MPE-4000 MPEG-2/H.264 SD/HD Encoder

Datasheet and User Manual

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Table of Content

Introduction

Product Overview

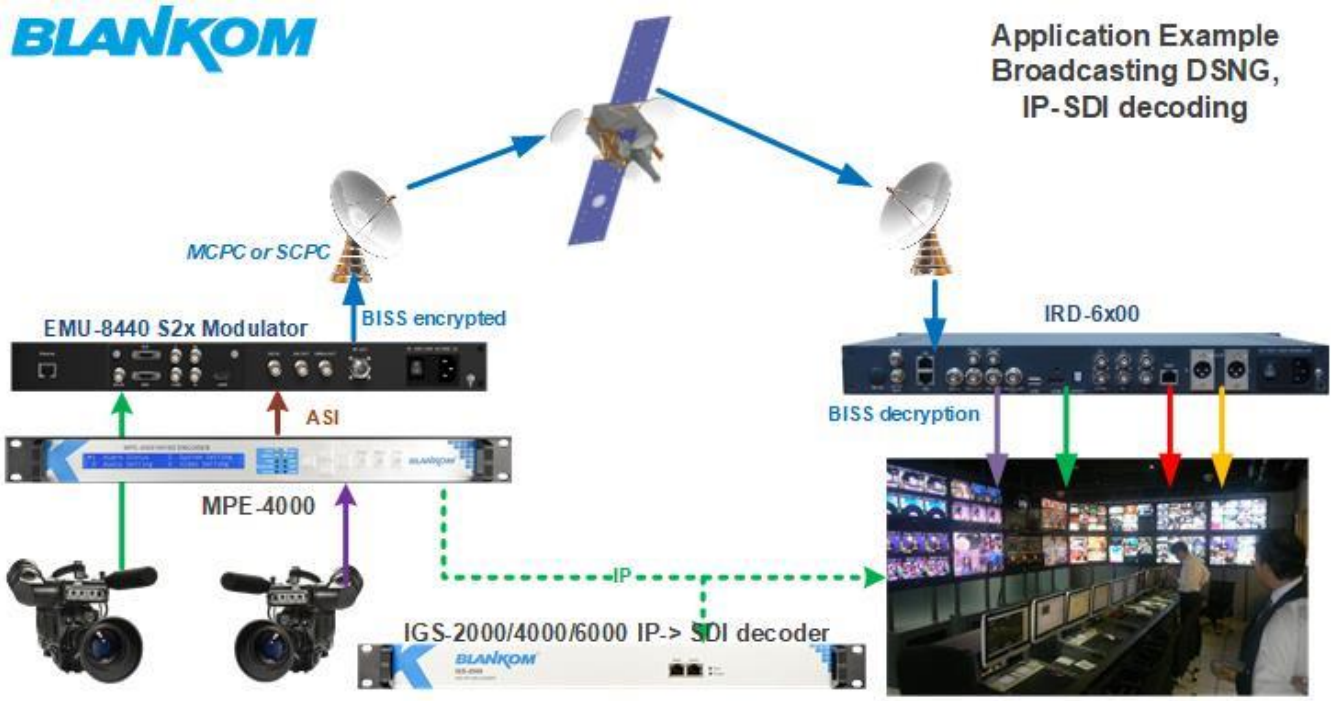
MPE-4000 MPEG-2/H.264 SD/HD Encoder is a broadcasting audio & video encoding device with powerful functionality. It is equipped with multiple and therefore flexible Video input interfaces (SDI, CVBS, YPbPr and HDMI) and Audio input interfaces (AES, RCA and XLR) to be compatible with different signal sources.

Multiple audio and video encoding formats are available to meet your flexible and various requirements. 4 stereo (8 mono) or one DD 5.1 (AC3) audio signals can be embedded to the stream output. The encoded program will finally output in a DVB conform TS through ASI and IP port.

The MPE-4000 has an overlay insertion feature: QR code, LOGO and OSD-TEXT. It can generate 3 parallel overlay operations at the same time. You can insert an advertisement picture, own LOGO, special QR code and/or OSD content on top of the encoding process.

Key Features

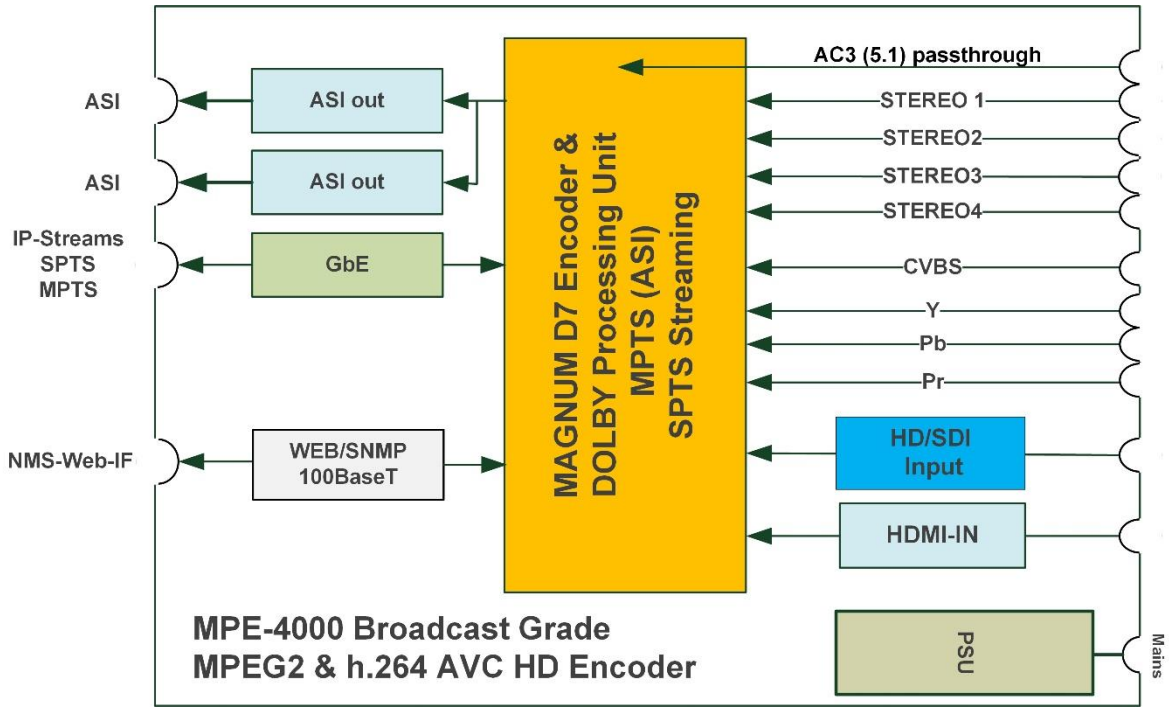
- MPEG-2 HD/SD and MPEG-4 AVC/H.264 HD/SD video encoding
- 1080I,720P, 480I, 576I video resolution and downscale transform
- Low latency
- MPEG1 Layer II, HE-AAC (v1 & v2), LC-AAC and DD AC3 audio encoding and adjustment
- Dolby Digital AC3 audio pass through (for SDI in)
- Additional 4 stereo or 8 mono audio encoding
- Video buffer, selectable Video sources (all video interfaces available in parallel Inputs)
- Support TT/CC (closed caption-US norm), EIA 608 and EIA 708 (for CVBS and SDI in)
- Dual parallel ASI output and IP over UDP and RTP
- LCD / Keypad control and Web based management by RJ45 Ethernet port
- AD-Insertion: QR code, LOGO, OSD-text



Specifications

<table>
<tr><td rowspan="11">Video</td><td>Interface</td><td colspan="3">1×SDI, 1×CVBS, 1×YPbPr and 1×HDMI</td></tr>
<tr><td rowspan="10">Resolution</td><td>Input</td><td>Output</td><td>Interfaces</td></tr>
<tr><td>1920×1080i@60</td><td rowspan="3">1920×1080,
1440×1080,
1280×1080i, 960×1080i</td><td rowspan="3">HDMI, SDI, YPbPr</td></tr>
<tr><td>1920×1080i @59.94</td></tr>
<tr><td>1920×1080i @50</td></tr>
<tr><td>1280×720p@60</td><td rowspan="3">1280×720, 960×720p,
640×720p</td><td rowspan="3">HDMI, SDI, YPbPr</td></tr>
<tr><td>1280×720p@59.94</td></tr>
<tr><td>1280×720p@50</td></tr>
<tr><td>720×576i@50</td><td>720×576, 704×576,
640×576, 544×576,
528×576, 480×576,
352×576</td><td>SDI, CVBS</td></tr>
<tr><td>720×480i@59.94</td><td>720×480, 704×480,
640×480, 544×480,
528×480, 352×480</td><td>SDI, CVBS</td></tr>
<tr><td>Encoding</td><td colspan="3">MPEG-2 HD/SD; MPEG-4 AVC/H.264 HD/SD</td></tr>
<tr><td>Bitrate Range</td><td colspan="3">0.52 – 60.00 Mbps</td></tr>
<tr><td>Rate Control</td><td colspan="3">CBR (Encoding)</td></tr>
<tr><td>GOP Structure</td><td colspan="3">Auto, IP, IPB, IPBB, IPBBB</td></tr>
<tr><td>Aspect Ratio</td><td colspan="3">4:3, 14:9 (for SD video), 16:9 (for HD video)</td></tr>
<tr><td>Chroma</td><td colspan="3">4:2:0, 4:2:2</td></tr>
<tr><td>Advanced Pretreatment</td><td colspan="3">De-interlacing, noise reduction, sharpening</td></tr>
<tr><td rowspan="4">Audio</td><td>Interface</td><td colspan="3">4×XLR, 4×RCA, 1×AES, 1×HDMI, 1×SDI (maximum 4 stereos synchronous processing or one DD 5.1 CH processing)</td></tr>
<tr><td>Encoding</td><td colspan="3">MPEG-1 Layer II, HE-AAC (v1&v2), LC-AAC, DD AC3 (2.0, 5.1 available); DD AC3 pass-through (for SDI in)</td></tr>
<tr><td>Sampling rate</td><td colspan="3">48KHz</td></tr>
<tr><td>Resolution</td><td colspan="3">24-bit</td></tr>
<tr><td colspan="2">Bit-rate</td><td colspan="3">32Kbps...384Kbps</td></tr>
<tr><td colspan="2">Low Latency options</td><td colspan="3">150ms, 200ms, 350ms, 650ms depending on Resolution and S-Rates</td></tr>
<tr><td colspan="2" rowspan="2">Stream output</td><td colspan="3">2×ASI output ports, BNC interface</td></tr>
<tr><td colspan="3">IP over UDP and RTP, 100 Base-T Ethernet interface (UDP multicast/unicast)</td></tr>
<tr><td colspan="2" rowspan="3">System function</td><td colspan="3">LCD/Keypad and web management</td></tr>
<tr><td colspan="3">Language: English</td></tr>
<tr><td colspan="3">Ethernet based software updates</td></tr>
<tr><td rowspan="5">General</td><td>Dimensions</td><td colspan="3">482mm × 405mm × 44.5mm (W × D × H)</td></tr>
<tr><td>Weight</td><td colspan="3">Approx. 4.0 Kg</td></tr>
<tr><td>Temperature</td><td colspan="3">0...45℃(Operation), -20...8°C(Storage)</td></tr>
<tr><td>Power</td><td colspan="3">AC110V ±10%, 50/60Hz; AC 220V ±10% , 50/60Hz</td></tr>
<tr><td>Consumption</td><td colspan="3">21W</td></tr>
</table>

Block Diagram



Remark: DVB TELETEXT or american CC will be passed as well

Appearance and Description

Front Panel Illustration

① **LCD window** ❶ ❷ ❸ ❹❺❻

② **LED-Status Indicators**

③ **Up and down, left and right navigation buttons**

④ **Enter button: for confirmation**

⑤ **Menu button: for back step**

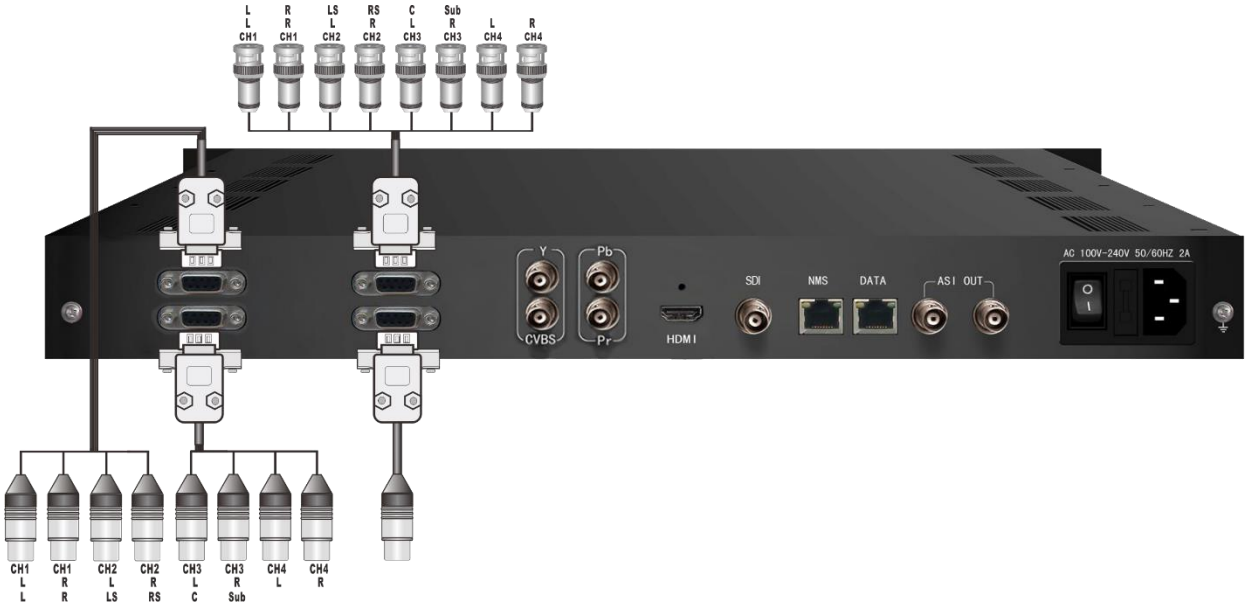
⑥ **Lock button: press once to unlock setting access by Keypad**

All technical data are subject to change w/o further notice

Rear Panel Illustration

① **XLR input connectors (for stereo audio 1-2 input)***
② **XLR input connectors (for stereo audio 3-4 input)*** — **(For 5.1 surround input)**
③ **RCA input connectors* (for stereo audio 1-4 input or 5.1 surround input)**
④ **AES input connector *(for only one channel digital stereo)**
⑤ **YPbPr & CVBS video input connectors**
⑥ **HDMI input connector (Audio input embedded)**
⑦ **SDI input connector (Audio input embedded)**
⑧ **NMS connector for connecting Web management on PC**
⑨ **DATA Port for IP stream output**
⑩ **ASI output connectors**
⑪ **Power supply/Fuse**

Audio Adapter Cable Illustration



- **L/R: For Mono or Stereo input (Analog)***
- **L/R/LS/RS/C/Sub: For 5.1 surround input (Analog)***
- **AES: For single digital stereo audio input***

***) (Adapter not included)**

Installation Guide

We assume, that the installation will be done by a skilled and well educated electrical technician taking care of environmental circumstances like Air-condition and grounding requirements. The device should always be mounted into a 19'' Rack by the front screws and even better with some metal angles avoiding bending of the units housing.

Power

- When you connect the power source, make sure the source voltage fits to the PSU data.
- Make sure the connected cables are in good condition. Avoid shortage of signal cables.
- Make sure the power switch is OFF before you start to install the device

Environmental Requirement

Item	Requirement
Server operating room and floor	Electric Isolation, Dust Free Volume resistivity of ground anti-static material: $1x10^{7}...1x10^{10}\Omega$， Grounding current limiting resistance: 1MΩ (Floor bearing should be greater than 450Kg/㎡)
Environmental Temperature	5...40°C (sustainable)， 0...45°C (short time), installing air-conditioning is recommended
Relative Humidity	20%...80% sustainable 10%...90% short time
Pressure	86...105kpa
Door & Window	Installing rubber strip for sealing door-gaps and dual level glasses for window
Wall	It can be covered with wallpaper, or brightness less paint.
Fire Protection	Fire alarm system and extinguisher
Power	Requiring device power, air-conditioning power and lighting power are independent from each other. Device power requires AC 110V±10%, 50/60Hz or AC 220V±10%, 50/60Hz. Please carefully check before connecting.

Grounding Requirement

The grounding requirements can vary from region to region but usually has to be considered according to national norms and regulations. Opening the top case is strictly forbidden as long as the AC power source is connected or the device is in fully operation. A grounding cable is in the accessory.

Front Panel Operation

MPE-4000's front panel is you operation interface where you configure the device manually. The LCD is a 2-line x 40-character back-lit dot-matrix you interface with pushbuttons for **UP, DOWN, LEFT, RIGHT, ENTER, MENU,** and **LOCK button** for front panel control. You can decide whether to directly use the factory setting, or customize the input/output parameters and so on.

