

SHDE-4000 · SHDE-4002 · SHDE-400

Quick Start Manual

4K H.265/H.264 encoder and IPTV streamer with 12G-SDI and HDMI 2.0 – installation, web interface, recording, streaming and system settings

IRENIS / BLANKOM · Quick Start Manual · Ralf Riedel, Director Technical Sales & Engineering, IRENIS GmbH

SHDE-4000 / SHDE-4002 · 19" 1U, DUAL REDUNDANT PSU

Front and rear panel



SHDE-400 · COMPACT

Same encoder and web interface in a compact enclosure with external 12 V power supply

Contents

PART 1 · PRODUCT

1	Product overview	3
2	Technical highlights	4
3	Specifications	5
4	Remarks	7

PART 2 · GETTING STARTED

5	Quick Start	9
6	Starting the web interface	10
7	Status window and configuration menus	12
8	The INPUT status frame	13
9	NTP	13
10	Network settings	14

PART 3 · STATUS, RECORDING AND PREVIEW

11	Status page	16
12	Recording	16
13	SMB 1.0 support (Windows)	18
14	Status page: stream information	22
15	Preview player	23
16	HEVC preview	24

PART 4 · ENCODER AND SYSTEM SETTINGS

17	System – Advanced settings	27
18	HLS	29
19	SRT	30
20	SRT Live Server (SLS)	31
21	SRT network latency	31
22	TS tables	33
23	Transport stream (TS) settings	33
24	System settings	36
25	SAR settings	40
26	Reverse proxy (FRP)	41
27	Bitrate	45
28	Encoded size and bitrate control	45
29	OSD: on-screen display (logo and text)	46
30	ONVIF	50

PART 5 · APPLICATION EXAMPLES

31	Example: streaming to Vimeo Live by RTMP	53
32	Streaming H.265 to YouTube using HLS	54

PART 6 · APPENDIX

33	Appendix: firmware file	56
34	Useful links regarding SRT	56
35	Restreamer 2 (SRT)	57
36	SRT settings for an encoder–decoder pair	57
37	Addendum: serial to TCP (remserial)	59

PART 7 · NEW WEB GUI

38	The new web GUI	63
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ANNEX

39	Version history	79
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Quick Start Manual SHDE-4000 / SHDE-4002 / SHDE-400 · Version 2.0

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Online: <https://www.irenis-blankom.com/product/4k-60fps-uhd-ip-encoder-streamer-with-12g-sdi-and-hdmi-input-19-inch/>

The SHDE series at a glance

The SHDE-4000, SHDE-4002 and SHDE-400 encode 12G-SDI and HDMI 2.0 sources up to 4Kp60 in H.265 or H.264 and stream them over IP.

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In this part Product overview Technical highlights Specifications Remarks

KEY POINTS

- Both inputs are encoded in parallel: 1× up to 4Kp60 as main stream and 1× up to 1080p60 as sub stream.
- SRT, RTMP(S), RTSP, HTTP(S), HLS, FLV and UDP/RTP unicast or multicast; ONVIF.
- SHDE-4000: 19" 1U with dual redundant power supplies. SHDE-4002: two independent encoders in 1U sharing the supplies. SHDE-400: compact unit with external 12 V supply.

Product overview

The BLANKOM SHDE-4000 is a broadcast-grade UHD encoder designed for 24/7 operation in professional environments. It combines high-efficiency H.265 (HEVC) encoding with versatile inputs and accepts signals up to 4Kp60 via 12G-SDI or HDMI 2.0.

Built for reliability, the 1U rackmount unit has dual redundant power supplies for uninterrupted transmission – for broadcasters, IPTV providers and live event streaming. With integrated SRT (Secure Reliable Transport), the SHDE-4000 delivers high-quality, low-latency video even over unpredictable public internet connections.

Key features

- **True 4K UHD encoding:** input resolutions up to **4096 × 2160p60** and **3840 × 2160p60**.
- **Advanced compression:** high-efficiency **H.265 (HEVC)** and H.264 (AVC) encoding saves up to 50 % bandwidth compared with older standards.
- **Multi-protocol streaming:** simultaneous output via **SRT**, RTMP/RTMPS, RTSP, UDP, RTP, HLS and FLV; directly compatible with YouTube, Facebook Live, Vimeo and Wowza.
- **High reliability:** 19-inch 1U housing with **dual redundant power supply units (PSUs)** for fail-safe operation.
- **Local recording:** integrated USB 3.0 interface and SAMBA server for recording to HDDs or USB sticks (NTFS/exFAT/FAT32).
- **Dual-stream output:** encodes a high-bitrate main stream (4K) and a lower-bitrate sub stream (1080p) simultaneously for flexible distribution.
- **OSD and watermarking:** text and logo insertion (overlay) on both main and sub stream.

Applications

- **Live broadcasting:** send broadcast-quality video from 12G-SDI cameras directly to studios or CDNs via SRT.
- **IPTV and OTT headends:** distribute 4K content over LAN/WAN to set-top boxes (STBs) or smart TVs.
- **Digital signage and hospitality:** reliable feeds for hotels, stadiums and campuses.
- **Remote production:** low-latency video transmission for remote directing and monitoring.



Rear panel

- Dual power supplies (PSUs) with IEC connectors, built-in fuses and power switches
- Gigabit Ethernet LAN connector, RJ45
- HDMI and 12G-SDI inputs, plus two external stereo audio inputs (3.5 mm jacks)

Technical highlights

FEATURE	SPECIFICATION
Video inputs	1 × 12G-SDI (BNC), 1 × HDMI 2.0
Encoding format	H.265 (HEVC) Main / Main10 profile; H.264 (AVC) High / Main / Baseline
Resolution	Up to 4096 × 2160 at 60 fps
Streaming protocols	SRT, HTTP, HLS, RTSP, RTMP(S), UDP/RTP (multicast/unicast), ONVIF
Audio	Embedded (HDMI/SDI) plus analog input/output (3.5 mm jacks)
Management	Web interface, Telnet
Power	Dual redundant PSUs (100–240 V AC)
Recording	USB (with SAMBA access from the network) or NFS/CIFS network folders

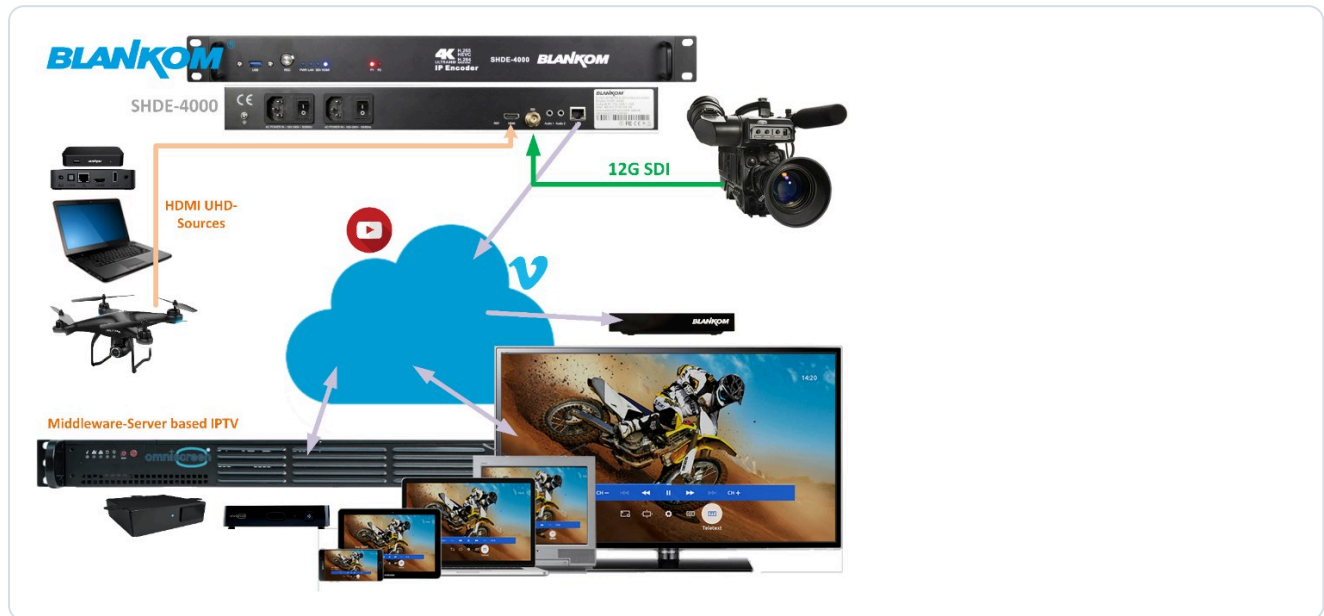


Variants

SHDE-400: compact version with external power supply.

SHDE-4002: 19-inch 1U version with two HDMI/12G-SDI GbE encoders sharing the dual redundant 100–240 V AC power supplies.

Application: parallel encoding and streaming from HDMI and SDI



Specifications

INTERFACES

Video input	HDMI and 12G-SDI; up to 4096 × 2160 at 60 fps, 3840 × 2160 at 60 fps, 2560 × 1440 at 144 fps, etc.
Audio input	HDMI and SDI embedded audio; external analog audio input
Ethernet	1000 Mbps, RJ45
Video encoding	HDR supported
Video format	H.264/AVC High / Main / Baseline profile; H.265/HEVC Main / Main10 profile; MJPEG/JPEG Baseline
Video resolution	Up to 4096 × 2160 at 60 fps
Video bitrate	0.1–100 Mbps
Frame rate	5–144 fps
Bitrate control	VBR / CBR / Strong CBR
Streaming protocols	Unicast: SRT / HTTP / HTTPS / HLS / FLV / RTSP / RTMP / RTMPS Multicast: UDP/RTP transport streams ONVIF
Audio format	AAC / AAC+ / AAC++ / MP3 / MP2 / AC3 / G.711

Sample rates	44.1 kHz / 48 kHz
Audio bitrate	12–640 kbps
SYSTEM	
Control	Web interface (multilingual with the new web GUI); Telnet access can be enabled
Firmware	Upgrade via Ethernet; default IP address 192.168.1.168; default user/password admin/admin
OPERATING ENVIRONMENT	
Operating temperature	-10 to +70 °C
Storage temperature	-20 to +80 °C
Relative humidity	5 to 90 %, non-condensing
MISCELLANEOUS	
Dimensions (L × W × H)	19-inch 1U: 480 × 270 × 40 mm with integrated dual PSU; compact version (SHDE-400): 150 × 110 × 45 mm
Weight	approx. 2,400 g (SHDE-400: 500 g without power supply)
Power supply	2 × IEC inlet, 100–240 V AC, 50/60 Hz; internal 12 V DC, 2 A (SHDE-400: external 12 V DC, 2 A adapter)

4K H.265 HDMI/12G-SDI video encoder: the SDI and HDMI inputs operate in parallel – up to 1 × 4K60 and 1 × 1080p60 encoded at the same time.

Unicast: SRT / HTTP / HLS / FLV / RTSP / RTMP / RTMPS.

Multicast: UDP/RTP; ONVIF. The encoder works with online live broadcast platforms such as Vimeo, YouTube, Facebook, Ustream and X (Twitter).

- 12G-SDI (BNC) and HDMI inputs for encoding and recording to USB 3.0 (NTFS/exFAT/FAT32) with built-in SAMBA server for network access to the recorded files, or to NFS/CIFS network folders
- Stereo audio: embedded, or external input (3.5 mm stereo); audio output
- Resolutions 2160p60, 1080p, 1080i, 720p and lower; progressive output
- GbE IP output: RTSP, RTMP(S), UDP/RTP, HTTP, HLS, FLV, MJPEG, SRT
- Distribution of (U)HD camera video and other sources over LAN, WAN or the internet
- Two simultaneous, independent encoder engines for live streaming to multiple destinations
- Video-over-IP applications, digital signage, NVR, hotel info channels
- IPTV/OTT applications, video conferencing, camera streaming
- IPTV on LAN, corporate IPTV for broadcasting
- UHD, HD and SD encoding and downscaling
- Motion JPEG encoding and SRT streaming protocol
- User-friendly web interface

- Colour sampling up to 4:2:2 10-bit; B-frame support from IBP to IBBBBP
- HDR modes: SDR, HDR10, HLG; 16 HEVC and 17 AVC profiles supported
- Remote control via router port forwarding
- Multi-protocol support: SRT / HTTP / HTTPS / HLS / FLV / RTSP / RTMP / RTMPS / UDP/RTP (unicast/multicast) transport streams and ONVIF
- Multiple RTMP(S) outputs (main and sub stream) to different media streaming servers
- 4K input and encoding: 4096 × 2160 at 60 fps, 3840 × 2160 at 60 fps, 2560 × 1440 at 144 fps, etc.
- One-click recording to USB 3.0 (NTFS/exFAT/FAT32) with built-in SAMBA server, adjustable file splitting and easy network access for review and handling via SAMBA
- Recording to NFS or SMB/CIFS network folders; ONVIF
- Text and image (logo) insertion on main and sub stream
- Additional external analog audio input and output; digital audio gain control

IN BRIEF

The BLANKOM **SHDE-4000** IPTV encoder distributes TV signals in excellent quality over LAN and the internet. Its H.264 and H.265 (HEVC) compression offers low latency and low bit rates for IPTV/OTT systems, and the highly efficient encoding chips save bandwidth across the whole resolution range. It distributes SD to UHD TV channels over IPTV/OTT networks from almost any kind of video source, with excellent video and audio quality and high reliability – no regular service or maintenance is needed during operation.

The live video can be received by video media servers, by TV sets with IPTV set-top boxes, and on PCs and tablets with VLC player.

Remarks

Anmerkung:

Alle von uns veröffentlichten Betriebsanleitungen richten sich an den Antennen- und IT-Fachmann, der über grundlegende Kenntnisse der Empfangs-, Netzwerk- und Anlagentechnik verfügt. Die Einhaltung aller relevanten Vorschriften und Richtlinien für den Aufbau und Betrieb von solchen Anlagen obliegt dem Installateur und/oder dem Betreiber. Insbesondere sind die in den jeweiligen Ländern geltenden Vorschriften und Richtlinien für die Inbetriebnahme speziell für den Stromanschluß und alle mit den Produkten in Zusammenhang stehenden und geltenden Normen und Gesetze einzuhalten.

Remark:



All operating instructions published by us are intended for the antenna and IT specialist who has basic knowledge of reception, network and system technology. Compliance with all relevant regulations and guidelines for the installation and operation of such systems is the responsibility of the installer and/or the operator. In particular, the regulations and guidelines applicable in the respective countries for commissioning, especially for the power connection, and all standards and laws related to the products must be complied with.

Annotation:



Tous les modes d'emploi que nous publions sont destinés aux professionnels de l'antenne et de l'informatique qui ont des connaissances de base en matière de réception, de mise en réseau et de technologie des équipements. Le respect de toutes les réglementations et directives pertinentes pour l'installation et l'exploitation de ces systèmes relève de la responsabilité de l'installateur et/ou de l'exploitant. En particulier, il convient de respecter les réglementations et directives applicables dans les pays respectifs pour la mise en service, notamment pour le raccordement électrique, ainsi que toutes les normes et lois relatives aux produits.

Annotazione:

Tutte le istruzioni per l'uso da noi pubblicate sono destinate al professionista dell'antenna e dell'informatica che ha una conoscenza di base della tecnologia di ricezione, di rete e delle apparecchiature. Il rispetto di tutti i regolamenti e le linee guida pertinenti per l'installazione e il funzionamento di tali sistemi è responsabilità dell'installatore e/o dell'operatore. In particolare, devono essere rispettati i regolamenti e le linee guida applicabili nei rispettivi paesi per la messa in funzione, soprattutto per il collegamento alla rete elettrica e tutte le norme e le leggi relative ai prodotti.

Anotación:

Todas las instrucciones de uso publicadas por nosotros se dirigen al profesional de la antena y de la informática que tiene conocimientos básicos de recepción, de redes y de tecnología de equipos. El cumplimiento de todos los reglamentos y directrices pertinentes para la instalación y el funcionamiento de dichos sistemas es responsabilidad del instalador y/o del operador. En particular, deben cumplirse los reglamentos y directrices aplicables en los respectivos países para la puesta en marcha, especialmente para la conexión de la energía y todas las normas y leyes relacionadas con los productos.

Anotação:

Todas as instruções de operação publicadas por nós são destinadas ao profissional de antena e TI que possui conhecimentos básicos de recepção, rede e tecnologia de equipamentos. O cumprimento de todos os regulamentos e diretrizes relevantes para a instalação e operação de tais sistemas é de responsabilidade do instalador e/ou do operador. Em particular, os regulamentos e diretrizes aplicáveis nos respectivos países para comissionamento, especialmente para a conexão de energia e todas as normas e leis relacionadas aos produtos devem ser obedecidas.

Our warranty does not cover devices that have been misused or handled incorrectly – for example, and particularly with the compact versions, when a wrong AC or DC voltage has been connected to the unit.

Connecting and first access

Connect the unit, power it up and open the web interface.

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In this part [Quick Start](#) [Starting the web interface](#) [Status window and configuration menus](#)
[The INPUT status frame](#) [NTP](#) [Network settings](#)

KEY POINTS

- Connect the power cords and a common ground first, then network and signal inputs.
- Default IP address 192.168.1.168, user/password admin/admin. Your PC must be in the same network (192.168.1.x).
- For multicast outputs use a Layer 3 switch with IGMP v2 or v3.
- When asking for support or new firmware, always quote the firmware version shown in the status window.

Quick Start

The connectors are self-explanatory.

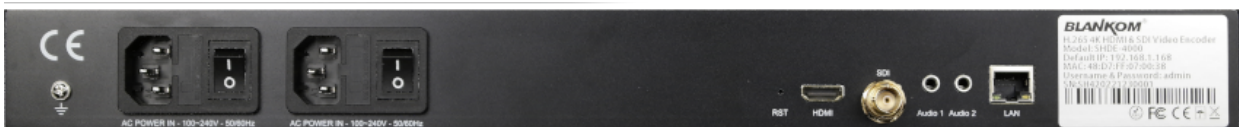
Front panel:



USB 3.0 port for the recording device you plug in

Manual start/stop recording button, blue status LEDs (Power, LAN, SDI and HDMI connected) and two red PSU status LEDs

Rear panel:



- 2 × IEC power inlets, 100–240 V AC, with fuses and on/off switches

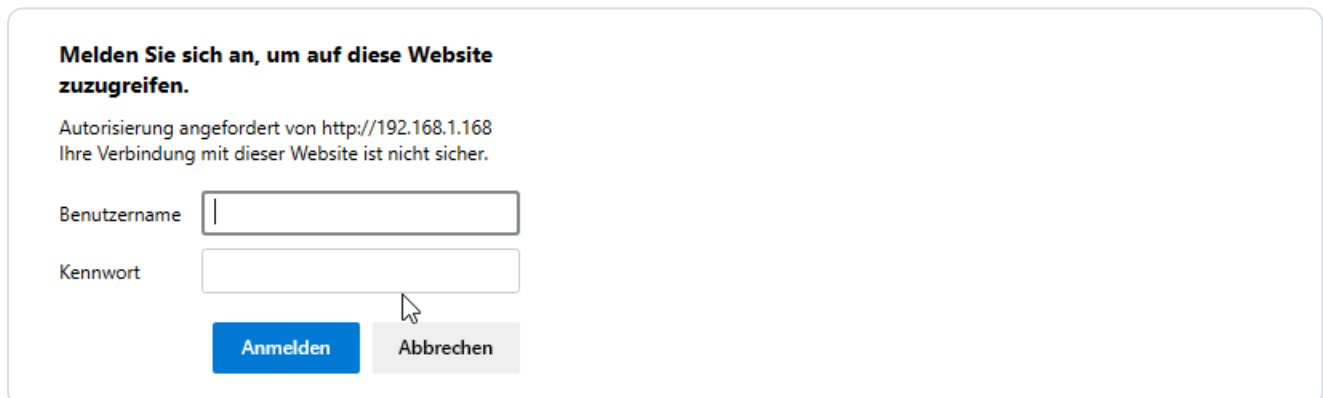
- RESET hole to restore the factory defaults – for example if you have forgotten the IP address or other problems occur
- HDMI connector: input up to 4K 2160p60, including HDR
- 12G-SDI input, BNC connector
- 2 × external stereo audio inputs; used for the encoding instead of the embedded audio (either–or, not mixed)
- Gigabit Ethernet RJ45 connector for the web interface and the stream outputs
- Label with the default data: MAC address, serial number, default IP address, user name and password

Note: connect the IEC power cables first, then the network and the signal inputs.

Before switching on, connect the device and the signal sources to a common ground (e.g. the rack) to prevent electrostatic discharges caused by potential differences. Make sure the chassis is grounded to the rack and the grounds of the signal inputs are safely connected, so that no electromagnetic or electrostatic discharges occur between different voltage potentials.

We recommend connecting the RJ45 Gigabit Ethernet port with a shielded (S/FTP) Cat cable to a Layer 3 switch with 100/1000BASE-T auto-sensing and IGMP v2 or v3 support if you want to use multicast stream outputs.

Starting the web interface



Melden Sie sich an, um auf diese Website zuzugreifen.

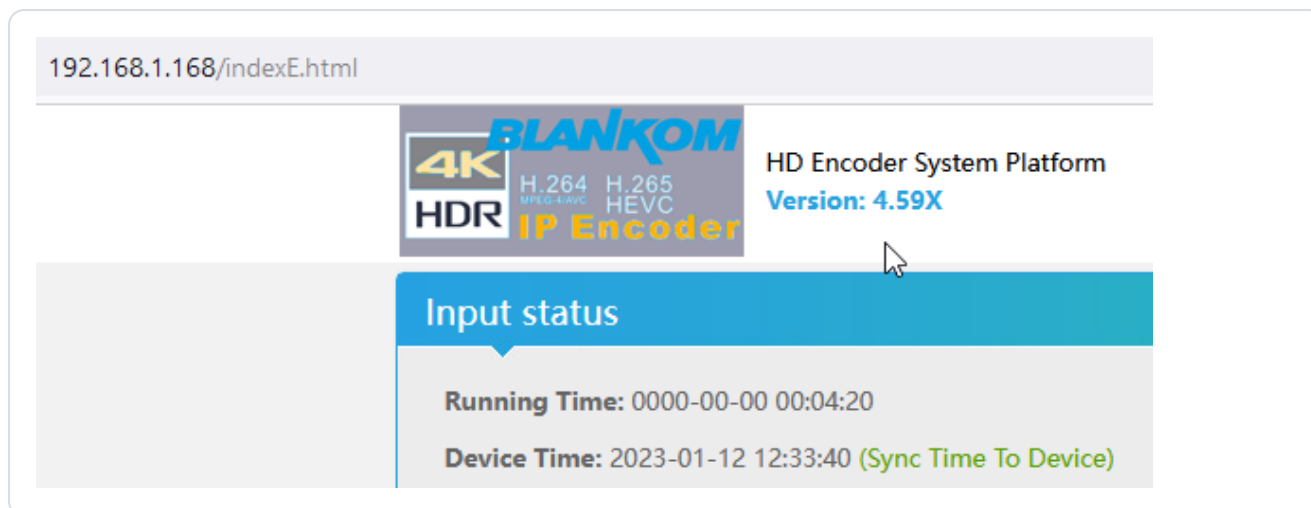
Autorisierung angefordert von http://192.168.1.168
Ihre Verbindung mit dieser Website ist nicht sicher.

Benutzername

Kennwort

Enter the default IP address in your browser. Make sure your computer is in the same network (192.168.1.xxx) – otherwise you cannot connect. When asked, enter the default user name and password admin / admin:

The following pages show the old web GUI design. The new design is explained in a separate chapter at the end of this document.



When you ask us for support or for newer firmware releases, always state the currently installed version shown in the status window (here: version 4.59x).

