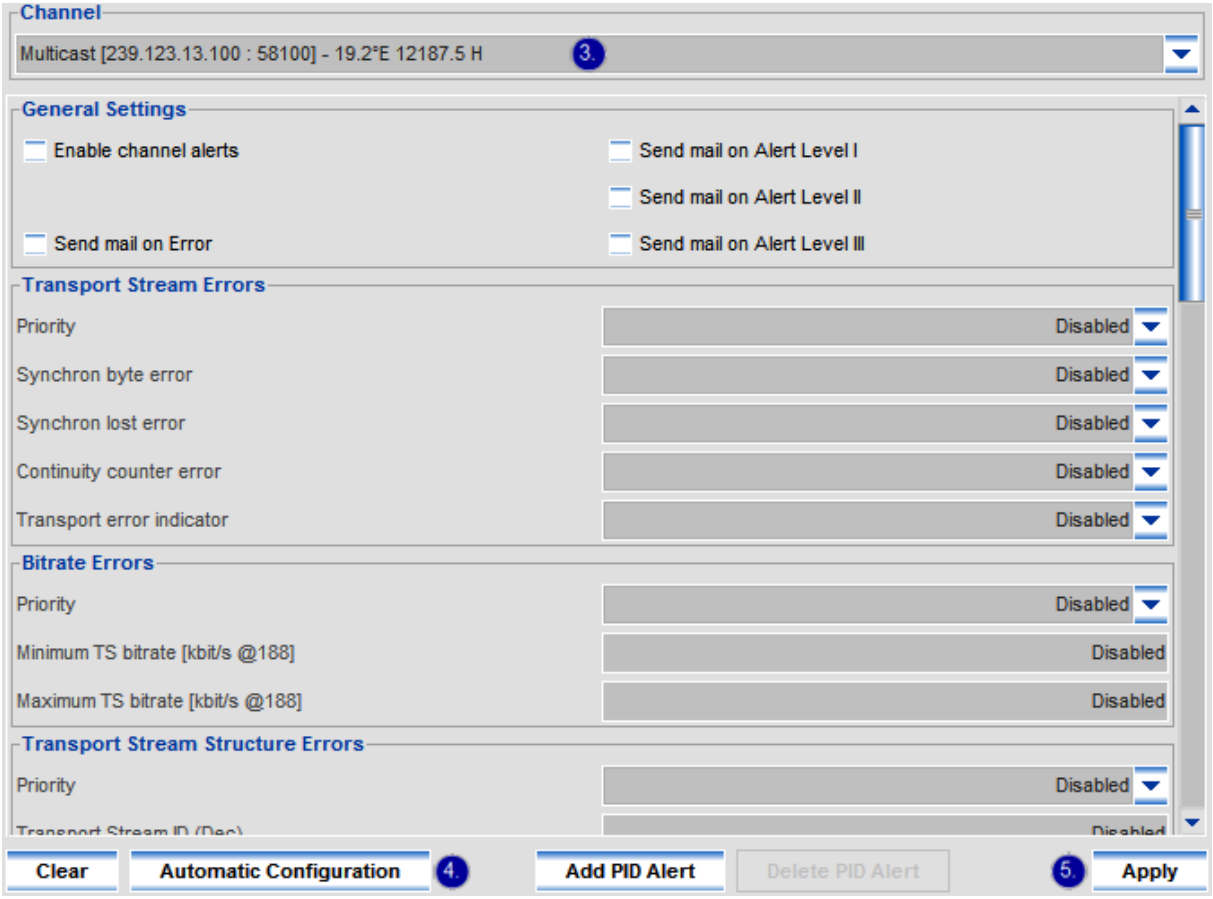


ASI channel setup

- [1] To receive the ASI channels the analyzer should be set to the 60 UDP and 4 ASI Transport Stream mode.
- [2] The analyzer transmits the signals connected to the ASI Input terminals to the ASI outputs without alterations.

1.3.9 Setting alarm and event logging

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **Setup Alert & Log** function from the **Alert & Log** menu or use the setup wizard.
3. Select the desired channel. Wait until the analysis ends.
4. Use the **Automatic Configuration** function, then fine-tune the settings.
5. Click **Apply** to validate the settings.



Setting alarm and event logging

Besides the real-time measurements the analyzer is capable of continuous monitoring of the channels and also generating alarms of different levels. Four different alarm levels are available for the pre-set alarm conditions: Error, and Alert Level I, II, III. The alert level may be different for each channel. All alarm events are recorded in the alert log. The alarm messaging must be enabled.

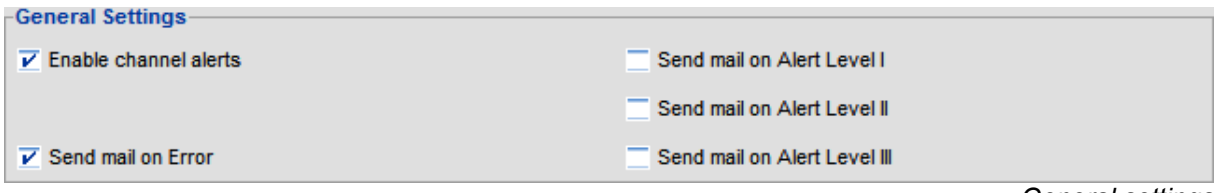
General settings

Enable channel alerts

- monitoring the alarm conditions of the selected channel

Send mail on Error, Alert Level I, II, III

- enabling the messaging at a given alert level



General settings

Transport Stream Errors

Priority

- alert level of the transport stream errors

Synchron byte error

- alarm threshold of the synchron byte errors occurring within 15 seconds
- synchron byte error: the value of the first byte of the transport stream packet is not 0x47

Synchron lost error

- alarm threshold of the synchron lost errors occurring within 15 seconds
- synchron lost: three consecutive synchron byte errors

Continuity counter error

- alarm threshold of the continuity counter errors occurring within 15 seconds
- continuity counter: four-bit counter in the header of the transport stream packets
- continuity error: the counter does not increment continually in the successive TS packets of the same PID value

Transport error indicator

- alarm threshold of the TEI errors occurring within 15 seconds
- TEI bit: flag in the header of the transport stream packets
- TEI error: the receiver (DVB-S/S2, DVB-C, DVB-T) was not able to correct the transmission errors

Alarm settings for transport stream errors

Bitrate Errors

Priority

- alert level of the bitrate errors

Minimum TS bitrate [kbit/s @ 188]

- the minimum value of the entire transport stream bitrate in the current channel
- by setting zero the function can be disabled

Maximum TS bitrate [kbit/s @ 188]

- the maximum value of the entire transport stream bitrate in the current channel
- by setting zero, the function can be disabled

Limits of the data rate

Transport Stream Structure Errors

Priority

- alert level of the structural defects in the transport stream

Transport Stream ID (Dec)

- monitoring the Transport Stream ID value in the PAT table
- by setting zero, the function can be disabled

Service count

- monitoring the number of services in the transport stream
- by setting zero, the function can be disabled

Monitoring the structure of the Transport Stream

PID Errors

Priority

- alert level of the PID errors

Enable

- monitoring the alarm conditions of the current PID value

PID (Dec)

- decimal value of the PID

Scrambled PID

- monitoring the two-bit Scrambling Control field in the header of the transport stream packet
- the alarm condition: checked checkbox and scrambled PID (the Scrambling Control field value is not zero)

CC Error

- alarm threshold of the continuity counter errors occurring within 15 seconds
- continuity counter: four-bit counter in the header of the transport stream packets
- continuity error: the counter does not increment continually in the successive TS packets of the same PID value

Min. Bitrate [kbit/s]

- the minimum value of the elementary stream bitrate
- by setting zero, the function can be disabled

Max. Bitrate [kbit/s]

- the maximum value of the elementary stream bitrate
- by setting zero, the function can be disabled

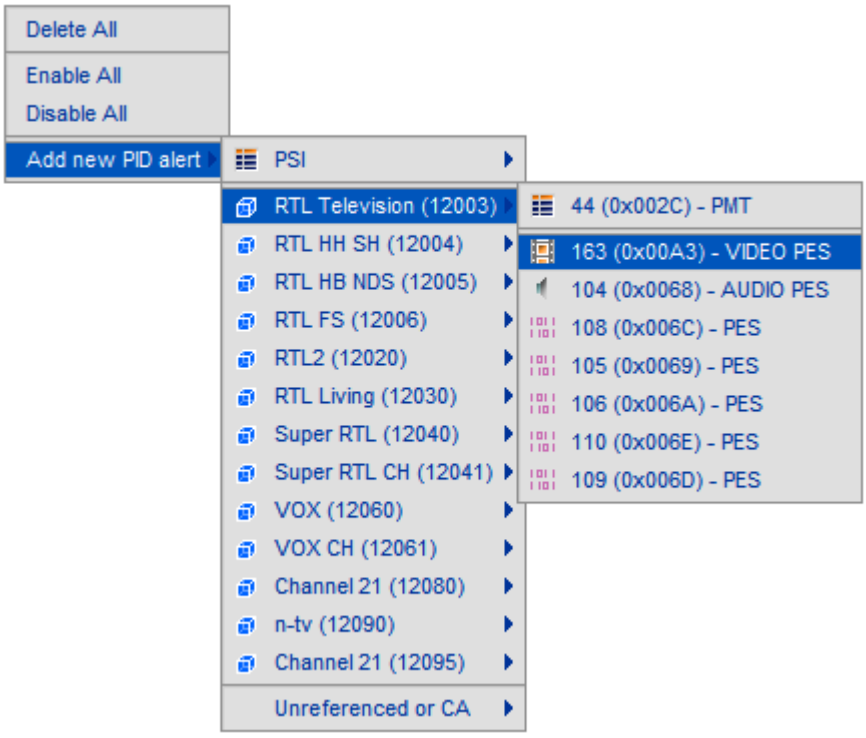
PID Errors

Priority Alert Level II

Enable	PID (Dec)	Scrambled	CC Error	Min. Bitrate [kbit/s]	Max. Bitrate [kbit/s]	Information
☑	0	☑	50 / 15s	2	6	PAT
☑	1	☑	50 / 15s	2	6	CAT
☑	16	☑	50 / 15s	1	4	NIT
☑	17	☑	50 / 15s	1	2	BAT/SDT
☑	18	☑	50 / 15s	381	1522	EIT
☑	44	☑	50 / 15s	1	4	RTL Television (12003), PMT
☑	163	☑	50 / 15s	1738	6950	RTL Television (12003), VIDEO...
☑	104	☑	50 / 15s	102	406	RTL Television (12003), AUDIO...
☑	108	☑	50 / 15s	2	6	RTL Television (12003), PES
☑	105	☑	50 / 15s	150	600	RTL Television (12003), PES
☑	106	☑	50 / 15s	197	786	RTL Television (12003), PES
☑	110	☑	50 / 15s	34	136	RTL Television (12003), PES
☑	109	☑	50 / 15s	4	18	RTL Television (12003), PES
☑	54	☑	50 / 15s	2	6	RTL HH SH (12004), PMT