Keypad Function Description

LEFT/RIGHT: To choose and set the parameters

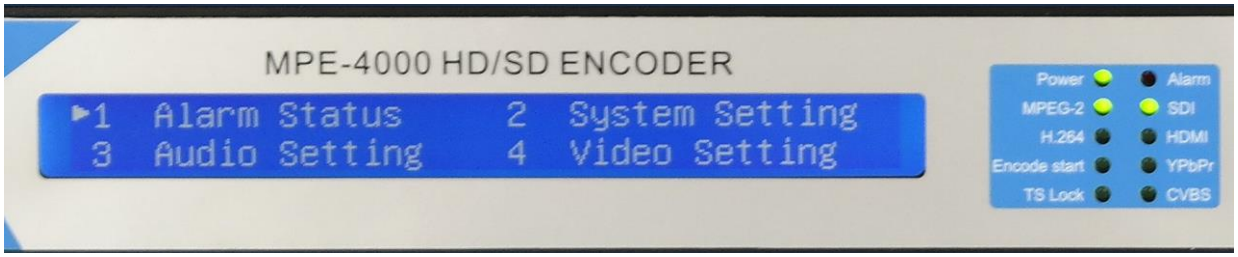
UP/DOWN : Modify activated parameters or page up/down when parameter is inactivated.

MENU : To cancel presently entered value, resume previous setting;

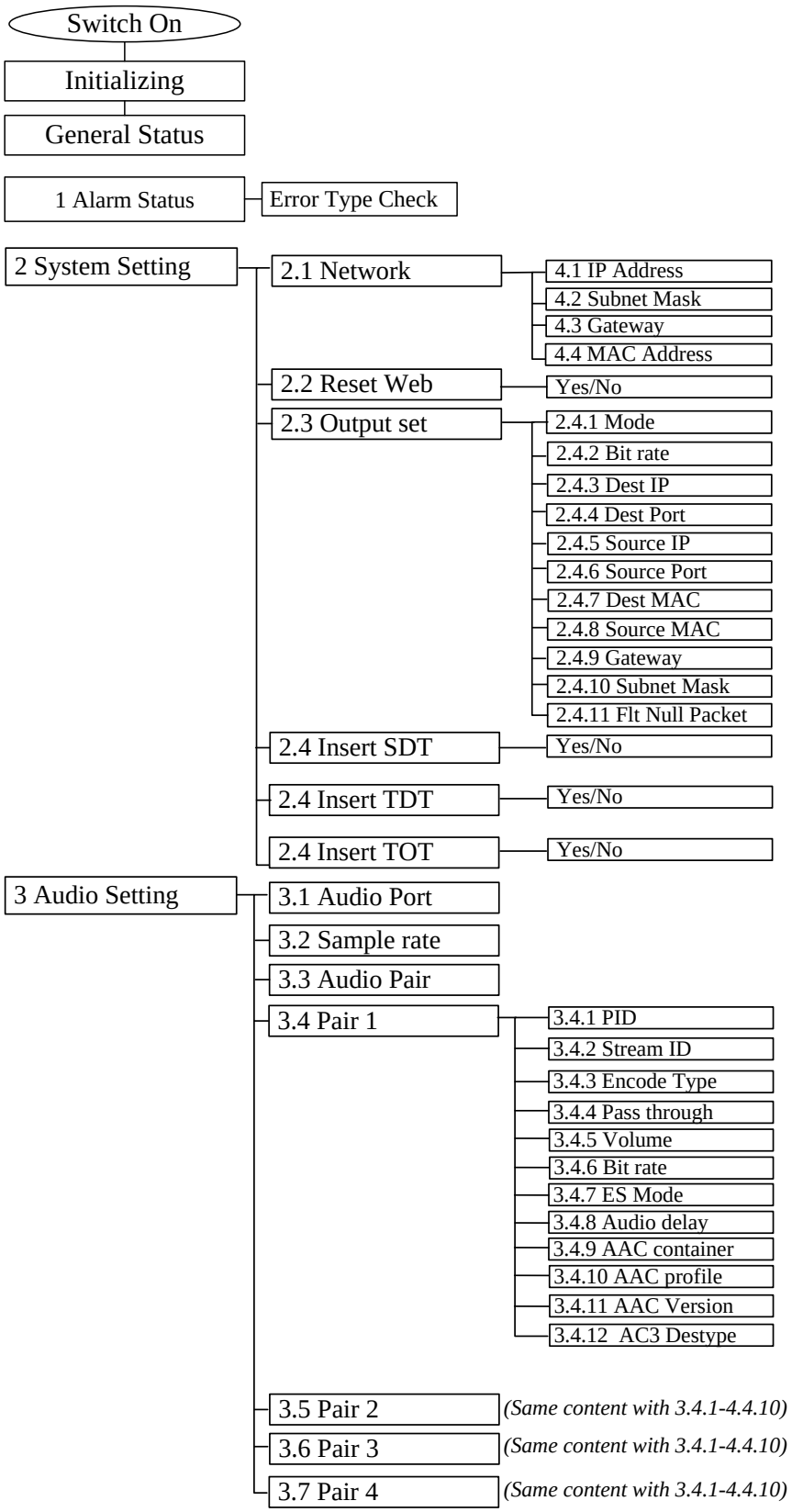
ENTER : Activate the parameters which need modification, and confirm the changes after modification

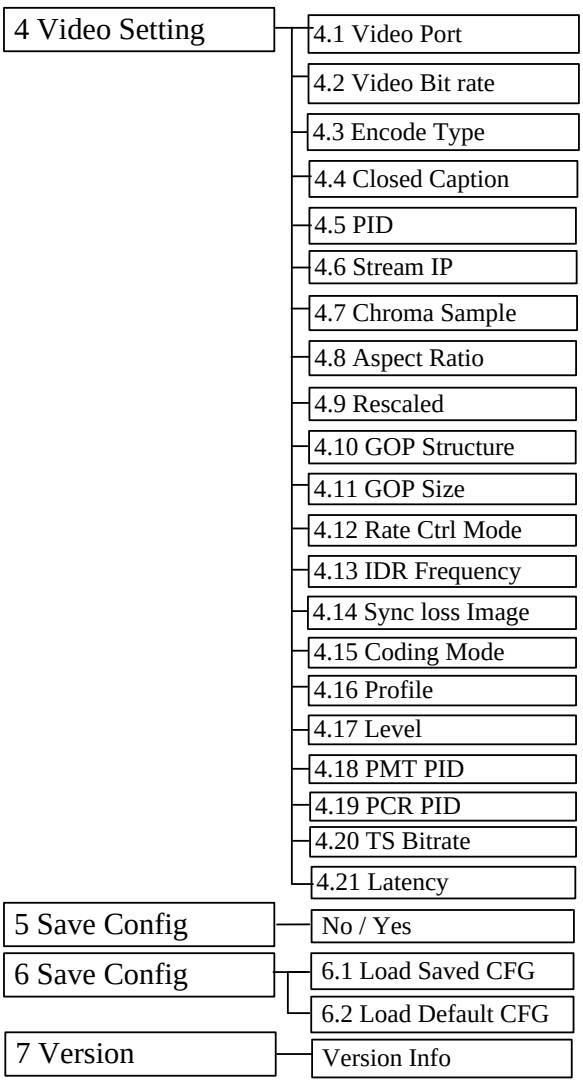
LOCK : Lock/unlock the LCD screen. After pressing the lock key, the system will question you to save or not. If not, the LCD will display the current configuration state and you can toggle between the menu's and adjust the unit.

LCD Menu settings



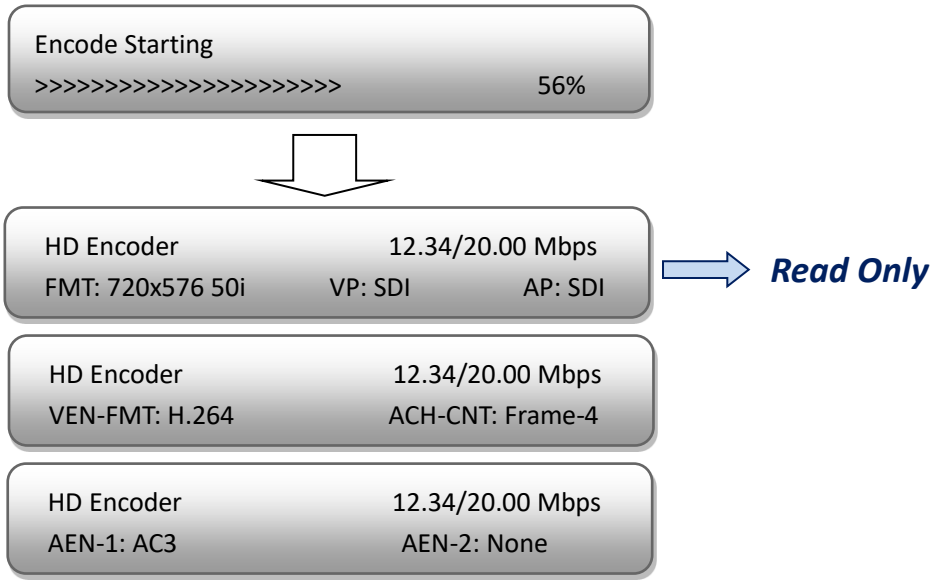
Overview of the LCD menu tree:





Initial Status

Switch on the device and after a few seconds' initialization, it presents a booting pictures as below:



- **HD Encoder:** to indicate the device name.
- **XX.XX/XX.XX Mbps:** to indicate the current encoding Bit Rate and total Output Bit Rate
- **FMT:** to indicate source signal resolution format
- **VP/AP:** to indicate the Video and Audio Signal source port.
- **VEN-FMT:** to indicate the video encode format.
- **ACH-CMT:** to indicate the audio Capture Mode.
- **AEN-1 to AEN-4:** to indicate the 4 channel audio encode format.

General Settings for the Main Menu

Press "***LOCK***" key on the front panel to enable the main menu. The LCD will show the following pages where you can configure the parameters for the device:

You can press UP/DOWN/LEFT/RIGHT buttons to specify menu item, and then press ENTER to enter the submenus as below:

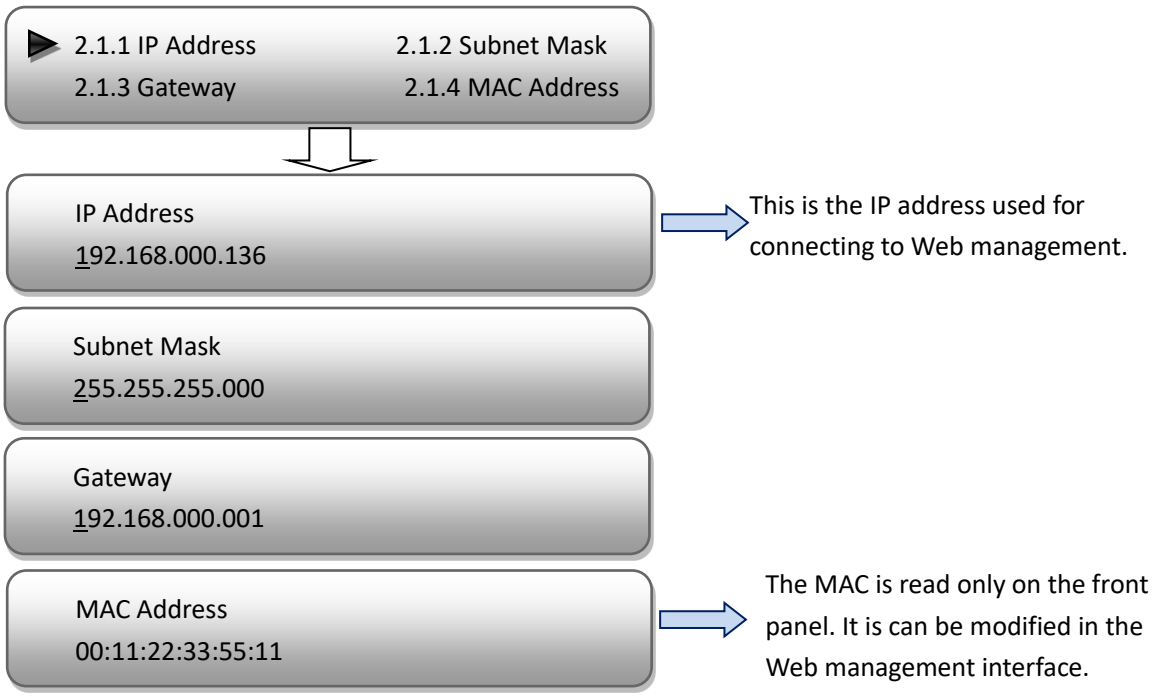
ALARM STATUS

The alarm indicator will turn on if signal source loses or encoding errors occur. You can then enter this menu to check the error type.

SYSTEM SETTING

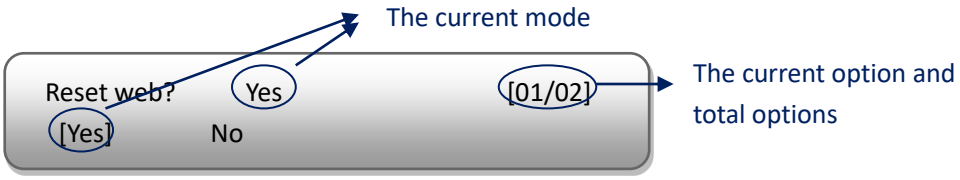
Network setting

Enter "*Network*" to set the network. Submenus go as below:



Reset web

With this interface, by pressing ENTER again, you can select to reset the web-if. The operation interface will turn up as following page:

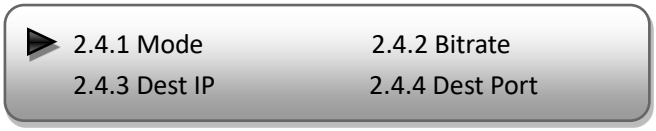


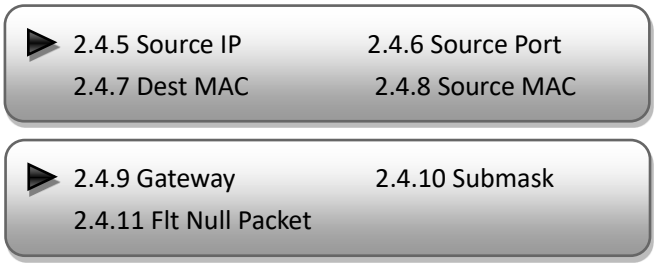
NOTE: Below explanations are applied in this entire manual.

1) When you enter this submenu, the LCD shows only one option which is the device's current option which is marked with square bracket when you presses ENTER **again** to enter the operation interface.
2) "01/02" in the up-right corner indicates there are all together 2 options and the LCD is showing the 1st option currently.

Output setting

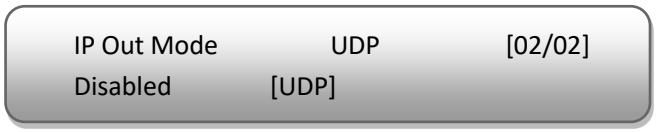
Enter "*Output Set*" to set the output parameters. Sub-menus works as below:





- **IP Out Mode**

MPE-4000 HD encoder supports program stream to output over UDP through the DATA port.

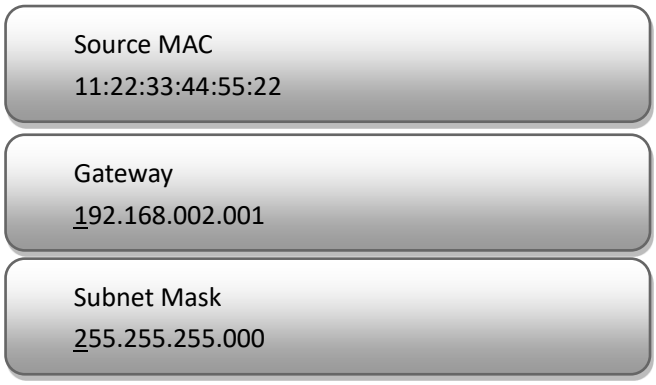


Disable: Program stream will not output from IP port, just output to the ASI Port(s).

- **Output Bit rate**

You can set the total output Bit rate (include video and audio Bit rate, PID Bit rate, etc.) under this menu.

- You can enter **the other IP settings** accordingly to check or modify output IP parameters.



Source MAC is read only on the front panel. It can only be modified by the Web management interface.

- **Flt Null Packet**

You can decide whether to filter IP null packet (PID 8191dec) at this menu.

Insert SDT

At this interface, by pressing ENTER again, you can choose to insert SDT (Service Description Table) or not.

Insert TDT (Time Date Table)

At this interface, by pressing ENTER again, you can choose to insert TDT or not.

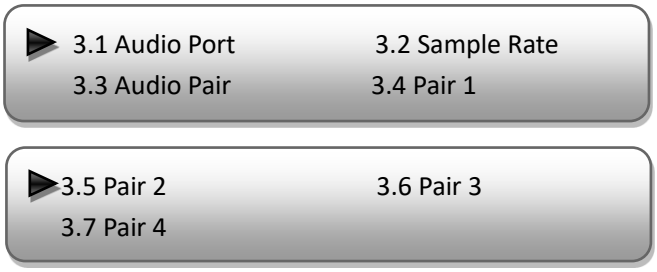
Insert TOT (Time Offset Table)

At this interface, by pressing ENTER again, you can choose to insert TOT or not.

Insert VCT (American ATSC standard table part can be compared with DVB- SDT)

AUDIO SETTING

Enter "*Audio setting*" to configure the Audio parameters for the input program (HDMI/SDI/YPbPr/CVBS input program). Submenus go as below:



Audio Port

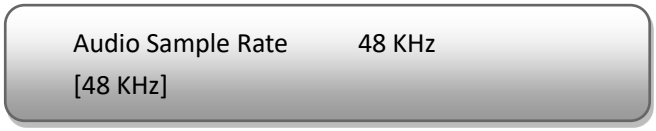
Press ENTER to enter menu *Audio Port*. It displays the current mode of audio Port. Press ENTER again to enter the setting interface, move the square bracket with LEFT/RIGHT keys to select the target mode and press ENTER to confirm. At last, press MENU to step back to the upper menus.