Status window and configuration menus

Input status

Running Time: 0000-00-00 01:18:04
Device Time: 2023-01-12 13:47:24 (Sync Time To Device)
Device Name: Encoder_49126
CPU Usage: 15%
CPU Junction Temperature: 61°C,59°C
FPGA Junction Temperature: 58°C
Memory Usage: 830.5M/3932.5M
HDMI Video Size: 3840x2160p@30
HDMI Audio Samplerate: 48000
SDI Video Size: 1920x1080i@50
SDI Audio Samplerate: 48000
SDI CRC Error: 0
Net Packet Sent: 3216
Net Packet Dropped: 0

Record Status

Total Disk Space: 30174 MByte
Free Disk Space: 299 MByte
SMB/CIFS File Share: \\192.168.1.168\encoder\
Record Status: Not Recording (Start Record) (Unmount Disk) (Delete All Video Files)
Disk Status: Full

Main stream

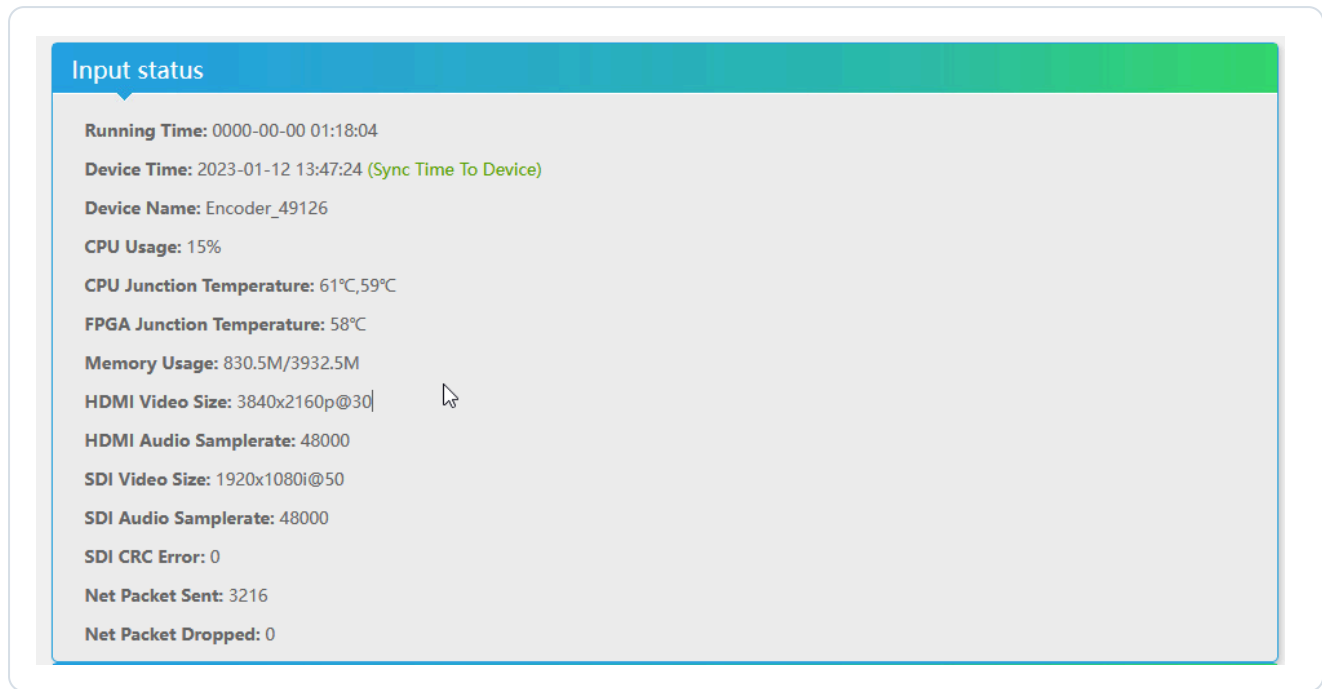
Input: HDMI
Encode Type: H.264/AVC High Profile 4:2:0 8bit

Status Network Main stream Substream System

The menus are selected with the tabs at the bottom:

STATUS – NETWORK – Main Stream – Sub Stream – System settings.

The INPUT status frame

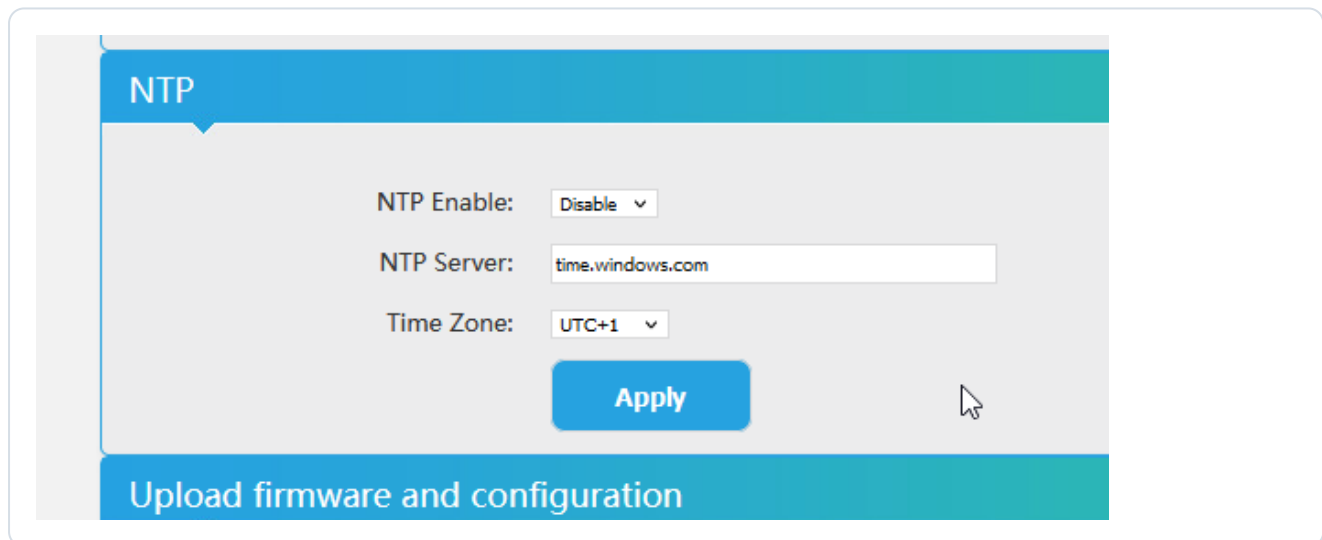


The input status shows information about the HDMI and SDI inputs and other values. If the correct time zone is configured in the system settings (scroll down), you can click

(Sync time to device) to set the device clock.

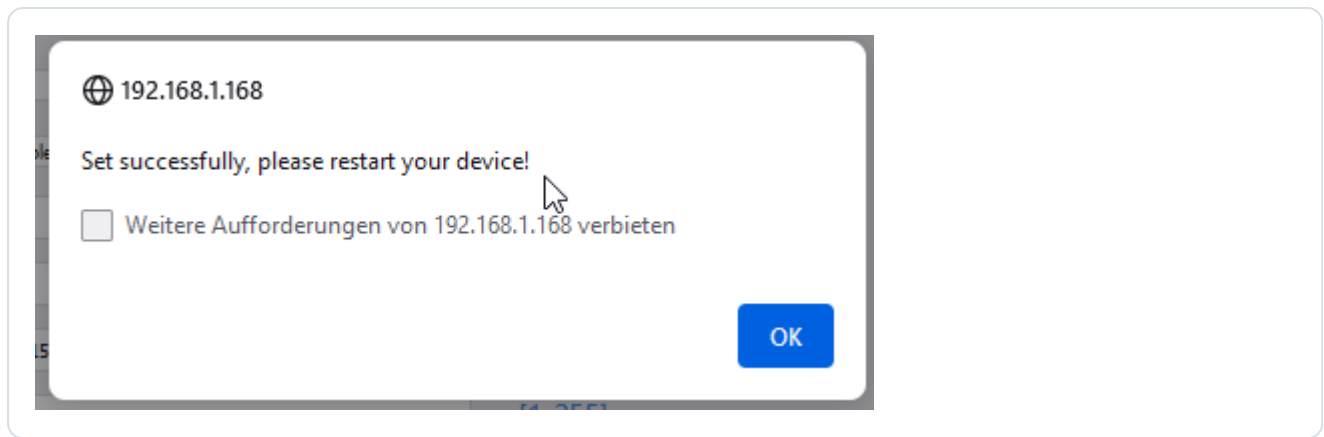
(Central Europe is UTC+1, or UTC+2 in summer.)

NTP



Always click **Apply** after you have made changes.

If this pop-up appears after you have clicked **Apply**:



NOTE

This does **not** mean restarting the encoder/streamer, but your receiving device – e.g. VLC on a PC, an IPTV set-top box or a BLANKOM decoder.

This is because the receiver usually needs to re-synchronize to the new values.

Network settings

In the network section you can adapt the encoder to your local network:

Internet access

DHCP: Disable

IP:

Netmask:

Gateway:

MAC:

DNS

DNS1:

DNS2:

PORT

HTTP Port: [1-65500]

RTSP Port: [1-65500]

Apply

Status

Network

Main stream

Substream

System

If you choose DHCP, check in your DHCP server/router which address has been assigned to the encoder. We recommend a fixed (static) address with the matching netmask and gateway settings.

DNS is needed for NTP and for streaming to RTMP(S) media servers, which often provide a URI instead of an IP address. Make sure DNS servers are available.

Example: 8.8.8.8 is a public internet DNS server operated by Google, while 192.168.1.1 is typically the local DNS of a router in your LAN.

If you change the MAC address, make sure the same address does not exist in your internal network – that would cause problems.

The default ports for the HTTP and RTSP stream outputs are normally correct and do not need to be changed.

Status page, recording and preview

Monitor inputs and streams, record to USB or network storage and preview the encoded streams.

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In this part [Status page](#) [Recording](#) [SMB 1.0 support \(Windows\)](#) [Status page: stream information](#)
[Preview player](#) [HEVC preview](#)

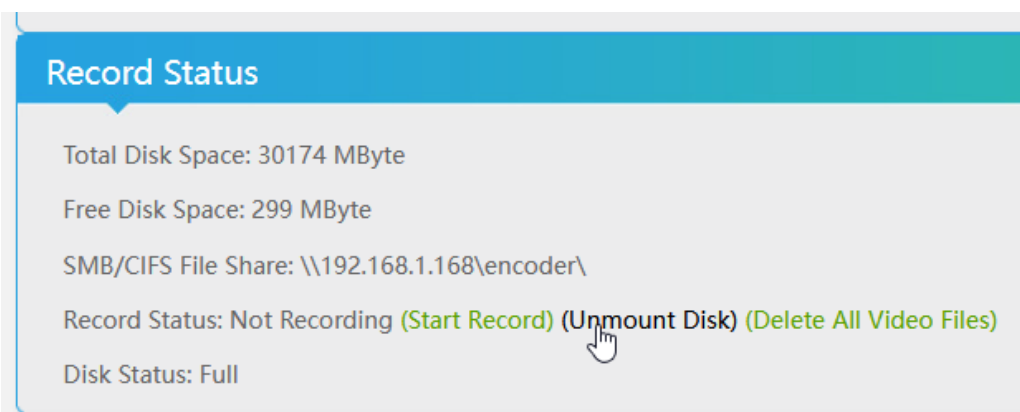
KEY POINTS

- The recording section appears only when a formatted USB drive or HDD is connected; USB 3.0 is recommended for UHD.
- Recordings are split into 30-minute files by default; FAT32 cannot store files larger than 4 GiB.
- To open the recording share from Windows, SMB 1.0 support must be enabled.
- The MP4 preview link works only with the H.264 codec in modern browsers.

Status page

Recording

The recording section only appears after you have connected a correctly formatted USB flash drive or external HDD. If no USB device is connected, it is hidden.

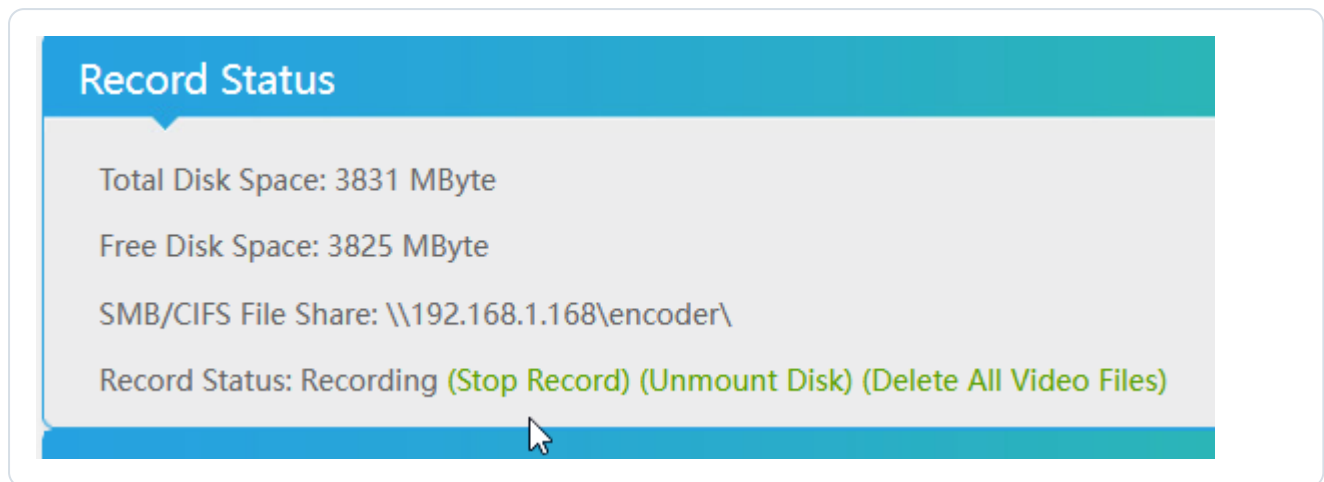


It shows the relevant information, and you can start recording here (or with the button on the front panel).

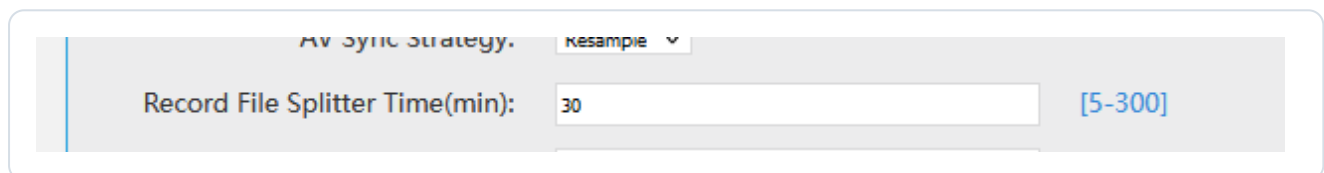
Please unmount the disk before you remove it!

We recommend at least USB 3.0 because of the recording speed required for UHD content.

Clicking **Start** or pressing the button on the front panel shows the current status:



By default, the TS recordings are split into 30-minute files. This is recommended if the files would otherwise be too big for the file system of the USB drive. You can change the split time in the advanced system settings:

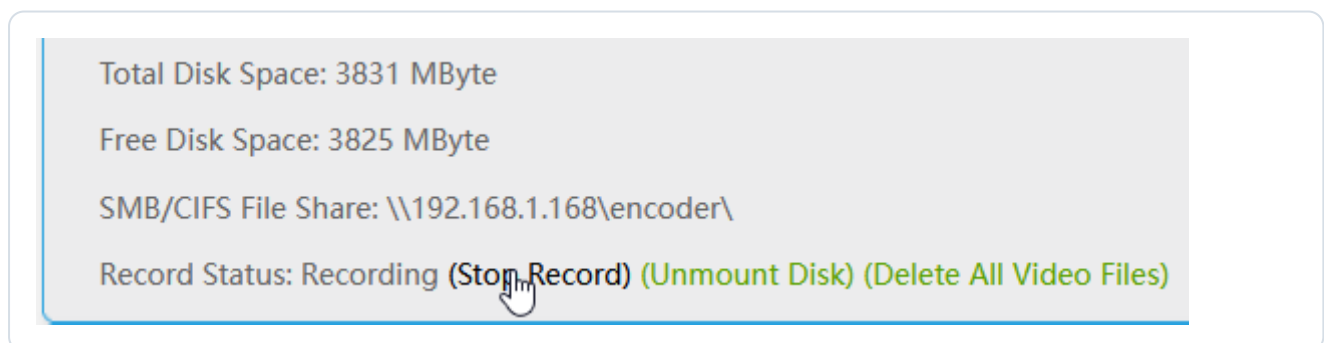


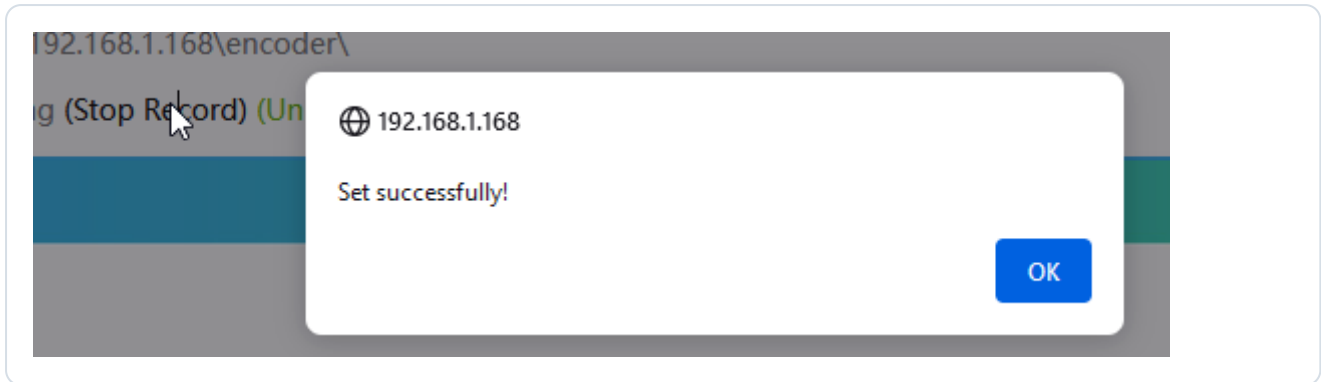
A FAT file system cannot store files larger than 4 GiB. This is a hard limit: FAT stores the file size in a 32-bit field, and 2^{32} bytes = 4 GiB (strictly 4 GiB minus one byte, i.e. 4,294,967,295 bytes, because files can have zero length).

You therefore cannot copy a file larger than 4 GiB to a plain FAT volume.

exFAT solves this with a 64-bit size field, but switching to exFAT requires reformatting the partition. Splitting the recording into several files lets you transfer all of the data – just not as a single file, so you may need to recombine the files before use.

Stopping the recording:

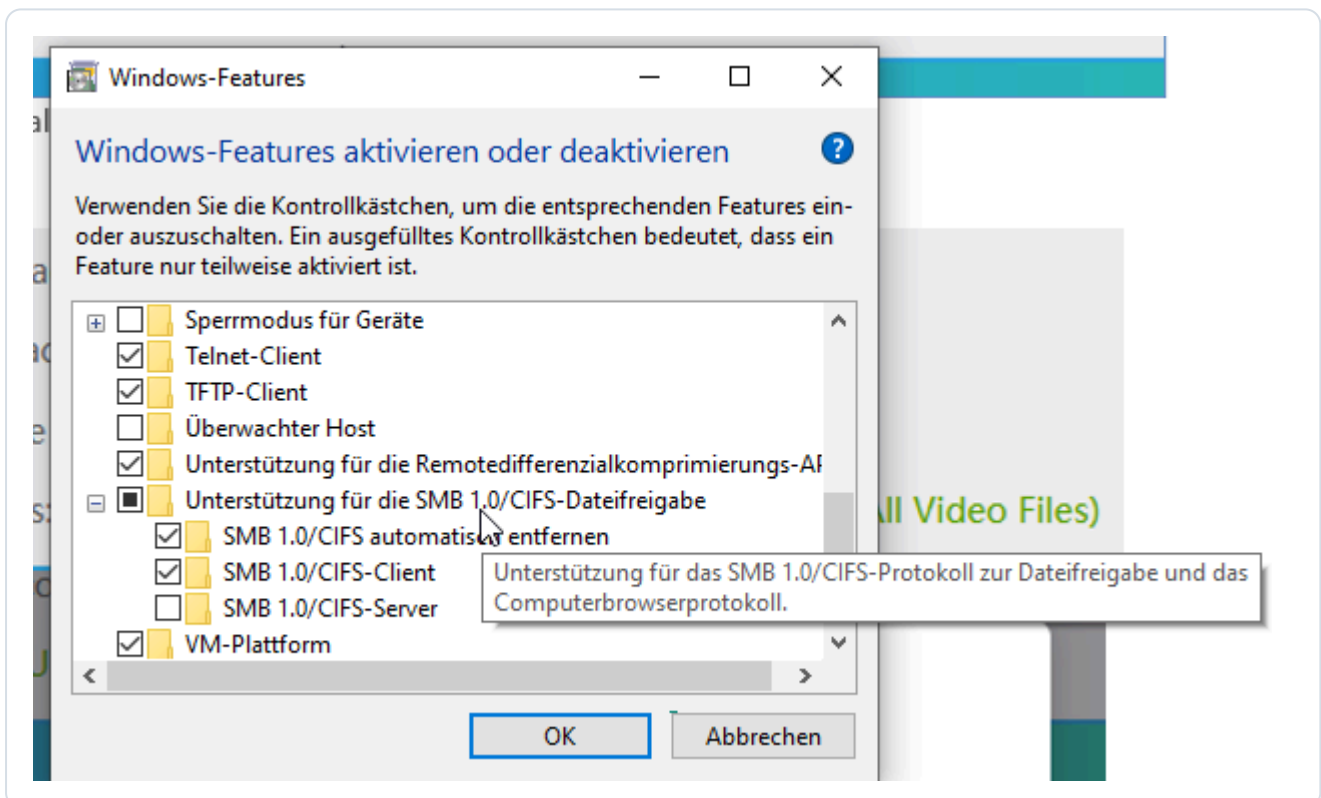
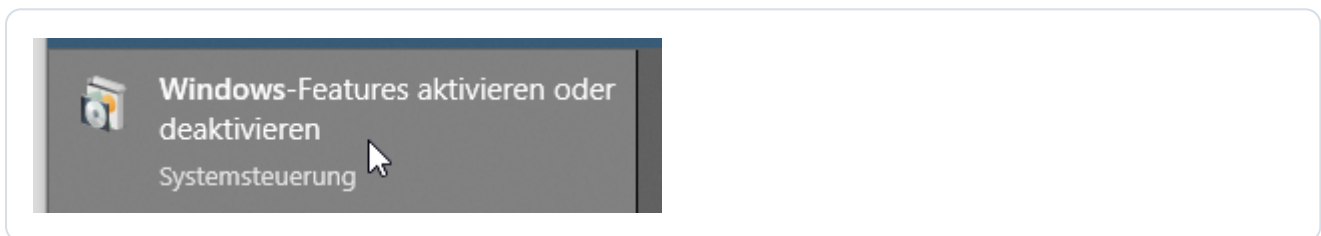




Please confirm the message.

To access the USB drive from a Windows computer, you need to enable SMB 1.0 support (Windows disables it by default for security reasons):

SMB 1.0 support (Windows)



It can also be enabled from an administrator PowerShell console; a reboot is required:

```
Enable-WindowsOptionalFeature -Online -FeatureName
smb1protocol
```

Administrator: Windows PowerShell

```
Windows PowerShell
Copyright (C) Microsoft Corporation. Alle Rechte vorbehalten.

Lernen Sie das neue plattformübergreifende PowerShell kennen - https://aka.ms/pscore6

PS C:\WINDOWS\system32> Enable-WindowsOptionalFeature -Online -FeatureName smb1protocol
```

For Linux, please refer to the documentation of your distribution.