Alarm settings for PID errors

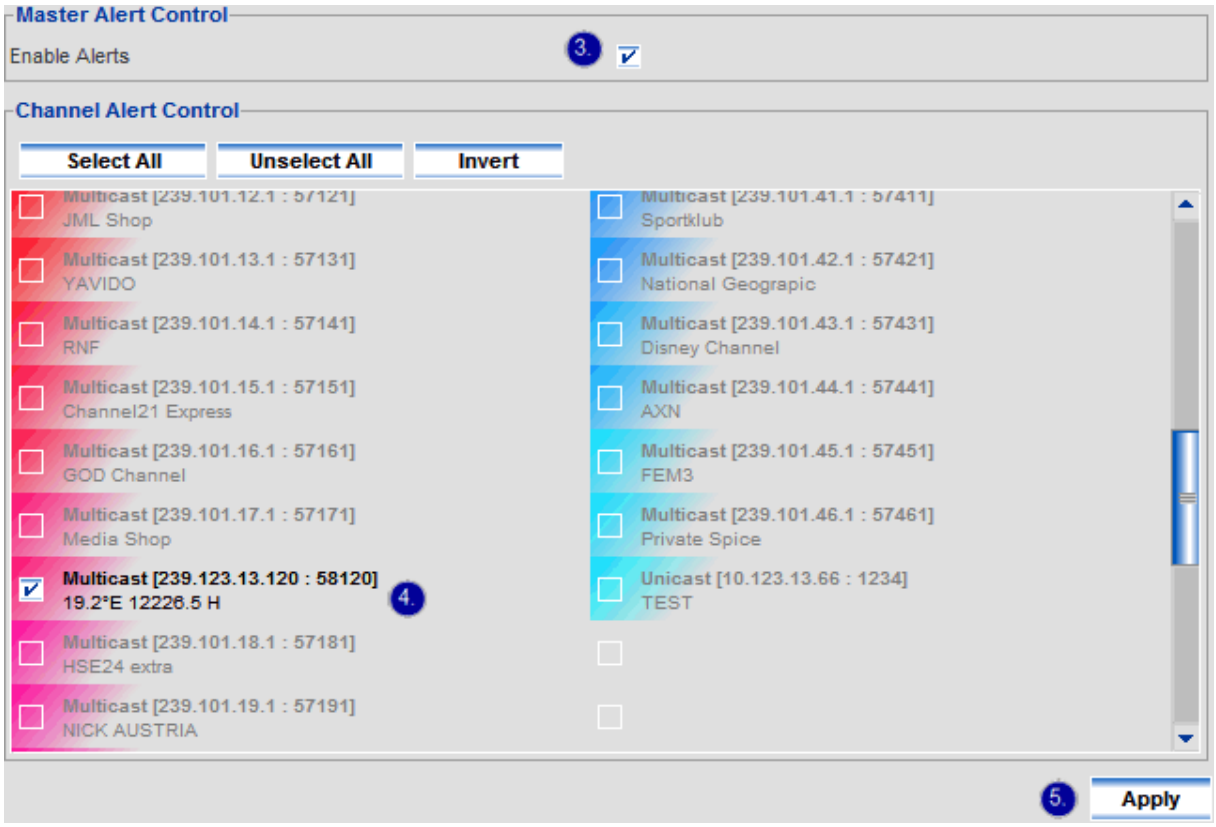
Use the Automatic Configuration function to complete the table, and then fine-tune the settings. To fill it manually use the PSI generated pop-up menu or enter the desired PID value.



Adding the PID using the pop-up menu

1.3.10 Enabling alerts and logging

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **Enable or Disable Alerts** function from the **Alert & Log menu**.
3. **Enable** the device alert function.
4. Check the channels you want to enable.
5. Click **Apply** to validate the settings.



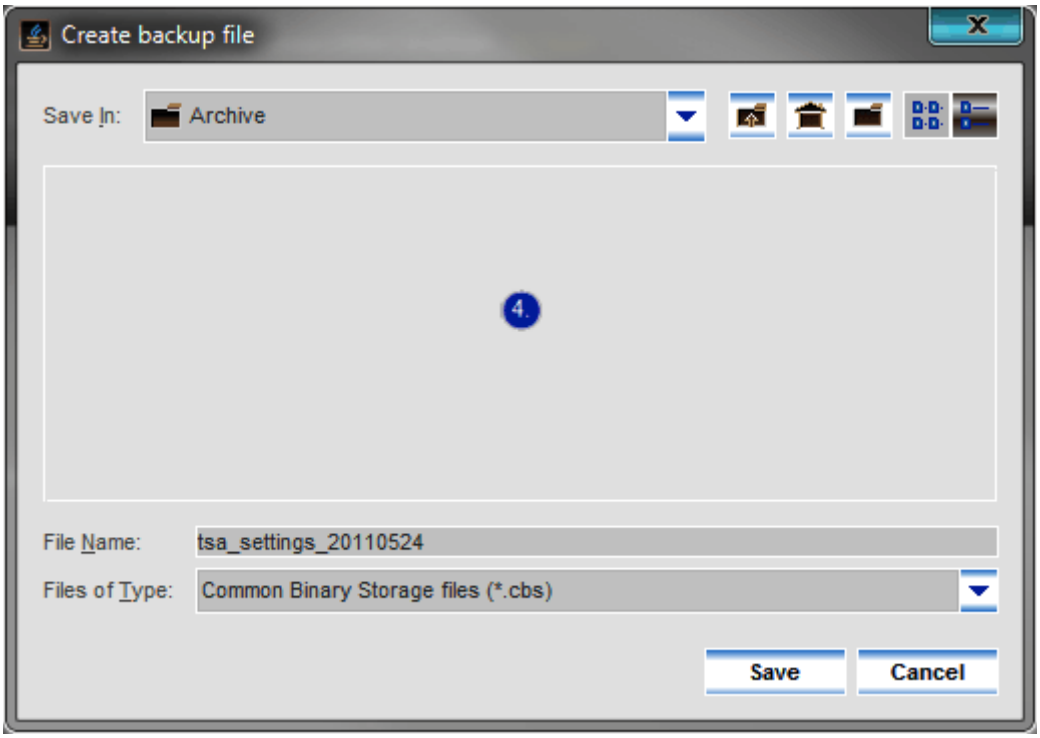
Enabling the alerts and logging

1.4 Backup and restore the settings

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **Backup & Restore** function from the **Settings** menu.
3. Click **Backup Settings** to save the settings.