REMARKS:

If the audio source is from **HDMI** or **SDI**, the system will automatically identify and match the interface. It is not necessary to set this menu. If the audio source is from **XLR, RCA** or **AES**, it needs to match the interface manually.

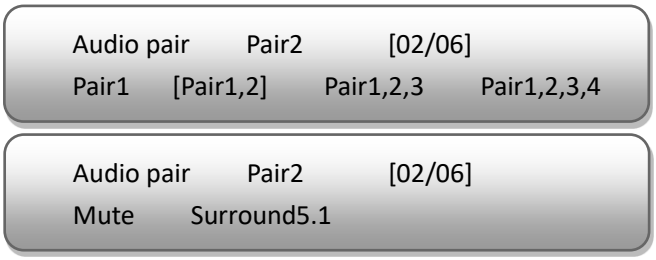
Sample Rate

The audio sample rate is 48 KHz without other options.



Audio Pair

MPE-4000 supports 4 stereo (8 mono) or one DD 5.1 (AC3) audios embedded to mix with the video stream output.

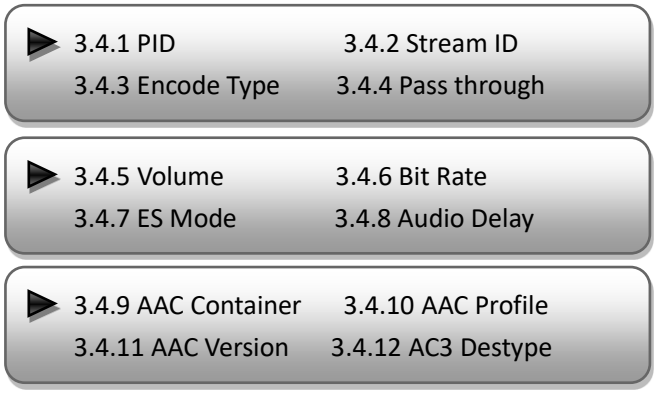


Drop: Audio data has been captured.

Pair-1: A single (channel 1) audio stream is captured.
Pair-2: 2 audio (channel 1&2) streams are captured.
Pair-3: 3 audio (channel 1 to 3) streams are captured.
Pair-4: 4 audio (channel 1 to 4) streams are captured.
5.1CH: Surround (5.1) for Dobby/AC3 5.1 channel.

Pair1-4

As the MPE-4000 is with 4 audio encode channel, “3.4”-“3.7”. You can enter “3.4”/“3.5”/“3.5”/“3.7” to set the corresponding audio parameters. Submenus (taking “3.4” as an example) are as below:



- **PID**

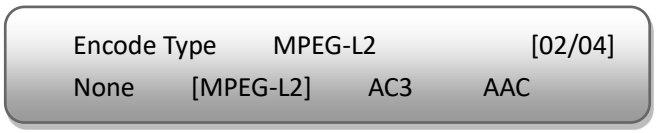
You can set the PID for first channel under this menu.

- **Stream ID**

You can set the audio stream ID under this menu.

- **Encode Type**

Select audio encode format among items listed in the interface.



REMARKS:

If “*None*” is chosen the audio format, the system will not choose any audio to process and there will be no audio in the output data stream.

- **Pass Through**

MPE-4000 supports AC3 audio to pass-through from SDI input.

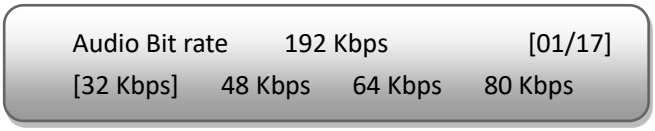
You can decide to switch “on” AC3 Pass through function or “off” under this menu.

- **Volume**

You can set the Audio Volume Level under this menu.

- **Audio Bit rate**

Select audio bit rate among 32Kbps – 384Kbps.



MPE-4000 support MPEG1-L2, AC3, AAC (LC/HE-AAC) audio encoding. Different audio encode types have different Audio Bit rates usually to consider.
64Kbps, 96-384Kbps for MPEG1-L2
32-384Kbps for AAC
128Kbps, 192Kbps, 156Kbps, 384Kbps for AC3

- **ES Mode**

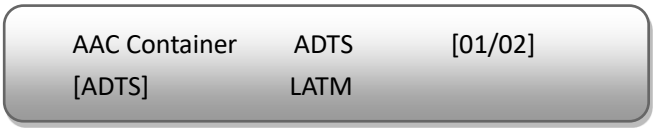
Select Stereo mode among stereo, Dual Mono, L-Mono, and R-Mono.

- **Audio Delay**

You can set the audio delay under this menu.

- **AAC Container**

You can choose the AAC container mode under this menu.



- **AAC Profile**

Select AAC profile among LC, HE and HEV2.

AAC Profile	LC	[01/03]
[LC]	HE	HEV2

- **AAC Version**

You can set the AAC encoder version in this menu.

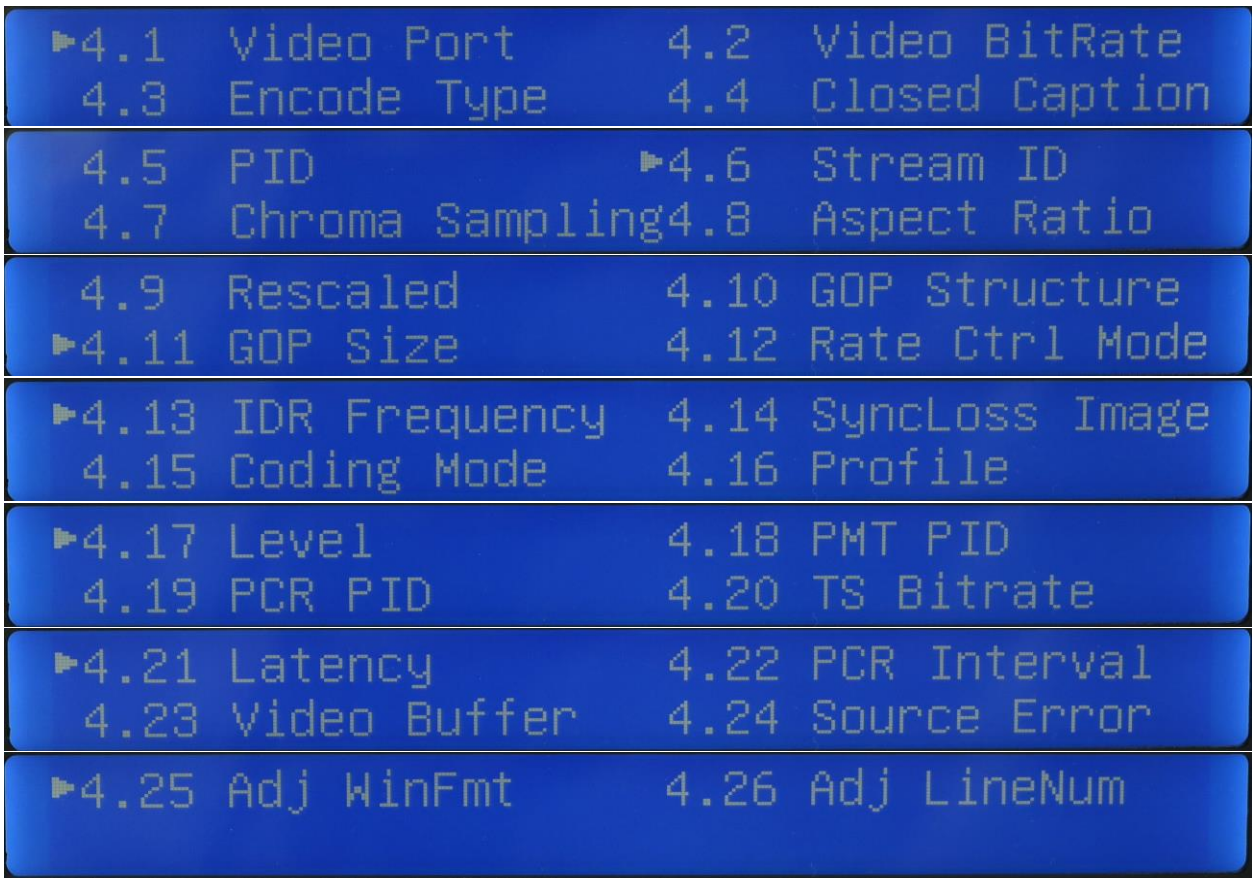
AAC Version	MPEG-2	[01/02]
[MPEG-2]	MPEG-4	

- **AC3 Destype**

You can set the AC3 Descriptor type in this menu.

AC3 Destype	DVB	[01/02]
[DVB]	ATSC	

VIDEO SETTING



- **Video Port**

Press ENTER to enter menu *Video Port*. It shows the current mode of the video input. Press ENTER again to enter the setting interface, move the square bracket with LEFT/RIGHT keys to select the target mode and press ENTER to confirm. At last, press MENU to step back to the upper menus.

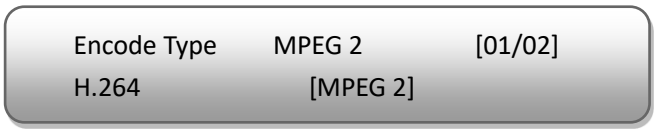
There are 4 types of interface for video input. Select one type and the system will detect the single and process. Make sure the single cables are properly connected.

- **Video Bit Rate**

MPE-4000 can encode video at range of 0.52 Mbps to 60.00 Mbps.

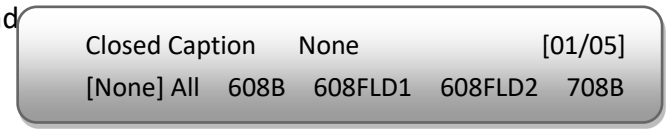
- **Encode Type**

MPE-4000 supports two Encode Types: **H.264** (MPEG4 AVC/H.264) and **MPEG2**. You can choose to one mode as the video compression type at this menu.



- **Closed Caption (CC)** *American Teletext*

(Note: MPE-4000 supports CC from CVBS and SDI input only)
None: not to insert the CC into the output stream
All: The device will automatically identify the Closed Caption Standard among 608B 608FLD1 608FLD2 and



- **PID**

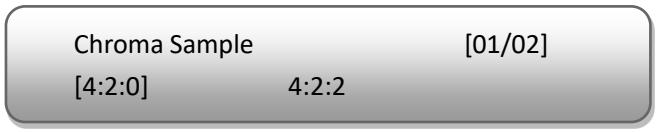
Enter this menu to edit Video PID.

- **Stream ID**

Enter this menu to set Video Stream ID.

- **Chroma Sample**

Select one Chroma Sample mode from the 2 options listed. They are applicable for both MPEG2and H.264 encoding mode.

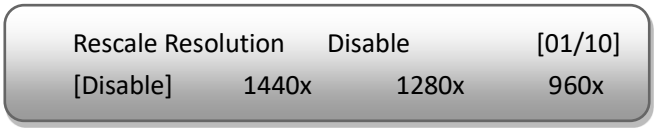


- **Aspect Ratio**

Select aspect ratio mode from option listed. SD Video can choose from 4x3 and 14:9. HD Video only can choose 16:9.

- **Rescaled**

Enter this menu to set the output Resolution.
MPE-4000 support 1080I, 720P, 480I, 576I video input resolution and downscale transform.
Disable: To out the same resolution as source resolution.



- **GOP Structure**

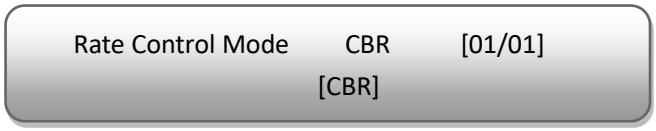
Select GOP structure mode from the options listed.

- **GOP Size**

You can set the GOP Size by this menu item.

- **Rate Control Mode**

MPE-4000 supports CBR (Constant Bit Rate) encoding control mode.



- **IDR Frequency**

Specify the IDR frequency relative to I-Frames.

- **Sync Loss Image**

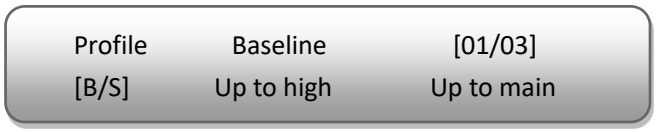
You can choose the image type to encode during loss of video source sync.

- **Coding Mode**

Choose the coding mode from the options listed.

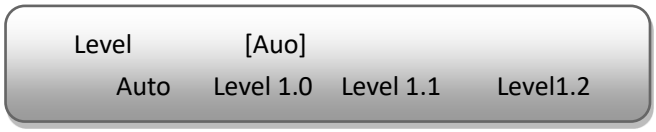
- **Profile**

Select the encoding Profile from the options listed.



- **Level**

You can choose the level which is used for encoding.



- **PCR/PMT PID**

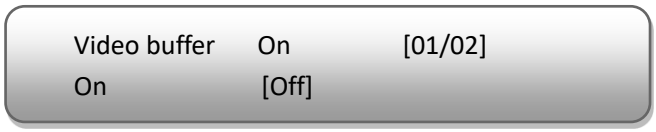
Enter each single menu to edit the PIDs.
REMARKS: These values are based on decimal system (not HEX).

- **TS Bitrate**

You can check and modify the TS bitrate which is used for encoding.

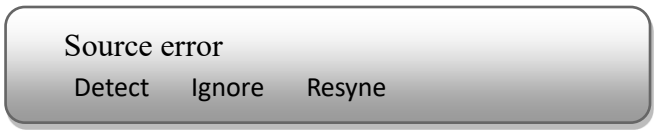
- **Video Buffer**

You can select to turn on/off the video buffer.



- **Source error**

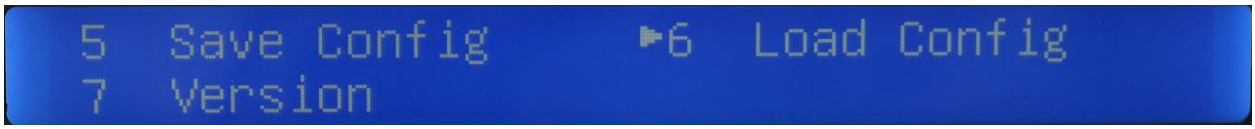
You can check the source error which is used for encoding.



- **Adj Winformat and Linenumber**

You can check the Window format which is used for encoding.

Because of new SW-Versions enabling additional functions the menu structure can vary.

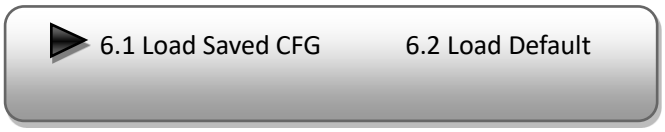


SAVE CONFIGURATION

You can enter *Saving Configuration* for saving settings. Choose yes and press ENTER to confirm.

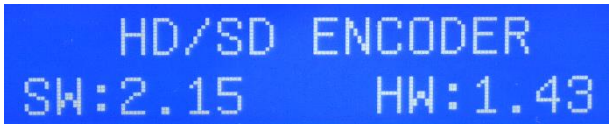
LOAD CONFIGURATION

With this menu, you can select a loading source and press ENTER to confirm. You can restore the device into the last saved configuration by choosing “6.1” and restore the device into factory configuration by choosing “6.2” the display will show this menu as below:



VERSION

You can check the software version and hardware version of this equipment under this submenu.



WEB Interface based NMS Operation

You can not only use front panel to set configuration, but also control and set the configuration with a PC (Personal Computer) or Laptop by connecting the device to the RJ45 WEB-IF NMS Port
(Network Management Setup). You should ensure that the computer's IP address is different from the MPE-4000's IP address (default = 192.168.0.136) otherwise, it would cause IP conflict.

Login

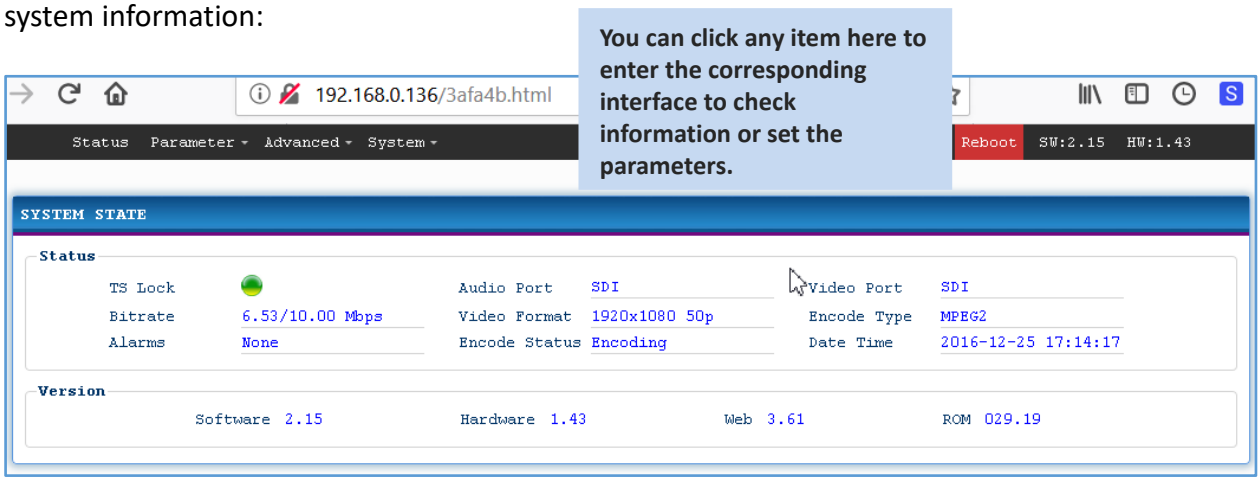
The default IP address of this device is 192.168.0.136. You can modify the IP Address through the front panel – menu 4.1. or by WEB-IF.
Connect the PC and the device with a network cable, and use ping command to confirm they are on the same network segment.
Use your web browser (recommended Mozilla newest version) to connect the device with a PC by inputting the device's IP address in the browser's address bar and press Enter.
It will display the Login interface as Figure-1. Input the Username and Password (Both the default Username and Password are "admin".) and then click "LOGIN" to start the device setting.