To access the USB share, copy the share path and enter it in Windows Explorer:

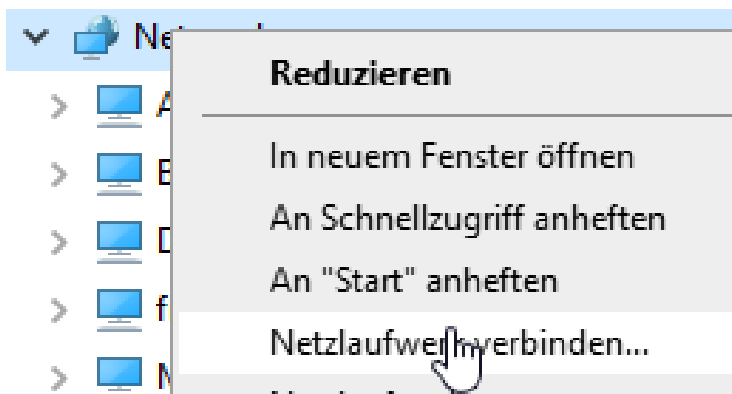
Record Status

Total Disk Space: 3831 MByte

Free Disk Space: 3713 MByte

SMB/CIFS File Share: \\192.168.1.168\encoder\

Record Status: Not Recording (Start Record) (Unmon



then map it to a drive letter:

Welcher Netzwerkordner soll zugeordnet werden?

Bestimmen Sie den Laufwerksbuchstaben für die Verbindung und den Ordner, mit dem die Verbindung hergestellt werden soll:

Laufwerk: R: ▾

Ordner: \\192.168.1.168\encoder\ ▾ Durchsuchen...

Beispiel: \\Server\Freigabe

☐ Verbindung bei Anmeldung wiederherstellen

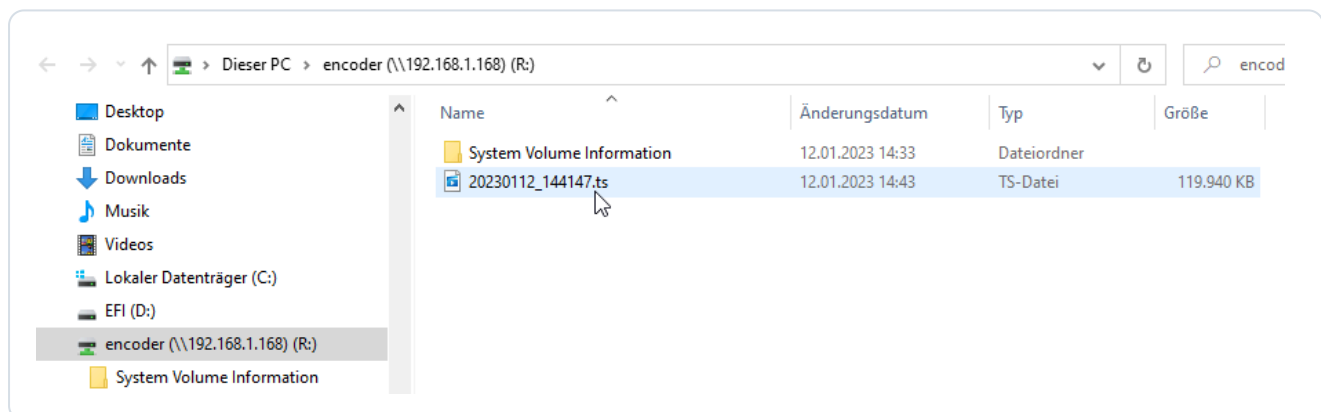
☐ Verbindung mit anderen Anmeldeinformationen herstellen

[Verbindung mit einer Website herstellen, auf der Sie Dokumente und Bilder speichern können](#)

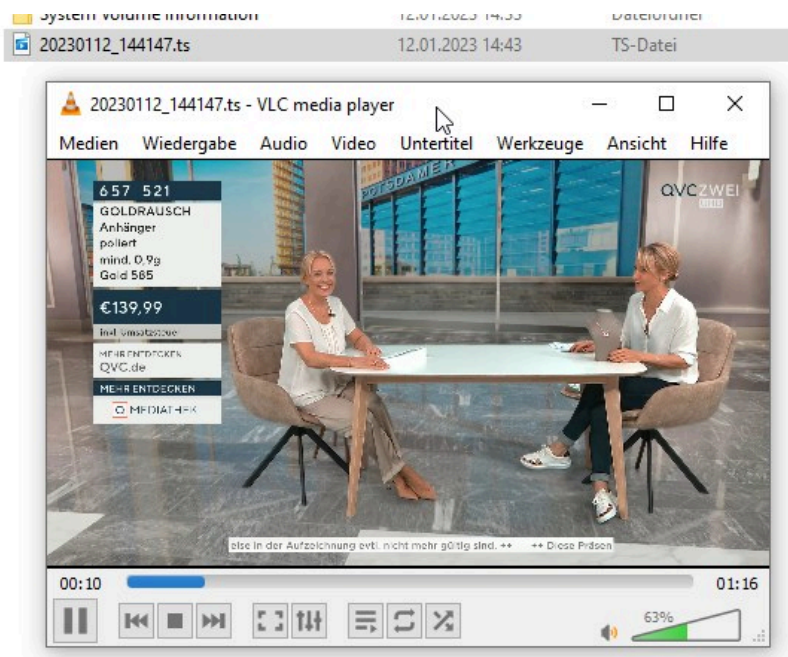
Fertig stellen

Abbrechen

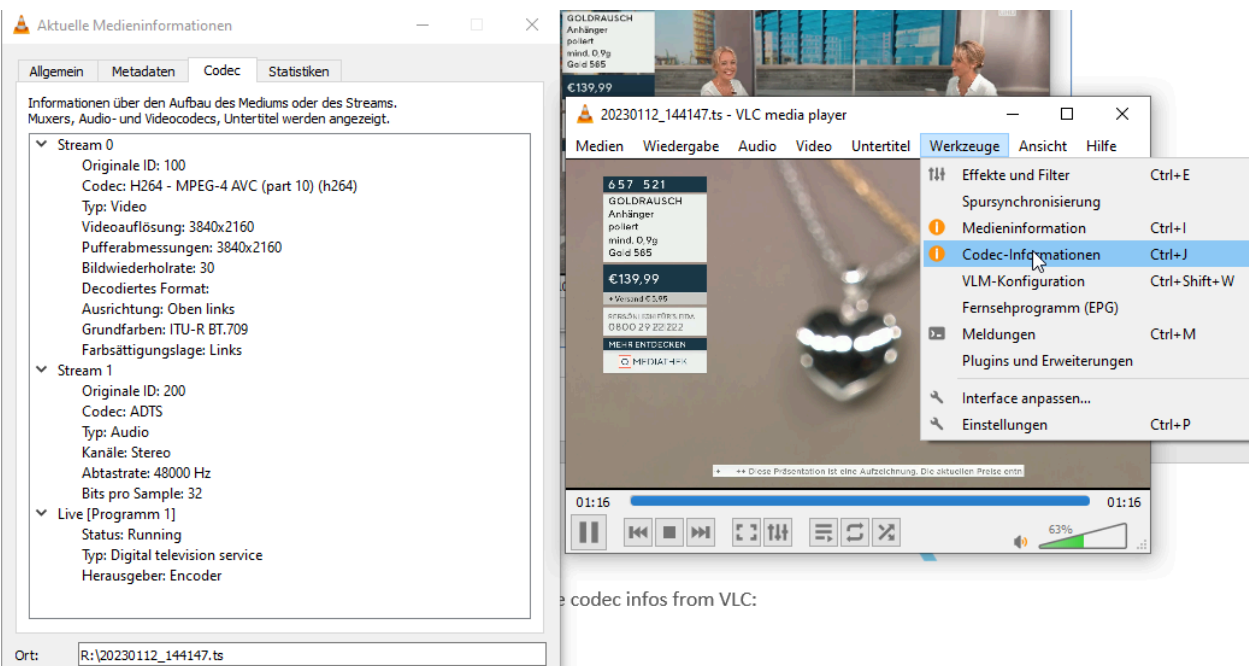
Done:



Now you can copy, delete or play the TS files – here with VLC:



VLC also shows the codec information:



the codec infos from VLC:

Status page: stream information

Main stream

Input: HDMI

Encode Type: H.264/AVC High Profile 4:2:0 8bit

Encoding Type: 3840x2160@30

Bitrate(kbit): 8000

Realtime: 11339kbps 29.41fps

TS URL: http://192.168.1.168/0.ts http://192.168.1.168:8086/0.ts

HLS TS URL: Disable

HLS MP4 URL: Disable

MP4 URL: <http://192.168.1.168/0.mp4>

FLV URL: http://192.168.1.168/0.flv http://192.168.1.168:8086/0.flv

RTSP URL: rtsp://192.168.1.168/0 rtsp://192.168.1.168:8554/0

RTMP URL: Disable

RTMP(S) PUSH URL: Disable

Multicast URL: udp://@238.0.0.1:1234

SRT URL: srt://192.168.1.168:9000

SRT PUSH URL: Disable

HLS PUSH URL: Disable

[Preview\(HTML5\)](#)

The status page shows all stream information you have configured for encoding and streaming. You can mark, copy and paste the URLs with the mouse:

HLS MP4 URL: Disable

MP4 URL: <http://192.168.1.168/0.mp4>

FLV URL: http://192.168.1.168/0.flv http://192.168.1.168:8086/0.flv

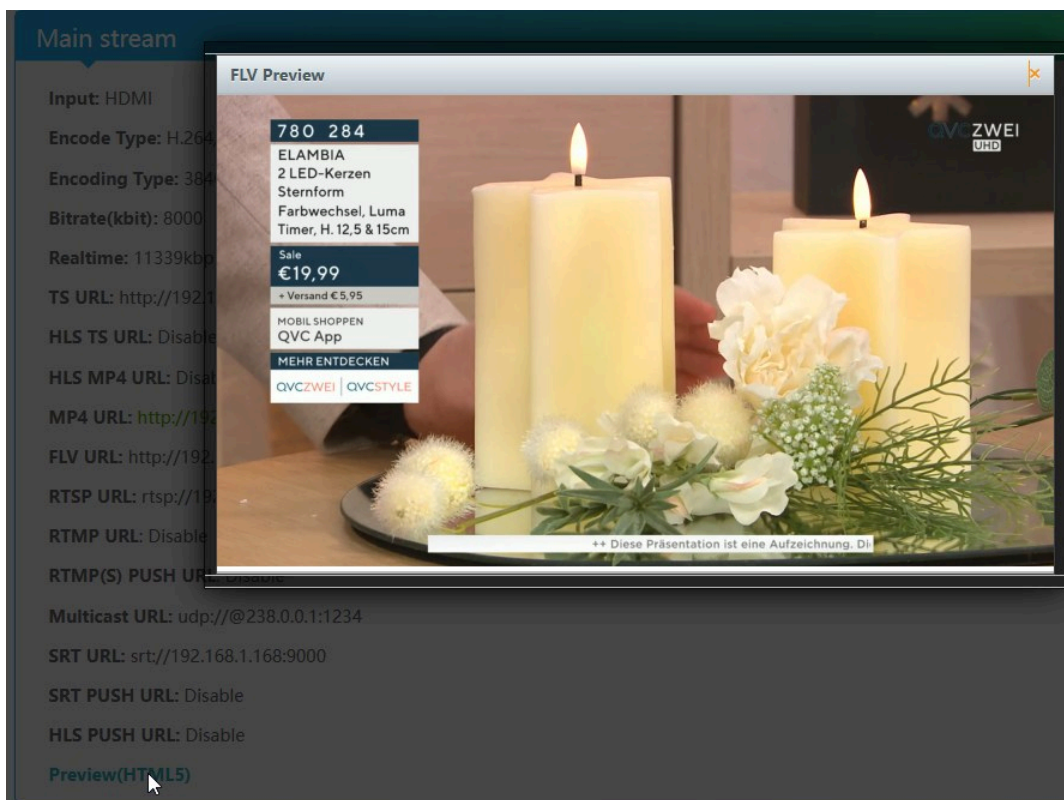
RTSP URL: rtsp://192.168.1.168/0 rtsp://192.168.1.168:8554/0

Clicking the MP4 link works only with the H.264 codec in modern browsers:



Preview player

Alternatively, use the preview player pop-up:



HEVC preview

The HEVC preview also works when the FLV stream is enabled, but without play, stop and pause functions.

In the main stream settings:

Main stream

Input: HDMI ▾

Type: H.265 ▾

Format: 4:2:0 8bit ▾

Profile: HEVC Main (Default) ▾

FPS: Auto ▾

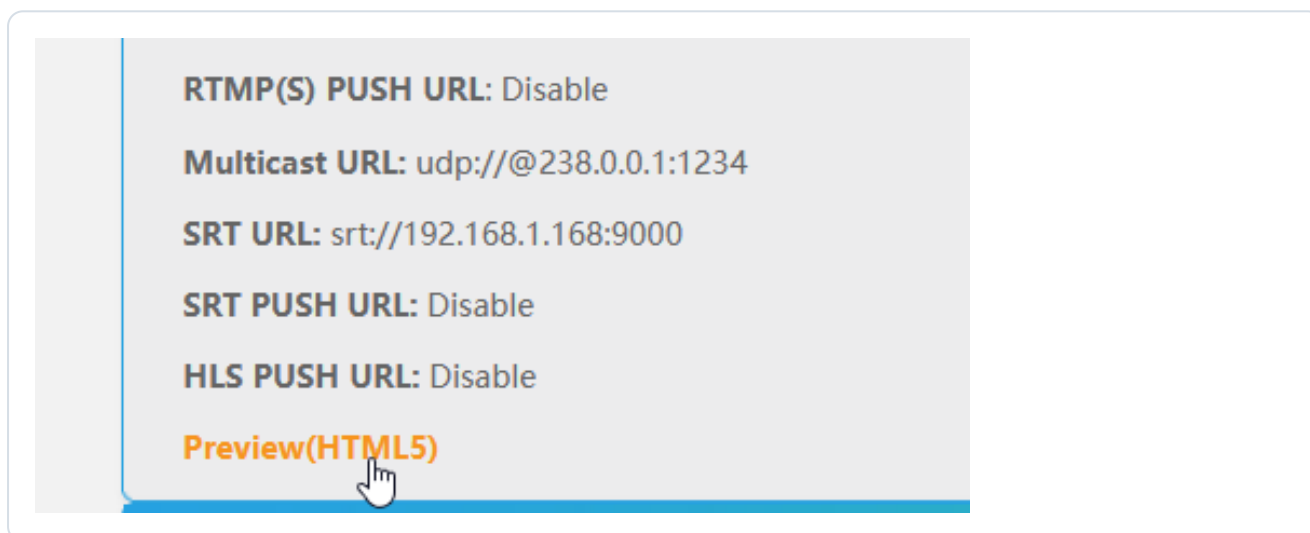
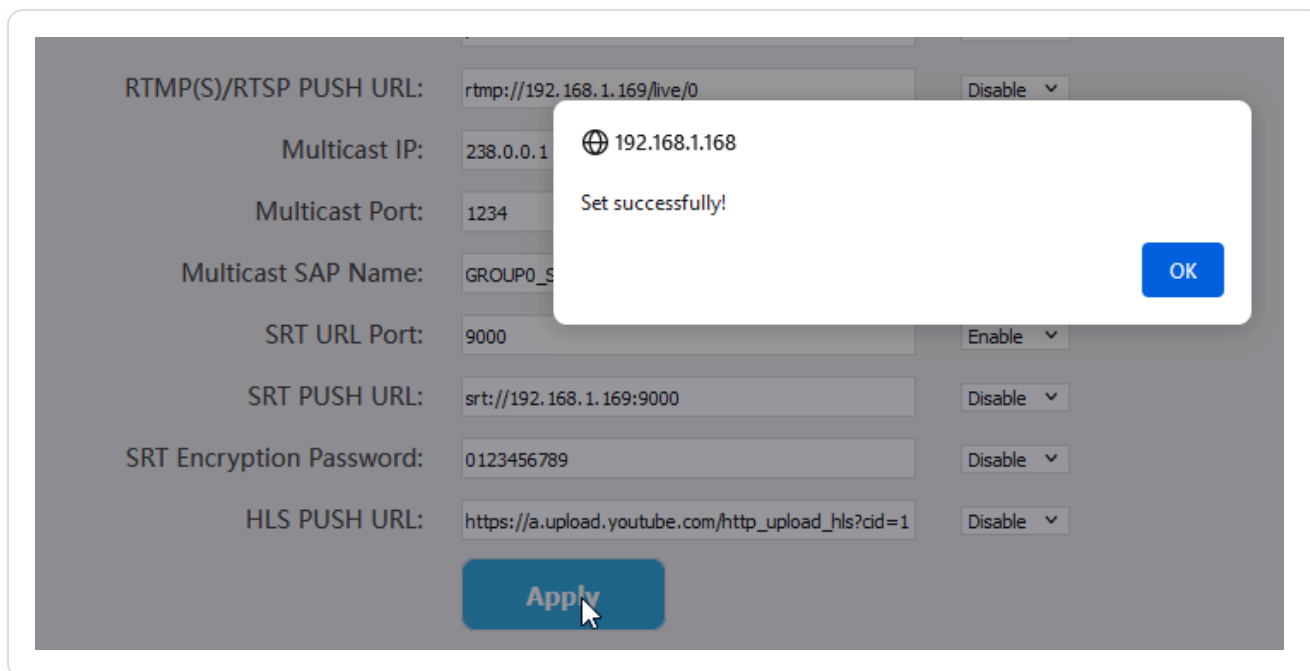
MP4 URL: /0.mp4 Enable ▾

FLV URL: /0.flv Enable ▾

RTSP URL: /0 Disable ▾

RTMP URL: /0 Disable ▾

- Do not forget to click **Apply**!



Main stream

Input: HDMI

Encode Type: H.265/HEVC Main Profile 4:2:0 8bit

Encoding Type: 3840x2160@30

Bitrate(kbit): 8000

Realtime: 3351kbps 29.89fps Locked

TS URL: http://192.168.1.168/0.ts http://192.168.1.168/0.mpegts

HLS TS URL: Disable

HLS MP4 URL: Disable

MP4 URL: http://192.168.1.168/0.mp4

FLV URL: http://192.168.1.168/0.flv http://192.168.1.168/0.m3u8

RTSP URL: rtsp://192.168.1.168/0 rtsp://192.168.1.168/0.sdp

RTMP URL: Disable

RTMP(S) PUSH URL: Disable

Multicast URL: udp://@238.0.0.1:1234

SRT URL: srt://192.168.1.168:9000

SRT PUSH URL: Disable

HLS PUSH URL: Disable

Preview(HTML5)

FLV Preview

779 920

LUMIDA Flora
künstl. Pampasgras
20 warmweiße LEDs
inkl. Topf
Höhe 76cm

Sale
€39,99
inkl. Umsatzsteuer

MEHR ENTDECKEN
QVC.de

ALTE GERÄTE
GRATIS
ENTSORGEN

QVCZWEI
HD

hnung evtl. nicht mehr gültig sind. ++ ++ Diese Präsentation ist eine Auf

The same applies to the secondary (sub) stream encoder.

The following sections explain the common encoder values, which are located in the system settings menus.

Encoder and system settings

Common encoder values, streaming protocols, transport stream tables, OSD and audio settings.

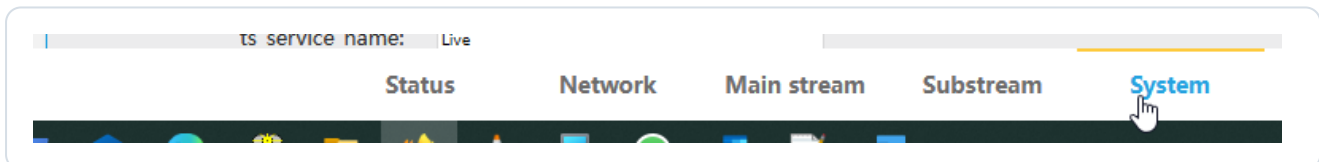
IRENIS / BLANKOM · Quick Start Manual · Ralf Riedel, Director Technical Sales & Engineering, IRENIS GmbH

In this part [System – Advanced settings](#) [HLS](#) [SRT](#) [SRT Live Server \(SLS\)](#) [SRT network latency](#)
[TS tables](#) [Transport stream \(TS\) settings](#) [System settings](#) [SAR settings](#) [Reverse proxy \(FRP\)](#)
[Bitrate](#) [Encoded size and bitrate control](#) [OSD: on-screen display \(logo and text\)](#) [ONVIF](#)

KEY POINTS

- SRT works only in pairs: the receiving device must support SRT.
- For RTP multicast use an even port number above 5000, e.g. 5004.
- Logos can be uploaded as BMP (background colour 0xF1F1F1 becomes transparent) or as transparent PNG.
- RTMP(S) is in practice limited to H.264; to send H.265 to YouTube use HLS push.

System – Advanced settings



At the top:



HD Encoder System Platform Version: 4.59X

Change password

Old password:

New password:

Confirm password:

Apply

This is self-explanatory.

Here you can adjust many parameters of the encoding process:

Advanced

Device Name:

Encoder_49126

EDID:

0.3840x2160@60_SAMSUNG_U32H85x

Gamut:

0.3840x2160@60_SAMSUNG_U32H85x

Color Range:

1.4096x2160@60_ITE

Video Only:

2.1920x1080@60_DELL_U2414H

Audio Only:

3.2560x1440@60_SAMSUNG_S27H85x

AV Sync Strategy:

4.2560x1440@144_Capture

Record File Splitter Time(min):

5.1920x1080@60_DV_D241FL

6.Default(1080P60)

7.1920x1080@60_DELL_U2414H

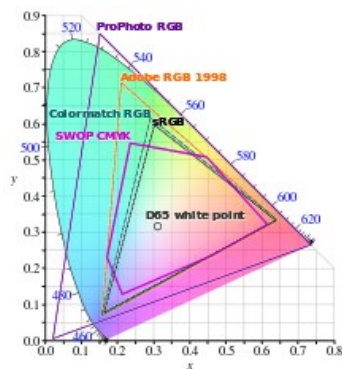
8.1920x1080@60_ITE

9.1920x1080@60_RGB

[5-300]

First of all, the EDID that the unit presents to the source, depending on how you want to process your inputs.

Gamut:



Gamut: BT709

Color Range: BT601_PAL

Video Only: BT709

Audio Only: SMPTE_240M

See <https://en.wikipedia.org/wiki/Gamut>

Video only and audio only need no explanation.

The colour range (TV or PC) may be of interest:

Color Range: TV

Video Only: Disable

Audio Only: Disable

AV Sync Strategy: Resample

Record File Splitter Time(min):

If you notice lip-sync problems, try this setting.

HLS

HLS (developed by Apple) is a streaming protocol with high latency. The tutorials section of our website contains several documents about latency.

Hls Splitter Time(s):	10	[3-20]
Hls Number:	5	[3-20]
SRT Latency(ms):	150	[1-10000]
SRT Bandwidth(KByte, 0=nolimit):	0	[0-102400]

You can experiment with these HLS values.

SRT

SRT has become the most widely used protocol for reducing network-related latency.

We have published our own SRT document – also available for download in the tutorials section of our website.

Deinterlaced:	Bottom Only
Net Drop Threshold:	Both
TS muxer:	Bottom Only
	Field To Frame

If you see jerky images in fast horizontal motion (e.g. Formula 1 races), select **Bottom only** here. This reduces such artefacts in the encoder.

More details:

<https://www.srtalliance.org>

What is SRT?

Secure Reliable Transport (SRT) is an open-source protocol and technology stack designed for live video streaming over the public internet.

SRT provides connection control and reliable transmission similar to TCP, but at the application layer, using UDP as the underlying transport. It supports packet recovery while maintaining low latency (default: 120 ms), and it supports AES encryption.

Source: https://en.wikipedia.org/wiki/Secure_Reliable_Transport

Note: SRT works only in pairs – the receiving device must support SRT.

SRT is supported by our video encoders and decoders. They work with Haivision Play, Larix Broadcaster and other SRT applications.

SRT Live Server (SLS)

Our video encoder supports SRT Live Server (SLS).

Introduction

SRT Live Server (SLS) is an open-source, low-latency live streaming server based on Secure Reliable Transport (SRT).

Over the internet, the transport latency via SLS is normally below one second.

Requirements

Install SRT first; see <https://github.com/Haivision/srt> for the system requirements. SLS runs only on Linux-based operating systems such as macOS, CentOS or Ubuntu.