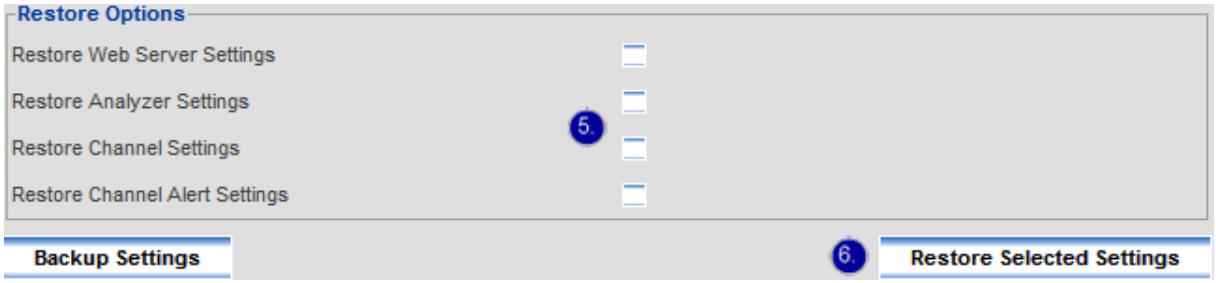
Backup the settings

4. Enter the place of saving in the pop-up file dialog box.



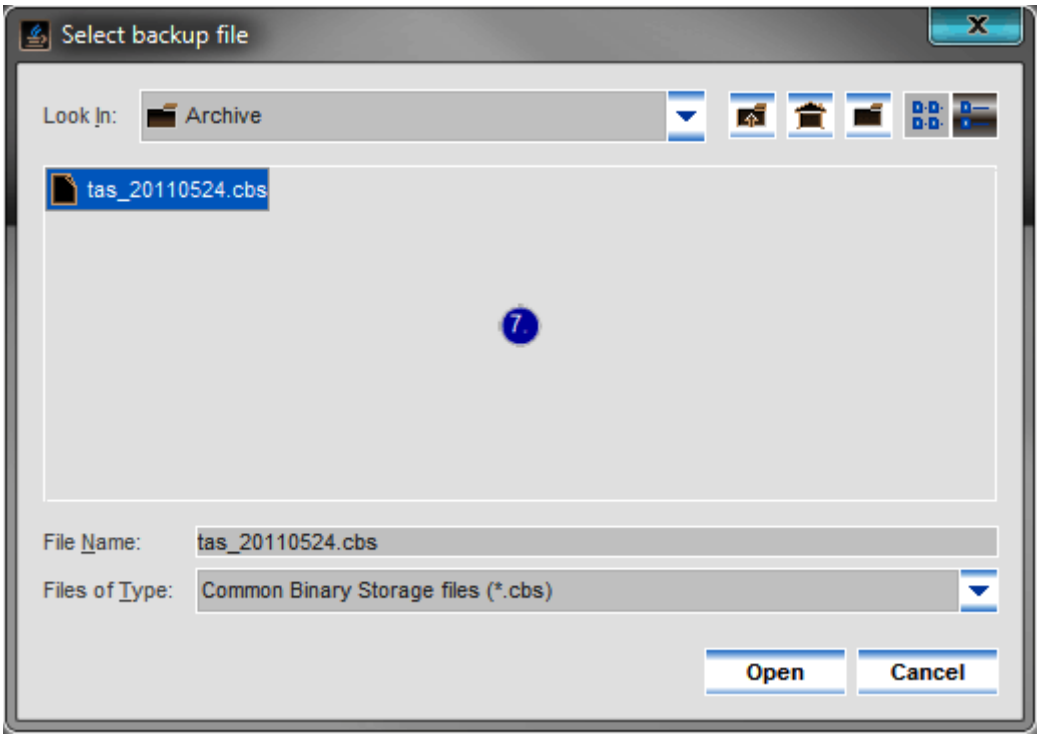
Selecting the file

5. Check the groups of settings to restore.
6. Click **Restore Selected Settings** to restore.



Restoring the settings

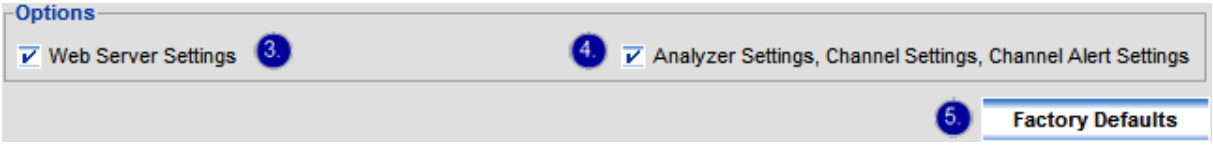
7. Select the file comprising the settings in the pop-up file dialog box.



Selecting the file

1.5 Restore factory defaults

1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **Factory Defaults** function from the **Settings** menu.
3. Check the **Web Server Settings** checkbox to restore the default settings for the web server.
4. Check the **Analyzer Settings** checkbox to restore the default settings for the analyzer.
5. Click **Factory Defaults** [1] to validate the settings.

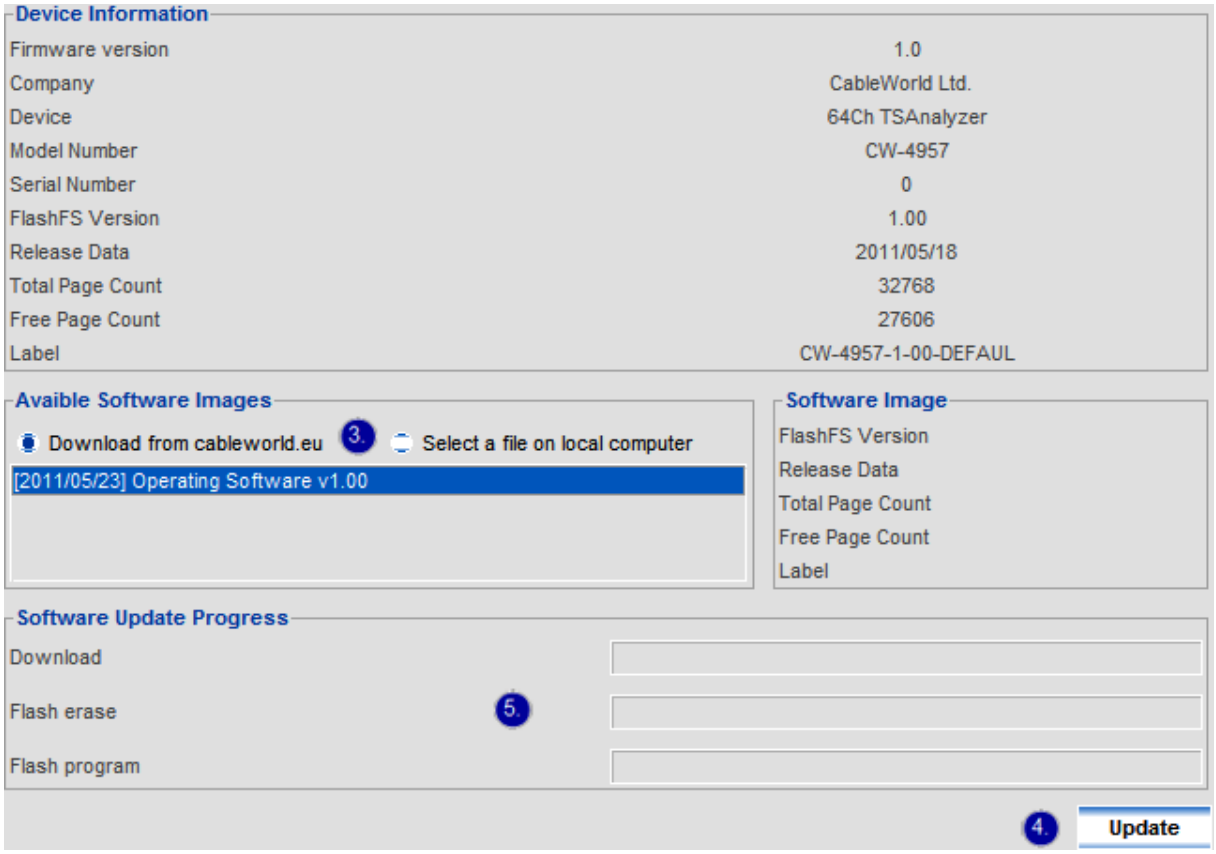


Restore factory defaults

- [1] Restoring the factory defaults may cause an IP address collision in the network. Connecting to the network

1.6 Software update

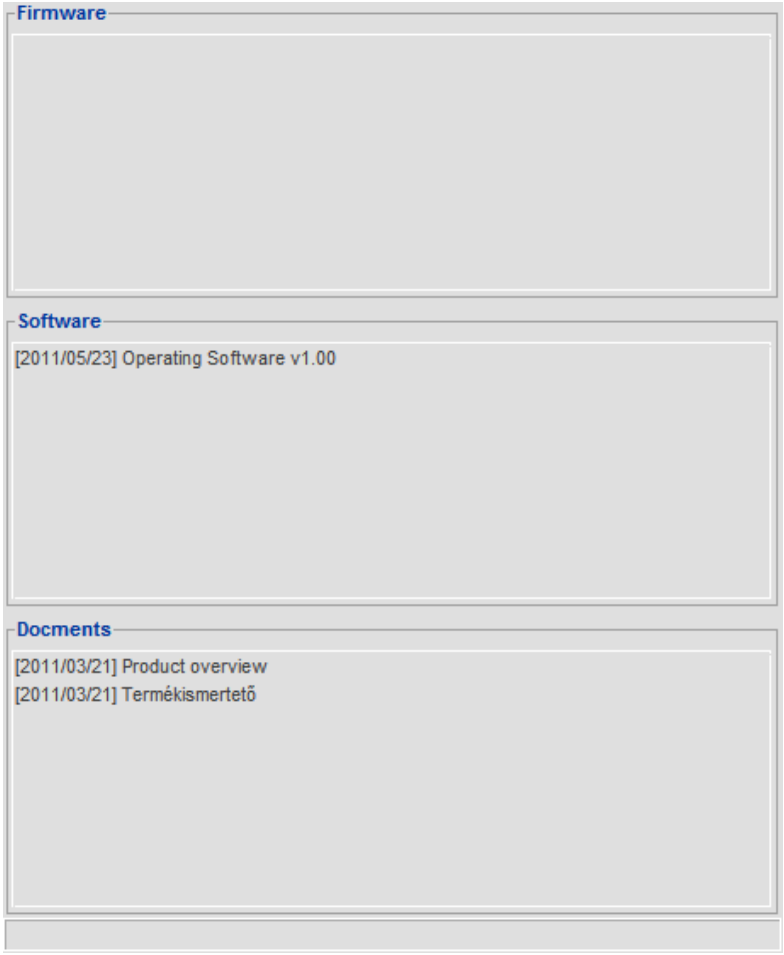
1. Load the analyzer's web-based interface to the browser by adding the **/admin.html** supplement to the URL (e.g. 192.168.10.10/admin.html).
2. Select the **Software Update** function from the **Settings** menu.
3. Select the image file comprising the software.
4. Click **Update** to start the software update. [1]
5. The update process can be tracked on the **Software Update Progress** panel.



Software update

At the end of the update process the analyzer will restart. If after the restart the analyzer interface does not appear in the browser, contact CableWorld Ltd.

The manufacturer is developing continuously the analyzer's interface and functions. The latest software is available in the database on the website of CableWorld. Besides the software image files the database also includes other documents, which can be found in the Download Manager function of the Help menu. Double-click the item you want to download.



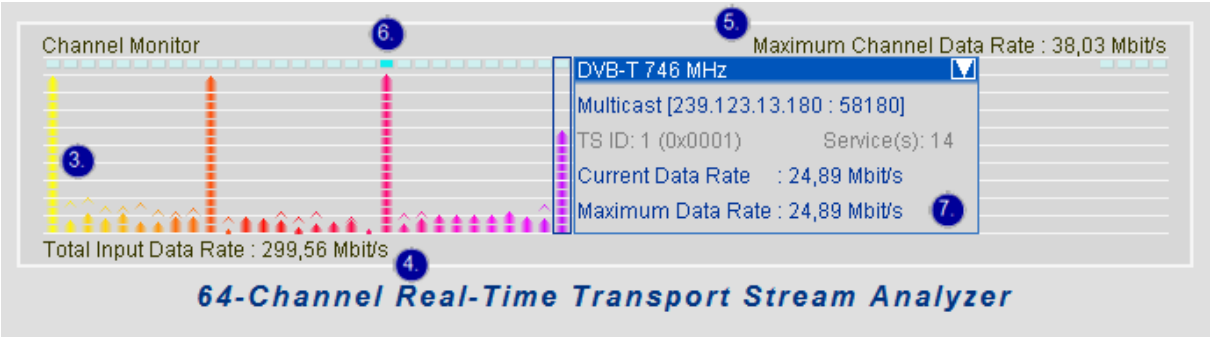
Download Manager

- [1] Do not power off the device during the software update.

2. Making Measurements

2.1 Opening page

1. Select the **Summary** function from the **Start** menu.
2. After loading the JAVA applet left-click the chart for detailed viewing.