Figure-1

Operation

- **System Information**

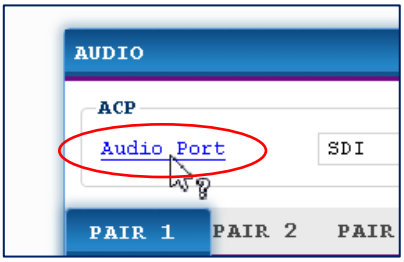
After login, it shows the SYSTEM INFORMATION as Figure-2 where you can view the current system information:

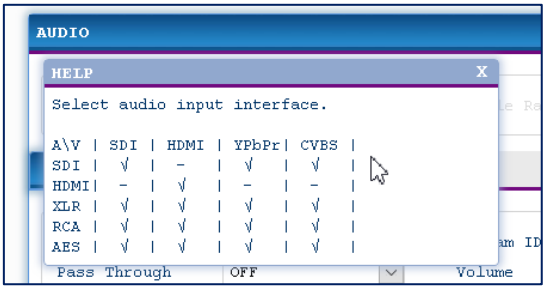


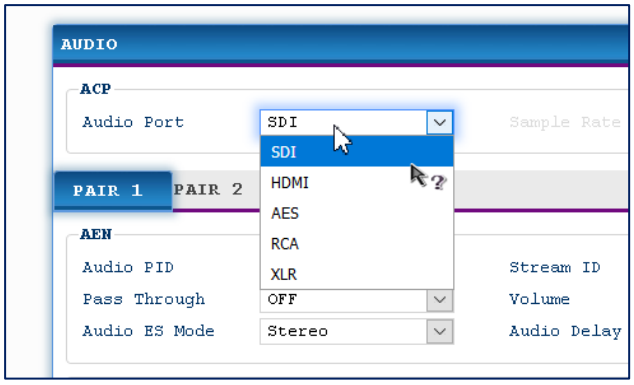
Date-Time system settings

"Help" Function

In "Encode Setting" Interface, whenever the mouse cursor is suspended on one item, a question mark appears by the cursor and the corresponding item comes to a hyperlink state. Click the hyperlink item to trigger a text window to give instructions on properly setting the corresponding item.

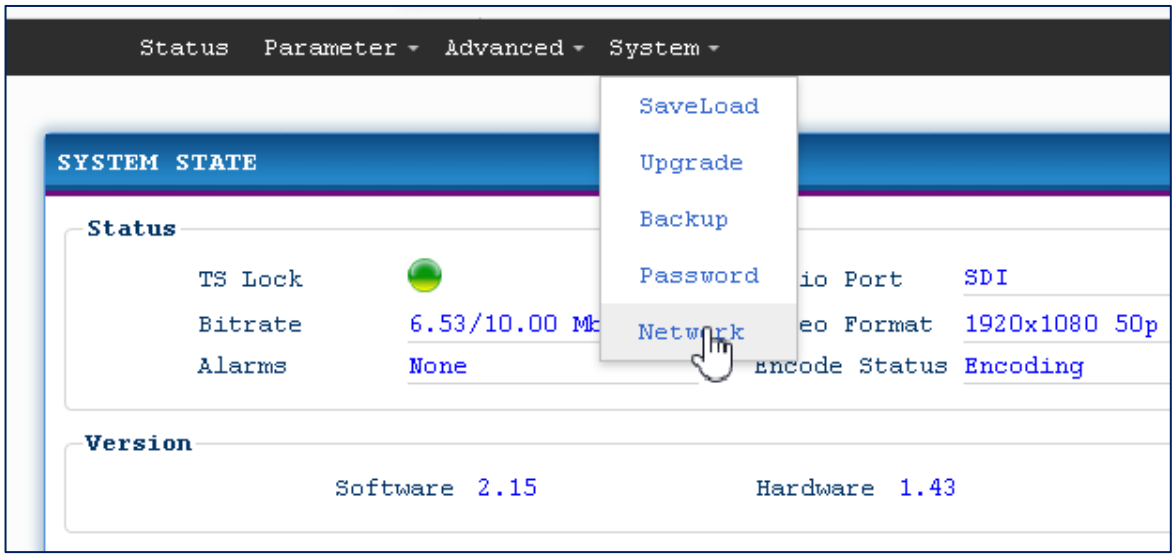


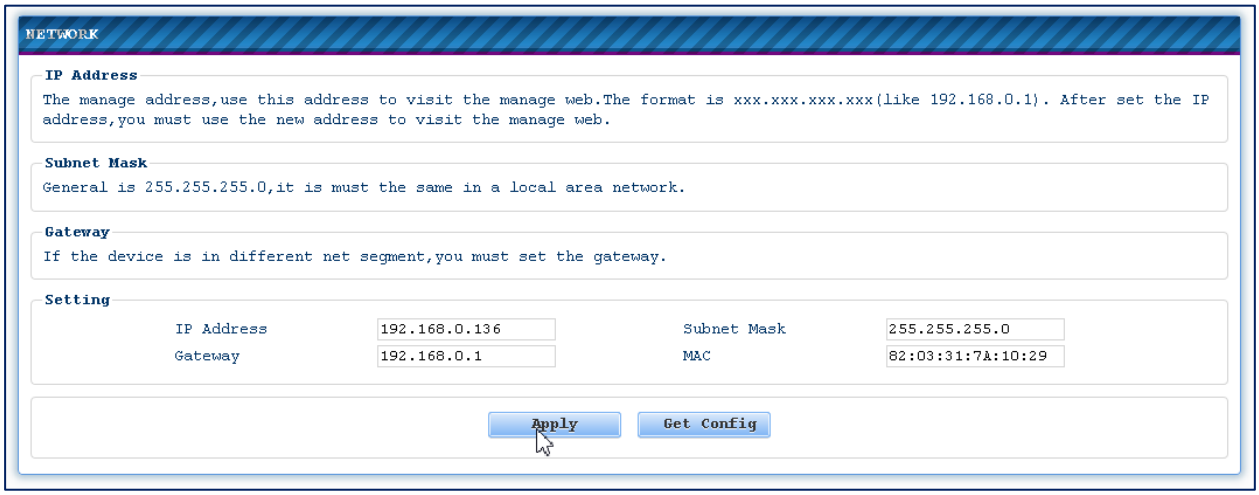


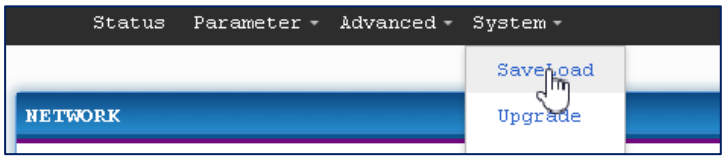


System settings

First of all we should take care about some basic settings like network IP addresses and Time/Date settings:

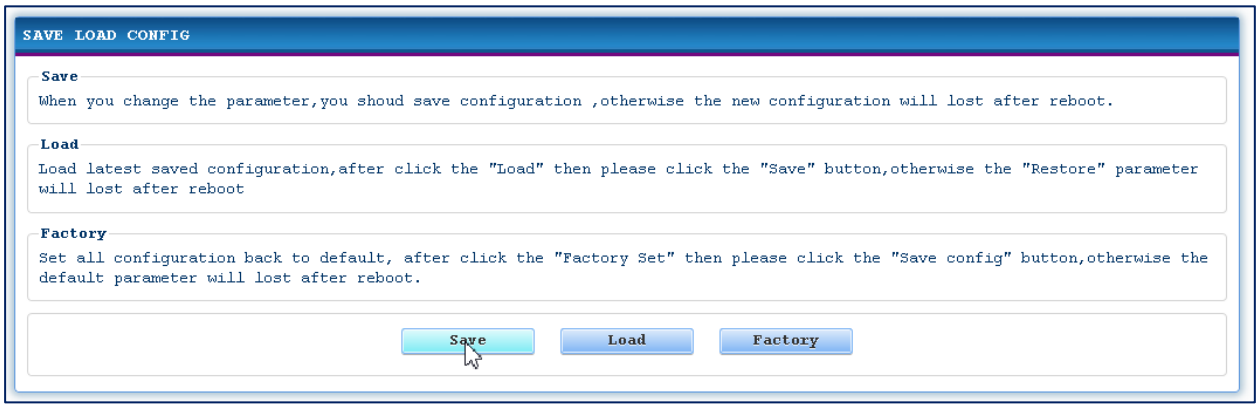


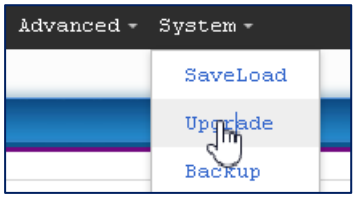




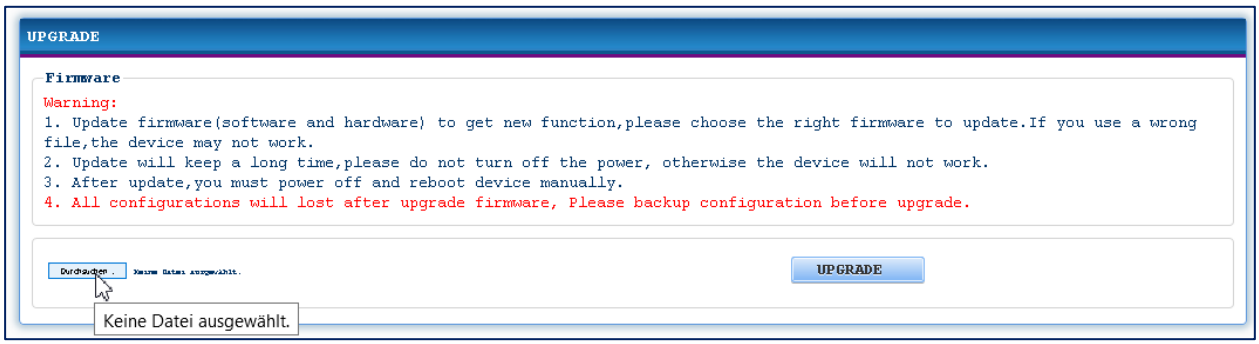
SAVE and Load Menu

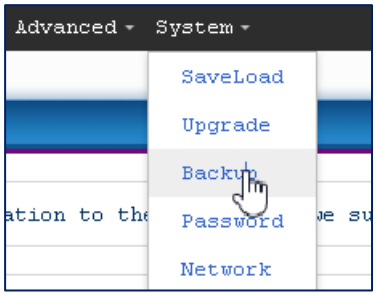
The description is self-explaining…



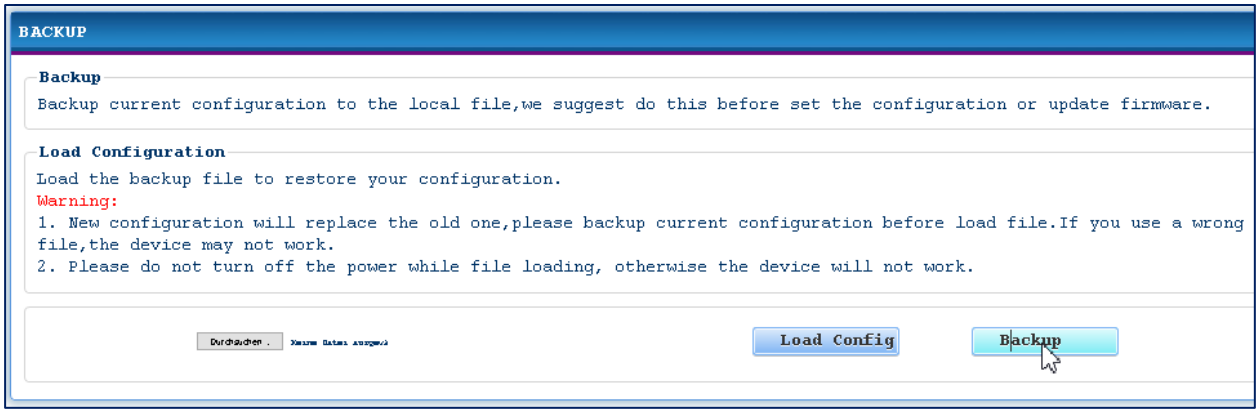


If new Firmware is released, you can upload it here.

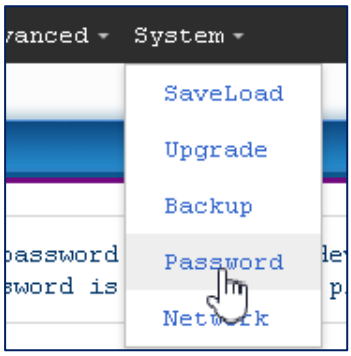




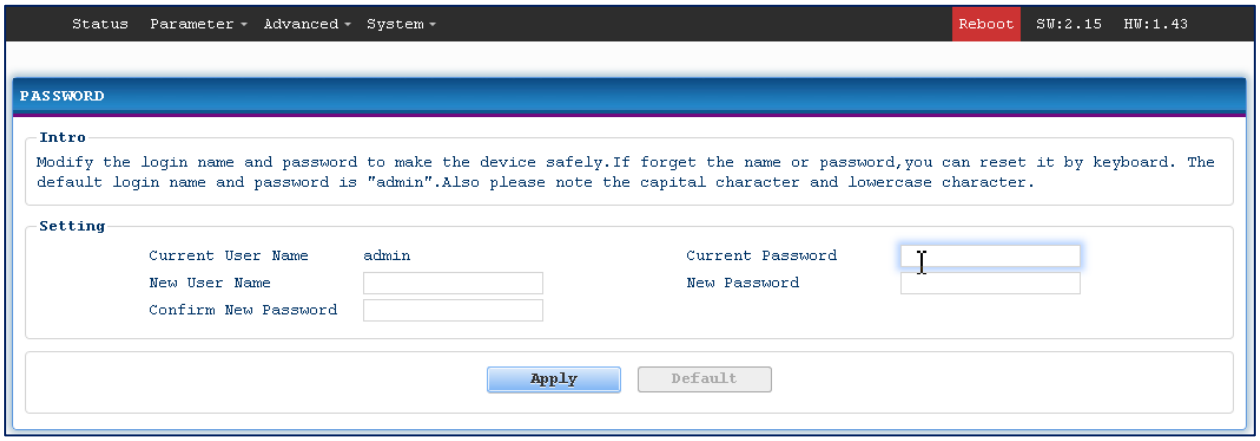
So better to BACKUP before Upgrade! :



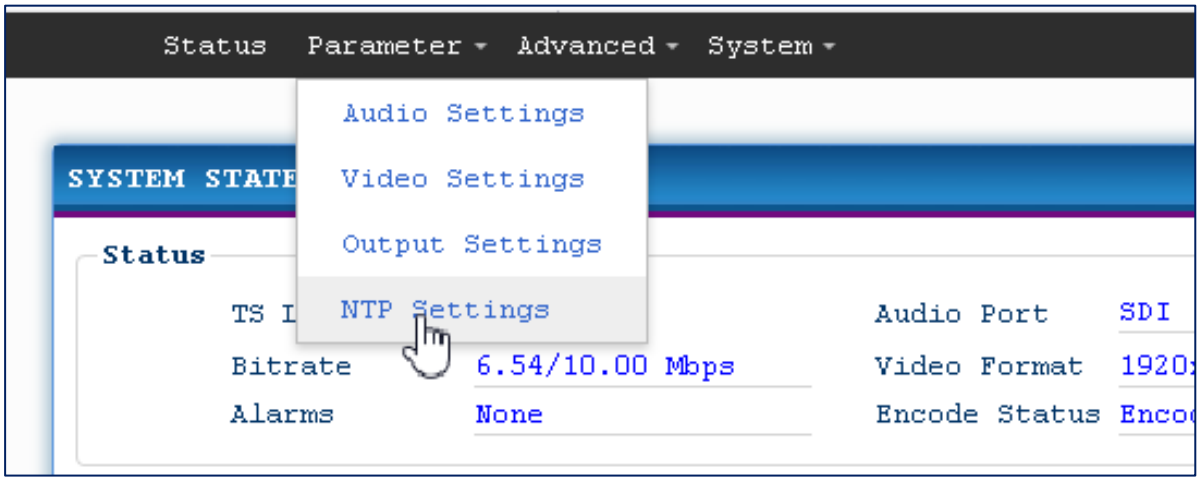
A popup will appear to safe the file 'config.bin'. This would be the upload file after a factory reset.