Source: <https://github.com/Edward-Wu/srt-live-server>

Use the following URL to send the stream to your Docker container:

```
srt://your.server.ip:1935?streamid=input/live/yourstreamname
```

SRT URL Port:	9000	Enable ▾
SRT PUSH URL:	srt://192.168.1.169:9000	Disable ▾
SRT Encryption Password:	0123456789	Disable ▾
HLS PUSH URL:	https://a.upload.youtube.com/http_upload_hls?cid=1	Disable ▾

Fill in:

SRT PUSH URL:	srt://your.server.ip:1935?streamid=input/	Enable ▾
---------------	--	----------

For point-to-point transmission, select **SRT PUSH** and enter the destination IP address and port.

YouTube supports HLS, so you can push the stream to YouTube with your own account data.

SRT network latency

Depending on the firmware version, the SRT network latency can be set in the SYSTEM menu:

SRT Latency(ms):	150	[1-10000]
SRT Bandwidth(KByte, 0=nolimit):	0	[0-102400]

SRT is designed as a fast transport protocol for low latency over public networks.

If the output stream drops packets – visible as disturbed pictures with macroblocks, or video that freezes periodically – your network may carry a lot of unexpected traffic, which can also make the unit and its web interface react slowly. You can make the encoder more robust by setting **Net Drop Threshold** to 500, i.e. lower than the default:

Net Drop Threshold:	5000	[50-50000]
---------------------	-----------------------------------	------------

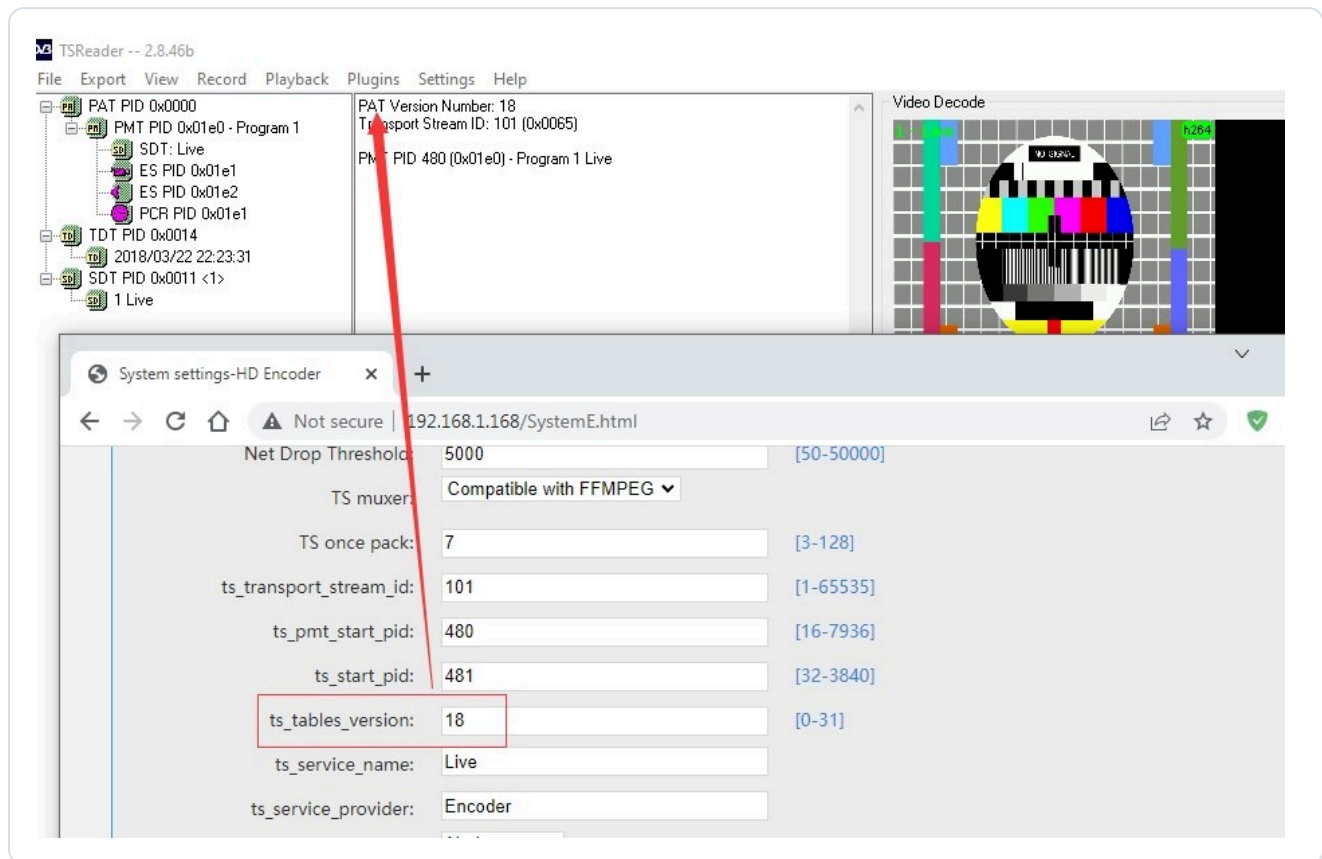
TS muxer:	Compatible with FFmpeg	
TS once pack:	7	[3-128]
TS TDT:	Enable	
ts_transport_stream_id:	101	[1-65535]
ts_pmt_start_pid:	480	[16-7936]
ts_start_pid:	481	[32-3840]
ts_tables_version:	6	[0-31]
ts_service_id:	1	[1-65535]
ts_service_name:	Live	
ts_service_provider:	Encoder	
ts_system_b:	Disable	
TS Empty Packet:	No Insert	

The following settings mainly concern the DVB conformity of the transport stream and the DVB tables it contains:

- TS muxer: VLC-compatible (possible issues cannot be ruled out)
- or FFmpeg, which we recommend.

TS tables

The TS tables version refers to the PAT (see MPEG/DVB):



Transport stream (TS) settings

TS = transport stream. The TDT (time and date table) can be provided by enabling the NTP function of the unit. It does not fully support DVB-style TDT/TOT, so there is no offset table and no country/region setting. The TS ID is required for the table structure. A small manual cannot explain all DVB tables – please refer to dvb.org and to the tutorials on our website.

PMT = program map table, which is essential for the TV service you are streaming.

PIDs are the packet identifiers that link the table structures.

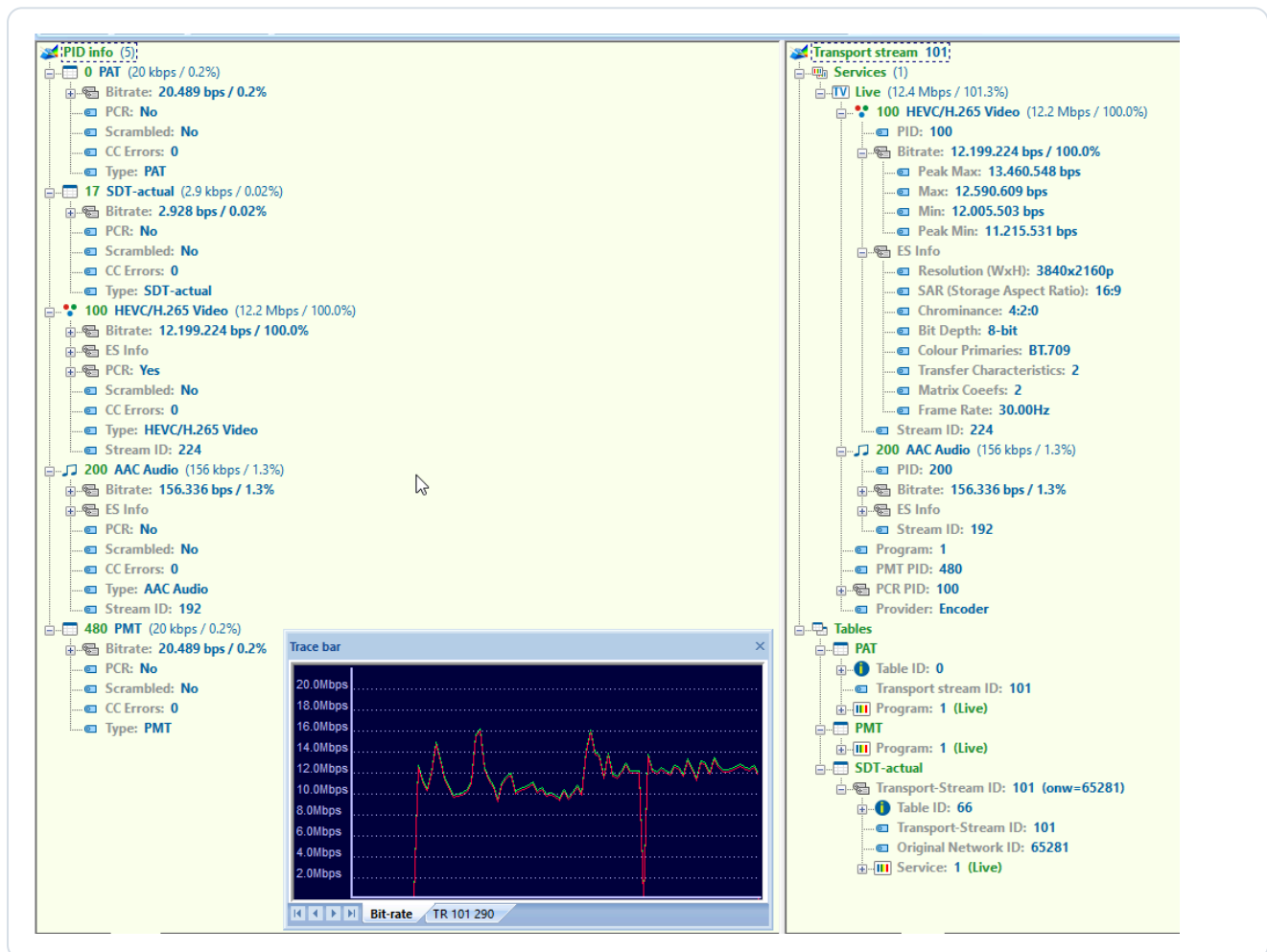
TS empty packet insertion adds null packets with PID 8191 (decimal, not hex) to fill the transport stream to an almost constant bitrate (CBR). Do not confuse this with CBR as an encoding method.

A video stream is usually transmitted with a variable bitrate (VBR), because picture and audio content fluctuate. Again, this is different from VBR as an encoding method.

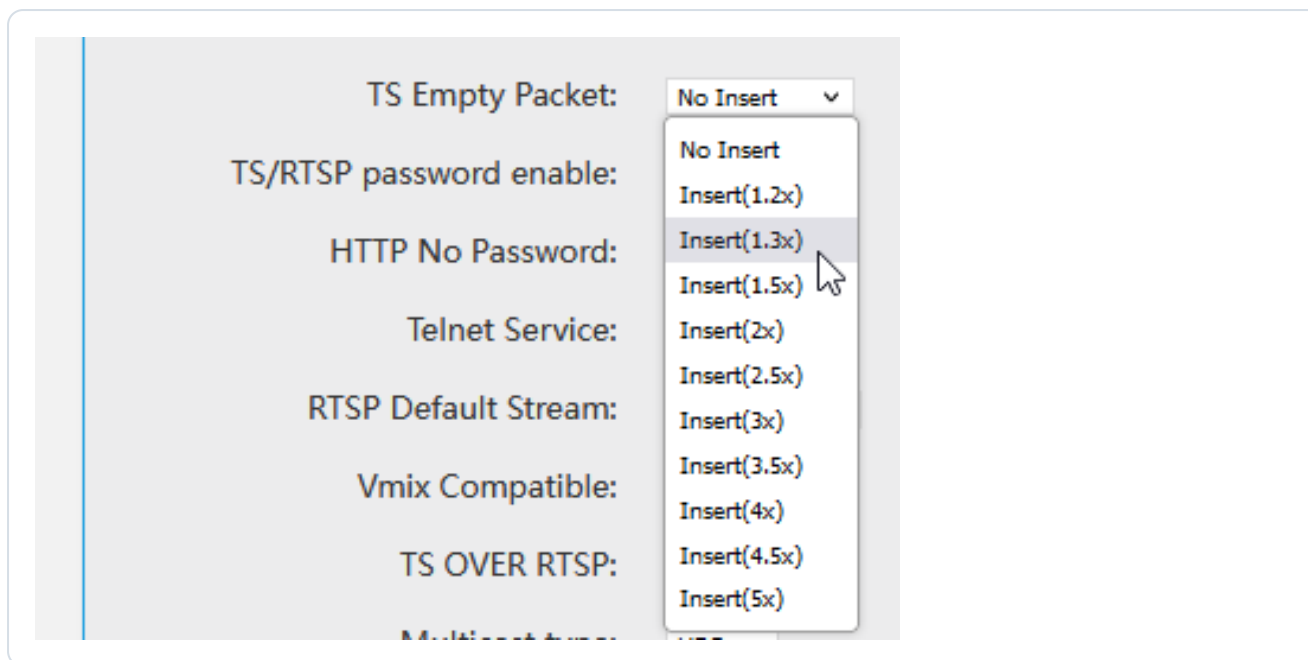
Example: variable bitrate (VBR) stream:



The related DVB PIDs (left) and TS table content (right):

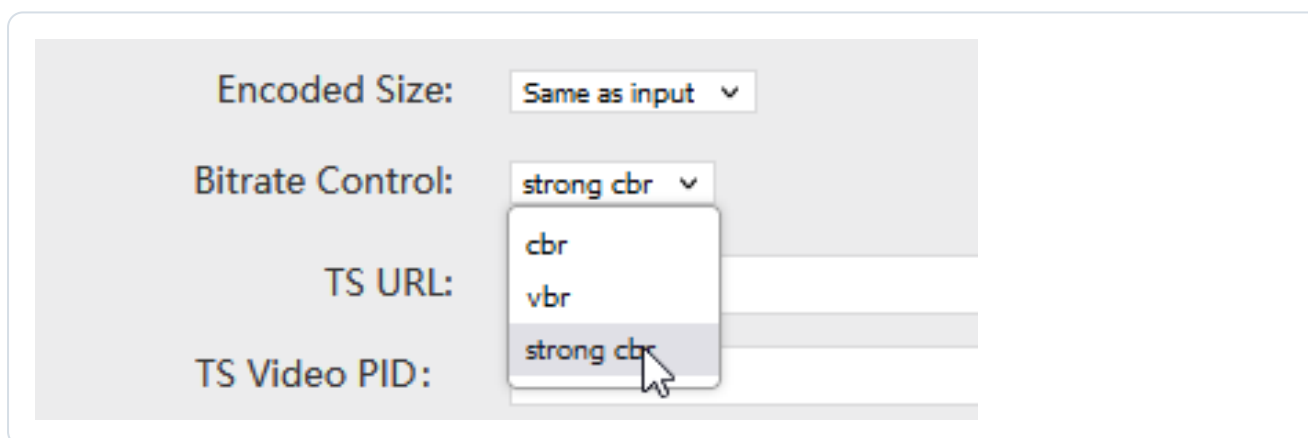
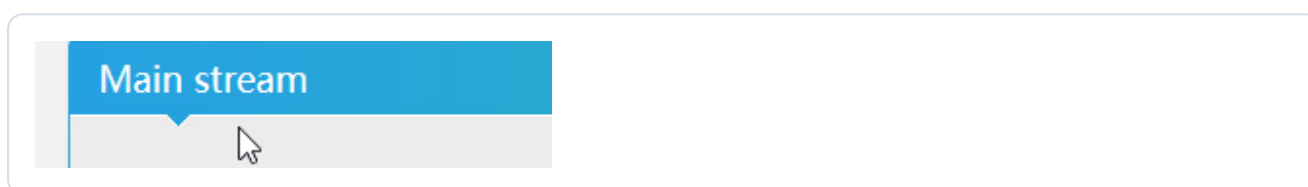


To produce a transport stream with null packets – some IP to DVB-QAM modulators need this (tested with the STN Holland 2x4 QAM modules) – use factor 1.3 here



and change the mode to CBR here:

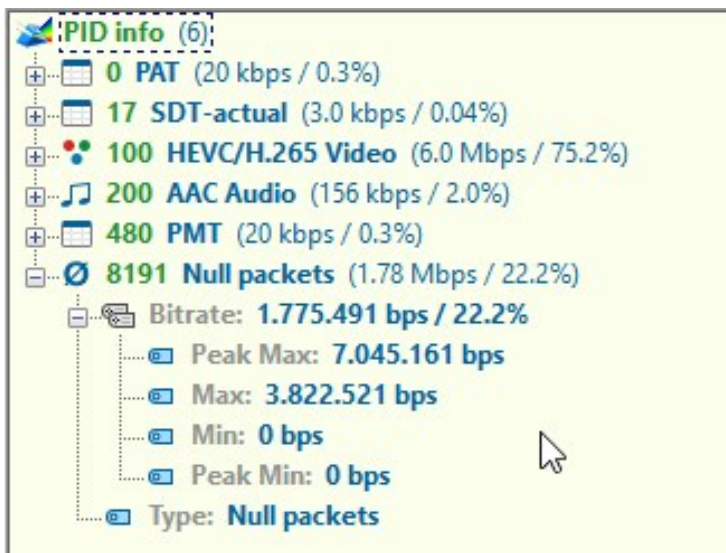
in the main or secondary stream menu:



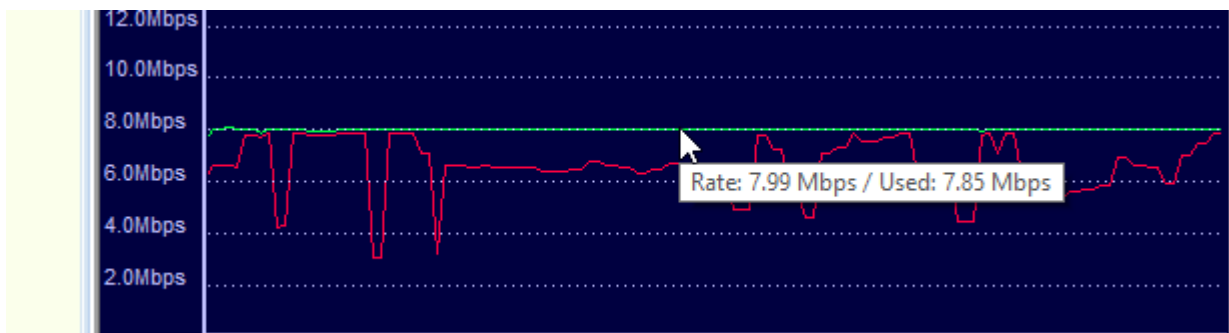
NOTE

Customers have reported that the older Cisco DCM (edge QAM = IP to DVB-C modulator) has problems importing the streams of our encoder error-free. Our research shows that the stream values, including the PCR jitter of the video PIDs, are within the limits of the standards; we cannot change the input behaviour of the Cisco unit.

This inserts PID 8191 (decimal):



See also:



System settings

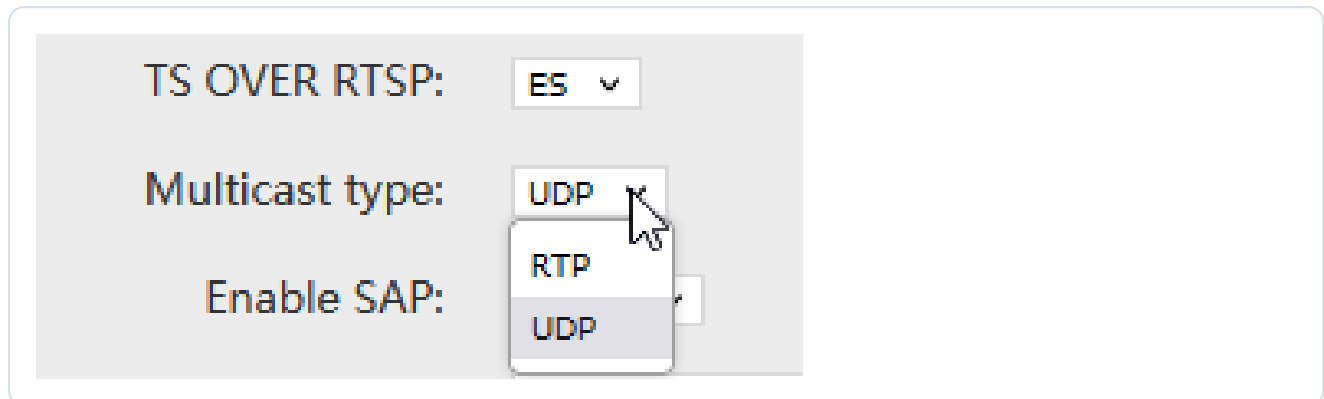
TS/RTSP password enable:	Disable ▾
HTTP No Password:	Disable ▾
Telnet Service:	Enable ▾
RTSP Default Stream:	Main Stream ▾
Vmix Compatible:	Disable ▾
TS OVER RTSP:	ES ▾

Here you can protect the streams with user name and password. The credentials are the same as for the encoder (default: admin/admin).

Telnet access and the RTSP default stream can also be enabled here.

vMix is a media server and internet streaming service similar to YouTube. To enable it, you need access to a vMix server: <https://www.vmix.com/>

If you face problems, try the vMix-compatible setting.



TS over RTSP can be set to TS or ES (elementary stream).

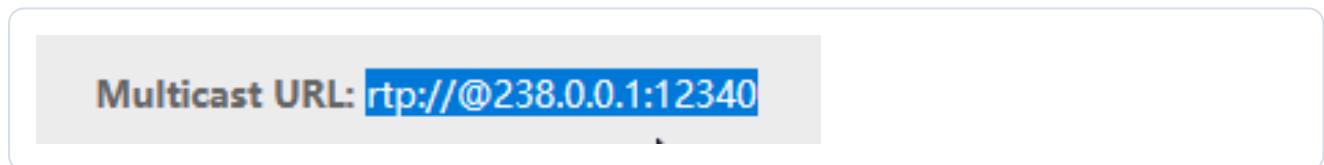
The multicast type (for all multicast outputs of the main and secondary stream) can be UDP or RTP.

Rules for RTP:

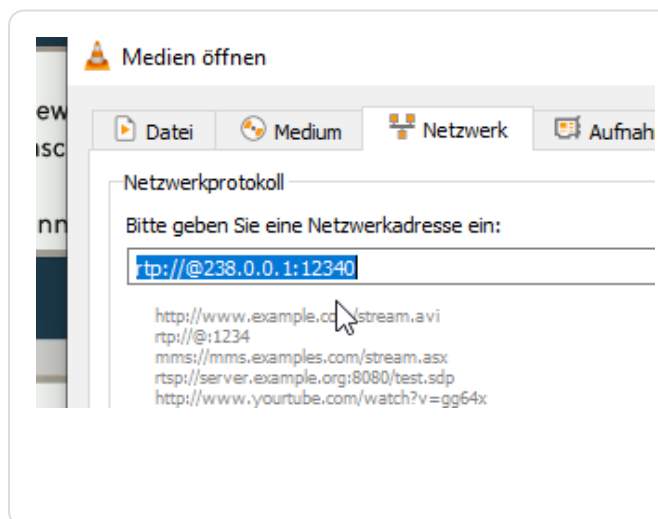
The port number should be higher than 5000 and even, e.g. 5004,

because RTP sends a second stream with timing and packet information on port number + 1, which is then odd.

For RTP, enter the address in VLC as follows:



In VLC:



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)				

Enable SAP:	Enable	
MTU Size:	1500	[500-1500]
UDP TTL:	64	[1-254]
UDP SOCKET_BUF_SIZE:	20971520	(0-20971520)

SAP stands for the broadcast protocol SAP/SDP.

The Session Announcement Protocol (SAP) is an experimental protocol for advertising multicast session information. SAP typically uses the Session Description Protocol (SDP) to describe Real-time Transport Protocol (RTP) sessions. Announcements are sent using IP multicast and UDP.

Under SAP, senders periodically transmit SDP descriptions to a well-known multicast address and port (9875). A listening application builds a guide of all advertised multicast sessions.

SAP was published by the IETF as RFC 2974.