Channel Monitor diagram

3. Channel data rate columns
4. Total input data rate
5. Maximum channel data rate
6. Channel alarm status
7. Details

2.2. Ethernet and IP measurements

2.2.1 Real-time measurement of MAC statistics

1. Select the **MAC [1] Statistics (Real-Time)** function from the **Ethernet Analyzer** menu.
2. Right-click the chart and use the pop-up menu to customize the table.

The MAC statistics summarize the measured and calculated quantities of the Ethernet frames [2] received at the transport stream input of the analyzer. The MAC is the sublayer of the data link layer of the OSI reference model, which provides error-free transfer for the network layer between two devices using the services of the physical layer. The sender sends the data to be sent in pieces as data frames and processes the acknowledgement frames sent back by the receiver. The frame is the data unit of communication.

No.	Serial number of measurement results. The current measurement result is always shown in the first line of the table.
Time Stamp	Time stamp of the given measurement result.
Relative Time	Difference of the time stamp belonging to the measurement result in the given line and the current time stamp.
Delta Time	Difference between the time stamps of the given line and the previous line.
Total Bytes Received	Total amount of data received at the transport stream input of the analyzer from the beginning of the measurement.
Delta Bytes Received	Difference between the total amounts of data received in the given line and the previous line.
Bitrate [kbit/s]	Data rate measured between the times of measurement in the given line and the previous line.
Total Frames	Number of Ethernet frames received between the times of measurement in the given line and the previous line.
Delta Frames	Change in the number of Ethernet frames between the times of measurement in the given line and the previous line.
Delta/Total Ratio	Ratio of Delta Frames to Total Frames in the given line.
Broadcast Frames	Number of Broadcast type Ethernet frames received between the times of measurement in the given line and the previous line.
Broadcast/Total Frame Ratio	Ratio of Broadcast Frames to Total Frames in the given line.
Multicast Frames	Number of Multicast type Ethernet frames received between the times of measurement in the given line and the previous line.
Multicast/Total Frame Ratio	Ratio of Multicast Frames and Total Frames in the given line.
Unicast Frames	Number of Unicast type Ethernet frames received between the times of measurement in the given line and the previous line.
Unicast/Total Frame Ratio	Ratio of Unicast Frames to Total Frames in the given line.
Total CRC Error Count	Number of Ethernet frames received with CRC error at the transport stream input of the analyzer from the beginning of the measurement.
CRC Error Count	Number of Ethernet frames received with CRC error between the times of measurement in the given line and the previous line.
CRC Error Ratio	Ratio of CRC Error Count to Total Frames in the given line.
500 ms	Measurement interval, which shows the test results of the last 15 seconds with 500 ms resolution.
15 s	Measurement interval, which shows the test results of the last 5 minutes with 15 sec resolution.
5 min	Measurement interval, which shows the test results of the last 1 hour with 5 minutes resolution.

- [1] Media Access Control. The sublayer of the data link layer of the OSI (Open System Interconnection) reference model.
- [2] IEEE 802.3 : CSMA/CD (Ethernet) Access Method

2.2.2 Real time measurement of IP statistics

1. Select the **IP Statistics (Real-Time)** function from the **Ethernet Analyzer** menu.
2. Right-click the chart and use the pop-up menu to customize the table.

The IP statistics summarize the measured and calculated quantities of the IP packets [1] received at the transport stream input of the analyzer.

No.	Serial number of measurement results. The current measurement result is always shown in the first line of the table.
Time Stamp	Time stamp of the given measurement result.
Relative Time	Difference of the time stamp belonging to the measurement result of the given line and the current time stamp.
Delta Time	Difference between the time stamps of the given line and the previous line.
Ethernet Frames	Number of Ethernet frames received between the times of measurement in the given line and the previous line.
IPV4 Packets	Number of IPV4 type packets received between the times of measurement in the given line and the previous line.
IPV4/Total Ratio	Ratio of IPV4 Packets to Ethernet Frames in the given line.
IPV6 Packets	Number of IPV6 type packets received between the times of measurement in the given line and the previous line.
IPV6/Total Ratio	Ratio of IPV6 Packets to Ethernet Frames in the given line.
ARP Packets	Number of ARP type packets received between the times of measurement in the given line and the previous line.
ICMP Packets	Number of ICMP type packets received between the times of measurement in the given line and the previous line.
IGMP Packets	Number of IGMP type packets received between the times of measurement in the given line and the previous line.
UDP Packets	Number of UDP datagrams received between the times of measurement in the given line and the previous line.
UDP/Total Ratio	Ratio of UDP Packets to Ethernet Frames in the given line.
TCP Packets	Number of TCP segments received between the the times of measurement in the given line and the previous line.
TCP/Total Ratio	Ratio of TCP Packets to Ethernet Frames in the given line.
500 ms	Measurement interval, which shows the test results of the last 15 seconds with 500 ms resolution.
15 s	Measurement interval, which shows the test results of the last 5 minutes with 15 sec resolution.
5 min	Measurement interval, which shows the test results of the last 1 hour with 5 minutes resolution.

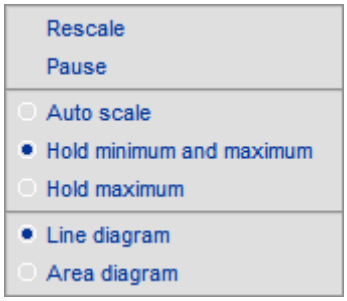
- [1] IETF RFC 791 : Internet Protocol

2.2.3 Ethernet bitrate graph

1. Select the **Interface Bitrate Analyzer** function from the **Ethernet Analyzer** menu.
2. Right-click the graph and use the pop-up menu to customize the graph.

The graph shows the total input data rate over time measured at the transport stream input of the analyzer. The current resolution of the vertical coordinate axis is indicated in the lower left corner by the gray number in bits/s units. In the upper right corner the minimum, average and maximum of the displayed function are shown.

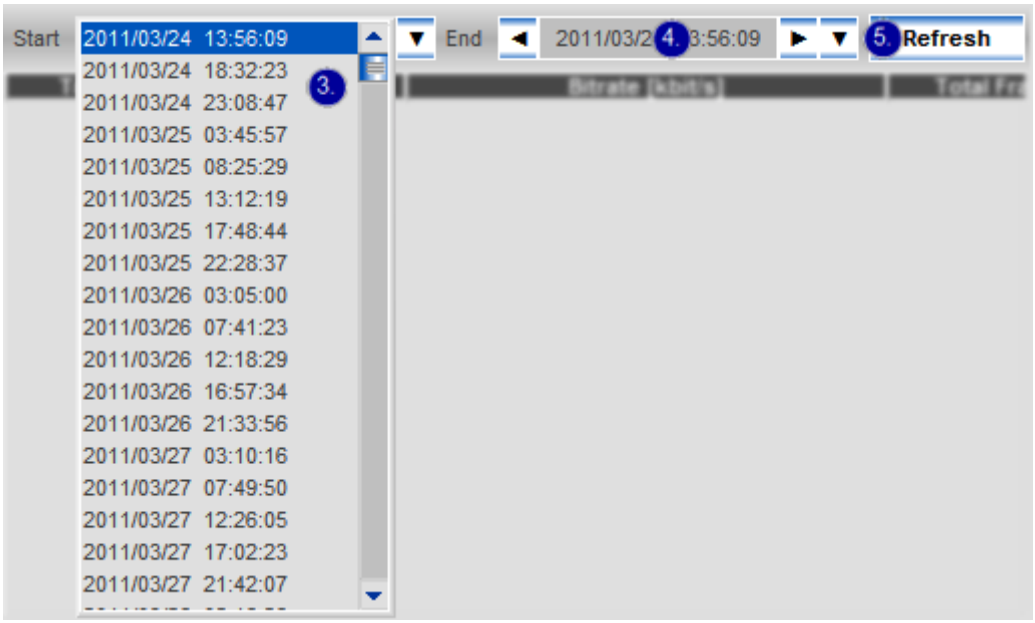
Rescale	Rescaling the graph.
Pause	Pausing and restarting the drawing of the graph.
Auto scale	Auto scaling the graph.
Hold minimum and maximum	Auto scaling the graph holding the minimum and maximum values.
Hold maximum	Auto scaling the graph holding the maximum value. The minimum value is always 0 bit/s.
Line diagram	Drawing a line diagram.
Area diagram	Drawing an area diagram.



The pop-up menu

2.2.4 Evaluation of MAC statistics from the SD memory card

1. Select the **MAC [1] Statistics (SD Card)** function from the **Ethernet Analyzer** menu.
2. Wait until the indexing process finishes.
3. Enter the starting point of the time interval to be analyzed.
4. Enter the endpoint of the time interval to be analyzed.
5. Click **Refresh** to display the data.
6. Right-click the table and use the pop-up menu to customize the table.



Selecting the time interval to be analyzed

The MAC statistics summarize the measured and calculated quantities of the Ethernet frames [2] received at the transport stream input of the analyzer. The MAC is the sublayer of the data link layer of the OSI reference model, which provides error-free transfer for the network layer between two devices using the services of the physical layer. The sender sends the data to be sent in pieces as data frames and processes the acknowledgement frames sent back by the receiver. The frame is the data unit of communication.