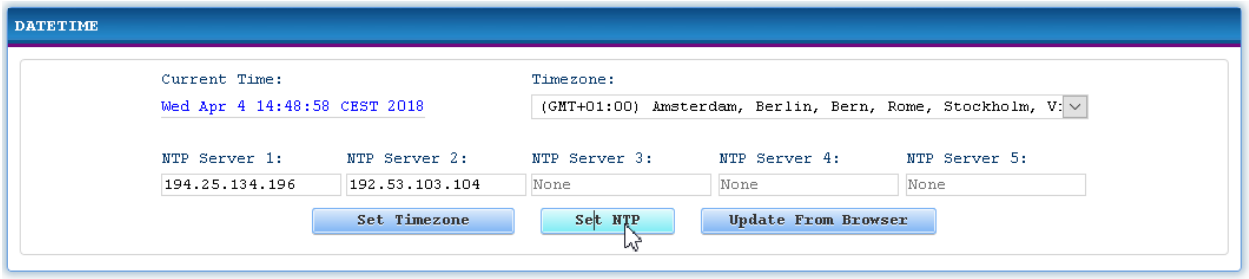
Change password here. If you'll lose it, you must reset the machine by Front-Panel Keypad:



Another important value to consider: Time and Date Information setup:



You should connect the unit to a local NTP server (5 max.) for syncing of actual correct time and date and offset:

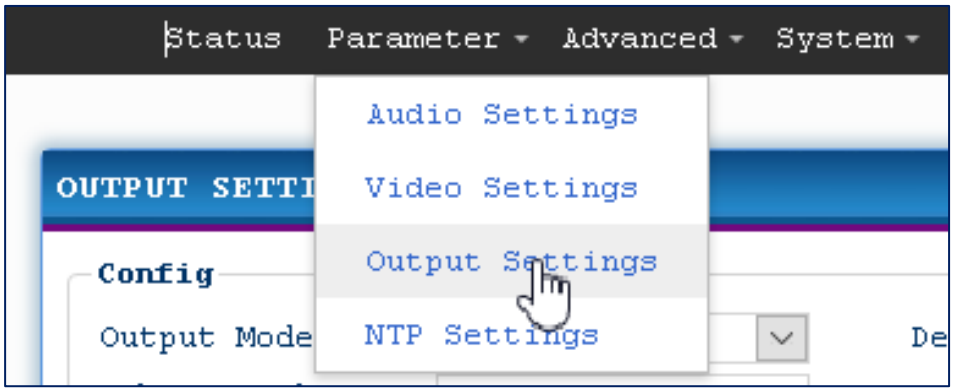


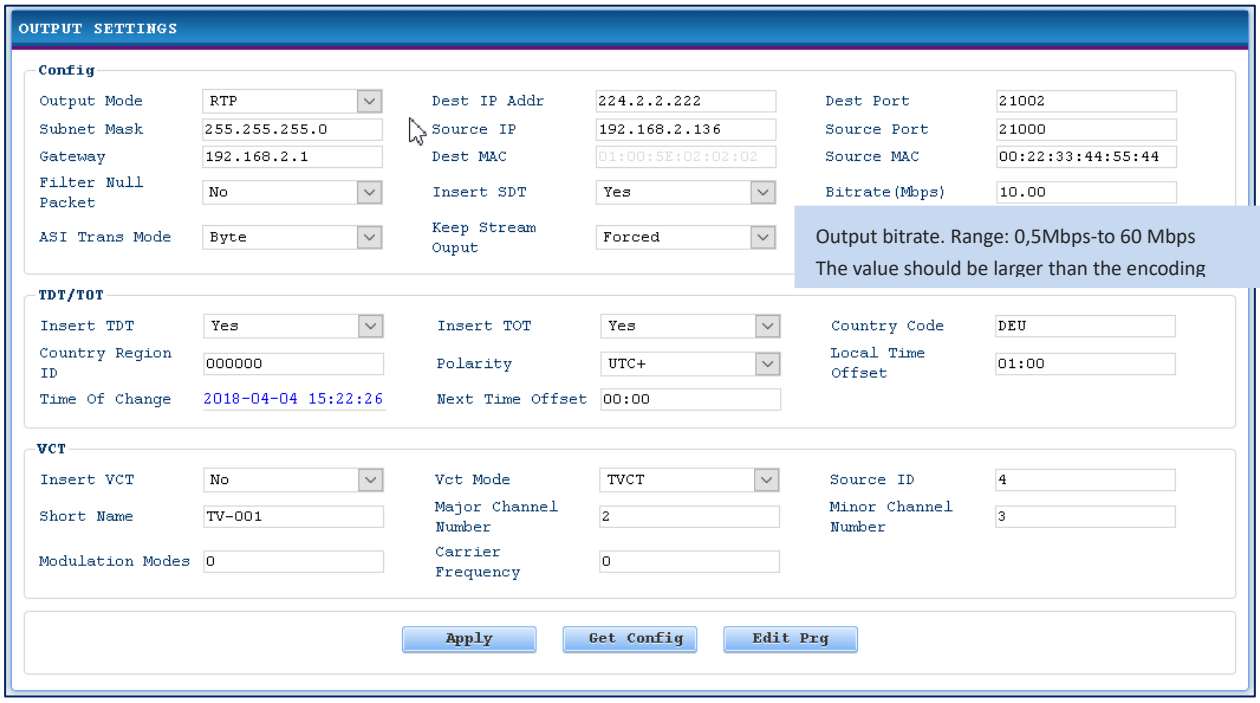
To be able to insert TDT/TOT Information in the output TS this time & date & GMT offset information are necessary.

Because we want to output the encoded TS as ASI and IP-Stream, we need to setup the

OUTPUT SETTINGS:

Click *"Output Setting"* on the top column and it displays interface as Figure-7. You can set the output parameters by inputting a value or selecting a mode in the pull-down list.





Config-Section:

In this part, all settings for the output stream from the DATA –RJ45 network interface can be adjusted. Of course a streamer need an IP Address (Source), GW and NM settings. RTP or UDP can be chosen. The MAC should be unique but can be adjusted somehow. If the IP Stream output should be a VBR, the Zero-packets (PID 8191dec) can be skipped. This doesn't work on ASI output because ASI is always a CBR incl. Zero packets filling up to the Bitrate you can setup to your needs. The ASI port can be used as Burst or Byte mode. An Insertion of the SDT is for TS related multiplexers and even for IPTV streams nearly mandatory.

TDT/TOT must be generated if the ASI / IP Stream output demands this for the further multiplexer devices. Reason: While an SDI or HDMI or even CVBS analogue Video signal must not carry time and date information, it is almost a must-have to insert this information in a Transportstream (TS).

See also: https://www.dvb.org/resources/public/standards/a38_dvb-si_specification.pdf

While VCT is a part of the ATSC norm, as well as CC Closed caption information (Subtitles as Overlays similar to DVB-Teletext) you can insert a VCT-PID containing relevant information or skip this part.

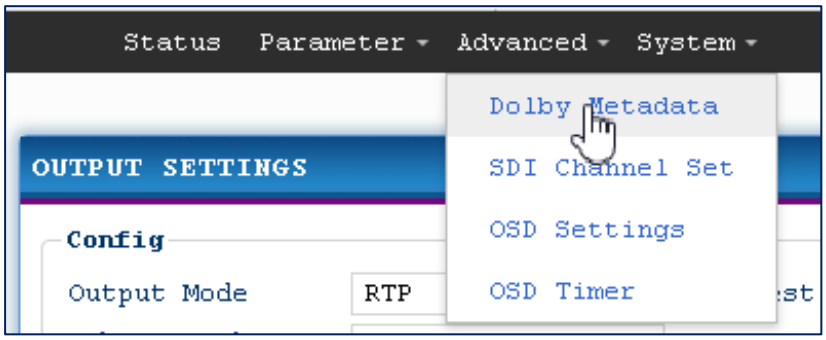
Some explanations from Internet:

http://www.tvwithoutborders.com/tutorials/dtv_intro/atsc_psip/vct/

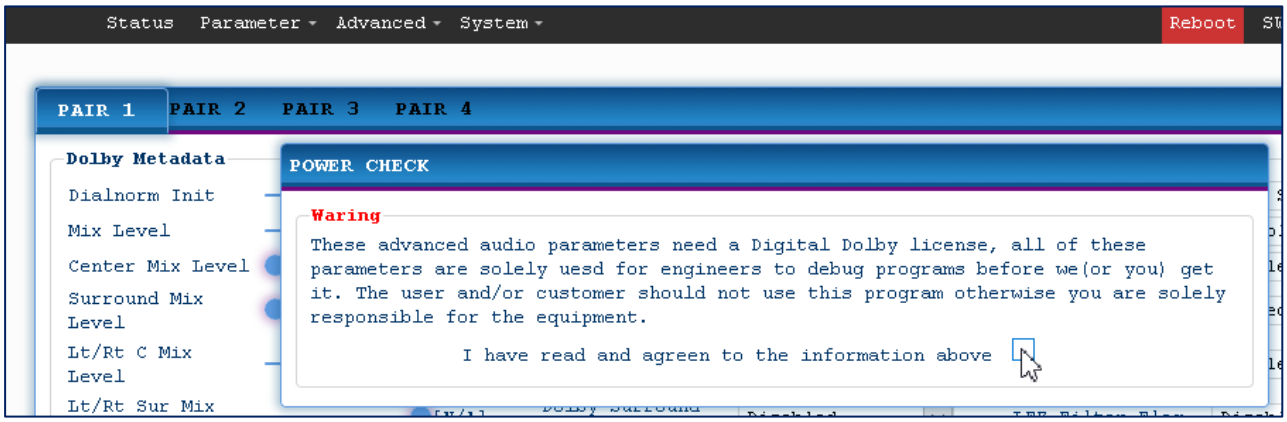
The first thing that service information has to describe is the organization of the transport stream. This is defined as part of the MPEG standard, and so these tables are common across all types of digital TV system, be it DVB or ATSC. The most important table is the Program Association Table (PAT). This is the entry point into the service information, and so it must be broadcast on a well-known PID within the transport stream – PID 0. Programs in MPEG are the same as services in a digital TV context. The Program Association Table lists how many services there are in the transport stream, and provides pointers to more detailed descriptions of those services. Each service has an associated Program Map Table(PMT) that describes the elementary stream s that make up the service. For every elementary stream in the service, the PMT for that service contains information about the type of that stream (audio, video or data, and what type of audio, video or data) and the PID of that elementary stream. Since there are several instances of the PMT in a transport stream, these are broadcast on different PIDs. The PID for each PMT is carried in the PAT entry for that service. Now that the receiver knows how the network is organized at the stream level, some extra logical information is needed to make this more

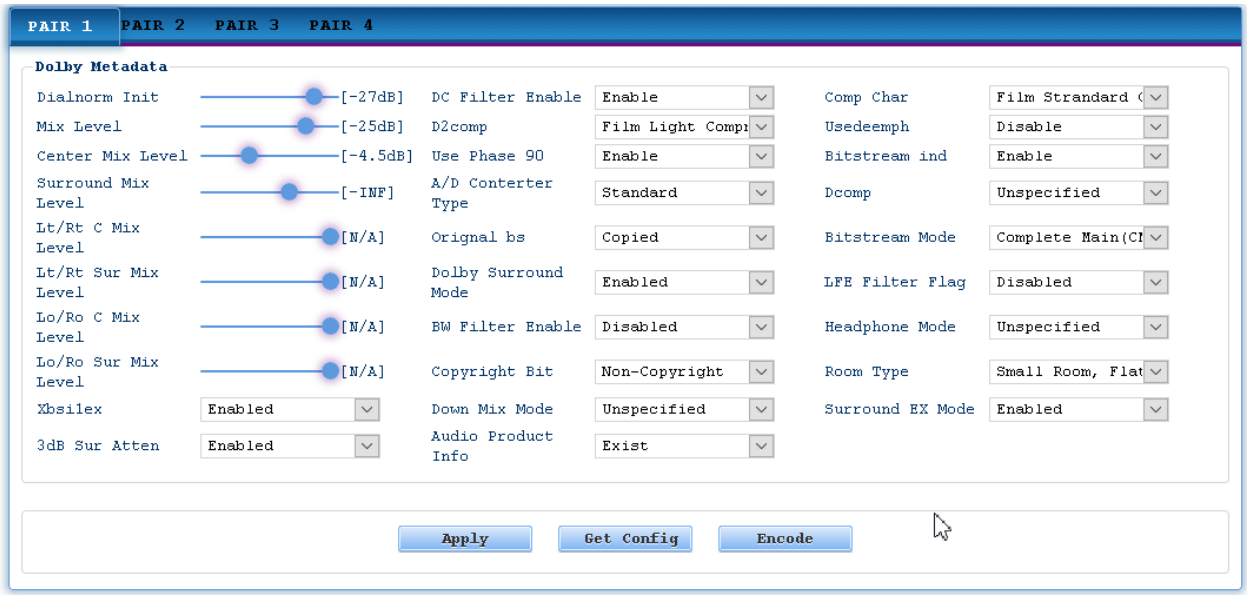
useful to the receiver. The PMT provides a list of how each service is organized in the transport stream, but it doesn't actually give much information about how services are organized from the perspective of the viewer. The viewer cares specifically about TV channels, and shouldn't even know about transport streams and elementary streams or any other part of the broadcasting system. To do this, ATSC uses another table called the Virtual Channel Table, or VCT. Cable, satellite and terrestrial networks all have slightly different versions of this table. …

ADVANCED: Dolby Meta-Data:

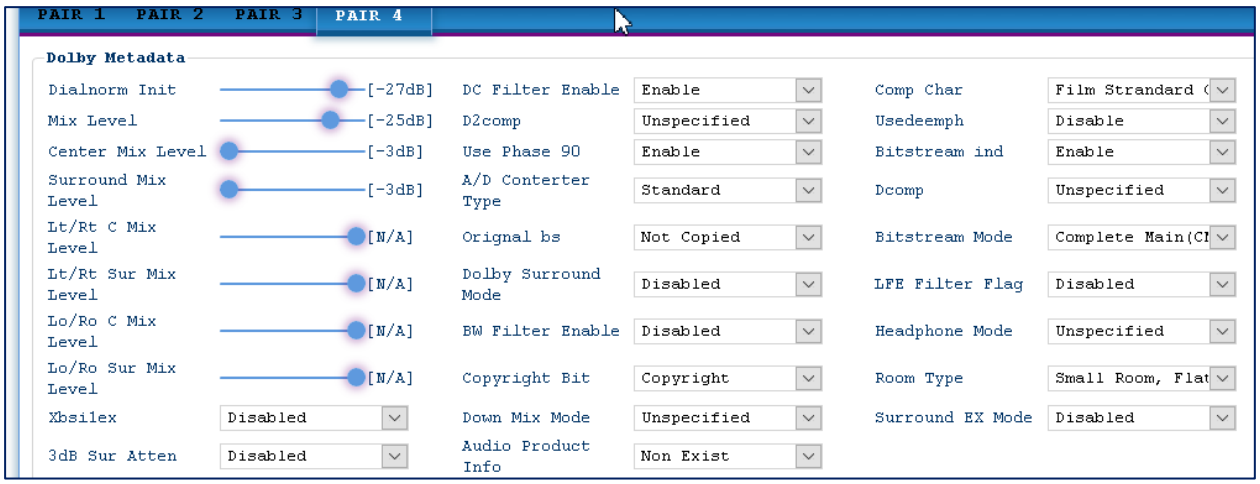


Because Dolby Labs are a margin optimizing oriented company, you should be sure to own the license for that. So we are asking for the confirmation of this notable issue.



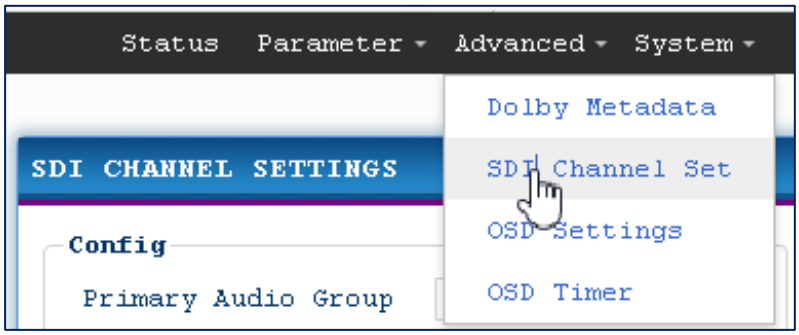


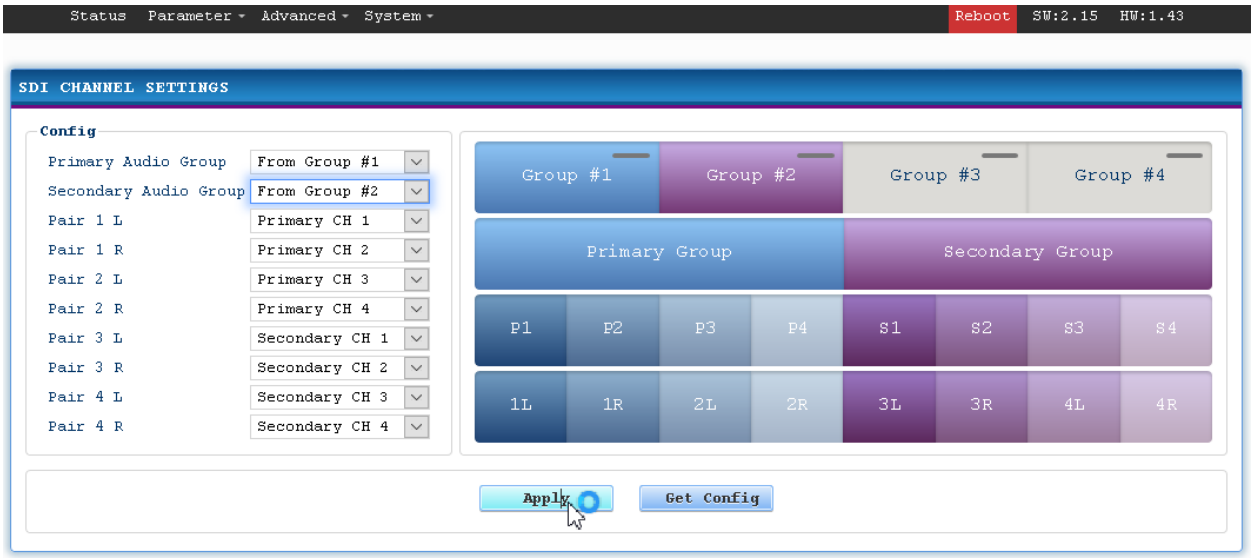
After confirmation of the License nag-screen, all of these parameters can be set according to your needs and independently for all 4 Audio-channel pairs.