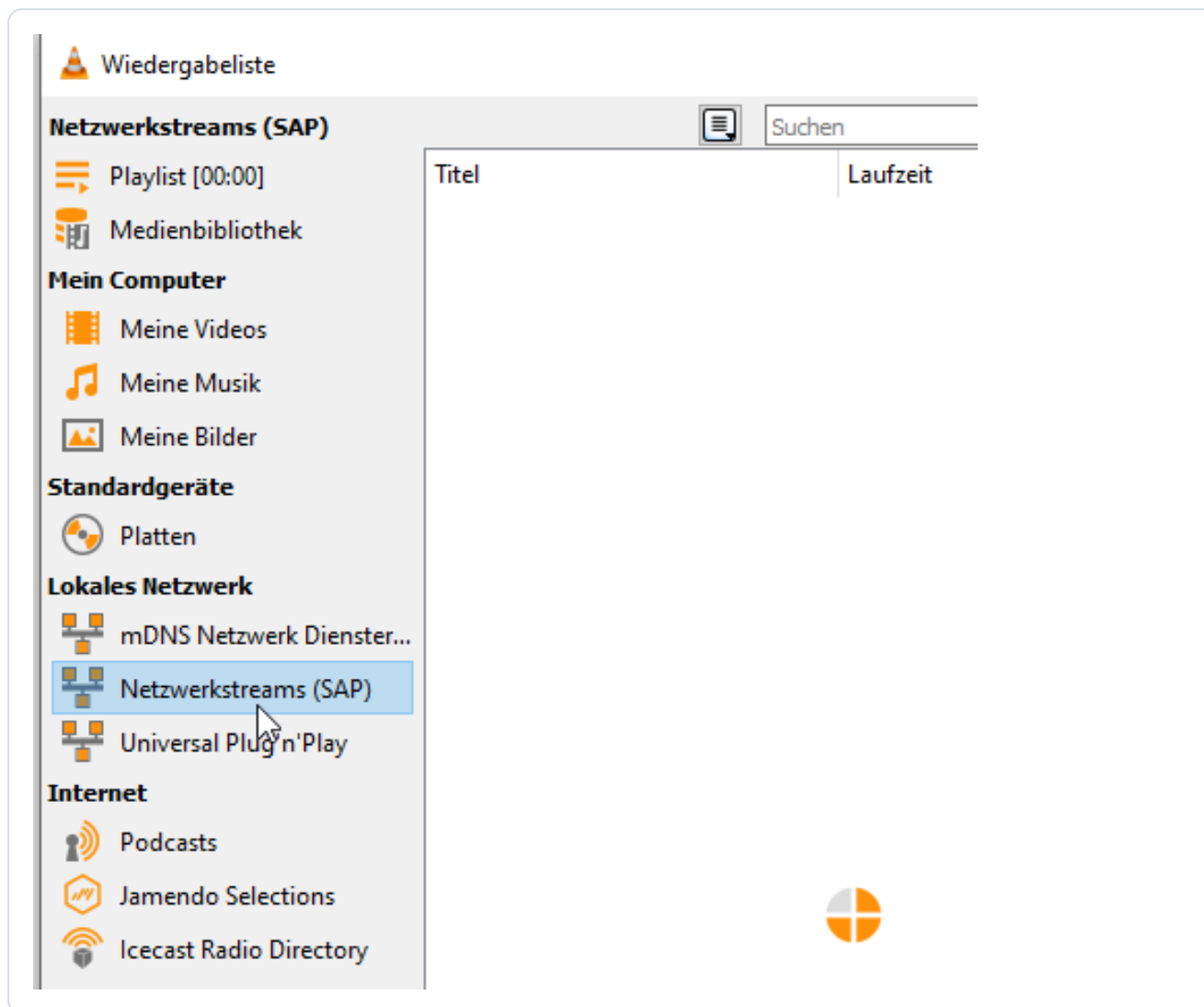
Note about SAP:

IPv4 global-scope sessions use multicast addresses in the range 224.2.128.0 – 224.2.255.255, with SAP announcements sent to 224.2.127.254, port 9875 (224.2.127.255 is used by the obsolete SAPv0 and must not be used).

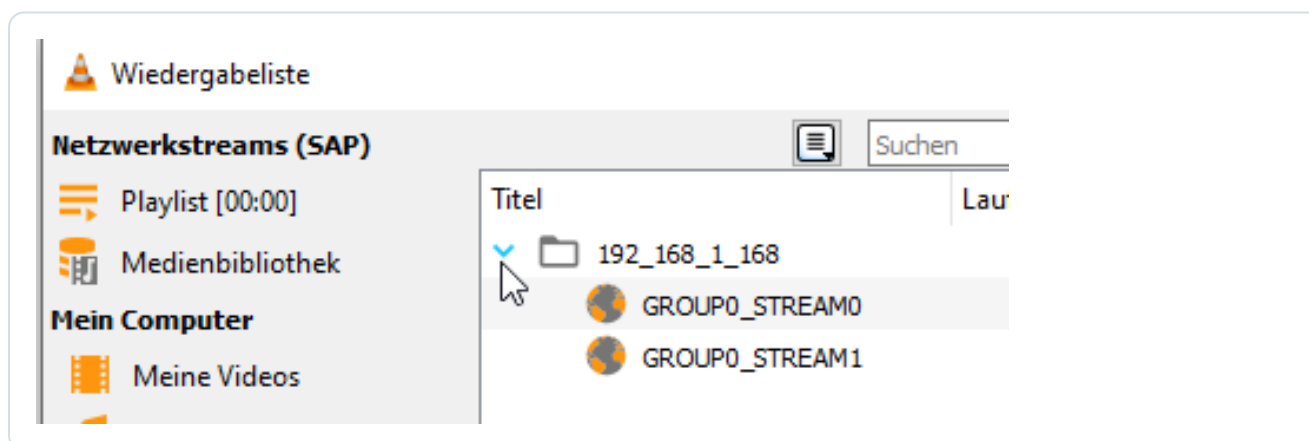
IPv4 administrative-scope sessions use administratively scoped IP multicast. The announcement address is the highest multicast address in the relevant administrative scope zone.

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.

You can search with VLC – VLC supports SAP:

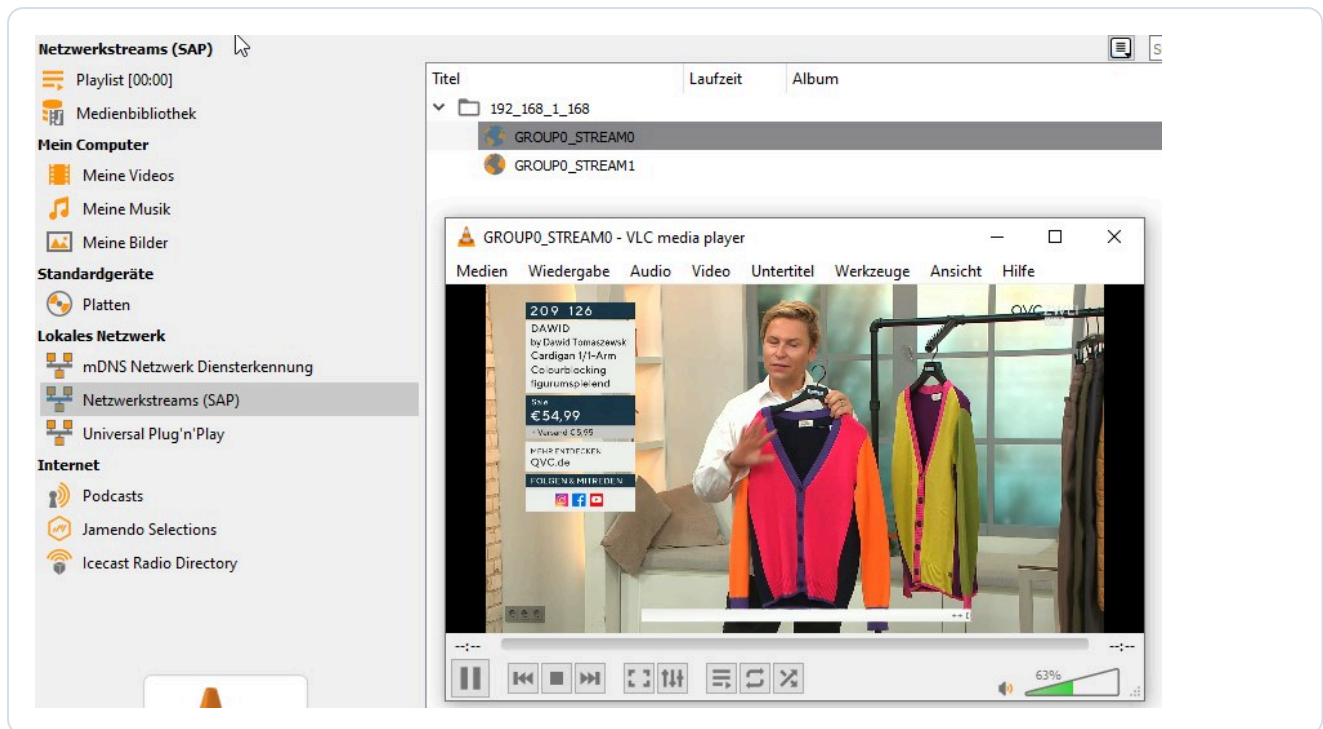


After a while, VLC finds the multicast from the encoder.



Open the group of the IP address to see the main and secondary stream entries.

Double-click an entry to open it:



SLICE Number:	1	[1-255]
MIN_QP:	5	[1-35]
MAX_QP:	42	(MIN_QP-50)

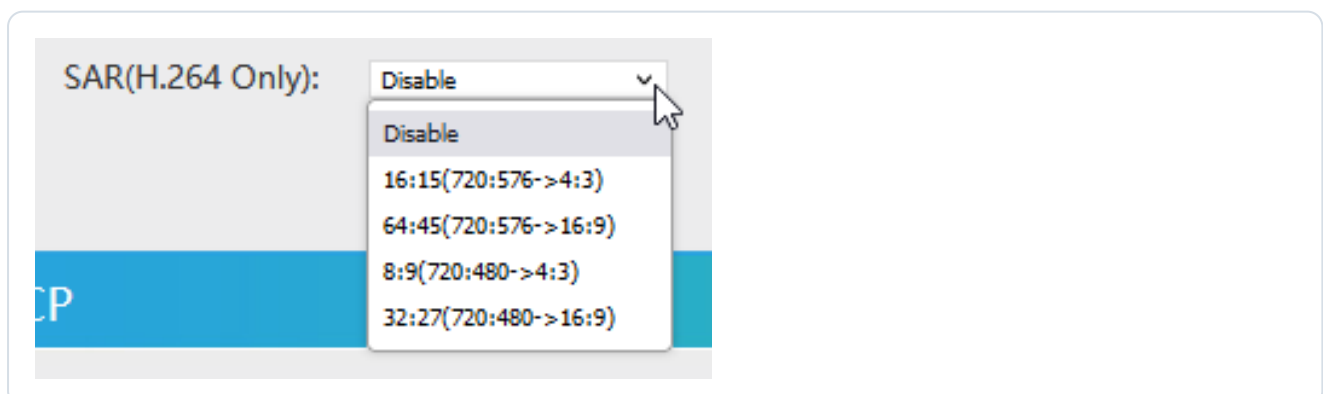
The number of slices can also be selected; this depends on the codec:

One characteristic of H.264/AVC is that an image can be divided into regions called slices. Each slice contains a sequence of macroblocks and can be decoded independently of the others. The macroblocks are processed in scan order, normally left to right, starting at the top. A frame can consist of a single slice or of several slices for parallel processing and error resilience, because an error in a slice propagates only within that slice.

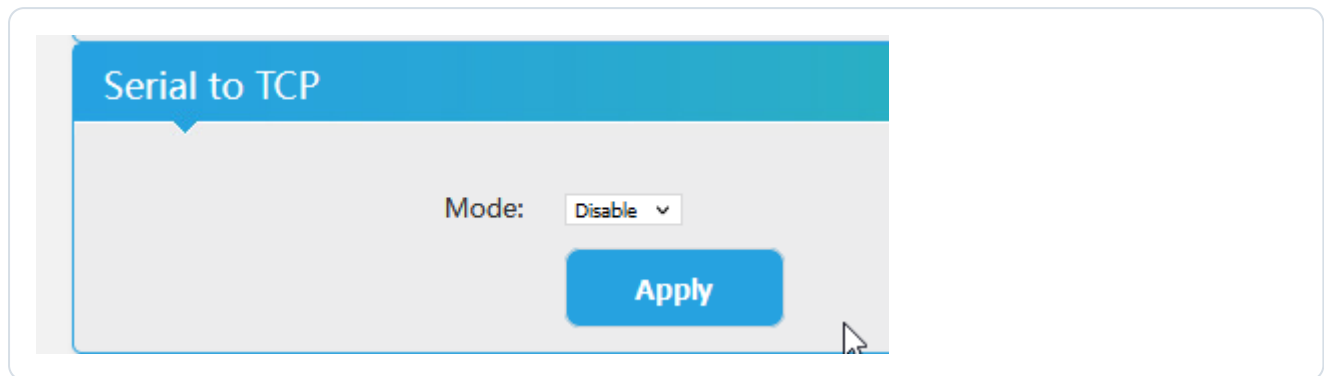
We recommend keeping the slice number and the MAX_QP/MIN_QP values unchanged.

Change them only if you know exactly what you are doing.

SAR settings



If you downscale, or use a source in an older format such as PAL (720 × 576, mostly 4:3), you can correct the “egghead” effect here to obtain correct output resolutions and aspect ratios.

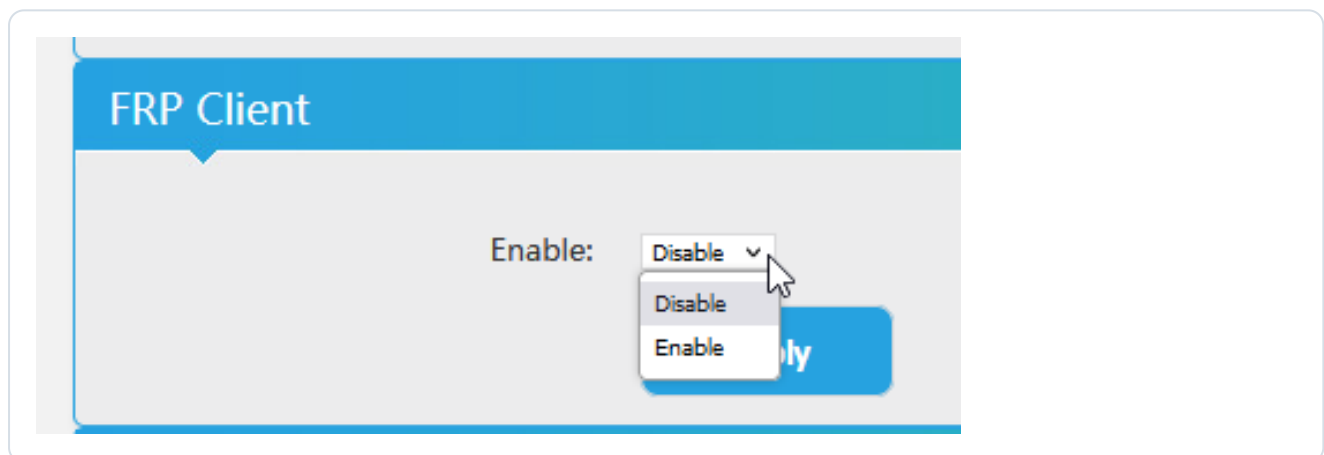


Serial to TCP is a special protocol that tunnels a serial connection (RS-232 or similar) over TCP. You need a suitable tool on your computer.

Some links:

<https://sourceforge.net/projects/serialtoip/>

See also the short extract about serial over TCP (remserial) at the end of this manual.



Reverse proxy (FRP)



FRP is a fast reverse proxy that exposes a local server behind NAT or a firewall to the internet. It supports TCP and UDP as well as HTTP and HTTPS; requests can be forwarded to internal services by domain name.

<https://gabrieltanner.org/blog/port-forwarding-frp/>

<https://administrator.de/tutorial/webdienste-ohne-dyndns-frp-fast-reverse-proxy-4337471392.html>

You can schedule a restart of the encoder, for example to re-synchronize to sources that fluctuate in your TV network:

The screenshot shows two configuration sections. The first section, titled 'Schedule restart', has a 'Restart enable:' dropdown set to 'Disable' and a 'Restart time:' input field containing '09:30'. Below these is a blue 'Apply' button. The second section, titled 'NTP', has an 'NTP Enable:' dropdown set to 'Disable', an 'NTP Server:' input field containing 'time.windows.com', and a 'Time Zone:' dropdown set to 'UTC+1'. Below these is another blue 'Apply' button.

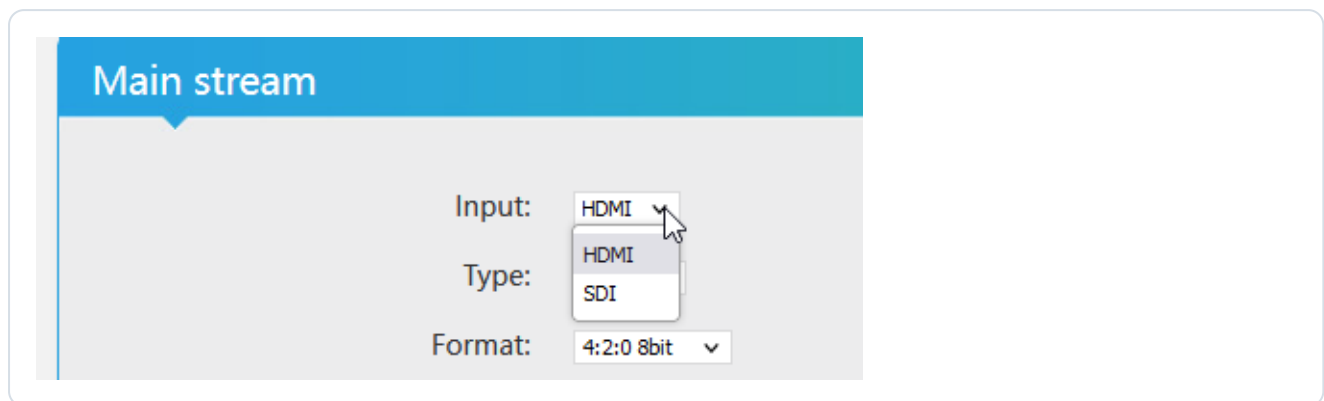
For this, enable **NTP** so that the encoder knows the current date and time.

These functions are self-explanatory:

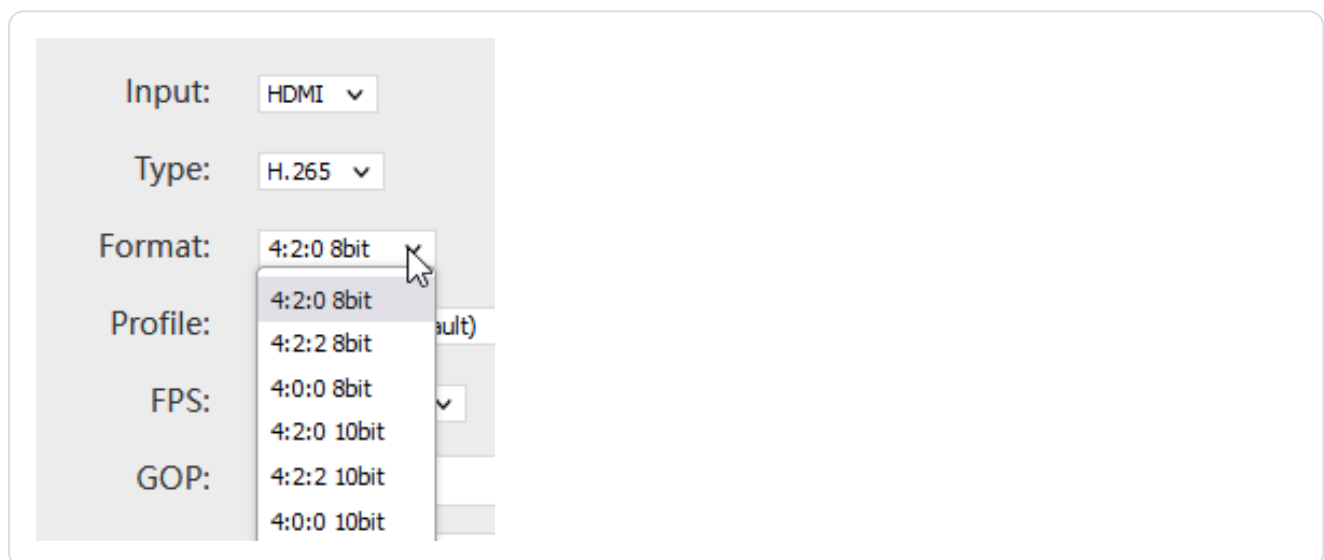
The screenshot shows three sections. The first, 'Upload firmware and configuration', includes a 'Select File:' label, a 'Durchsuchen...' button, and a note: '(File name has to be 'up.rar' or 'box.ini'. Please don't upload by different people at the same time and don't power off during upload.)'. Below is a blue 'Upload' button. The second, 'Backup firmware and configuration', has two blue buttons: 'Backup up.rar' and 'Backup box.ini'. The third, 'System settings', has two buttons: a blue 'Reboot' button and an orange 'Reset' button.

Main and secondary encoding settings

There are many options for codecs, bitrates and picture settings.



Type selects the codec, the format and the profile.



The following setting offers many options for the encoding process. Higher quality requires more computing time and increases latency.

The profiles:

Profile:	HEVC Main (Default)	Type:	H.264
FPS:	HEVC Main (Default)	Format:	4:2:0 8bit
GOP:	HEVC Main Intra	Profile:	AVC High (Default)
Rate(kbit):	HEVC Main 10	FPS:	AVC Constrained Baseline
ity Range:	HEVC Main 10 Intra	GOP:	AVC Baseline
oded Size:	HEVC Main 12	Rate(kbit):	AVC Main
Control:	HEVC Main Still Picture	ity Range:	AVC Constrained High
TS URL:	HEVC Main 4:2:2	oded Size:	AVC Progressive High
Video PID:	HEVC Main 4:2:2 Intra	Control:	AVC High (Default)
Audio PID:	HEVC Main 4:2:2 10	TS URL:	AVC High 10
	HEVC Main 4:2:2 12	Video PID:	AVC High 10 Intra
	HEVC Main 4:4:4	Audio PID:	AVC High 4:2:2
	HEVC Main 4:4:4 Intra	TS URL:	AVC High 4:2:2 Intra
	HEVC Main 4:4:4 10		Sony XAVC High 10 Intra CBG
	HEVC Main 4:4:4 10 Intra		Sony XAVC High 10 Intra VBR
	HEVC Main 4:4:4 Still Picture		Sony XAVC High 4:2:2 Intra CBG
			Sony XAVC High 4:2:2 Intra VBR
			Sony XAVC Main
			Sony XAVC High
			Sony XAVC High 4:2:2

The profile depends on the chosen codec (H.264/AVC or H.265/HEVC) and on the format the input actually delivers – it makes no sense to choose a higher encoding profile than the input provides.

FPS:	Auto	
GOP:	Same as input	[5-300]
Bitrate(kbit):	Auto	[32-64000]
	Custom	

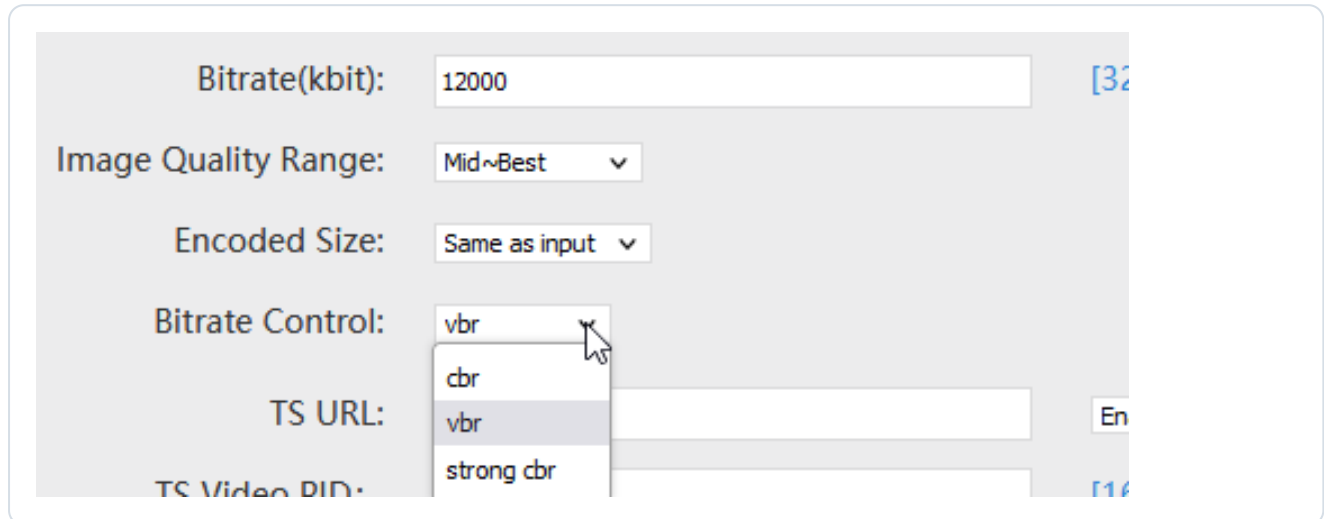
Choose the frame rate with latency in mind: changing it naturally increases latency.