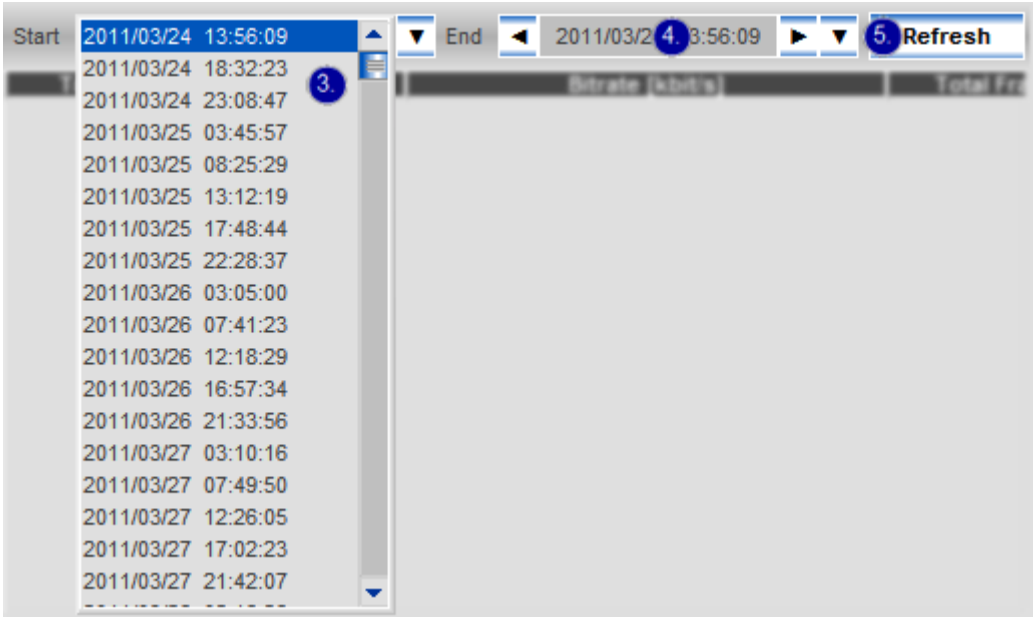
No.	Serial number of measurement results. The current measurement result is always shown in the first line of the table.
Time Stamp	Time stamp of the given measurement result.
Relative Time	Difference of the time stamp belonging to the measurement result in the given line and the current time stamp.
Delta Time	Difference between the time stamps of the given line and the previous line.
Total Bytes Received	Total amount of data received at the transport stream input of the analyzer from the beginning of the measurement.
Delta Bytes Received	Difference between the total amounts of data received in the given line and the previous line.
Bitrate [kbit/s]	Data rate measured between the times of measurement in the given line and the previous line.
Total Frames	Number of Ethernet frames received between the times of measurement in the given line and the previous line.
Delta Frames	Change in the number of Ethernet frames between the times of measurement in the given line and the previous line.
Delta/Total Ratio	Ratio of Delta Frames to Total Frames in the given line.
Broadcast Frames	Number of Broadcast type Ethernet frames received between the times of measurement in the given line and the previous line.

Broadcast/Total Frame Ratio	Ratio of Broadcast Frames to Total Frames in the given line.
Multicast Frames	Number of Multicast type Ethernet frames received between the times of measurement in the given line and the previous line.
Multicast/Total Frame Ratio	Ratio of Multicast Frames and Total Frames in the given line.
Unicast Frames	Number of Unicast type Ethernet frames received between the times of measurement in the given line and the previous line.
Unicast/Total Frame Ratio	Ratio of Unicast Frames to Total Frames in the given line.
Total CRC Error Count	Number of Ethernet frames received with CRC error at the transport stream input of the analyzer from the beginning of the measurement.
CRC Error Count	Number of Ethernet frames received with CRC error between the times of measurement in the given line and the previous line.
CRC Error Ratio	Ratio of CRC Error Count to Total Frames in the given line.
500 ms	Measurement interval, which shows the test results of the last 15 seconds with 500 ms resolution.
15 s	Measurement interval, which shows the test results of the last 5 minutes with 15 sec resolution.
5 min	Measurement interval, which shows the test results of the last 1 hour with 5 minutes resolution.

- [1] Media Access Control. The sublayer of the data link layer of the OSI (Open System Interconnection) reference model.
- [2] IEEE 802.3 : CSMA/CD (Ethernet) Access Method

2.2.5 Evaluation of IP statistics from the SD memory card

1. Select the **IP Statistics (SD Card)** function from the **Ethernet Analyzer** menu.
2. Wait until the indexing process finishes.
3. Enter the starting point of the time interval to be analyzed.
4. Enter the endpoint of the time interval to be analyzed.
5. Click **Refresh** to display the data.
6. Right-click the table and use the pop-up menu to customize the table.



Selecting the time interval to be analyzed

The IP statistics summarize the measured and calculated quantities of the IP packets [1] received at the transport stream input of the analyzer.

No.	Serial number of measurement results. The current measurement result is always shown in the first line of the table.
Time Stamp	Time stamp of the given measurement result.
Relative Time	Difference of the time stamp belonging to the measurement result of the given line and the current time stamp.
Delta Time	Difference between the time stamps of the given line and the previous line.
Ethernet Frames	Number of Ethernet frames received between the times of measurement in the given line and the previous line.
IPV4 Packets	Number of IPV4 type packets received between the times of measurement in the given line and the previous line.
IPV4/Total Ratio	Ratio of IPV4 Packets to Ethernet Frames in the given line.
IPV6 Packets	Number of IPV6 type packets received between the times of measurement in the given line and the previous line.
IPV6/Total Ratio	Ratio of IPV6 Packets to Ethernet Frames in the given line.
ARP Packets	Number of ARP type packets received between the times of measurement in the given line and the previous line.
ICMP Packets	Number of ICMP type packets received between the times of measurement in the given line and the previous line.

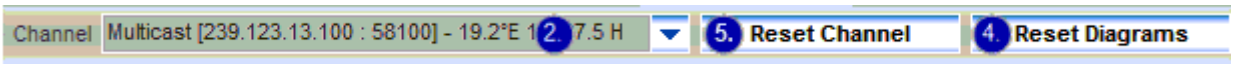
IGMP Packets	Number of IGMP type packets received between the times of measurement in the given line and the previous line.
UDP Packets	Number of UDP datagrams received between the times of measurement in the given line and the previous line.
UDP/Total Ratio	Ratio of UDP Packets to Ethernet Frames in the given line.
TCP Packets	Number of TCP segments received between the the times of measurement in the given line and the previous line.
TCP/Total Ratio	Ratio of TCP Packets to Ethernet Frames in the given line.
500 ms	Measurement interval, which shows the test results of the last 15 seconds with 500 ms resolution.
15 s	Measurement interval, which shows the test results of the last 5 minutes with 15 sec resolution.
5 min	Measurement interval, which shows the test results of the last 1 hour with 5 minutes resolution.

- [1] IETF RFC 791 : Internet Protocol

2.3. Transport stream measurements

2.3.1 General Statistics (Real-time)

1. Select the **General Statistics (Real-Time)** function from the **Channel Analyzer** menu.
2. Select the channel to be examined from the drop-down box.
3. To re-scale the bar graphs that appear in the cells of the table, click **Reset Diagrams**.
4. To reset the counters, click **Reset Channel**.
5. Right-click the table and use the pop-up menu to customize.



Channel selector toolbar

The general statistics summarize the measured and calculated quantities of the transport stream packets received at the transport stream input of the analyzer.

No.	Serial number of measurement results. The current measurement result is always shown in the first line of the table.
Time Stamp	Time stamp of the given measurement result.
Relative Time	Difference of the time stamp belonging to the measurement result in the given line and the current time stamp.
Delta Time	Difference between the time stamps of the given line and the previous line.
Total Packets Received	Total amount of TS packets received at the transport stream input of the analyzer from the beginning of the measurement.
Packets Received	The number of TS packet received at the transport stream input of the analyzer from the beginning of the measurement.
Bitrate [kbit/s] @ 184	Data rate measured between the times of measurement in the given line and the previous line without the TS packet headers.
Bitrate [kbit/s] @ 188	Data rate measured between the times of measurement in the given line and the previous line together with the TS packet headers.
Bitrate [kbit/s] @ 204	Data rate measured between the times of measurement in the given line and the previous line together with the TS packet headers and the RS bytes.
Delta Packets	Difference between the number of TS packets in the given line and the previous line.
Delta Packet Ratio	Ratio of Delta Packets to Packets Received in the given line.
TTL Max.	The maximum value of the IP datagram TTL fields[3] containing TS packets, received between the times of measurement in the given line and the previous line.
TTL Max.	The minimum value of the IP datagram TTL fields[3] containing TS packets, received between the times of measurement in the given line and the previous line.
Format	The TS packet format for embedding into IP datagrams. (N×188, M×204, ES/PSI, IPTV, TSoverIP)
Min. UDP Arrival Time [us]	The minimum period measured between the arrival of the UDP packets containing TS packets.
Max. UDP Arrival Time [us]	The maximum period measured between the arrival of the UDP packets containing TS packets.
Total Eth. CRC Error Count	Number of Ethernet frames[2] received with Eth. CRC error at the transport stream input of the analyzer from the beginning of the measurement.
Eth. CRC Error Count	Number of Ethernet frames received with Eth. CRC error between the times of measurement in the given line and the previous line.
Eth. CRC Error Ratio	Ratio of Eth. CRC Error Count to Total Frames in the given line.
Total Sync Error Count	The number of TS packets received with sync error[1] in the given channel from the beginning of the measurement.
Sync Error Count	The number of TS packets received with sync error between the times of measurement in the given line and the previous line.

Sync Error Ratio	Ratio fo Syinc Error Count and Packets Received in the given line.
Total Sync Lost Count	Number of sync losses[1] from the beginning of the measurement.
Sync Lost Count	Number of sync losses[1] between the times of measurement in the given line and the previous line.
Sync Lost Ratio	Ratio of Sync Lost and Packet Received in the given line.
Total Eth. CRC Error Count	The number of Ethernet frames [2] received with CRC Error in the given channel from the beginning of the measurement.
Eth. CRC Error Count	The number of Ethernet frames [2] received with CRC Error between the times of measurement in the given line and the previous line.
Eth. CRC Error Ratio	Ratio of Eth. CRC Error Count and Packets Received in the given line.
Total Sync Error Count	The number of TS packets with Sync Error[1] in the given channel from the beginning of the measurement.
Sync Error Count	The number of TS packets received with Sync Error between the times of measurement in the given line and the previous line.
Sync Error Ratio	Ratio of Sync Error Count and Packets Received in the given line.
Total Sync Lost Count	The number of Sync losses[1] in the given channel from the beginning of the measuremet.
Sync Lost Count	The number of Sync losses between the times of measurement in the given line and the previous line.
Sync Lost Ratio	Ratio of Sync Lost Count and Packets Received in the given line.
Total CC Error Count	The number TS packets received with Continuity Counter Errors[1] from the beginning of the measuremet.
CC Error Count	The number of TS packets received with CC Error between the times of measurement in the given line and the previous line.
CC Error Ratio	Ratio of CC Error Count and Packets Received in the given line.
Total Transport Error Count	The number of TS packets received with Transport (TEI) Error[1] in the given channel from the beginning of the measuremet.
Transport Error Count	The number of TS packets received with Transport (TEI) Error[1] between the times of measurement in the given line and the previous line.
Transport Error Ratio	Ratio of Transport Error Count and Packets Received in the given line.
Last Packet Time Stamp	The arrival time stamp of the last TS packet received to the measurement time of the given line.
Last Error Time Stamp	The arrival time stamp of the last erroneous TS packet to the measurement time of the given time.
500 ms	Measurement interval, which shows the test results of the last 15 seconds with 500 ms resolution.
15 s	Measurement interval, which shows the test results of the last 5 minutes with 15 sec resolution.
5 min	Measurement interval, which shows the test results of the last 1 hour with 5 minutes resolution

- [1] ETSI TR 101 290 : Measurement guidelines for DVB systems, 5. Measurement and analysis of the MPEG-2 Transport Stream
- [2] IEEE 802.3 : CSMA/CD (Ethernet) Access Method
- [3] IETF RFC 791 : Internet Protocol

2.3.2 PID Statistics (Real-time)

1. Select the **PID Statistics (Real Time)** function from the **Channel Analyzer** menu.
2. Select channel.
3. Select the measurement period.
4. Click **Sample** to display the data.
5. Right-click on the table to customize the table.
6. Click the table column head for sorting the table.