SDI-Channel SET:

In this menu – if the SDI-Input carries multiple AUDIO pairs already, you can select these and re-organize them.

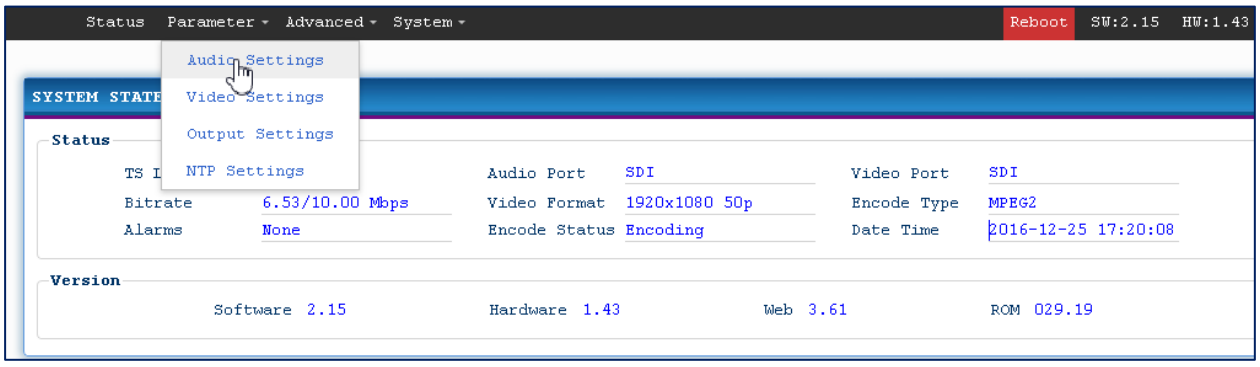


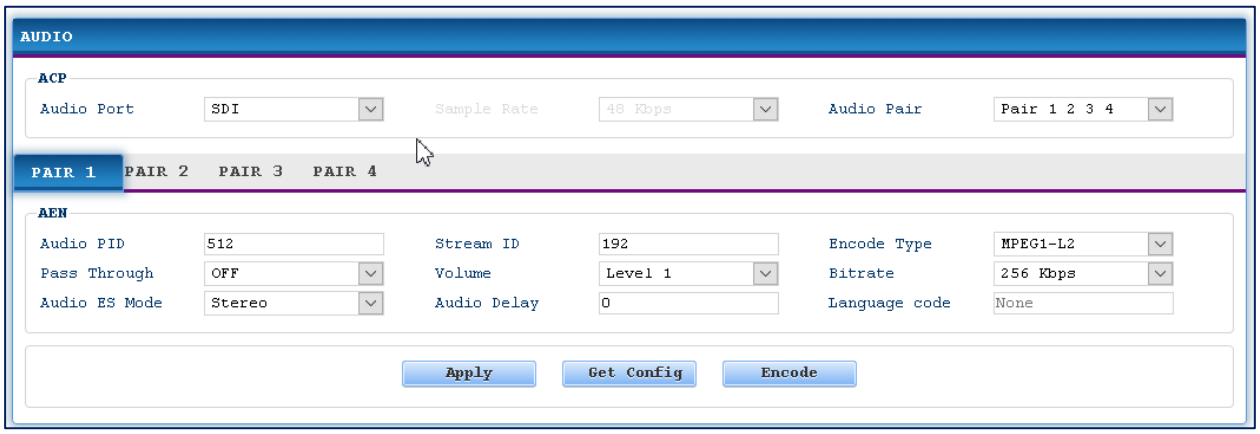


Groups and primary / secondary channels can be changed for the encoding output.

Parameter -> Audio Setting

Select "*Audio Setting*" on the top column and it shows the AUDIO interface. You can configure the Audio parameters:





Capture Mode:

MPE-4000 supports 4 stereo (8 mono) or one DD 5.1 (AC3) audios embedded to mix with the video to form a stream output.

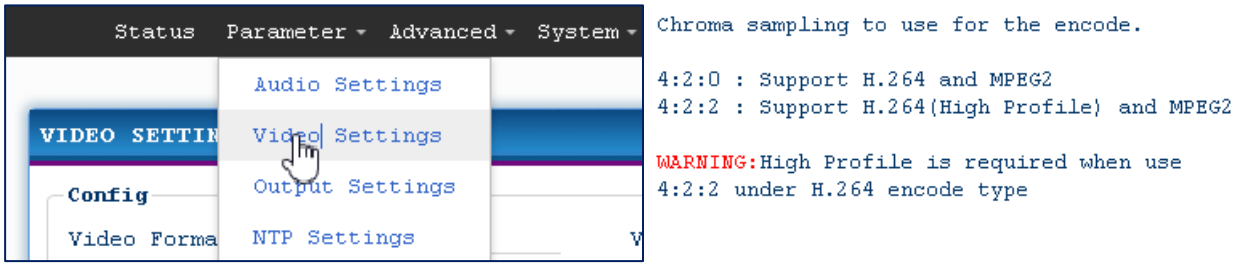
Drop: Audio data is captured.

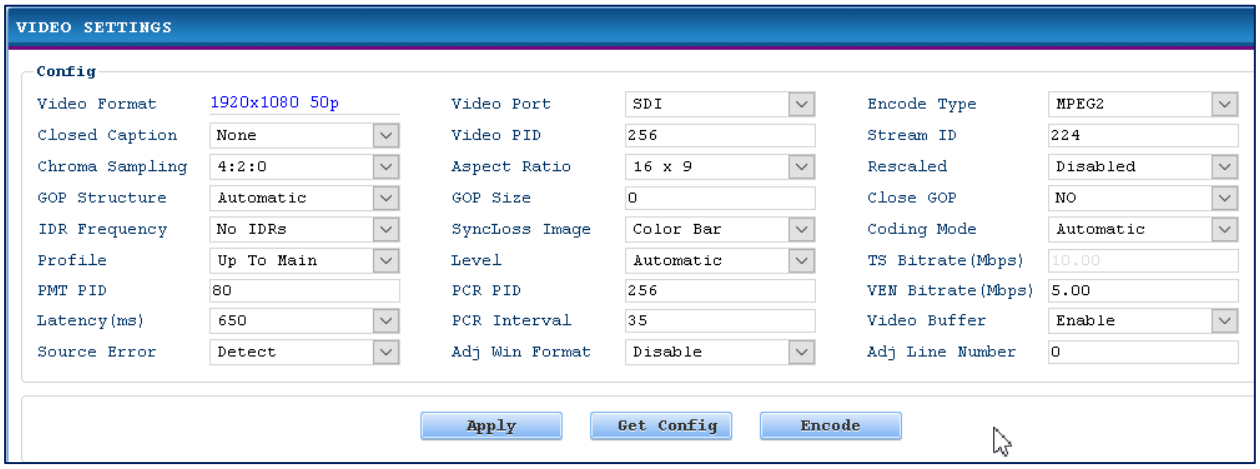
Frame-1: A single (channel 1) audio stream is captured.

Frame-2: 2 audio (channel 1&2) streams are captured.
Frame-3: 3 audio (channel 1 to 3) streams are captured.
Frame-4: 4 audio (channel 1 to 4) streams are captured.
5.1CH: Surround (5.1) for Dobby/AC3 5.1 channel.

Parameter -> Video Setting

Select "*Video Setting*" on the top column and it shows its interface. Configuring the Video parameters:





Video Format: 1920x1080 50p is related to the detected INPUT Resolution! No adjustment possible.
GOP Structure: Specifies the GOP structure of the encoded video.
-For H.264 650ms latency the max number of B frames is 2 for 29.97/25Hz, and 3 for 60/50Hz.
-For MPEG-2 650ms latency the max number of B frames is 1 for 29.97/25/24Hz, and 2 for 60/50Hz.
WARNING: There are no B frames for 150ms latency.
IDR-Frequency: Specifies the IDR frequency relative to I-Frames.
Profile: The maximum profile to be used for encoding. Coding tools for profiles higher than specified will be disabled. The encoder will signal the lowest profile in the bitstream that allows for the currently enabled coding tools.
PMT PID: Set TS PMT PID Number for the DVB / ATSC related Program map table -> See DVB/ATSC specs. Avoid reserved PID's like 11dec = NIT, 18dec = EIT, …. WARNING: Please do not set this value identical as other PID's!
PID Range: 19 … 8190 (8191 = zero packets)
Latency: 150ms, 200ms, 350ms, 650ms optional.
Source Error: Detect or ignore the source error. NOTE: Only SDI source input is supported yet.
WARNING: For safety sake, in general, please use the Detect options.

Video Port:

Select video input interface. Input availability Matrix:

FMT\V	SDI	HDMI	YPbPr	CVBS
480I	√	-	-	√
576I	√	-	-	√
720P	√	√	√	-
1080I	√	√	√	-

VIDEO PID: WARNING: Please do not set this value identical like other PIDs!

PID Range: 19…8190

Aspect Ratio: Select the aspect ratio for video encoding.

SD: 4x3 16x9 14x9 HD : 16x9 Note: Only h.264 encoding supports 14x9

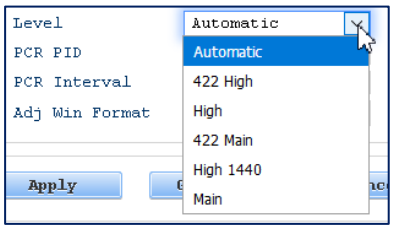
GOP Size: The size of each GOP in frames. The value of 0 for GOP size indicates AUTO, which is the following: -150ms/250ms/350ms MPEG-2 and h.264:

The default GOP size is infinite. This means that there will be I-fields only at scene changes and all other fields will be P-fields using Continuous Decoder Refresh (CDR) method.

-650ms MPEG-2: The default GOP size is 132 frames

-650ms H.264: The default GOP size is 300 frames

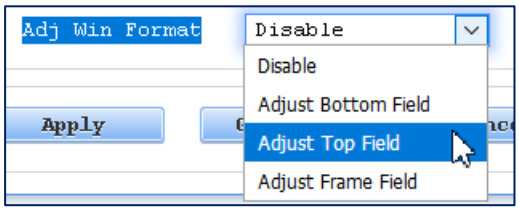
SyncLoss-Image: The image type to encode during loss of video source syncronisation. Color bar or Black screen

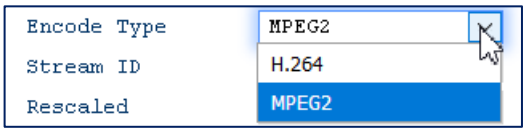


PCR-PID: The value for the TS output PCR-PID. Here please beware of the PID regions like above.

PCR-Interval: Set PCR interval in milliseconds. WARNING: Range: 1…40, default 35

Adj Win Format: Active adjust the window format:





Stream ID: Set video stream ID. ID Range:-1…225 , default:224

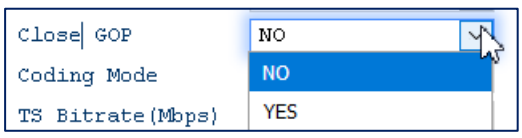
WARNING: Generally, please use default value.

Rescaled: Horizontal rescale the input video to this resolution.

For 1920 pixel wide inputs, valid values are: 1440 (3/4), 960

For 1280 pixel wide inputs, valid values are: 960 (3/4), 640

For 720 pixel wide inputs, valid values are: 704 (drop), 640 (square pixels), 544 (3/4), 528 (3/4 of 704), 480, 352



Close GOP structure yes/no.

Coding Mode: The coding mode to use.

WARNING: For MPEG2 encoding only AUTO is supported (field coding for interlaced/frame coding for progressive).

For H.264 150ms latency only AUTO is supported (field coding for interlaced/frame coding for progressive).

For H.264 650ms latency, FIELD mode is supported for interlaced content if B pictures are disabled. Otherwise AUTO will select MBAFF for interlaced or FRAME for progressive.

TS Bitrate: Output bit rate of the transport mux

WARNING: This parameter is read only, and is related to the Bitrate (Mbps) parameter which has been configured in the output page.

VEN Bitrate (Mbps): Video bit rate in bits per seconds (BPS). MPEG2: Range 0,52Mbps … 60Mbps

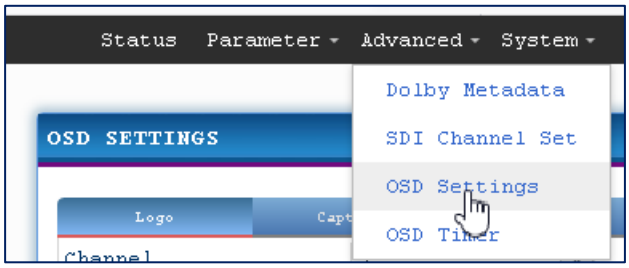
h.264: Range 0,256Mbps … 60Mbps

WARNING: Encoding Bitrate (video and audio) can't be larger than the TS Bitrate!

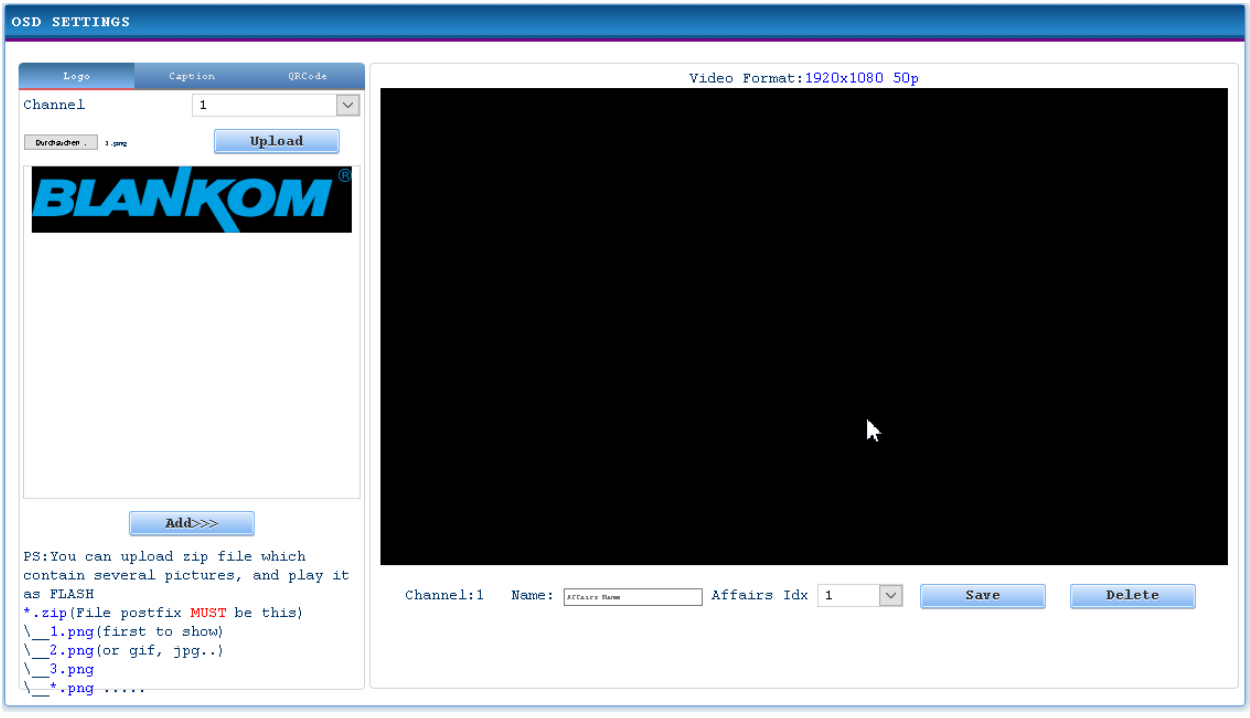
Video Buffer: When source input signal is unstable, enabling this parameter can protect the encoder to avoid crashing. NOTE: Only the SDI source input is supported. WARNING: If enabled video buffer, the time of system latency will increase about 200ms, and audio will out of synch about 1…10 frames with the video!