FPS:	Custom	
Custom FPS:	30	[5-60]
GOP:	5	[5-300]
Bitrate(kbit):	12000	[32-64000]

We recommend staying with the usual matching factors: if you re-encode an i50 picture, it makes no sense to change it to i60 or p30 with the custom FPS setting. The factor should be one or one half. The same applies to the group of pictures (GOP):

for a p50 input, a GOP of 30 does not fit well – 25 or 50 is better.

Bitrate

A screenshot of a video encoding software interface. The 'Bitrate(kbit):' field is set to '12000'. The 'Image Quality Range:' dropdown is set to 'Mid~Best'. The 'Encoded Size:' dropdown is set to 'Same as input'. The 'Bitrate Control:' dropdown menu is open, showing options: 'vbr', 'cbr', 'vbr' (highlighted), and 'strong cbr'. Below this, the 'TS URL:' field is visible. The interface has a light gray background with white text and dropdown menus.

The bitrate should be neither too low nor too high.

Squeezing the bitrate as low as possible makes no sense, because compression (H.265/HEVC and H.264 are compression algorithms) then costs a lot of picture quality.

Too high a bitrate makes no sense either: it floods your network or occupies too much bandwidth. Typical DVB stream bitrates are 12–14 Mbit/s for 720p50 in good quality (German public broadcasters). UHD streams can reach 20–25 Mbit/s or more, especially with HDR.

Encoded size and bitrate control

Encoded size: you can downscale; upscaling is a matter of trial and error.

Bitrate control selects the encoding mode: variable (VBR) or constant (CBR) bitrate.

CBR produces a nearly constant output stream, while VBR simply encodes what comes in and is the fastest method (lowest latency).

Strong CBR is recommended if you want to add null packets to the stream (see the transport stream settings above).

Both streams have separate audio codec settings:

The streaming protocols are a big topic, so we do not explain every protocol here. Please see the tutorials on our website:

<https://www.blankom.de/tutorials.html>

TS URL:	/0.ts	Enable ▾
TS Video PID:	100	[16-8190]
TS Audio PID:	200	[16-8190]
HLS TS URL:	/0.m3u8	Disable ▾
HLS MP4 URL:	/0_mp4.m3u8	Disable ▾
MP4 URL:	/0.mp4	Enable ▾
FLV URL:	/0.flv	Enable ▾
RTSP URL:	/0	Enable ▾
RTMP URL:	/0	Disable ▾
RTMP(S)/RTSP PUSH URL:	rtmp://192.168.1.169/live/0	Disable ▾
Multicast IP:	238.0.0.1	Enable ▾
Multicast Port:	12340	[1-65535]
Multicast SAP Name:	GROUP0_STREAM0	
SRT URL Port:	9000	Enable ▾
SRT PUSH URL:	srt://192.168.1.169:9000	Disable ▾
SRT Encryption Password:	0123456789	Disable ▾
HLS PUSH URL:	https://a.upload.youtube.com/http_upload_hls?cid=1	Disable ▾

OSD: on-screen display (logo and text)

Older TV sets had menus based on OSD overlays inserted into the running picture.

Here, OSD means the insertion of text and logo pictures:

OSD

Alpha: 200 [0-255]

Zone 1

Zone: Enable

Type: txt

X: [0-1920]

Y: [0-1080]

Text:

Font size: 36 [8-72]

Background color: transparent

Color: select color

The logo can be uploaded as a BMP (with a defined background colour that becomes transparent) or as a transparent PNG:

LOGO

LOGO:

Durchsuchen...

 Keine Da...ewählt. |

(Please upload PNG or 24-bit BMP(0xF1F1F1=transparent) pictures less than 500 KB.

The file name has to be logo1.bmp/logo2.bmp–logo4.bmp

or logo1.png/logo2.png–logo4.png.)

Upload

Apply

There are some size limits, and the file names must follow the rules described above.

Example BMP:



Komprimierung:	Keine		
Auflösung:	300	x	300 DPI Ändern
Originalgröße:	432 x 89 Pixel (4.85)		
Aktuelle Größe:	432 x 89 Pixel (4.85)		
Druck-Größe (aus DPI):	3.7 x 0.8 cm; 1.44 x 0.30 inches		
Originalfarben:	16,7 Millionen (24 BitsPerPixel)		
Aktuelle Farben:	16,7 Millionen (24 BitsPerPixel)		
Gezählte Farben:	246	☒	Zählen aktiv
Benötigter Plattenplatz:	112.69 KB (115.398 Bytes)		
Benötig. RAM-Speicher:	112.68 KB (115.384 Bytes)		

The light grey background colour 0xF1F1F1 appears transparent on the TV screen.

Use GIMP or any other graphics software to change the background of your logo accordingly. PNG supports transparency; BMP does not.

You can also use the encoder to improve the picture with the CSC settings, or crop parts of the video source:

Video Input

CSC:

Disable ▾

Brightness:

50

[0-100]

Contrast:

50

[0-100]

Red Gain:

50

[0-100]

Green Gain:

50

[0-100]

Blue Gain:

50

[0-100]

Input Video Clipping:

Disable ▾

Video Clipping(Left):

0

Video Clipping(Top):

0

Video Clipping(Width):

0

Video Clipping(Height):

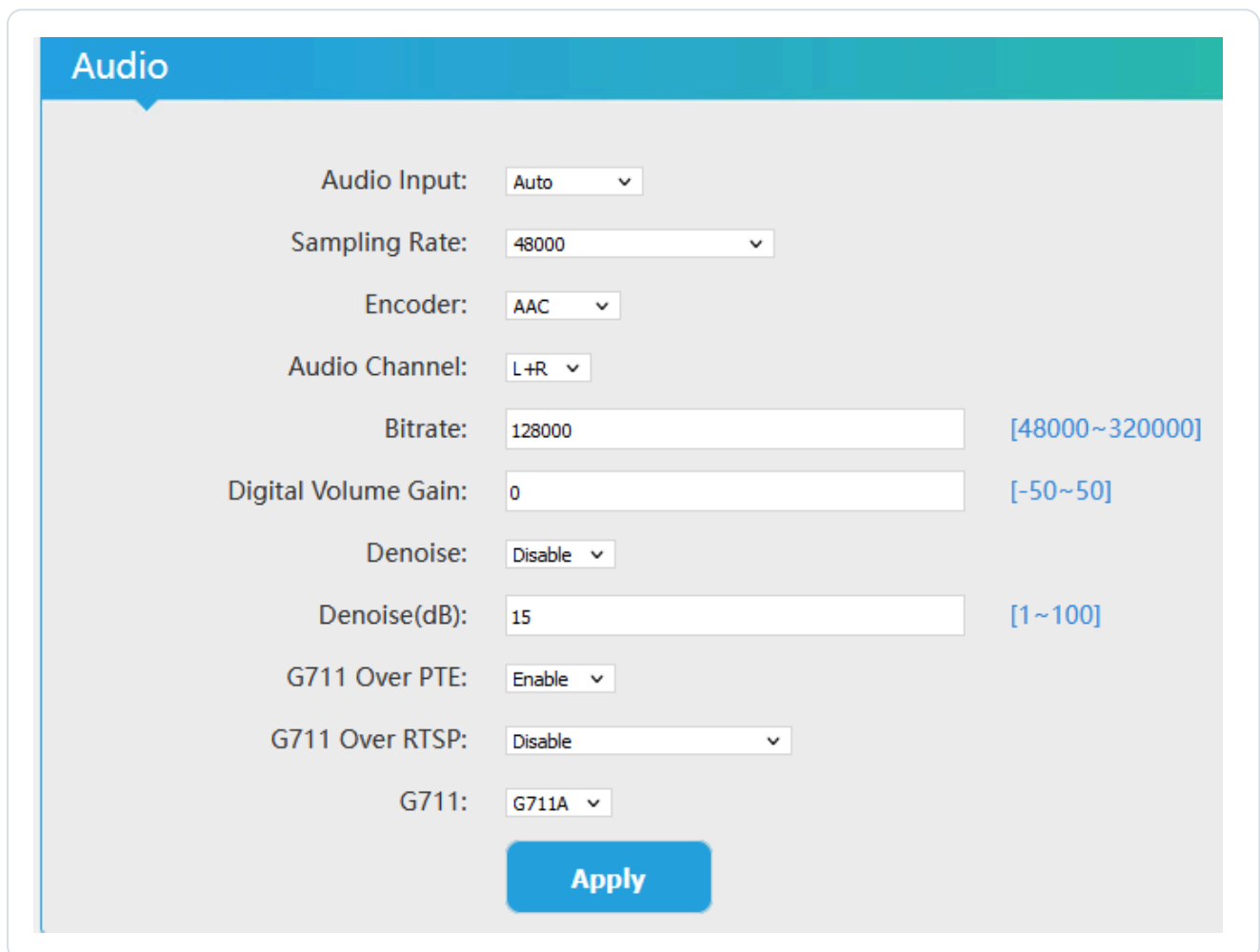
0

Apply

Be careful:



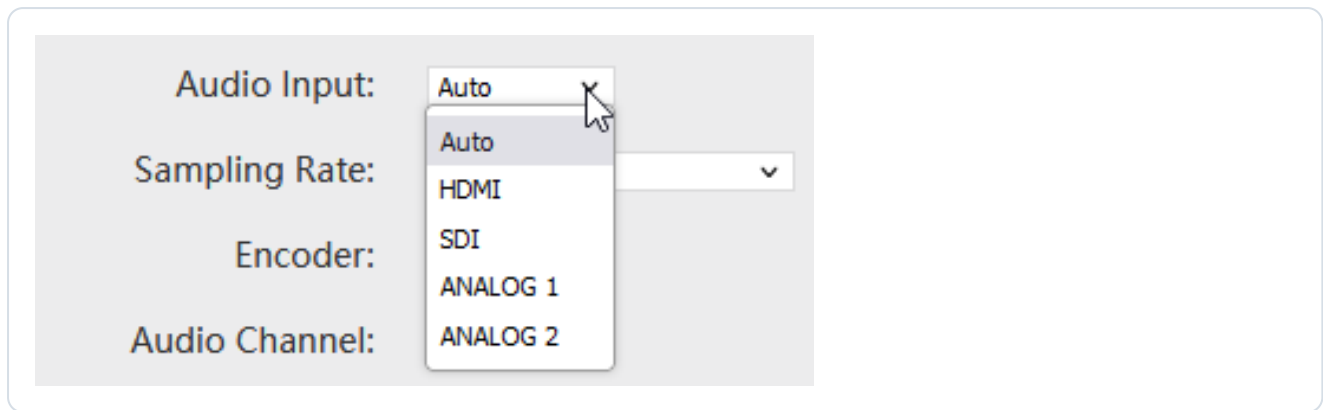
The audio encoding is independent for the main and secondary streams and can be selected:



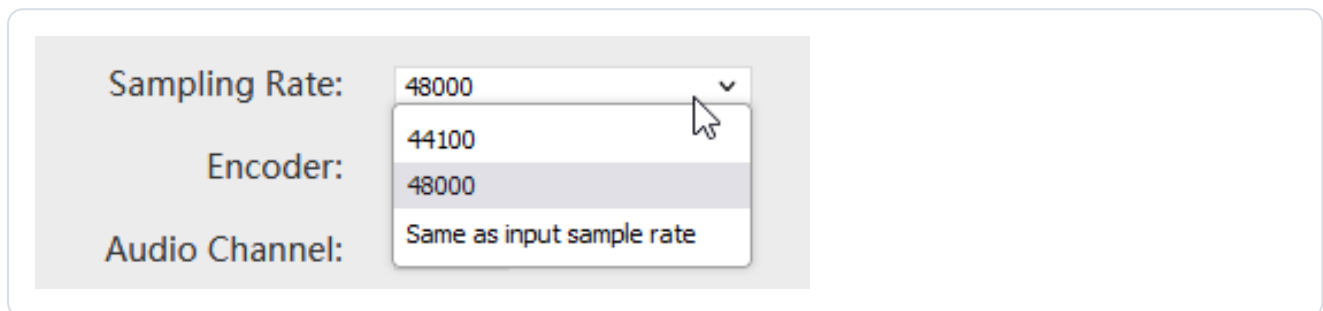
G.711 is an audio mode used by RTSP and ONVIF, among others. Normally you do not need to change or use it.

<https://en.wikipedia.org/wiki/G.711>

G.711 is a narrowband audio codec originally designed for telephony, providing toll-quality audio at 64 kbit/s. It passes audio signals in the range 300–3400 Hz and samples them at 8,000 samples per second with a tolerance of 50 parts per million (ppm). Non-uniform (logarithmic) quantization with 8 bits per sample results in 64 kbit/s. There are two slightly different versions: μ -law, used mainly in North America and Japan, and A-law, used in most other countries.

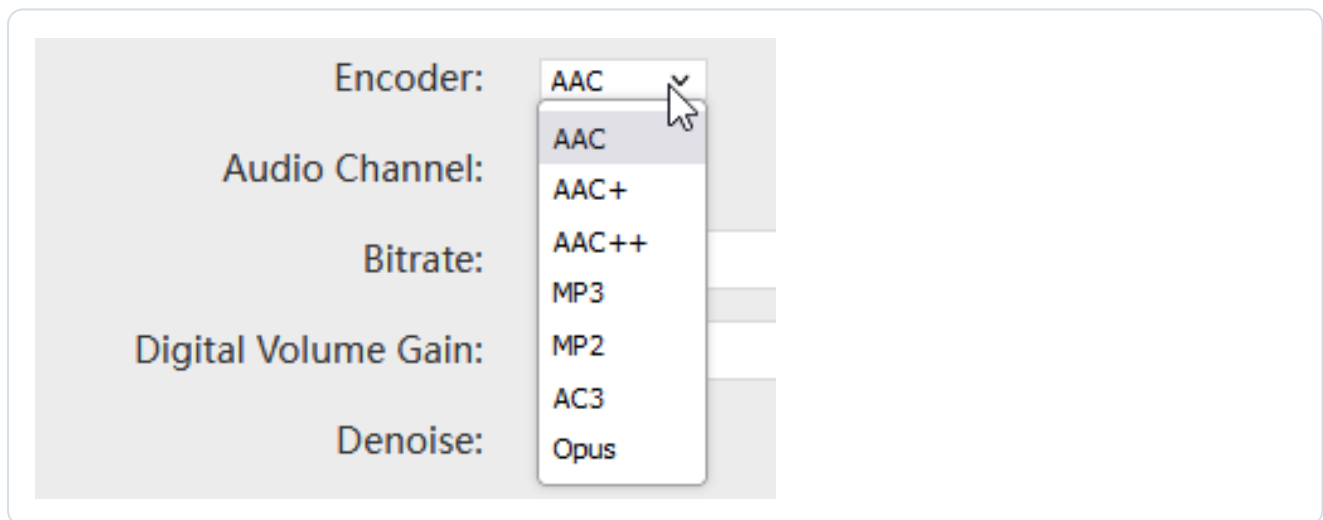


Select the source for the main or secondary channel:



Self-explanatory:

Supported audio codecs:



Example: encoder used with ONVIF

ONVIF

ONVIF has been used with the Genetec VMS:

I would like to clarify the following:

The Encoder sent to Genetec HQ for integration is a [REDACTED] (HDMI)

This has been tested in our lab and works properly.

The Encoders used in the CESAC project are

[REDACTED] (DB15 Analog input)

This is the one we have not been able to stream video from.

Rabindranath Parra

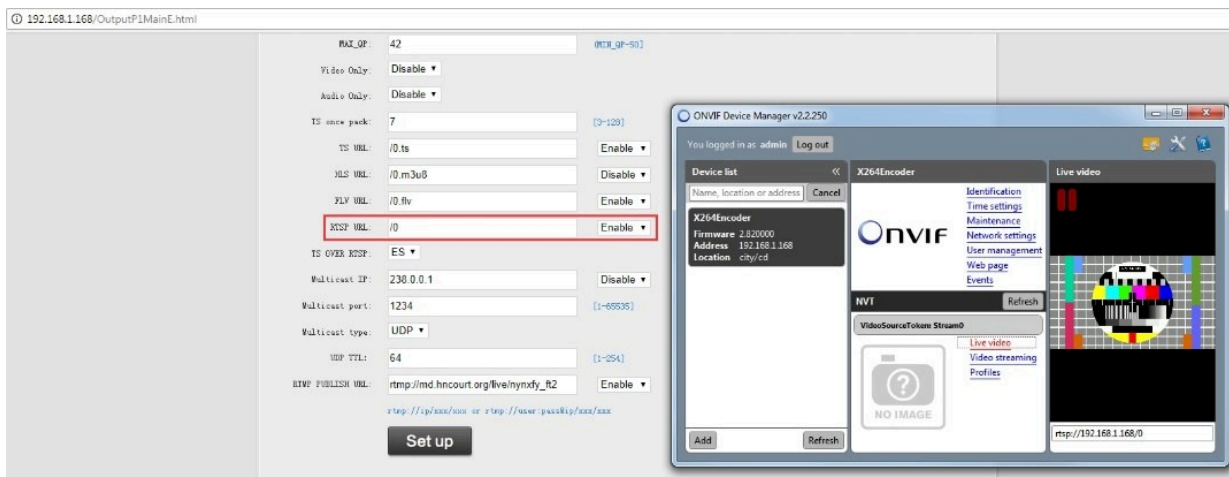
Professional Services Manager - Latin and South America



Video Surveillance | Access Control | License Plate Recognition

P: +1-514-332-4000 X 6781 | M: +52 1 (443) 273-2460 | rparra@genetec.com
2280, Alfred-Nobel Blvd, suite 400, Montreal, QC, H4S 2A4, Canada

Built to evolve: www.genetec.com/dna



Note: we recommend not enabling all streams and protocols at the same time.

RTMP(S) hardly works with the H.265/HEVC codec, because Adobe has not added this codec to the list of valid RTMP codecs. This may change in the future.

Audio encoder

Samplerate:

44100

Encoder:

AC3

Audio Channel:

L+R

Bitrate:

128000

ONVIF audio

G711A Over RTSP:

Enable

G711:

Disable

Enable

enable and resample with 8k

RTSP does not support AC3 stereo; if you enable AC3, RTSP will probably use G.711A.

If you choose AC3, you cannot disable the G.711A audio for ONVIF:

ONVIF audio

G711A Over RTSP:

Enable

G711:

G711A

Set up

Application examples

Step-by-step examples for live streaming platforms.

IRENIS / BLANKOM · Quick Start Manual · Ralf Riedel, Director Technical Sales & Engineering, IRENIS GmbH

In this part [Example: streaming to Vimeo Live by RTMP](#) [Streaming H.265 to YouTube using HLS](#)

Example: streaming to Vimeo Live by RTMP

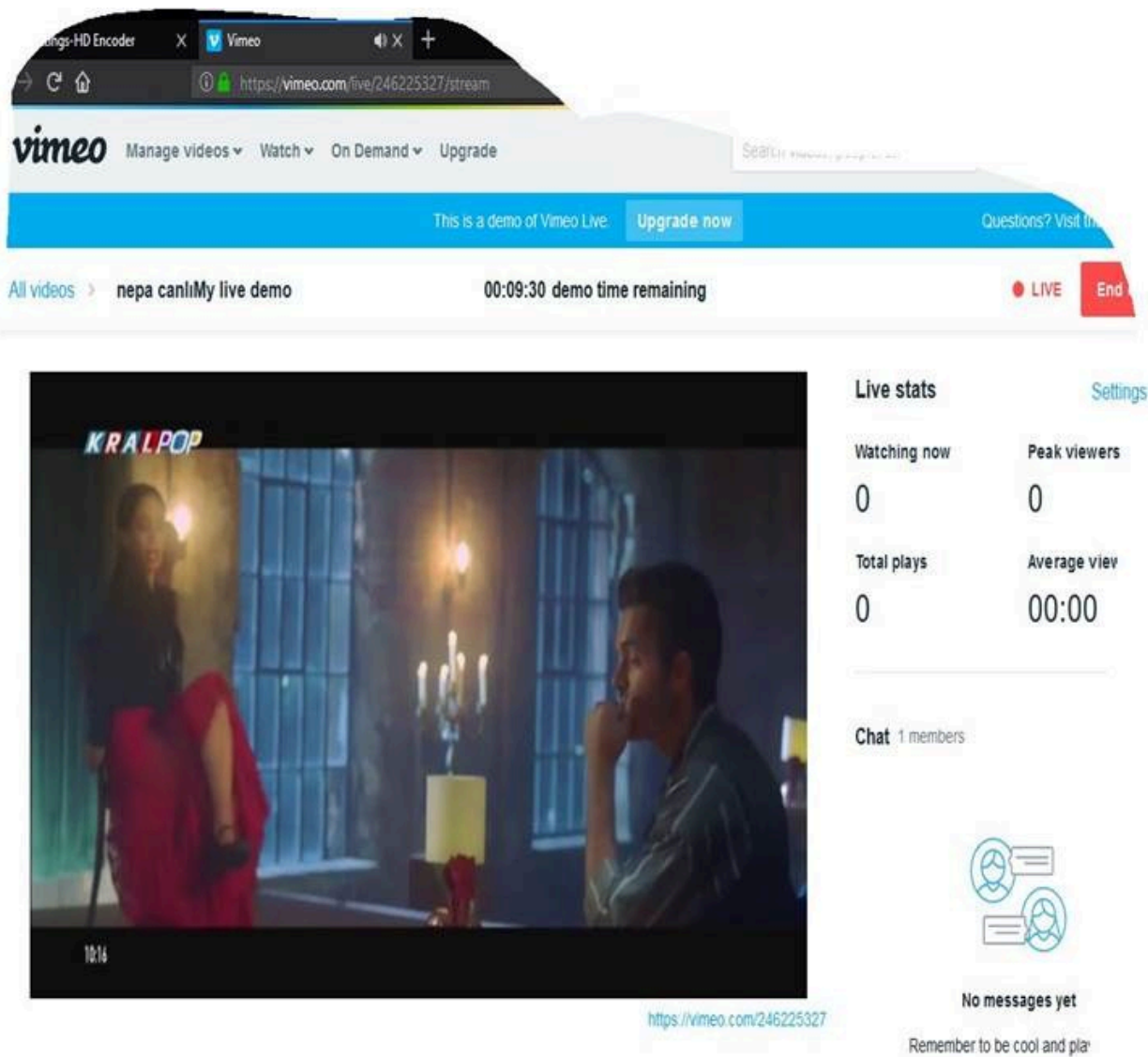
Main stream

```
Encoding Type:1920x1080@25
Bitrate(kbit):1800
TS URL: http://192.168.2.168/0.ts    http://192.168.2.168:8080/0.ts
HLS URL:Disable
FLV URL:Disable
RTSP URL:Disable
RTMP PUBLISH URL(Connected):rtmp://rtmp.cloud.vimeo.com/live?token=45dfd48b-9e8b-49bf-8539-90aa29aaf7a2
/dcfe39e7-5912-4388-8507-347daac833f8
Multicast URL:Disable
```

Vimeo provides an RTMP address with a live token at the end. No user name or password is needed, because Vimeo issues individual stream keys, which are simply inserted as follows:

```
rtmp://rtmp.cloud.vimeo.com/live?token=*****/streamkey
```

You can then check your stream in the Vimeo live portal:



Streaming H.265 to YouTube using HLS

Yes – our H.265 video encoder supports HLS push to YouTube.