The PID Statistics summarize for every PID the measured and calculated quantities of the transport stream packets received at the transport stream input of the analyzer.

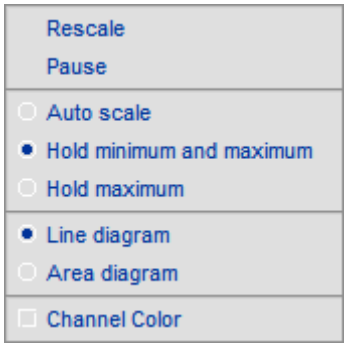
PID (Dec)	The packet identifier[2] in the transport stream packet header displayed in decimal.
PID (Hex)	The packet identifier[2] in the transport stream packet header displayed in hexadecimal.
Type	The type of data stream or table belonging to the given PID.
Service ID (Dec)	The decimal value of the program identifier belonging to the given PID.
Service ID (Hex)	The hexadecimal value of the program identifier belonging to the given PID.
Service Name	The program name belonging to the given PID.
Total Packets Received	The number of packets received on the given PID from the beginning of the measurement.
Packet Ratio	Ratio of the packets received on the given PID and the Total Packet Received between the times of measurement in the given line and the previous line.
Bitrate [bit/s] @188	Data rate measured on the given PID between the times of measurement in the given line and the previous line together with the TS packet headers.
Sync Error Count	The number of sync errors[1] on the given PID from the beginning of the measurement.
CC Error Count	The number of CC Errors[1] on the given PID from the beginning of the measurement.
Transport Error Count	The number of TEI errors[1] on the given PID from the beginning of the measurement.
PSI CRC Error Count	The number of PSI sections with CRC Errors[1][3] on the given PID from the beginning of the measurement.
Scrambled	Indicates if any scrambled packets arrive on the given PID from the beginning of the measurement.
PCR	Indicates if any packets containing PCR[2] arrive on the given PID from the beginning of the measurement.
Last Packet	The time stamp of the last packet received on the given PID.
Priority	Indicates if any higher priority packets arrive on the given PID from the beginning of the measurement.
Description	The accurate description of the elementary stream type[2] received on the given PID.
Information	Additional information[3] in the PMT belonging to the given PID.

- [1] ETSI TR 101 290 : Measurement guidelines for DVB systems, 5. Measurement and analysis of the MPEG-2 Transport Stream
- [2] ITU-T Rec. H.222.0 | ISO/IEC 13818-1 : Generic coding of moving pictures and associated audio information: Systems
- [3] ETSI EN 300 468 : Digital Video Broadcasting; Specification for Service Information (SI) in DVB systems

2.3.3 Channel bitrate analyzer

1. Select **Channel Bitrate Analyzer** function from the **Channel Analyzer** menu.
2. Select channel.
3. Right-click to customize the graph.

The graph shows the bitrate of the selected channel together with the TS packet headers as a function of time.



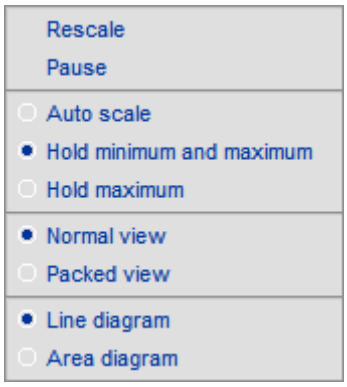
Customization

Rescale	Rescale the graph
Pause	Pausing the drawing of graph
Auto scale	Auto scale the graph
Hold minimum and maximum	Holding the minimum and maximum values during measurement
Hold maxiumum	Holding the maximum value during measurement, the minimum value is always 0 bit/s
Line diagram	Drawing line diagram
Area diagram	Drawing area diagram
Channel Color	Coloring the graph according to the color of the channel

2.3.4 MultiChannel bitrate analyzer

1. Select the **MultiChannel Bitrate Analyzer** function from the **Channel Analyzer** menu.
2. Select the channels to be measured on the left panel.
3. Right click to customize the graph.
4. Click the table column head for sorting the table.

The graph shows the bitrates of the selected channels together with the TS packet headers as a function of time.

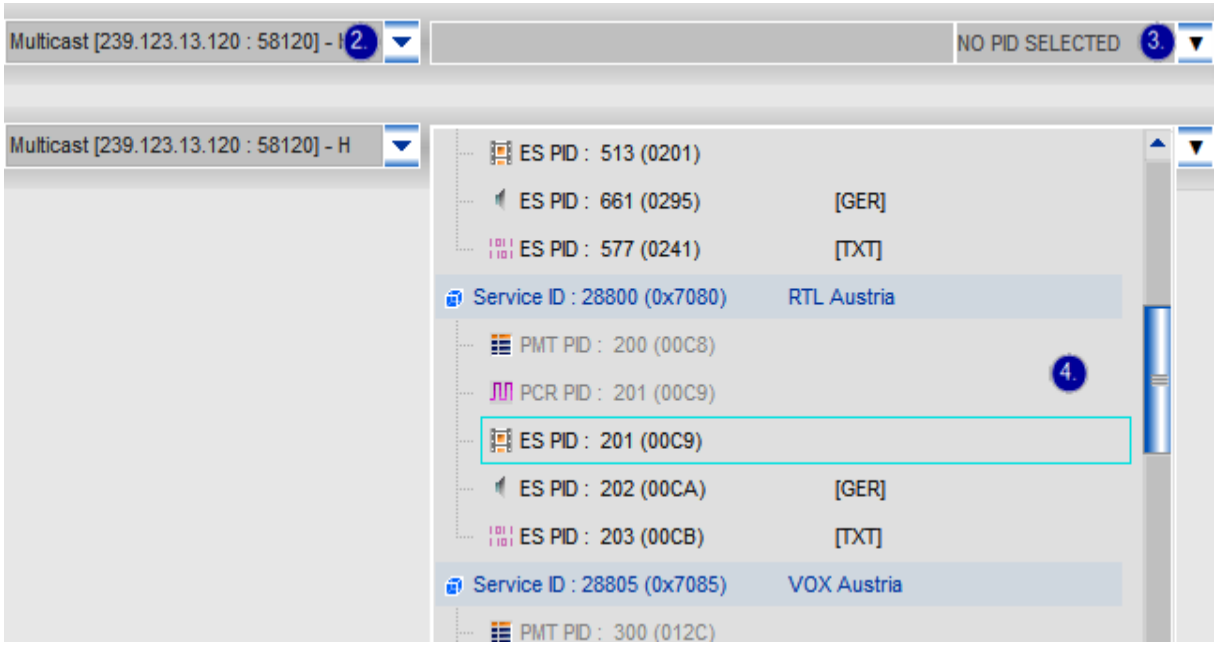


Customization

Rescale	Rescale the graph
Pause	Pausing the drawing of graph
Auto scale	Auto scale the graph
Hold minimum and maximum	Holding the minimum and maximum values during measurement
Normal view	Several channel bitrates on the same graph without offset
Packed view	Several channel bitrates on the same graph with offset in packed view
Line diagram	Drawing line diagram
Area diagram	Drawing area diagram

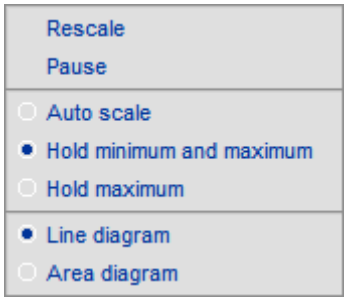
2.3.5 PID bitrate analyzer

1. Select the **Channel Bitrate Analyzer** function from the **Channel Analyzer** menu.
2. Select channel.
3. Drop down the PID selector fild and wait until the end of analyzing.
4. Select the PID to be measured.
5. Right-click to customize the graph.



PID selection

The graph shows the bitrate of the selected PID together with the TS packet headers as a function of time.



Customization

Rescale	Rescale the graph
Pause	Pausing the drawing of graph
Auto scale	Auto scale the graph
Hold minimum and maximum	Holding the minimum and maximum values during measurement
Hold maxiumum	Holding the maximum value during measurement, the minimum value is always 0 bit/s
Line diagram	Drawing line diagram
Area diagram	Drawing area diagram

2.3.6 MultiPID bitrate analyzer

1. Select the **MultiPID Bitrate Analyzer** function from the **Channel Analyzer** menu.
2. Select channel.
3. Select the PID to be measured.
4. Click **[+]** to add the selected PID.
5. Click **[≡]** to display additional functions.
6. Right-click to customize the graph.
7. Right-click on the table to customize.
8. Click the table column head for sorting the table.

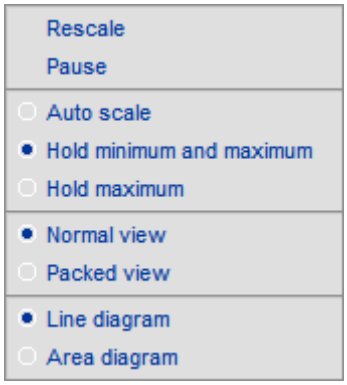
PIDs addition

The graph shows the bitrates of the selected PIDs together with the TS packet headers as a function of time.