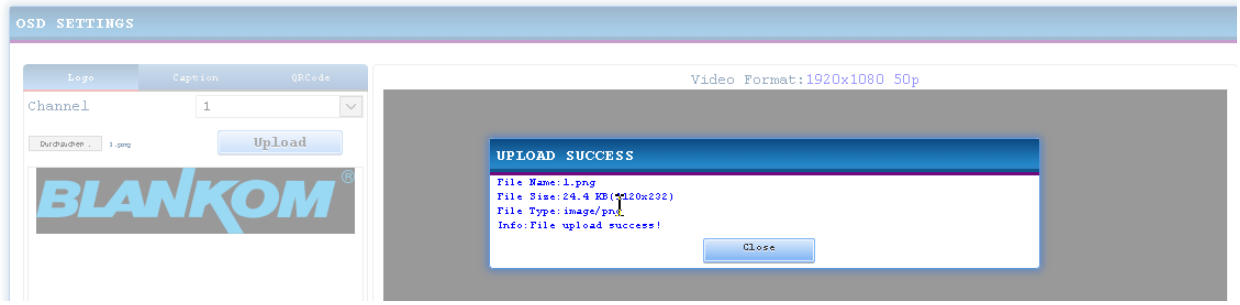
Adj Line number: Active window start line offset

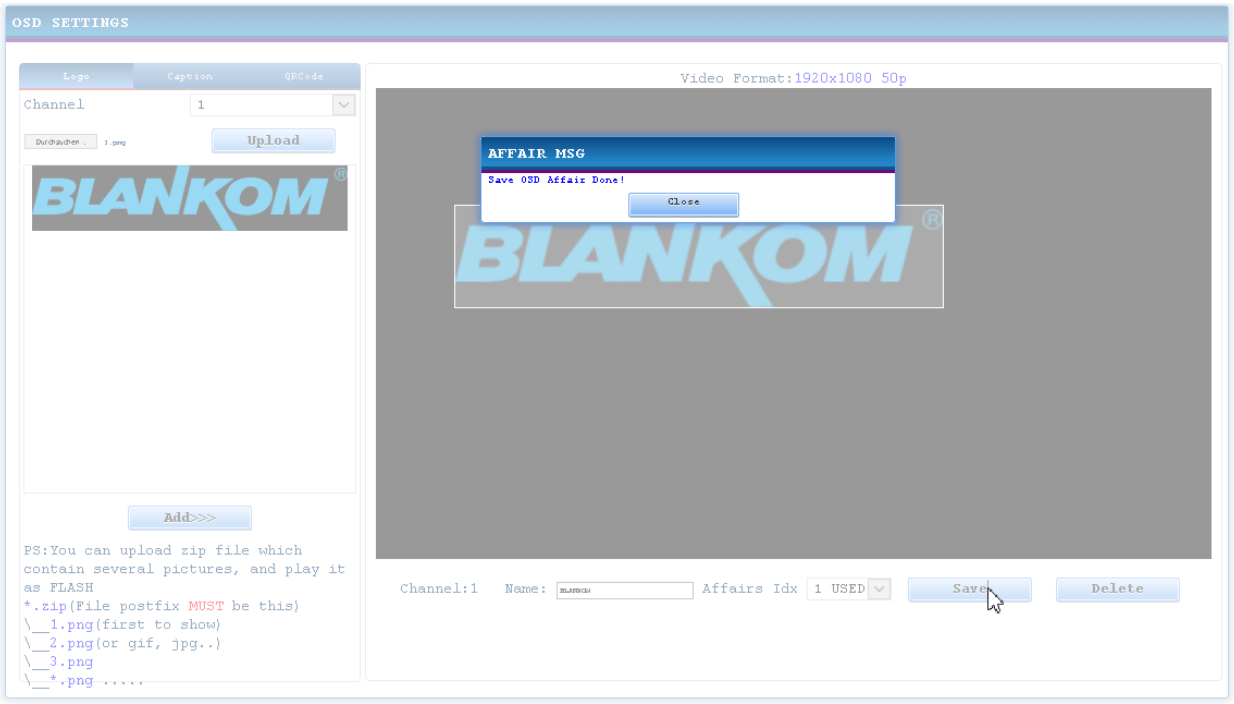
OSD settings:

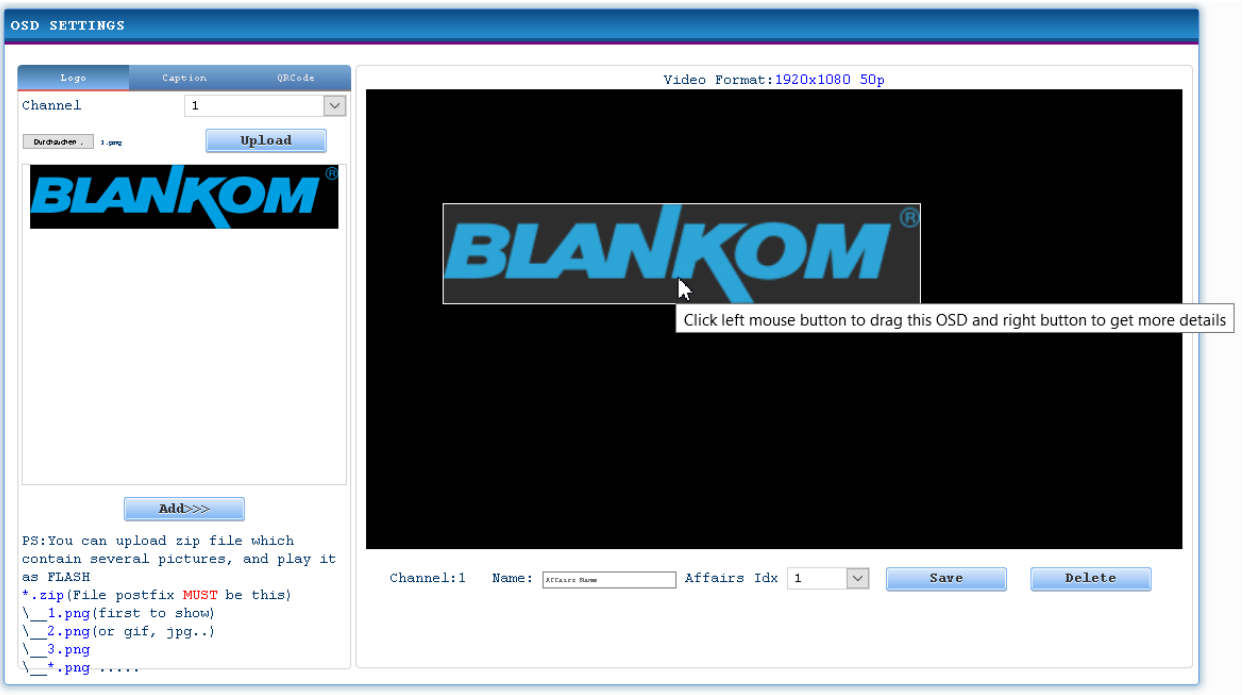


In this Menu you can add multiple logos, text and QR codes ------ Menu is nearly self-explaining:

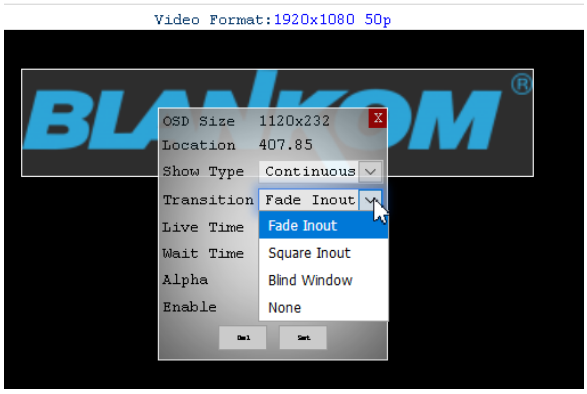




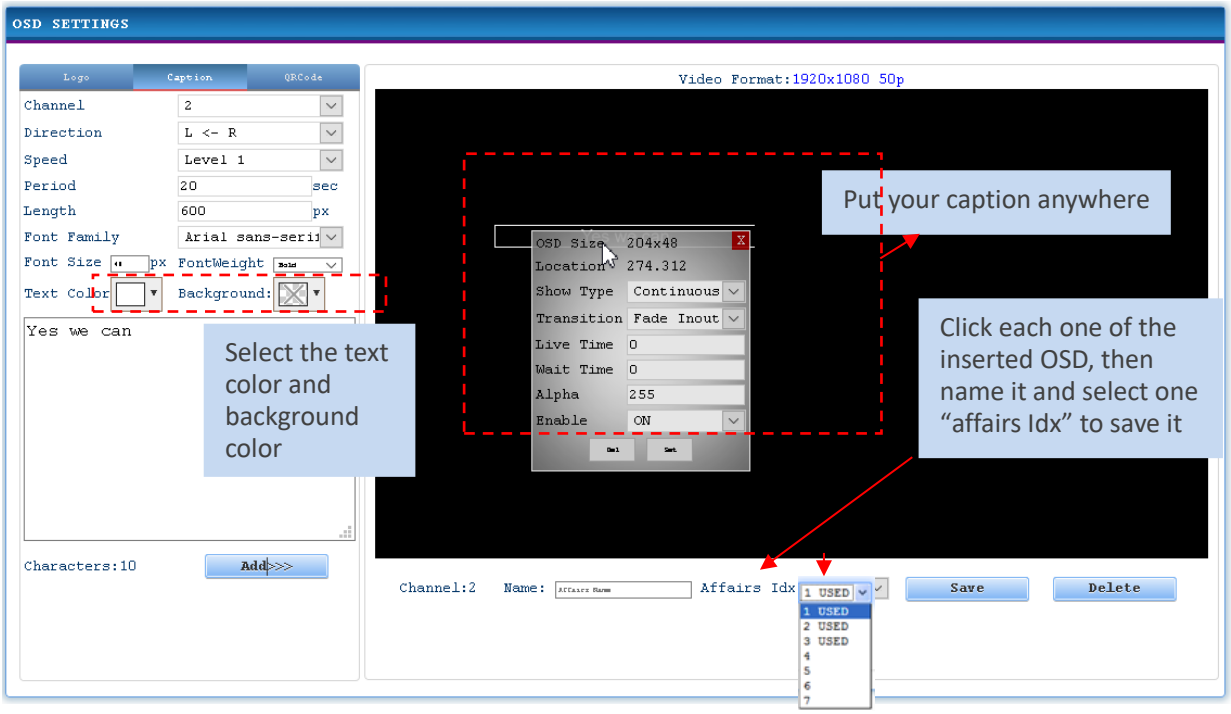




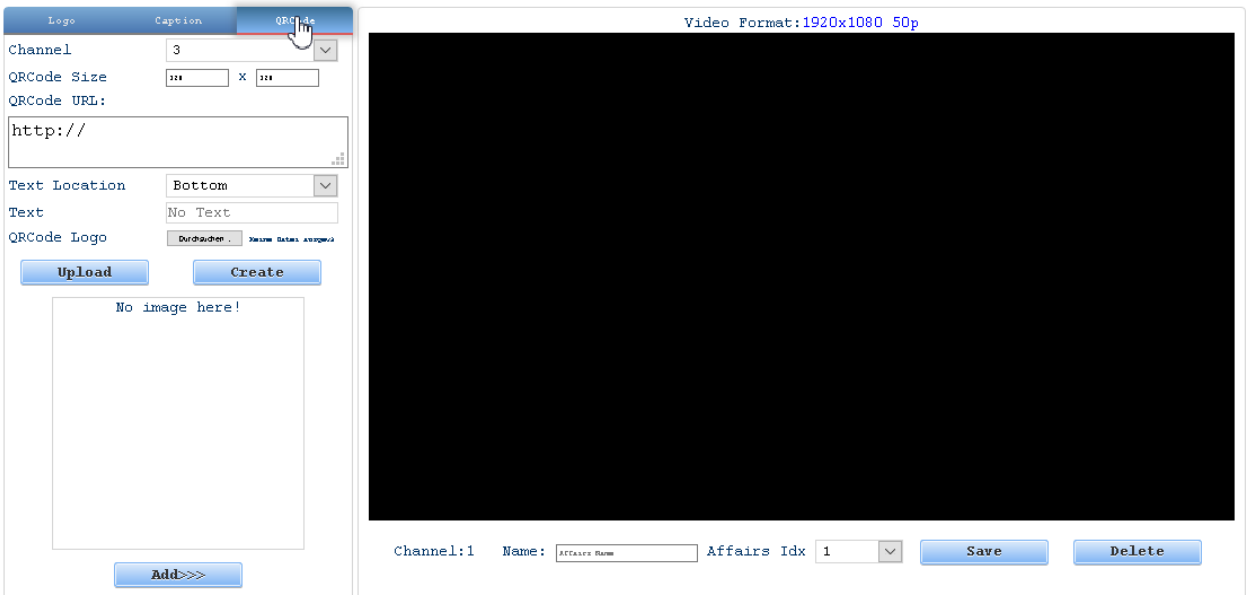
Right click: Settings of the logo can be modified.



Caption–Caption insert configuration

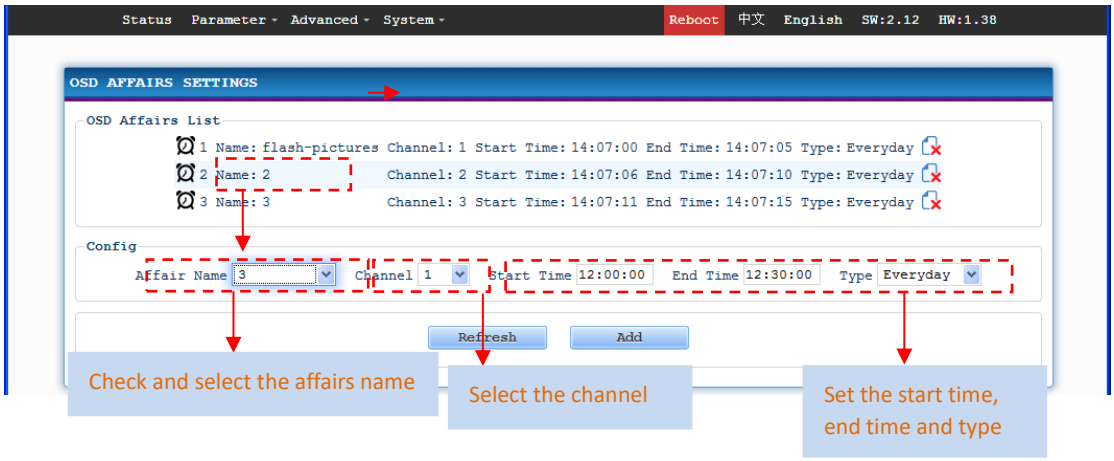


QRcode–QR code insert configuration



Advanced -> OSD affairs settings

Click "*OSD affairs settings*" on the top column will show the setup where you can configure the OSD affairs as per configuration.



Troubleshooting

The manufacturers ISO9001 quality assurance system has been approved by CQC organization. For guarantee the products' quality, reliability and stability. All products have been passed the testing and inspection before shipping out from factory. The testing and inspection scheme already covers all the Optical, Electronic and Mechanical criteria which have been published by the Manufacturer. To prevent potential hazard, please strictly follow the operational conditions.

Prevention Measure

- Installing the device at the place in which environment temperature between 0 to 45 °C
- Making sure good ventilation for the heat-sink on the rear panel and other heat-sink bores if necessary
- Checking whether the input AC voltage is within the power supply working range and the connection is correct before switching on device
- Checking all signal cables have been properly connected
- Frequently switching on/off of the device is prohibited; the interval between every switching on/off must be higher than 10 seconds.

Conditions need to unplug power cord

- Power cord or socket damaged.
- Any liquid flowed into device.
- Any stuff causes circuit short
- Device in damp environment
- Device was suffered from physical damage
- Longtime idle.
- After switching on and restoring to factory setting, device still cannot work properly.
- Maintenance needed

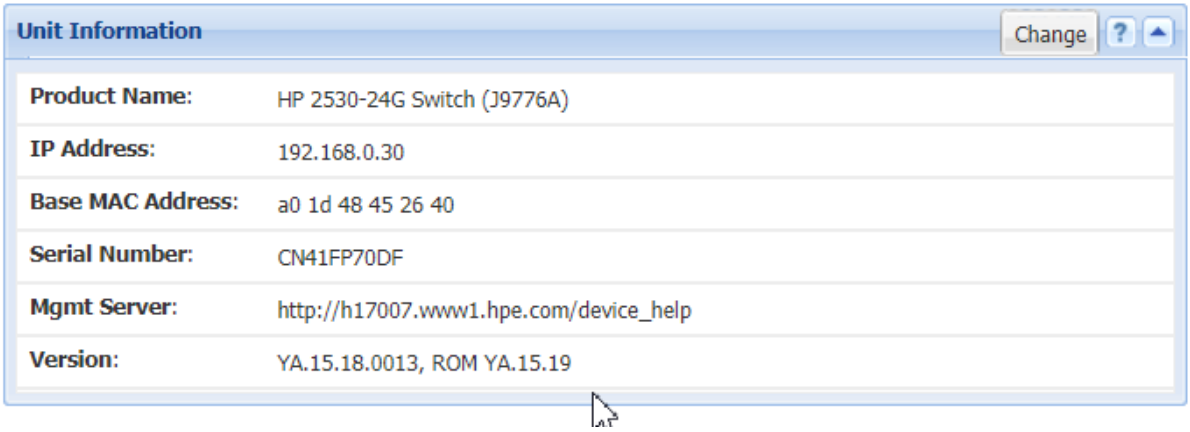
Packing List

MPE-4000 MPEG2/H.264 HD Encoder	1 pcs
this Manual	1 pcs
HDMI Cable	1 pcs
SDI Cable	1 pcs
YPbPr Cable	1 pcs*
CVBS Cable	1 pcs*
XLR adapter Cables	2 Sets*
RCA adapter Cables	1 Set*
Power Cord	1 pcs

*) optional

Recommendations:

As a Multicast capable Switch we recommend is the HP (ARUVA) 2530 24G or 48G.
(For Floor switches we have an own branded one and support IGMP as well) IGMP should be set to ON in the port configs. The latest HP Firmware might not be the best choice. Better to test IGMP functions before installation into a HOT running System and eventually do a downgrade of the Firmware. This one works:



General notes about Streams:

Multicast streams:

Multicast Address Ranges:

We recommend, that the addressing of your Multicast streams should be in conjunction with this listings to avoid conflicts with other network equipment or protocols.
https://www.iana.org/assignments/multicast-addresses/multicast-addresses.xhtml

One small part from this:

IPv4 Multicast Address Space Registry

Last Updated

2018-01-05

Expert(s)

Stig Venaas

Note

Host Extensions for IP Multicasting [RFC1112] specifies the extensions required of a host implementation of the Internet Protocol (IP) to support multicasting. The multicast addresses are in the range 224.0.0.0 through 239.255.255.255. Address assignments are listed below.

The range of addresses between 224.0.0.0 and 224.0.0.255, inclusive, is reserved for the use of routing protocols and other low-level topology discovery or maintenance protocols, such as gateway discovery and group membership reporting. Multicast routers should not forward any multicast datagram with destination addresses in this range, regardless of its TTL.