Step 1: get the HLS stream URL from YouTube. If you cannot find the HLS stream settings, see <https://support.google.com/youtube/answer/10349430>.

Firmware, SRT and serial to TCP

Firmware file handling, useful SRT resources, encoder–decoder SRT pairs and the integrated serial-to-TCP bridge.

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In this part [Appendix: firmware file](#) [Useful links regarding SRT](#) [Restreamer 2 \(SRT\)](#)
[SRT settings for an encoder–decoder pair](#) [Addendum: serial to TCP \(remserial\)](#)

Appendix: firmware file

Do not modify any value unless you know exactly what you are doing.

The firmware is specific to each model (HDMI or SDI, with or without H.264/H.265). Do not mix up firmware files – the file name is always up.rar.

Use the backup function only to save a firmware version in case you need to return to it.

Danger: do not repack the up.rar firmware file with a modern 64-bit RAR packer – that will not work, and neither will 7-Zip (32 or 64 bit).

A wrongly packed file can brick the unit and make it inaccessible.

Use the backup only to save a firmware version you might need to go back to – for example, back up before updating a unit.

If something goes wrong, press the RST (reset) button for 5–10 seconds until the LED goes off to restore the factory defaults.

Useful links regarding SRT

A media tool that handles SRT and more: OBS (Open Broadcaster Software)

<https://obsproject.com/>

<https://obsproject.com/wiki/Streaming-With-SRT-Protocol>

Streaming With SRT Protocol

This feature requires OBS Studio 25.0 or newer.

Table of Contents:

- General Overview
- Can SRT be used with Twitch or my favorite service?
 - Services
 - Encoders
 - Servers
 - Players
- How to set up OBS Studio
 - Option 1: Stream SRT using the Streaming output
 - Option 2: Stream SRT using the Custom FFmpeg Record output
- Examples of setups
 - Relay server to Twitch

<https://github.com/obsproject/obs-studio>

<https://github.com/haivision/srt>

<https://www.blankom.net/assets/downloads/How-to-connect-our-Video-Encoder-to-OBS.pdf> or

<https://www.blankom.de/assets/downloads/How-to-connect-our-Video-Encoder-to-OBS.pdf>

Restreamer 2 (SRT)

<https://datarhei.com/>

SRT settings for an encoder-decoder pair

For our HDMI, VGA/CVBS and SDI decoders (H.264 and H.265), the decoder plays the SRT URL as follows; the encoder works as caller (SRT push URL) or as listener (SRT URL port):

```
srt://ip:port          # encoder as listener; the decoder gets SRT from the encoder ('ip' = encoder IP)
srt://port or srt://@port # encoder as caller; pushes SRT to the decoder (encoder SRT push URL: srt://decoder-ip:port)
With passphrase/encryption, the decoder SRT play URL is:
```

```
srt://passphrase@ip:port # encoder as listener; the decoder gets the SRT stream from the encoder ('ip' = encoder IP)
srt://passphrase@port    # encoder as caller; pushes SRT to the decoder
See the screenshots below for the settings:
```

Main stream

Encoding type: H.265
FPS: 25
GOP: 30
Bitrate (kbit/s): 2500
Encoded size: 1280x720
Bitrate control: vbr
TS URL: /0.ts
HLS URL: /0.m3u8
FLV URL: /0.flv
RTSP URL: /0
RTMP URL: /0
RTMP (S)/RTSP PUSH URL: rtmp://285i5w1109.gicp.vip:51992/live/1
Multicast IP: 238.0.0.1
Multicast port: 1234
SRT URL Port: 9000
SRT PUSH URL: srt://192.168.1.169:9000
SRT Encryption Password: 0123456789

Enable
Enable
Enable
Enable
Disable
Disable
Disable
Enable
Enable
Disable

[5-60]
[5-300]
[32-32000]
[1-65535]
[1-65535]

Set up

4K Decoder H.265/H.264

Status
Address setting
Advance setting
System setting

Status

System status

runtime: 0000-00-00 00:15:06
cpu usage: 7%
mem usage: 52MB/253MB
output format: 1080P50
decode wndum: 4

Channel1

addr: srt://192.168.1.170:9000
status: normal
frame rate(fps): 25
code rate(kbit/s): 2287

Channel2

addr: srt://@9000
status: normal
frame rate(fps): 25
code rate(kbit/s): 437

Channel3

addr: srt://0123456789@192.168.1.170:9001
status: normal
frame rate(fps): 30
code rate(kbit/s): 524

TS URL: /1.ts
HLS URL: /1.m3u8
FLV URL: /1.flv
RTSP URL: /1
RTMP URL: /1
RTMP (S)/RTSP PUSH URL: rtmp://192.168.1.50/live/1
Multicast IP: 238.0.0.1
Multicast port: 1235
SRT URL Port: 9001
SRT PUSH URL: srt://192.168.1.169:9001
SRT Encryption Password: 0123456789

Enable
Disable
Disable
Disable
Disable
Disable
Disable
Enable
Enable
Enable

[1-65535]
[1-65535]

Set up

OSD

Status
Network
Main stream
Substream
Audio
System

Advance setting

System setting

output format: 1080P50
decode wndum: 4

Channel1

addr: srt://192.168.1.170:9000
status: normal
frame rate(fps): 25
code rate(kbit/s): 2031

Channel2

addr: srt://@9000
status: normal
frame rate(fps): 25
code rate(kbit/s): 813

Channel3

addr: srt://0123456789@192.168.1.170:900
status: normal
frame rate(fps): 30
code rate(kbit/s): 527

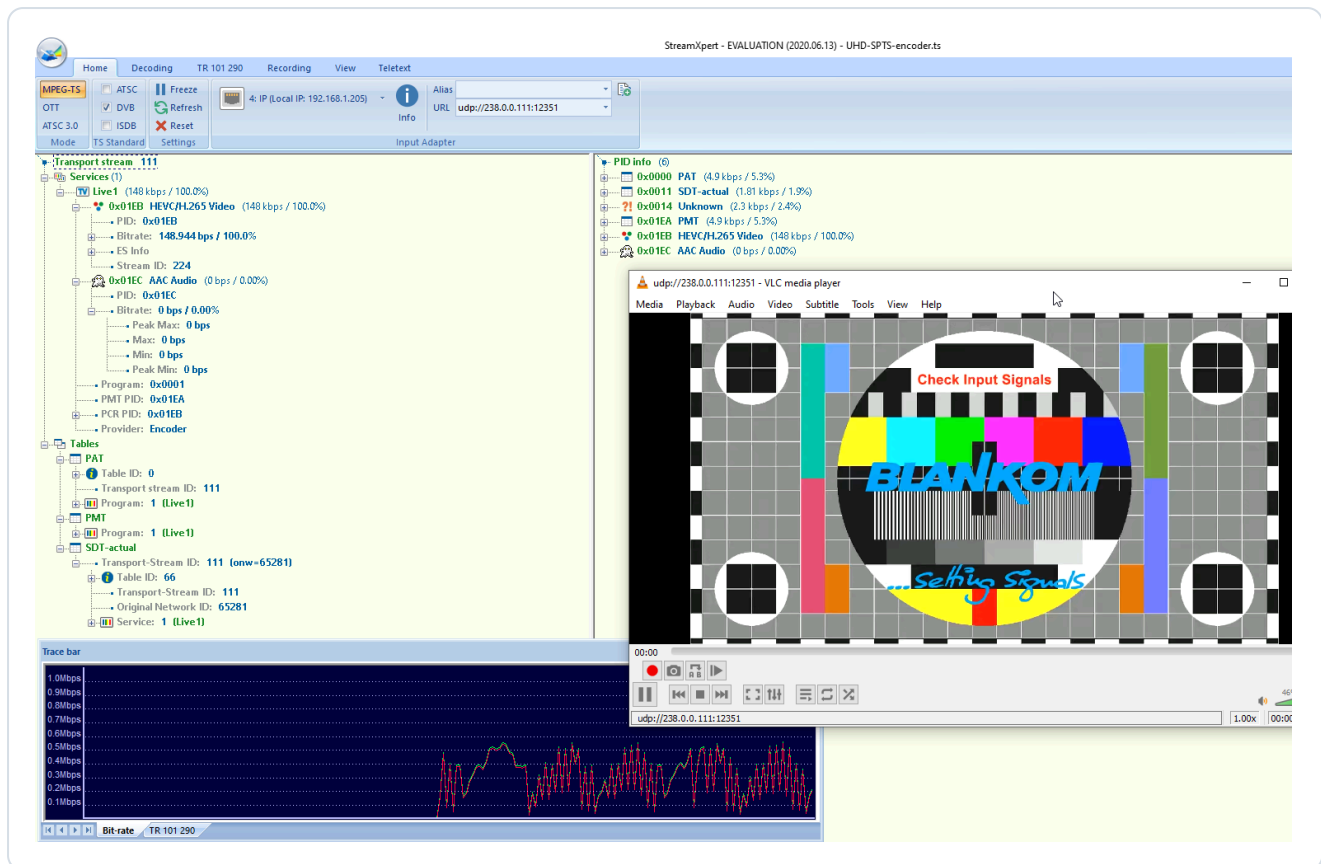
Channel4

addr: srt://0123456789@9001
status: normal
frame rate(fps): 30
code rate(kbit/s): 497

If no signal is detected at the input, the test picture appears and the output stream may “pump”, because the encoder checks the input periodically – during these periods the output stream can fluctuate:

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58



Addendum: serial to TCP (remserial)

Serial to TCP works with the integrated remserial 1.4 function.

remserial

The remserial program acts as a communications bridge between a TCP/IP network port and a Linux device such as a serial port. Any character-oriented Linux /dev device will work.

The program can also use pseudo-ttys as the device. A pseudo-tty is like a serial port in that it has a /dev entry that can be opened by a program that expects a serial port device, except that instead of belonging to a physical serial device, the data can be intercepted by another program.

remserial uses this to connect a network port to the master (programming) side of the pseudo-tty, so that the device driver (slave) side can be used by a program expecting a serial port. See example 3 below.

The program can operate as a server accepting network connections from other machines, or as a client connecting to a remote machine that runs remserial or another program accepting a raw network connection. The network connection passes data as-is; there is no control protocol over the network socket.

Several copies of the program can run on the same computer at the same time, provided each uses a different network port and device.

Examples:

1) Access an RS-232 device over a network

The computer with the serial port connected to the device (such as a data acquisition device) runs the remserial program:

```
remserial -d -p 23000 -s "9600 raw" /dev/ttyS0 &
```

This starts the program in daemon mode, so that it runs in the background. It waits for connections on port 23000 and sets up the serial port /dev/ttyS0 at 9600 baud. Network connections to port 23000 from any machine can then read from and write to the device attached to the serial port.

It can be started from /etc/rc.local, as an entry in /etc/inittab or as a system service.

2) Connect an RS-232 device to a specified server

The computer with the serial port connected to the device (such as a data acquisition device) runs the remserial program:

```
remserial -d -r server-name -p 23000 -s "9600 raw" /dev/ttyS0  
&
```

Used together with example 1, this creates an end-to-end serial connection: what goes into the serial port on one machine comes out of the serial port on the other. The ports may run at different baud rates or other serial settings.

3) Connect a Linux program that needs a serial port to a remote serial port

Some programs are written to communicate directly with a serial port such as some data acquisition programs. The remserial program can use pseudo-ttys to fool the program into thinking that it is talking to a real serial port on the local machine:

```
remserial -d -r server-name -p 23000 -l /dev/remserial1 /dev/ptmx  
&
```

This creates a file called /dev/remserial1 which can be used by the data acquisition application as its serial port. Any data sent or received is passed to the remote server-name on port 23000 where a computer configured in case number 1 above passes it to a real serial port.

remserial uses the special pseudo-tty master device /dev/ptmx (see man ptmx), which creates a slave device that looks like a normal serial port named /dev/pts/something. Because the created device name is not consistent, remserial creates a symbolic link from the name given with the -l option to the created /dev/pts/ name, so the other application can be configured with a consistent device name.

4) Server farm console control

Assuming multiple Linux servers (such as web servers) are set up to have a serial port as their console instead of a monitor/keyboard, their serial ports could be connected to a control server using a multi-port serial board.

On the control server, a copy of remserial is run for each server:

```
remserial -d -p 23000 -s "115200 raw" /dev/ttyS0 &
```

```
remserial -d -p 23001 -s "115200 raw" /dev/ttyS1 &
```

```
remserial -d -p 23002 -s "115200 raw" /dev/ttyS2 &
```

```
remserial -d -p 23003 -s "115200 raw" /dev/ttyS3 &
```

and so on.

From any computer on the local network, use a telnet program to connect to the control server on the appropriate port:

```
telnet control-server-name 23002
```

This connects through the associated serial port to the console of the desired server – in this example, the third server.

Careful scripting such as using the Linux "expect" program could allow batches of commands to be run on each server.

Other Linux programs useful with remserial

nc – the netcat program is similar to remserial, except that it connects network ports with the standard input and output of the command line.

For example, with case number 1 above, the following command run on another computer will send the contents of the named file out the serial port used by the remserial program:

```
nc server-name 23000 <file-name
```

Similarly, the following command will store incoming serial data in a file until the program is manually interrupted:

```
nc server-name 23000 >file-name
```

telnet – normally used to log in to a remote computer; with network ports other than 23 it operates in raw data mode.

For example, with case number 1 above, the following command will allow the user of the telnet program to see incoming serial port data and type data on the keyboard to send to the serial port:

```
telnet server-name 23000
```

This is ideal for controlling the device connected to the serial port if it has some sort of command line interface usable over the serial port.

remserial usage

```
remserial [-r machinename] [-p netport] [-s "stty params"] device
```

-r machinename The remote machine name to connect to. If not specified, this is the server side.

-p netport Specify IP port# (default 23000)

-s "stty params" If serial port, specify stty parameters, see man stty

-d Run as daemon program

-x debuglevel Set debug level, 0 is default, 1,2 give more info

-l linkname If the device is /dev/ptmx, creates a symbolic link to the corresponding slave pseudo-tty so that another application has a static device name to use.

-m max-connections Maximum number of simultaneous client connections to allow

device Character oriented device node such as /dev/ttyS0.

More useful links – or go to www.blankom.de → Tutorials / Know-how:

https://www.blankom.net/assets/downloads/TCP-IP-Unicast-IGMP-Dialog_und_snooping.pdf

<https://www.blankom.net/assets/downloads/Whitepaper-streaming-protocols.pdf>

https://www.blankom.net/assets/downloads/SRT_Protocol_Technical_Overview-blankom2.pdf

https://www.blankom.net/assets/downloads/Difference_IGMP-Dialog_and_snooping-DE_EN.pdf

<https://www.blankom.net/assets/downloads/mpegts-introduction.pdf>

or visit the renewed www.blankom.de.

The new web GUI

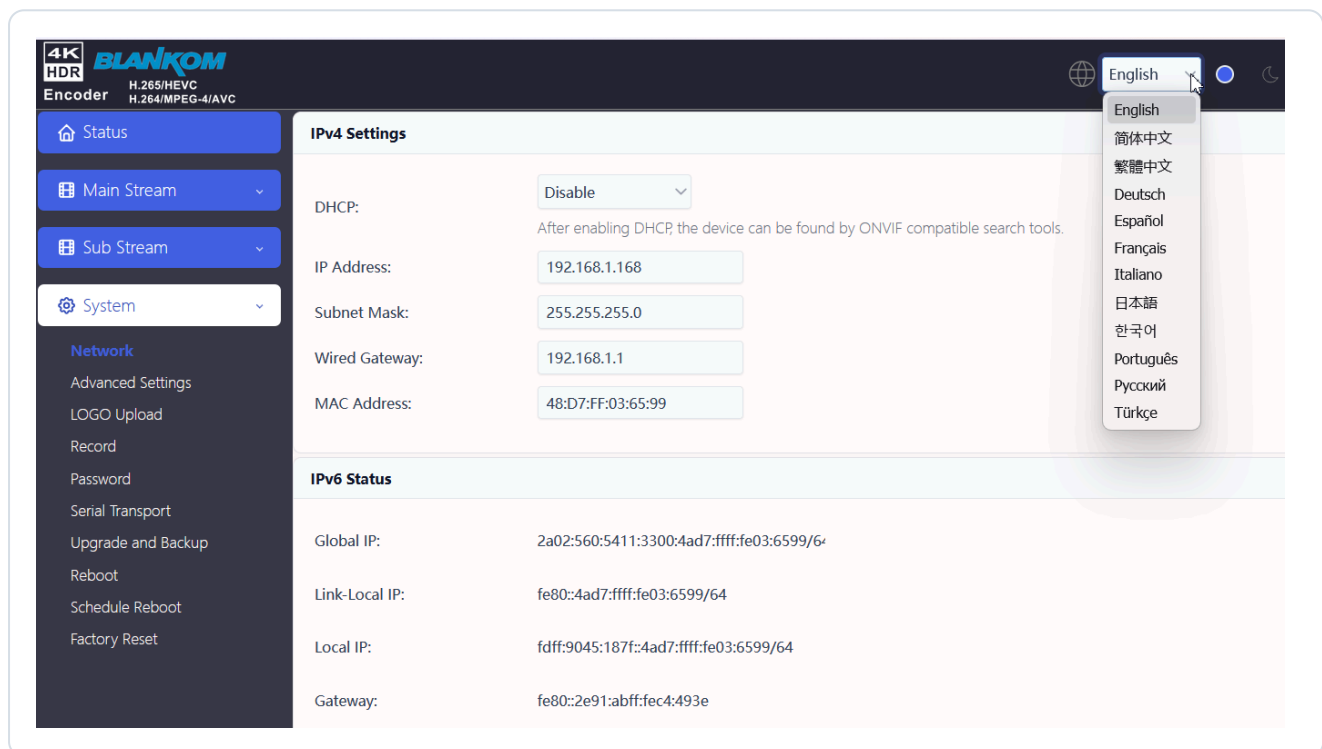
The new web GUI design moves the menu to the left, puts the streaming protocols on top and adds new features.

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In this part The new web GUI

The new web GUI

The new web GUI design brings further features and improvements, for example:



The menu is now on the left side, the streaming protocols are at the top.

Multilanguage support, IPv6, NTP with daylight saving settings and more.

IPv6 Settings

Mode:Auto Configuration

DNS Settings

DNS1:192.168.1.1

DNS2:9.9.9.9

NTP Settings

NTP Sync:Disable

Server:time.windows.com

Timezone:UTC+01:00

Daylight Saving:Off

Port Settings

HTTP Port 1:OffUnited StatesEuropean UnionAustralia[1-65535]

Secure HTTPS settings with upload of your own certificate:

Port Settings

HTTP Port 1:	80	Enable ▾	[1-65535]
HTTP Port 2:	8086	Enable ▾	[1-65535]
RTSP Port 1:	554	Enable ▾	[1-65535]
RTSP Port 2:	8554	Enable ▾	[1-65535]
ONVIF Port:	8899	Enable ▾	[1-65535]
SADP Port:	8000	Enable ▾	[1-65535]

HTTPS Settings

HTTPS Service:	Disable ▾	
HTTPS Port 1:	443	Enable ▾ [1-65535]
HTTPS Port 2:	8443	Enable ▾ [1-65535]
HTTPS Private Key Password:		(Leave empty if no password)
	Durchsuchen...	Keine Datei ausgewählt.
Upload Certificate:	(File name must be private.key, public.crt, private.pem or public.pem. Do not upload simultaneously or power off during upload)	
	Upload Certificate	Delete Certificate

SOCKS5 Proxy

SOCKS5 Proxy:	Disable ▾
Proxy Host:	
Proxy Port:	1080 [1-65535]
Username:	
	(Optional authentication, username and password must both be set)
Password:	

HOSTNAME Settings

HOSTNAME:	Encoder_26009
mDNS Service:	Enable ▾
mDNS Access Address:	Encoder26009.local

SOCKS proxy and mDNS:

The screenshot shows the BLANKOM Encoder web interface. The top header includes the BLANKOM logo and encoder specifications: 4K HDR, H.265/HEVC, and H.264/MPEG-4/AVC. The left sidebar contains navigation links: Status, Main Stream, Sub Stream, and System. The main content area is divided into two sections: Device Status and Recording Status.

Device Status

- Running Time: 00:00:03
- Device Time: 2026-10-13 12:17:18 (Sync time to device)
- CPU Usage: 24%
- CPU Temperature: 51°C, 48°C FPGA Temperature: 47°C
- Memory Usage: 533.0M/3932.5M
- Encoding Resource Usage: 17%
- HDMI Video Resolution: 1920x1080i@50
- HDMI Audio Sample Rate: 48000
- SDI Video Resolution: 1920x1080i@50
- SDI Audio Sample Rate: 48000
- SDI CRC Errors: 2
- Packets Sent: 348 (Network Test & System Log)
- Network TX Rate: 21.68 Mbps
- Packets Dropped: 0
- TCP Video Connections: 0 (Details)

Recording Status

- Recording Type: Disabled

More information for the user, network tests and a separate TCP connection window:

The screenshot shows the TCP Connection Status web interface. The top header includes the title "TCP Connection Status" and a subtitle "Current HTTP / HTTPS / RTSP / RTMP connections and recently closed records". The interface features a "Refresh Now" button and a summary section with five cards:

- Active Connections: 12 (HTTP 12)
- TCP Video Connections: 0 (No current connections)
- Pending Data: 0 B (0 connections have pending data · 0 pac...)
- Max Pending per Connection: 0 B (No pending data)
- Recently Closed: 45 (Recent records retained by the endpoint)

Below the summary section, there are tabs for "All Records", "Current Connections", and "Recently Closed". Under "Current Connections", there are sub-tabs for "All Types", "TCP Video Only", and "Non-video Connections". A search bar is located to the right of the sub-tabs, with the text "Search IP, port, protocol, request, URI, or stream ID". The interface also shows "Showing 0 / 57" records.

State	Connection	Client	Local Service	Request / Video Stream	Sent	Pending	Dropped
No connections match the current filters							

At the bottom, a note states: "Data is read only when this page opens or when you click 'Refresh Now'. The refresh request itself may briefly appear as an unclassified HTTP connection; pending data does not include the kernel socket queue."

Main Stream

Encode Input:HDMI
Codec: H.264/AVC High Profile 4:2:0 8bit
Encode Resolution: 1920x1080@25
Video Bitrate: 8000Kbps
Real-time Bitrate: 3263Kbps
Real-time FPS: 8.95
Video Encoded: 9004.7GByte
TS URL: <http://192.168.1.168/0.ts>
FLV URL: <http://192.168.1.168/0.flv>
HLS TS URL: Disabled
HLS MP4 URL: Disabled
MP4 URL: <http://192.168.1.168/0.mp4>
RTSP URL: <rtsp://192.168.1.168/0>
RTMP URL: Disabled
RTMP(S) PUSH URL0: Disabled
RTMP(S) PUSH URL1: Disabled
RTMP(S) PUSH URL2: Disabled
Multicast URL: <udp://@238.0.0.111:12340>
SRT Listener URL: <srt://192.168.1.168:9000>
SRT Caller URL: Disabled
HLS PUSH URL: Disabled
ICECAST PUSH URL: Disabled
Shoutcast PUSH URL: Disabled
WebRTC P2P URL: Disabled
WHIP: Disabled
TRTC Room ID: Disabled

[Video Preview \(WebRTC\)](#)

[Video Preview \(HTML5\)](#)

Sub Stream

Encode Input:SDI

Built-in WebRTC support:

It opens another browser window, but works only with the H.264 codec in normal TV operating modes, i.e. 4:2:0 8-bit chroma and a suitable AVC profile – not with HEVC.