Additional functions

- **Add all PIDs from selected service**
- **Add all VIDEO PIDs**
- **Add all AUDIO PIDs**
- **Add all PSI PIDs**
- **Remove all PIDs**

Bitrate graph



Customization

Rescale	Rescale the graph
Pause	Pausing the drawing of graph
Auto scale	Auto scale the graph
Hold minimum and maximum	Holding the minimum and maximum values during measurement
Normal view	Several PID bitrates on the same graph without offset
Packed view	Several PID bitrates on the same graph with offset in packed view
Line diagram	Drawing line diagram
Area diagram	Drawing area diagram

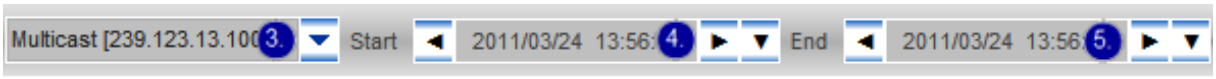
PID table

Channel	Channel description.
PID (dec)	The packet identifier[1] in the transport stream packet header displayed in decimal.
PID (hex)	The packet identifier[1] in the transport stream packet header displayed in hexadecimal.
Type	The type of data stream or table belonging to the given PID.
Service ID (dec)	The decimal value of the program identifier belonging to the given PID.
Service ID (hex)	The hexadecimal value of the program identifier belonging to the given PID.
Service Name	The program name belonging to the given PID.
Information	Additional information[2] in the PMT belonging to the given PID.
Minimum	The minimum value of the bitrate in bit/s together with header of the transport stream packet.
Average	The average value of the bitrate in bit/s together with header of the transport stream packet.
Maximum	The maximum value of the bitrate in bit/s together with header of the transport stream packet.

- [1] ITU-T Rec. H.222.0 | ISO/IEC 13818-1 : Generic coding of moving pictures and associated audio information: Systems
- [2] ETSI EN 300 468 : Digital Video Broadcasting; Specification for Service Information (SI) in DVB systems

2.3.7 General Statistics (SD Card)

1. Select the **General Statistics (SD Statistics)** function from the **Channel Analyzer** menu.
2. Wait until the indexing process is complete.
3. Select channel.
4. Enter the start time of the evaluation.
5. Enter the end time of the evaluation.
6. Click **Refresh** to display the data.
7. Right-click the table and use the pop-up menu to customize.



Channel selector toolbar

The general statistics summarize the measured and calculated quantities of the transport stream packets received at the transport stream input of the analyzer.

No.	Serial number of measurement results. The current measurement result is always shown in the first line of the table.
Time Stamp	Time stamp of the given measurement result.
Relative Time	Difference of the time stamp belonging to the measurement result in the given line and the current time stamp.
Delta Time	Difference between the time stamps of the given line and the previous line.
Total Packets Received	Total amount of TS packets received at the transport stream input of the analyzer from the beginning of the measurement.
Packets Received	The number of TS packet received at the transport stream input of the analyzer from the beginning of the measurement.
Bitrate [kbit/s] @ 184	Data rate measured between the times of measurement in the given line and the previous line without the TS packet headers.
Bitrate [kbit/s] @ 188	Data rate measured between the times of measurement in the given line and the previous line together with the TS packet headers.
Bitrate [kbit/s] @ 204	Data rate measured between the times of measurement in the given line and the previous line together with the TS packet headers and the RS bytes.
Delta Packets	Difference between the number of TS packets in the given line and the previous line.
Delta Packet Ratio	Ratio of Delta Packets to Packets Received in the given line.
TTL Max.	The maximum value of the IP datagram TTL fields[3] containing TS packets, received between the times of measurement in the given line and the previous line.
TTL Max.	The minimum value of the IP datagram TTL fields[3] containing TS packets, received between the times of measurement in the given line and the previous line.
Format	The TS packet format for embedding into IP datagrams. (N×188, M×204, ES/PSI, IPTV, TSoverIP)
Min. UDP Arrival Time [us]	The minimum period measured between the arrival of the UDP packets containing TS packets.
Max. UDP Arrival Time [us]	The maximum period measured between the arrival of the UDP packets containing TS packets.
Total Eth. CRC Error Count	Number of Ethernet frames[2] received with Eth. CRC error at the transport stream input of the analyzer from the beginning of the measurement.
Eth. CRC Error Count	Number of Ethernet frames received with Eth. CRC error between the times of measurement in the given line and the previous line.
Eth. CRC Error Ratio	Ratio of Eth. CRC Error Count to Total Frames in the given line.
Total Sync Error Count	The number of TS packets received with sync error[1] in the given channel from the beginning of the measurement.

Sync Error Count	The number of TS packets received with sync error between the times of measurement in the given line and the previous line.
Sync Error Ratio	Ratio fo Syinc Error Count and Packets Received in the given line.
Total Sync Lost Count	Number of sync losses[1] from the beginning of the measurement.
Sync Lost Count	Number of sync losses[1] between the times of measurement in the given line and the previous line.
Sync Lost Ratio	Ratio of Sync Lost and Packet Received in the given line.
Total Eth. CRC Error Count	The number of Ethernet frames [2] received with CRC Error in the given channel from the beginning of the measurement.
Eth. CRC Error Count	The number of Ethernet frames [2] received with CRC Error between the times of measurement in the given line and the previous line.
Eth. CRC Error Ratio	Ratio of Eth. CRC Error Count and Packets Received in the given line.
Total Sync Error Count	The number of TS packets with Sync Error[1] in the given channel from the beginning of the measurement.
Sync Error Count	The number of TS packets received with Sync Error between the times of measurement in the given line and the previous line.
Sync Error Ratio	Ratio of Sync Error Count and Packets Received in the given line.
Total Sync Lost Count	The number of Sync losses[1] in the given channel from the beginning of the measuremet.
Sync Lost Count	The number of Sync losses between the times of measurement in the given line and the previous line.
Sync Lost Ratio	Ratio of Sync Lost Count and Packets Received in the given line.
Total CC Error Count	The number TS packets received with Continuity Counter Errors[1] from the beginning of the measuremet.
CC Error Count	The number of TS packets received with CC Error between the times of measurement in the given line and the previous line.
CC Error Ratio	Ratio of CC Error Count and Packets Received in the given line.
Total Transport Error Count	The number of TS packets received with Transport (TEI) Error[1] in the given channel from the beginning of the measuremet.
Transport Error Count	The number of TS packets received with Transport (TEI) Error[1] between the times of measurement in the given line and the previous line.
Transport Error Ratio	Ratio of Transport Error Count and Packets Received in the given line.
Last Packet Time Stamp	The arrival time stamp of the last TS packet received to the measurement time of the given line.
Last Error Time Stamp	The arrival time stamp of the last erroneous TS packet to the measurement time of the given time.
500 ms	Measurement interval, which shows the test results of the last 15 seconds with 500 ms resolution.
15 s	Measurement interval, which shows the test results of the last 5 minutes with 15 sec resolution.
5 min	Measurement interval, which shows the test results of the last 1 hour with 5 minutes resolution.

- [1] ETSI TR 101 290 : Measurement guidelines for DVB systems, 5. Measurement and analysis of the MPEG-2 Transport Stream
- [2] IEEE 802.3 : CSMA/CD (Ethernet) Access Method
- [3] IETF RFC 791 : Internet Protocol

2.3.8 PID Statistics (SD Card)

This function is under development.

2.3.9 PSI analyzer

1. Select the **PSI Analyzer** function from the **Channel Analyzer** menu.
2. Select the channel to be analyzed from the drop-down box.
3. Click **Analyze**.
4. Select the desired page by clicking the tabs below.

2.3.10 PCR analyzer

1. Select the **PCR Analyzer** function from the **Channel Analyzer** menu.
2. Select the input to be analyzed from the left-hand pull-down box.
3. Pull down the **No PID SELECTED** field, then double-click the PCR PID to be analyzed.
4. Click **Analyze**.
5. Right-click on the PCR Samples, PCR_AC or PCR_OJ page to select the digital filter.
6. The standard-compliant samples in the table and graphs are displayed in green.
7. The line of defective samples is grey, the background of cells that contain erroneous values is displayed in red in the table.
8. The blue background of the PCR_AC and PCR_OJ cells in the table indicates that the 25 us low jitter application criterion is met.

Measuring the PCR inserting accuracy (PCR_AC)[1]

- defined for CBR (constant bitrate) data streams
- examines the uncorrected errors due to editing the data stream
- the errors generated during the transfer will not affect the measurement results
- the measurement result is the PCR inserting accuracy as a function of the PCR samples
- within the range of ± 500 ns the PCR_AC is considered correct
- within the range of ± 25 us us the PCR_AC is in accordance with the ISO 13818-9 [3] standard

Measuring the Overall PCR jitter (PCR_OJ)[2]

- defined for CBR and VBR (variable bitrate) data streams
- examines the errors from editing and transfer of the data stream together
- the measurement result is the overall PCR jitter as a function of the PCR samples
- within the range of ± 500 ns the PCR_OJ is considered correct
- within the range of ± 25 us the PCR_OJ is in accordance with the ISO 13818-9 [3] standard

Measuring the PCR repetition time [3][4]

- defined for CBR and VBR data streams
- examines the arrival times of the PCR timestamps
- the measurement result is the overall PCR repetition time as a function of the PCR samples
- the maximum value of 100 ms PCR arrival-time is in accordance with the ISO 13818-1 [1] standard
- the maximum value of 40 ms PCR arrival-time is in accordance with the TR 101 154 [4] standard

In digital television systems the transmission of timing information is essential to display the image and audio information at the receiving side simultaneously. For timing the transmitter generates timestamps for the decoder to indicate, when to decode the current data unit encoded (DTS or Decode Time Stamp) and when to display (PTS or Presentation Time Stamp). The generation of the timestamps is based on the 27-MHz system clock of high accuracy on the transmitter side, which increments a 42-bit counter. The current value of the counter is the PCR (Program Clock Reference), which must be inserted into the stream periodically. The upper 33 bits of the PCR are the PCR_{Base}, the lower 9 bits are the PCR_{Ext}. The PCR_{Ext} counts from 0 to 299 and increments the PCR_{Base} by one at every overflow.