Available Formats  **XML**  **HTML**  **Plain text**

Registries included below

- Local Network Control Block (224.0.0.0 - 224.0.0.255 (224.0.0/24))
- Internetwork Control Block (224.0.1.0 - 224.0.1.255 (224.0.1/24))
- AD-HOC Block I (224.0.2.0 - 224.0.255.255)
- RESERVED (224.1.0.0-224.1.255.255 (224.1/16))
- SDP/SAP Block (224.2.0.0-224.2.255.255 (224.2/16))
- AD-HOC Block II (224.3.0.0-224.4.255.255 (224.3/16, 224.4/16))
- RESERVED (224.5.0.0-224.251.255.255 (251 /16s))
- DIS Transient Groups 224.252.0.0-224.255.255.255 (224.252/14))
- RESERVED (225.0.0.0-231.255.255.255 (7 /8s))
- Source-Specific Multicast Block (232.0.0.0-232.255.255.255 (232/8))
- GLOP Block
- AD-HOC Block III (233.252.0.0-233.255.255.255 (233.252/14))
- Unicast-Prefix-based IPv4 Multicast Addresses
- Scoped Multicast Ranges
- Relative Addresses used with Scoped Multicast Addresses

Multicast (as opposed to unicast) is used to send UDP packets from 1 source to multiple destination servers. This is useful for example for streaming from a satellite/DVB-T receiver to multiple receiving PCs for playback. Multicast can also be used on the output of an encoder to feed multiple streaming servers. Multicast only works with UDP and is not possible with TCP due to the 2 way nature of TCP, most commonly multicast is used with RTP and MPEG2-TS.

A multicast IP address must be chosen according to IANA information, we recommend using an address in the range **239.0.0.0 to 239.255.255.255** as this is reserved for private use. Using multicast addresses in the 224.0.0.0 range may clash with existing services and cause your stream to fail. For more details see http://www.iana.org/assignments/multicast-addresses/multicast-addresses.xml

Choosing a UDP port number for multicast streams is also important. Even if you use a different multicast IP for each of your streams, we strongly recommend using different UDP port numbers as well. This is because a server and all software running on the server

receives ALL multicast traffic on an open port and extra processing is required to filter out the required traffic. If the each stream arrives on a different port, the server can safely ignore any traffic on ports that are not open. Port numbers MUST be chosen so that don't clash with any existing services or ephemeral ranges. The ephemeral range for Windows Vista, 7, 2008 is 49152 to 65535, for older Windows it is 1025 to 5000 and for Linux it is 32768 to 61000. For more information on Windows see http://support.microsoft.com/kb/929851 Care should also be taken to avoid system ports 0 to 1024. See http://www.iana.org/assignments/service-names-port-numbers/service-names-port-numbers.xml Generally one of the unassigned You Ports (**1024-49151**) should be used, you can run the ***netstat -abn*** (as admin under windows) command to see which ports are currently in use.

Registered port

A **registered port** is a network port (a sub-address defined within the Internet Protocol, in the range 1024–49151) assigned by the Internet Assigned Numbers Authority (IANA) (or by Internet Corporation for Assigned Names and Numbers (ICANN) before March 21, 2001,[1] or by USC/ISI before 1998) for use with a certain protocol or application.

Ports with numbers 0–1023 are called *system or well-known ports*; ports with numbers 1024-49151 are called *you or registered ports*, and ports with numbers 49152-65535 are called *dynamic and/or private ports*.[2] Both system and you ports are used by transport protocols (TCP, UDP, DCCP, SCTP) to indicate an application or service.

- **Ports 0–1023** – system or well-known ports
- **Ports 1024–49151** – you or registered ports
- **Ports >49151** – dynamic / private ports

https://en.wikipedia.org/wiki/List_of_TCP_and_UDP_port_numbers

Range for Ephemeral port

The Internet Assigned Numbers Authority (IANA) suggests the range 49152 to 65535 ($2^{15}+2^{14}$ to $2^{16}-1$) for dynamic or private ports.[1]

Many Linux kernels use the port range 32768 to 61000.[note 2] FreeBSD has used the IANA port range since release 4.6. Previous versions, including the Berkeley Software Distribution (BSD), use ports 1024 to 5000 as ephemeral ports.[2][3]

Microsoft Windows operating systems through XP use the range 1025–5000 as ephemeral ports by default.[4] Windows Vista, Windows 7, and Server 2008 use the IANA range by default.[5] Windows Server 2003 uses the range 1025–5000 by default, until Microsoft security update MS08-037 from 2008 is installed, after which it uses the IANA range by default.[6] Windows Server 2008 with Exchange Server 2007 installed has a default port range of 1025–60000.[7] In addition to the default range, all versions of Windows since Windows 2000 have the option of specifying a custom range anywhere within 1025–65535.[8][9]

Packet structure

UDP Header

Offsets Octet	0								1								2								3							
Octet	Bit	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0	0	Source port																Destination port															
4	32	Length																Checksum															

The UDP header consists of 4 fields, each of which is 2 bytes (16 bits).[1] The use of the fields "Checksum" and "Source port" is optional in IPv4 (pink background in table). In IPv6 only the source port is optional (see below).

Source port number

This field identifies the sender's port when meaningful and should be assumed to be the port to reply to if needed. If not used, then it should be zero. If the source host is the client, the port number is likely to be an ephemeral port number. If the source host is the server, the port number is likely to be a well-known port number.[4]

Destination port number

This field identifies the receiver's port and is required. Similar to source port number, if the client is the destination host then the port number will likely be an ephemeral port number and if the destination host is the server then the port number will likely be a well-known port number.[4]

Length

A field that specifies the length in bytes of the UDP header and UDP data. The minimum length is 8 bytes because that is the length of the header. The field size sets a theoretical limit of 65,535 bytes (8 byte header + 65,527 bytes of data) for a UDP datagram. However the actual limit for the data length, which is imposed by the underlying IPv4 protocol, is 65,507 bytes (65,535 − 8 byte UDP header − 20 byte IP header).[4]

In IPv6 jumbograms it is possible to have UDP packets of size greater than 65,535 bytes.[5] RFC 2675 specifies that the length field is set to zero if the length of the UDP header plus UDP data is greater than 65,535.

Checksum

The checksum field may be used for error-checking of the header and data. This field is optional in IPv4, and mandatory in IPv6.[6] The field carries all-zeros if unused.[7]

RTP:

a part from: https://tools.ietf.org/html/rfc3550

Chapter 11:

RTP relies on the underlying protocol(s) to provide demultiplexing of RTP data and RTCP control streams. For UDP and similar protocols, RTP SHOULD use an **even** destination port number and the corresponding RTCP stream SHOULD use the next higher (odd) destination port number. For applications that take a single port number as a parameter and derive the RTP and RTCP port pair from that number, if an odd number is supplied then the application SHOULD replace that number with the next lower (even) number to use as the base of the port pair. For

applications in which the RTP and RTCP destination port numbers are specified via explicit, separate parameters (using a signaling protocol or other means), the application MAY disregard the restrictions that the port numbers be even/odd and consecutive although the use of an even/odd port pair is still encouraged. The RTP and RTCP port numbers MUST NOT be the same since RTP relies on the port numbers to demultiplex the RTP data and RTCP control streams.

In a unicast session, both participants need to identify a port pair for receiving RTP and RTCP packets. Both participants MAY use the same port pair. A participant MUST NOT assume that the source port of the incoming RTP or RTCP packet can be used as the destination port for outgoing RTP or RTCP packets. When RTP data packets are being sent in both directions, each participant's RTCP SR packets MUST be sent to the port that the other participant has specified for reception of RTCP. The RTCP SR packets combine sender information for the outgoing data plus reception report information for the incoming data. If a side is not actively sending data (see Section 6.4), an RTCP RR packet is sent instead.

RTP (Real-Time Transport Protocol)	
Familie:	Netzwerkprotokoll
Einsatzgebiet:	Transport von Medien-Streams
Port:	beliebiger freier, gerader Port größer 1024
RTP im TCP/IP-Protokollstapel:	
Anwendung | **RTP**	
Transport | UDP	
Internet | IP (IPv4, IPv6)	
Netzzugang | Ethernet | Token Bus | Token Ring | FDDI | …	
Standard:	RFC 3550 (RTP: A Transport Protocol for Real-Time Applications, 2003)

any port (even, not odd > 1024)

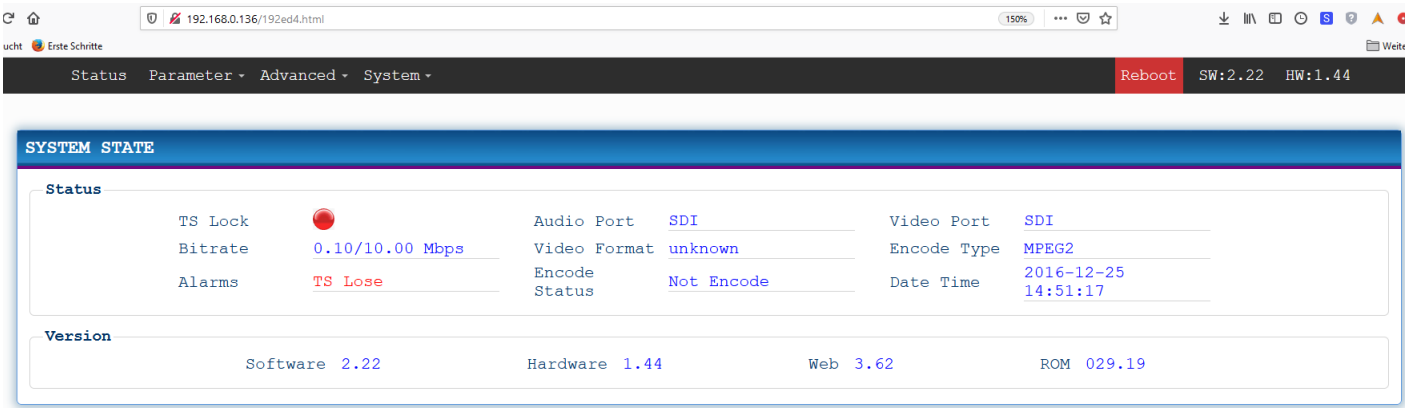
Note: Regarding SAP (Session Announcement Protocol)

IPv4 global scope sessions use multicast addresses in the range 224.2.128.0 - 224.2.255.255 with SAP Announcements being sent to 224.2.127.254 Port 9875 (note that 224.2.127.255 is used by the obsolete SAPv0 and MUST NOT be used).

IPv4 administrative scope sessions using administratively scoped IP multicast. The multicast address to be used for SAP announcements is the highest multicast address in the relevant administrative scope zone. For example, if the scope range is 239.16.32.0 - 239.16.33.255, then 239.16.33.255 is used for SAP Announcements.

We assume, that this professional unit is used by professional technicians knowing all relevant norms, regulations, abbreviations (i.e. DVB, ATSC, …) and specifications.

Actual Versions:



'Never change a running system' … If the device might have bugs or its operation might be unusual, please report these in details incl. the above screenshot to give the relevant OS data to the service/developers:

Contact:

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Phone: +49 5069 4809781
Managing Director: Dipl.Ing. Murad Önol
Commercial Register: HRB 206370 / District Court Hildesheim, WEEE: DE 54333499

Web: www.blankom.de **E-Mail:** info@blankom.de

Appendix Product Disposal

Warning! Ultimate disposal of this product should be handled according to all national laws and reg

製品の廃棄

この製品を廃棄処分する場合、国の関係する全ての法律・条例に従い処理する必要があります。

警告

本产品的废弃处理应根据所有国家的法律和规章进行。

警告

本產品的廢棄處理應根據所有國家的法律和規章進行。

Warnung

Die Entsorgung dieses Produkts sollte gemäß allen Bestimmungen und Gesetzen des Landes erfolgen.

¡Advertencia!

Al deshacerse por completo de este producto debe seguir todas las leyes y reglamentos nacionales.

Attention

La mise au rebut ou le recyclage de ce produit sont généralement soumis à des lois et/ou directives de respect de l'environnement. Renseignez-vous auprès de l'organisme compétent.

경고!

이 제품은 해당 국가의 관련 법규 및 규정에 따라 폐기되어야 합니다.

Waarschuwing
De uiteindelijke verwijdering van dit product dient te geschieden in overeenstemming met alle nationale wetten en reglementen.

Elektronische Geräte gehören nicht in den Hausmüll, sondern müssen - gemäß Richtlinie 2002/96/EG DES EUROPÄISCHEN PARLAMENTS UND DES RATES vom 27. Januar 2003 über Elektro- und Elektronik-Altgeräte fachgerecht entsorgt werden.
Bitte geben Sie dieses Gerät am Ende seiner Verwendung zur Entsorgung an den dafür vorgesehenen öffentlichen Sammelstellen ab.

Electronic equipment is not household waste - in accordance with directive 2002/96/EC OF THE EUROPEAN PARLIAMENT AND THE COUNCIL dated 27th January 2003 on used electrical and electronic equipment, it must be disposed of properly.
At the end of its service life, take this unit for disposal to an appropriate official collection point

Montage und Sicherheitshinweise / Installation and safety instructions

- Die beschriebenen Geräte dienen ausschließlich der Installation von Satelliten-Empfangsanlagen.
- *The equipment described is designed solely for the installation of satellite receiver systems.*
- Jegliche anderweitige Nutzung oder die Nichtbeachtung dieses Anwendungshinweises hat den Verlust der Gewährleistung bzw. Garantie zur Folge.
- *Any other use, or failure to comply with these instructions, will result in voiding of warranty cover.*
- Die Geräte dürfen nur in trockenen Innenräumen montiert werden. Nicht auf oder an leicht entzündlichen Materialien montieren.
- *The equipment may only be installed in dry indoor areas. Do not mount on or against highly combustible materials.*
- Die Geräte sind mit einer Potenzial-Ausgleichsleitung (Cu, mindestens 4 mm^2) zu versehen.
- *The equipment must be provided with an earthing wire (Cu, at least 4 mm2).*
- Die Sicherheitsbestimmungen der jeweils aktuellen Normen EN 60728-11 und EN 60065 sind zu beachten.
- *The safety regulations set out in the current EN 60728-11 and EN 60065 standards must be complied with*
- Verbindungsstecker: HF-Stecker 75 Ohm (Serie F) nach EN 61169-24
- *Connector: HF plug 75 Ohm (series F) to EN 61169-24.*
- **Nicht benutzte Teilnehmerausgänge** sollten mit 75-Ohm Widerständen (z. B. EMK 03) abgeschlossen werden. (Verringerung der terrestrischen Signalwelligkeit)
- ***Unused subscriber ports*** *should be closed off by 75 Ohm resistors (e.g. EMK 03).*
- **Nicht benutzte Kaskadenausgänge** sind mit 75 Ohm Widerständen inkl. DC-Blocker abzuschließen. 75 Ohm Widerstände ohne Gleichspannungssperren können das Gerät beschädigen!
- ***Unused trunk outputs*** *must be terminated with 75Ohm resistors including DC Blocker. Otherwise the device may be inoperable or damaged.*
- Bitte überprüfen Sie die Anlage vor Inbetriebnahme auf evtl. Kurzschlüsse der Koaxial-Kabel. Es ist darauf zu achten, dass die Eingangspegel der SAT-Ebenen möglichst gleich hoch sind. Power-LEDs zeigen den Betrieb an. Falls die nicht leuchten, bitte die Stromzufuhr kontrollieren.
- *Please check the installation against shortage in coax cables and connectors before switching on. The*

input levels should be adjusted accordingly. Power-LED's showing operational mode. If this is not illuminated, please check the power source.

- **Stromführendes Gerät**
- ***Current-carrying unit***
- Nicht öffnen oder am Gerät manipulieren!
- *Do not open or tamper with the unit!*
- Bei Arbeiten an der Anlage immer die Netzstecker aus der Steckdose ziehen!
- *When working on the system always unplug the mains plug from the wall socket!*
- Auf ausreichenden Abstand achten! Nach allen Seiten mind. 5 cm!
- *Ensure adequate clearance! Min. 5 cm to all sides!*
- Nicht über Kopf montieren.
- *Do not install overhead.*
- Für die Gerätekühlung muß freie Luftzirkulation möglich sein. Überhitzungsgefahr!
- *Free circulation of air must be possible to discharge the heat emitted by the unit. Risk of overheating!*
- Zulässige Umgebungstemperatur -20 bis +50°C
- *Permissible ambient temperature -20 to +50°C*

Wir empfehlen die Benutzung von Gleitschienen bevor das Gerät im 19 " Schrank installiert und angeschlossen wird.
We recommend using and installing 19" rails in your rack before you mount the device and install the F-connectors and cables.

Zur Beachtung / *Important notes*:

- Auf das Netzgerät dürfen keine mit Flüssigkeit gefüllten Gegenstände gestellt werden.
- *No liquid-filled items may be placed on top of the power supply unit.*
- Das Netzgerät darf nicht Tropf- oder Spritzwasser ausgesetzt sein.
- *The power supply unit must not be exposed to dripping or splashing water.*
- Der Netzstecker muss ohne Schwierigkeiten zugänglich und benutzbar sein.
- *The mains plug must be easily accessible and operable.*
- Das Gerät kann nur durch Ziehen des Netzsteckers vom Netz getrennt werden.
- *The only reliable method of disconnecting the unit from the mains is to unplug it.*
- Bei größerem Durchmesser des Kabel- Innenleiters als 1,2 mm bzw. Grat können die Gerätebuchsen zerstört werden.
- *If the inner cable conductor diameter is greater than 1.2 mm or in case of burr, the device sockets may be destroyed.*