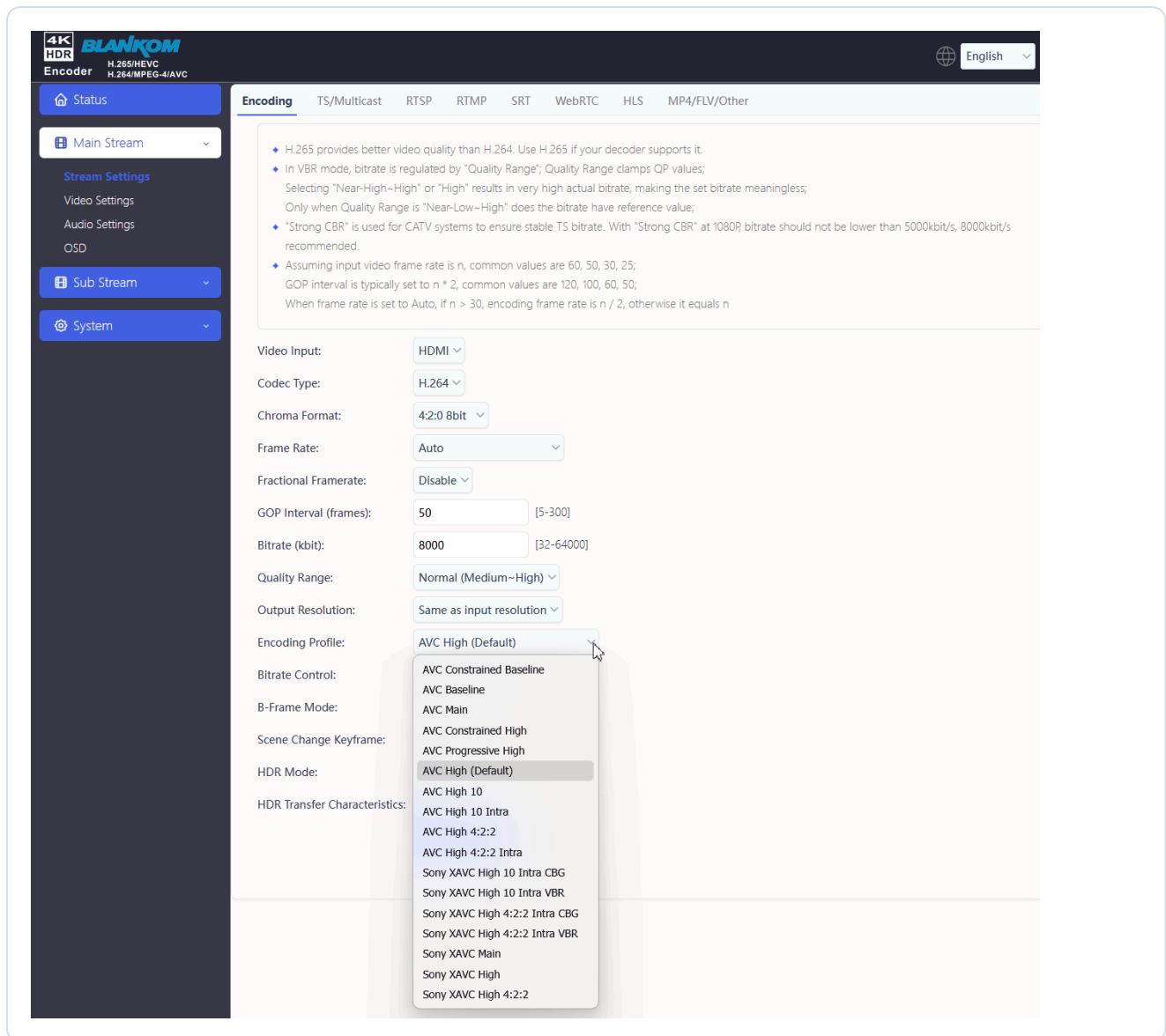


1920x1080
Resolution

25 fps
Framerate

9081.1 kbps
Bitrate

4.991
Packets



Use HDR only when it is needed; otherwise colours and contrast may look wrong:

4K HDR

BLANKOM

Encoder

H.265/HEVC
H.264/MPEG-4/AVC

Eng

Status

Main Stream

Stream Settings

Video Settings

Audio Settings

OSD

Sub Stream

System

Encoding

TS/Multicast

RTSP

RTMP

SRT

WebRTC

TRTC

HLS

MP4/FLV/Other

- Multicast address can also accept broadcast or unicast addresses, the system will auto-detect.
- If VLC cannot play multicast, check if your computer has multiple network adapters, try switching to another adapter.
- SAP name can be viewed on supported devices, such as VLC's playlist -> Local Network.

TS Stream URL:

/0.ts

Enable

Multicast IP:

238.0.0.111

Enable

Multicast Port:

12340

[1-65535]

SAP Name:

GROUP0_STREAM0

- TS advanced settings generally don't need adjustment.
- When connecting to IPTV systems, TS null packets should be adjusted to 1.3x, the device will auto-insert null packets to ensure stable bitrate; This setting only applies to "Strong CBR" mode.

TS Video PID:

100

[32-8186]

TS Audio PID:

200

[32-8186]

TS Audio Track Count:

1

Audio Track 1:

HDMI

PID:

200

Language:

Not set

TS Transport Stream ID:

101

[1-65535]

TS Original Network ID:

65281

[1-65535]

TS PMT Start PID:

480

[32-8186]

TS Start PID:

481

[32-3840]

TS Tables Version:

6

[0-31]

TS Service ID:

1

[1-65535]

TS Service Name:

Live

TS Provider Name:

Encoder

TS PCR Period (ms):

0

[0-100](0=automatic)

Conform to System B (DVB):

Enable

TS Null Packets:

No insert

TS TDT:

Disable

Save

Not set

English (eng)

中文 (zho)

Deutsch (deu)

Español (spa)

Français (fra)

Italiano (ita)

日本語 (jpn)

한국어 (kor)

Português (por)

Русский (rus)

Türkçe (tur)

العربية (ara)

हिन्दी (hin)

Tiếng Việt (vie)

ไทย (tha)

Multiple audio tracks are now supported. Set **Conform to DVB System B tables** to on if you stream to a DVB modulator instead of IPTV only.

Status

Main Stream

Sub Stream

Stream Settings

Video Settings

Audio Settings

OSD

System

Encoding

TS/Multicast

RTSP

RTMP

SRT

WebRTC

TRTC

HLS

MP4/FLV/Other

- ◆ Multicast address can also accept broadcast or unicast addresses, the system will auto-detect.
- ◆ If VLC cannot play multicast, check if your computer has multiple network adapters, try switching to another adapter.
- ◆ SAP name can be viewed on supported devices, such as VLC's playlist -> Local Network.

TS Stream URL:

/1.ts

Enable

Multicast IP:

238.0.0.1

Disable

Multicast Port:

1235

[1-65535]

SAP Name:

GROUP0_STREAM1

- ◆ TS advanced settings generally don't need adjustment.
- ◆ When connecting to IPTV systems, TS null packets should be adjusted to 1.3x, the device will auto-insert null packets to ensure stable bitrate; This setting only applies to "Strong CBR" mode.

TS Video PID:

100

[32-8186]

TS Audio PID:

200

[32-8186]

TS Audio Track Count:

4

Audio Track 1:

Audio Follow Video

PID:

200

Language:

English (eng)

Audio Track 2:

Audio Follow Video

PID:

201

Language:

Deutsch (deu)

Audio Track 3:

Audio Follow Video

PID:

202

Language:

Français (fra)

Audio Track 4:

Audio Follow Video

PID:

203

Language:

Italiano (ita)

TS Transport Stream ID:

101

[1-65535]

TS Original Network ID:

65281

[1-65535]

TS PMT Start PID:

480

[32-8186]

TS Start PID:

481

[32-3840]

TS Tables Version:

6

[0-31]

TS Service ID:

1

[1-65535]

TS Service Name:

Live

TS Provider Name:

Encoder

TS PCR Period (ms):

0

[0-100](0=automatic)

Conform to System B (DVB):

Enable

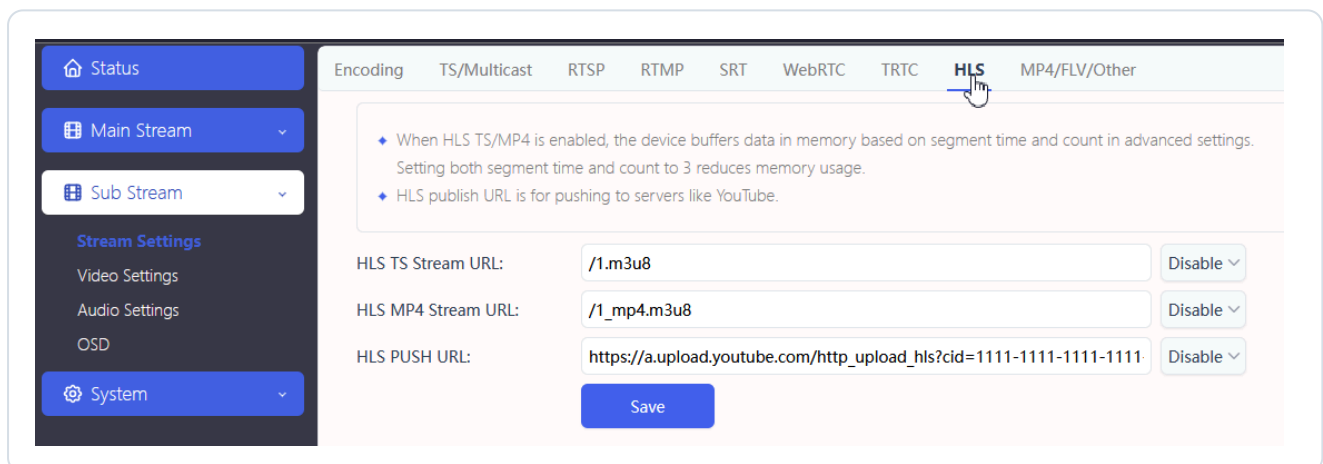
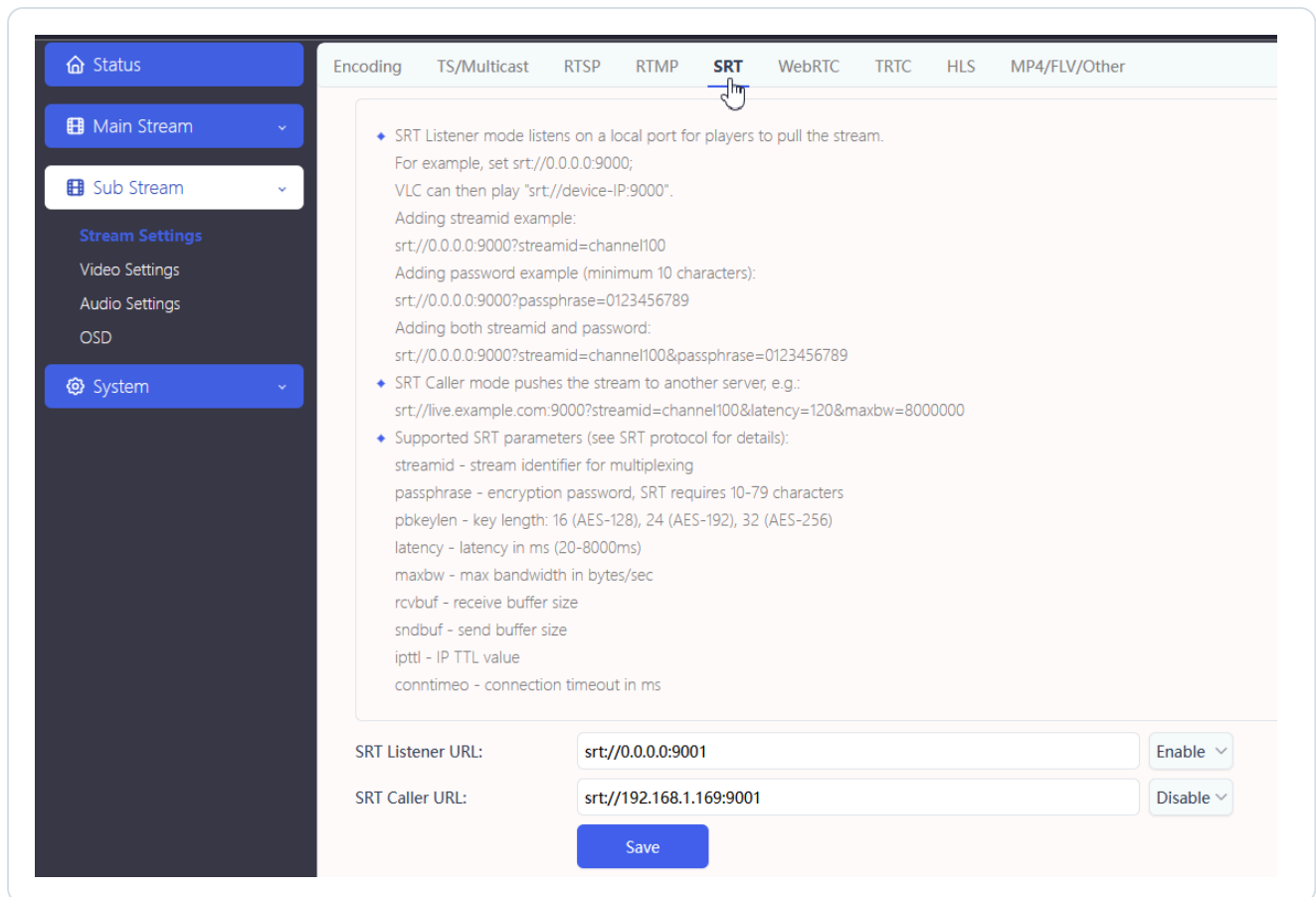
TS Null Packets:

No insert

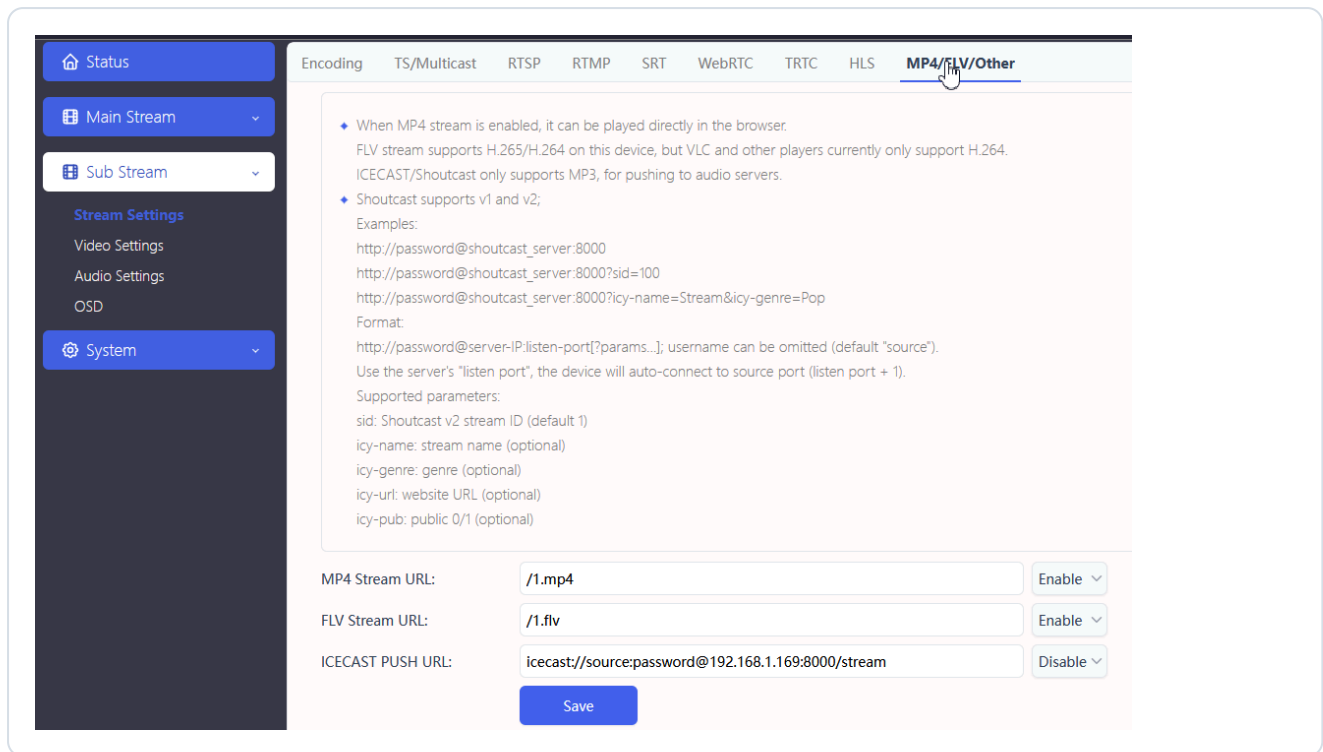
TS TDT:

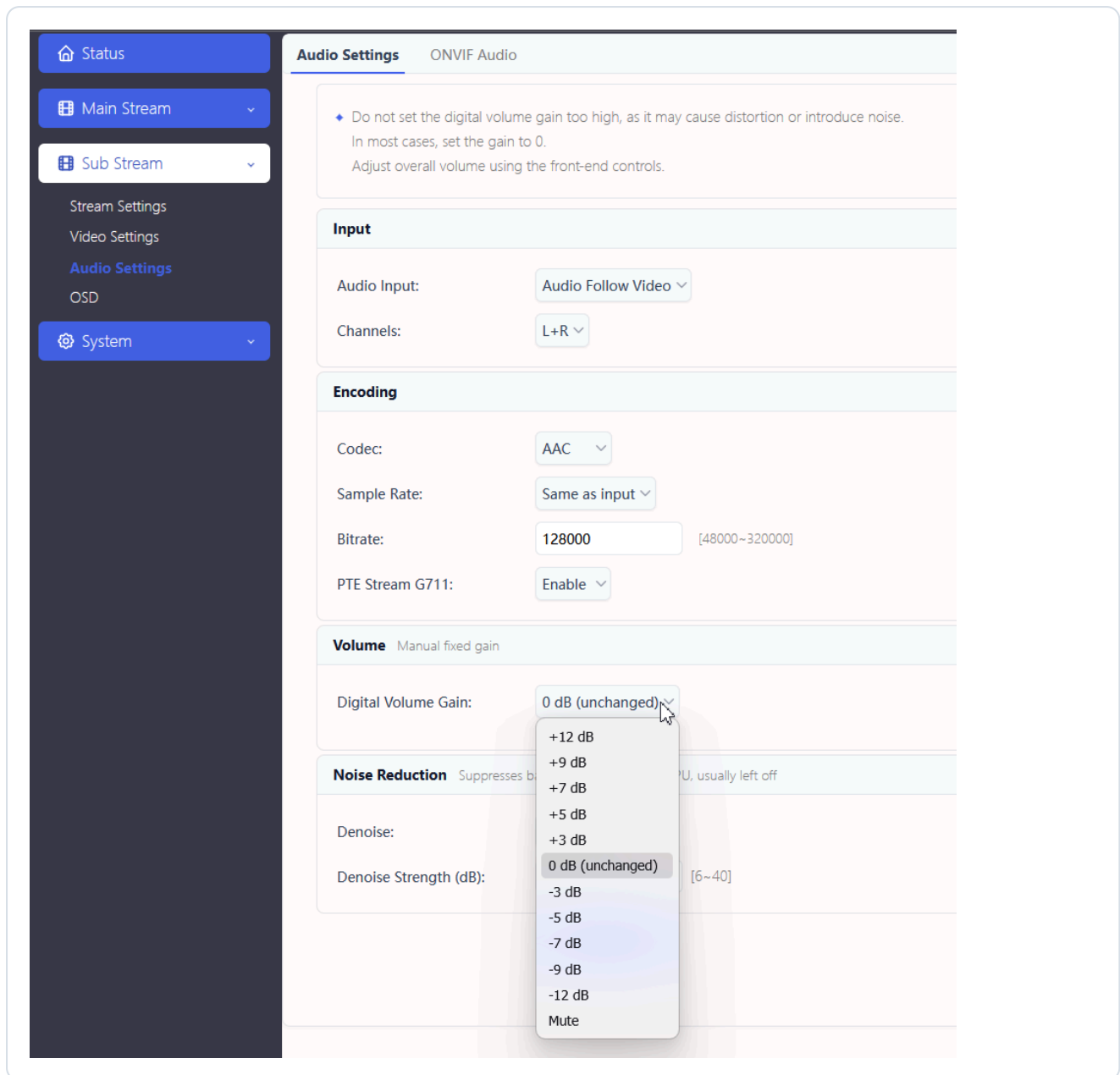
Disable

Save



Usability has also been improved with explanations inside the web menus:





The advanced settings have been improved, too:

Status

Main Stream

Sub Stream

System

Network

Advanced Settings

LOGO Upload

Record

Password

Serial Transport

Upgrade and Backup

Reboot

Schedule Reboot

Factory Reset

Video Input

EDID Select:

6. 1920x1080@60 (Encoder1080P)

No Signal:

Show no-signal in

Encoder Parameters

Color Range:

TV

MIN_QP:

5

[1-35] Effective only when rate control mode is set to CBR

MAX_QP:

42

(MIN_QP-50] Effective only when rate control mode is set to CBR

A/V Transmission

Video Only:

Disable

Audio Only:

Disable

A/V Sync:

Resample

Audio Delay (ms):

0

[-2000,2000]

Negative values make audio earlier, positive values later. Use only for A/V sync tuning.

Stream Transmission

RTSP Encapsulation:	ES Stream	▼
RTSP Default Stream:	Main Stream	▼
TS/RTSP Auth Required:	Disable	▼
Multicast Type:	UDP	▼
Enable SAP:	Enable	▼
TS Packets Per Send:	7	[3-128]
Packet Drop Threshold:	5000	[50-50000]
MTU Size:	1500	[500-1500]
Ethernet speed:	1000M	▼
UDP TTL:	64	[1-254]
UDP SOCKET_BUF_SIZE:	20971520	(0-20971520)
RTP H264 Packetization:	packetize_by_access_unit	▼

HLS Settings

HLS Segment Time (sec):	10	[3-10]
HLS Segment Count:	5	[3-10]

Service Settings

Web Access No Auth:	Disable	▼
Telnet Service:	Disable	▼
NDI Service:	Enable	▼
ONVIF Location:	city/sz	
ONVIF Mode:	Profile S/T (dedicated ONVIF)	▼
VMix Compatible:	Disable	▼
Lock all settings:	Disable	▼

Auto Restart

Disconnect Users on Input Change:	Disable	▼
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Log Settings

Local Log Service:	Disable	▼
TRTC SDK Log Level:	Error	▼
AliRTC SDK Log Level:	Error	▼
Loki Server Address:	192.168.1.100	Disable ▼
Loki Server Port:	3100	[1-65535]

Save

Recording settings:

Status

Main Stream

Sub Stream

System

Network

NDI

Advanced Settings

LOGO Upload

Record

Password

Serial Transport

Upgrade and Backup

Reboot

Schedule Reboot

Factory Reset

Recording Status

Record Type: Disabled

Recording Settings

Storage Type: NFS

Example Address: 192.168.1.100:/nfsroot/

Storage Address: 192.168.1.100:/nfsroot/

Record Type: MP4

Record Split Time (sec): 1800 [60-7200]

Auto-delete oldest when full: Disable

No Recording Without Signal: Enable

Save

Scheduled Recording

Time Segment 1: Disabled

Time Segment 2: Disabled

Time Segment 3: Disabled

Each segment can be All day or a Time range, with its own active weekdays; in a time range, an end earlier than the start means overnight (records into the next day, judged by the start day). Sync the device time (NTP) in Network Settings first, or the schedule will not trigger.

Save

Recording Settings

Storage Type:	SAMBA/CIFS
Example Address:	\\192.168.1.100\share\
Storage Address:	\\192.168.1.100\share\
Username:	
Password:	
Record Type:	MPEG TS
Record Split Time (sec):	1800 [60-7200]
Auto-delete oldest when full:	Disable
No Recording Without Signal:	Enable
Save	

Version history

TOPICS	VERSION
Initial	V1.0
Additions and corrections	V1.1
New web GUI	V2.0
Layout in the BLANKOM technical guide design; corrections	V2.0

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Further questions?

Please contact our international IRENIS – BLANKOM team. As we serve customers in all time zones, we prefer written enquiries: tell us the products, quantities and application, and our engineers will reply with a technical assessment and a quotation.

Request a quote

[irenis-blankom.com/request-a-quote/](https://www.irenis-blankom.com/request-a-quote/)

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