The CW-4957 Real-Time TS Analyzer is primarily designed for the operators of digital television systems, therefore the transmitter-side errors (Frequency offset, Frequency drift rate) are not examined. To measure the errors from the transmitting and editing of the transport stream the analyzer continuously collects information on all PID values that occur at the active inputs, regardless of whether the PID is in reference to the PMT table. From the packets containing the PCR timestamp the following data will be collected: packet counter value, arrival time, PID, TEI (Transport Error Indicator), DI (Discontinuity Indicator), PCR_{Base} and the PCR_{Ext} value. From this data structure the analyzer stores 8192 samples per input.

From a single program input stream (SPTS) that contains one PCR PID, if calculated with 25 ms PCR repetition time, more than 3-minute long sample will be stored. In case of multiple program input stream the storage capacity is dynamically distributed to the PIDs containing the PCR timestamp, if calculated with 8 programs and also 25 ms repetition time, approximately half of a minute long sample can be analyzed. The measurement data will be collected continuously after pressing the Analyze button during the continuous readout and evaluation, however the samples collected during reading will not be processed.

On pressing the Analyze button the analyzer calculates the following values from the measured data: distance between adjacent PCR timestamps measured in time and number of packets, the difference between the adjacent timestamps, PCR inserting accuracy, overall PCR jitter and the transport stream bitrate calculated from the PCR samples. For calculating the quantities of PCR_AC and PCR_OJ, the filters can be chosen are defined in the ETSI TR 101 290 standard, MGF1 (f = 10 mHz), MGF2 (f = 100 mHz) or MGF3 (f = 1 Hz).

The accuracy of the PCR has a prominent role, if PAL signal must be produced on the receiving side. The accuracy of the PAL subcarrier according to the standard is provided by the PCR. In pure digital systems the significance of the PCR is low.

- [1] ETSI TR 101 290 I.7.1
- [2] ETSI TR 101 290 I.7.4
- [3] ETSI TS 101 162 [1]
- [4] ETSI TR 101 154 [4]

2.3.11 Packet Arrival Analyzer

1. Select **Packet Arrival Analyzer** function from the **Channel Analyzer** menu.
2. Select the desired channel to be analyzed from the drop-down box.
3. Click **Analyze**.
4. Right-click Packet Arrival Table page to customize.
5. Right-click Packet Arrival Diagram page to customize.

In every channel, the device stores the arrival times of the last 8192 TS packets only. For more packets use the SW-4957 software.

Table

No.	Serial number of the packet in the table. The current measurement result is always shown in the last line of the table.
Time Stamp	Time stamp belonging to the packet.
Relative Time	Difference between the time stamps of the given packet and the last packet.
Delta Time	Difference between the arrival time of the given packet and the previous packet.
Delta Time - Average	Difference between the arrival time of the given packet and the average arrival time.
PID (Dec)	Packet identifier[1] in the transport stream packet header displayed in decimal.
PID (Hex)	Packet identifier[1] in the transport stream packet header displayed in hexadecimal.
Transport Error	Transport Error Indicator field[1] in the TS packet header.
Payload Unit Start	Payload Unit Start field[1] in the TS packet header.
Transport Priority	Transport Priority field[1] in the TS packet header.
Scrambling Control	Scrambling Control field[1] in the TS packet header.
Adaptation Field	Adaptation Field[1] in the TS packet header.
Continuity Counter	Value of the Continuity Counter[1] in the TS packet header.
Type	The type of data stream or table belonging to the given PID.
Service ID (Dec)	The decimal value of the program identifier belonging to the given PID.
Service ID (Hex)	The hexadecimal value of the program identifier belonging to the given PID.
Service Name	The program name belonging to the given PID.
Description	The accurate description of the elementary stream type[1] received on the given PID.
Information	Additional information[2] in the PMT belonging to the given PI

Graph

- **Draw Lines**
- Drawing lines between the packet arrival times and the average packet arrival time.
- **Group by UDP**Measuring UDP packet arrival time instead of TS packet arrival time. This measurement is interpreted only for IP inputs.

- [1] ITU-T Rec. H.222.0 | ISO/IEC 13818-1 : Generic coding of moving pictures and associated audio information: Systems
- [2] ETSI EN 300 468 : Digital Video Broadcasting; Specification for Service Information (SI) in DVB systems

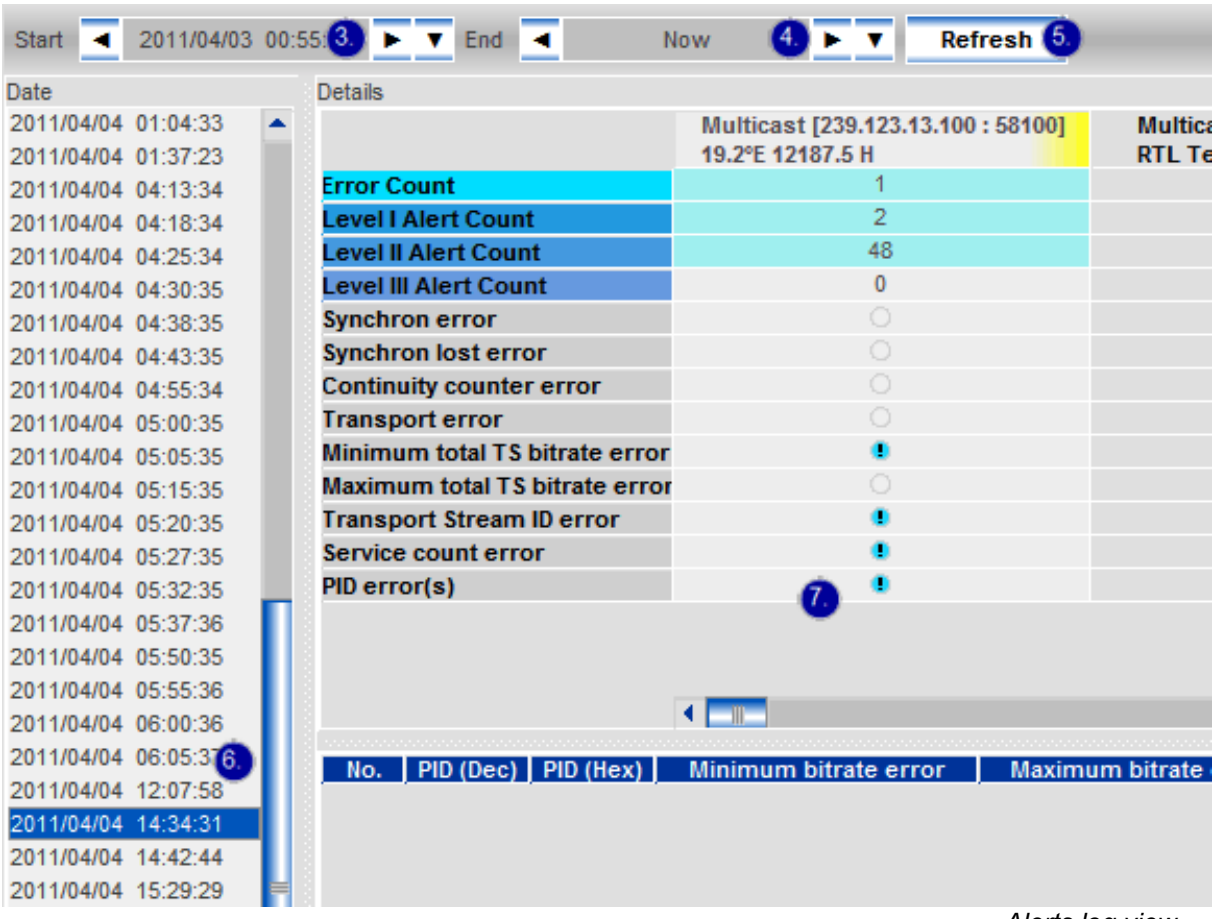
3. Alert & Log

3.1.1 View Alerts (Real-Time)

1. Select **View Alerts (Real-Time)** function from the **Alert & Log** menu.
2. Click the proper cell in the PID error(s) line to load the PID table belonging to the given channel.

3.1.2 View Alerts (SD Card)

1. Select **View Alerts (SD Card)** function from the **Alert & Log** menu.
2. Wait until the indexing process is complete.
3. Enter the start time of the evaluation.
4. Enter the end time of the evaluation.
5. Click **Refresh** to display the data.
6. Select the desired log entry from the list on the left.
7. Click the proper cell in the PID error(s) line to load the PID table belonging to the given channel.



Alerts log view

Frequently Asked Questions

F1. Abbreviations

ASI	Asynchronous Serial Interface	High-speed (270 MBit/s) serial digital transmission mode in MPEG-TS transfer between the devices.
ATSC	Advanced Television Systems Committee	USA standard for digital video broadcasting.
DHCP	Dynamic Host Configuration Protocol	Automatic IP address assignment for network devices.
DNS	Domain Name System	Address resolution mechanism.
DVB	Digital Video Broadcasting	Europian standard for digital video broadcasting.
IP, IPv4, IPv6	Internet Protocol	The basic protocol of the Internet.
MAC	Medium Access Control	The sublayer of the data link layer of the OSI (Open System Interconnection) reference model.
MPEG-TS	MPEG Transport Stream	Standard format for audio video and data transmisson in DVB and ATSC broadcast systems.
NAT	Network Address Translation	NAT allows LAN devices to communicate directly with external hosts without public IP address.
NTP, SNTP	Network Time Protocol, Simple Network Time Protocol	Time syncronization protocol used for network devices.
PCR	Program Clock Reference	$PCR = PCR_{Base} \times 300 + PCR_{Ext}$
PTS	Presentation Time-stamp	Time stamp in the PES header.
SMTP	Simple Mail Transfer Protocol	Protocol used for sending e-mail.

F2. What to do if I forget the IP address of the device

The device continuously sends ARP messages which contains its IP address. Use Ethernet analyzer to read it out (e.g. Wireshark).

Links

L1.www.cableworld.eu

L2.www.dvb.org