IP-8e
Audio over IP Encoder

User Manual

IP-8e User Manual V2.1
Bundle Version: 2.17
February 2026

Your audio. Our solution.

2wcom

Contents

1 About this Manual

You can download the latest version of this user manual here:

https://download.2wcom.com/products/IP-8e_SHZD/

1.1 References and Hyperlinks in this PDF File

If you are reading this manual as a non-print version, please note that this PDF file contains bookmarks. You can navigate through the document via the content overview in your PDF viewing software if you enable bookmarks view.

All references to pages, sections, figures, and tables in the text identify a location within this PDF file. Click on the reference to jump to the referred passage in the text.

1.2 Tags and Their Meanings

The following signal words and signs warn you about risks and dangers:

DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
NOTICE	Describes precautions necessary to protect the equipment.
	Contains useful information for the user.

	Warning of general danger situation
	Warning of electric shock
	Warning of hot surface
	Warning of fire hazard

2 For Your Safety

The device conforms to the relevant European directives and is safely constructed. Nevertheless, some residual dangers remain. 2wcom Systems GmbH accepts no liability for any damage caused by non-observance of the safety instructions.

- Read through this user manual carefully before using the device. If you pass on the device, be sure to also include this user manual.
- Any improper use of the device and all actions on the device not described in this user manual are considered as misuse outside the statutory limits for liability of the manufacturer.
- Only operate the device if it is in a technically perfect condition. If the device or a part of it is defective, take the device out of operation. Do not repair the device yourself. In case of any damages, send the device to 2wcom immediately for inspection or dispose of it properly according to the regional disposal regulations.
- Keep the device away from unauthorized persons.

Danger from electric current!

- Plug the device into a grounded power socket only. Never remove the grounding wire/contact.
- Do not open the housing of the device by yourself. Do not touch open electrical parts.
- Dangerously high voltages are present inside the housing. Even after disconnecting the mains supply, dangerously high voltage levels may be present for a certain time.
- Do not touch the device when your hands are wet.
- Never expose the device to liquids. If any liquid gets inside the housing, immediately disconnect the device completely from the power supply. Do not continue operating the device.

Fire hazard due to overheating or electric current!

- Ensure sufficient heat dissipation during operation. Avoid the following when installing the device:
  - Non-ventilated environment, e.g. a narrow shelf or built-in cabinet
  - Extremely warm or cold place
  - Direct exposure to sunlight
  - Too high or too low temperatures
  - Extremely wet or dusty environment
- Do not cover the ventilation openings of the device to avoid heat accumulation.
- Do not operate the device in the presence of flammable gases.
- Do not place objects with open flames, such as burning candles, on the device.
- Do not place any heavy objects on the supply cord. A damaged cord can lead to fire or electric shock hazards.
- When disconnecting the supply cord, always pull on the plug, never on the cable, to avoid cord damage.

Danger from explosive atmosphere!

- Do not use the device in an explosive environment.

Warning of hot surface!

The device may heat up greatly during normal operation despite an active cooling system.

- Do not touch the surfaces of the device during or shortly after operation.

Risk of equipment damage!

- Before each use, check the housing, the front panel, the cable and the power plug for visible damage and defects (e.g. scratches, cracks, wear and tear, damaged insulation, improper plug connections or extension cables).
- If the power cord is damaged, immediately disconnect the power plug. Never use the device with a damaged power cord.
- All damaged components must be replaced immediately.
- Only use a grounded three-wire power supply cord and plug that complies with the national regulations.
- Make sure that the power socket is next to the device and readily accessible to the user.
- External devices which are connected to the device could be damaged by the device or damage the device itself if the output levels exceed the specified limits.
- Do not use corrosive detergents on the device such as benzene, thinner, alcohol or acetone. Clean the surface of the device with a soft, dry cloth only.

3 Product Overview

3.1 About the IP-8e

The IP-8e is a point-to-point or point-to-multipoint audio encoder that uses IP-based audio network technologies for real-time streaming. The IP-8e offers you a variety of features and opportunities to ease your daily work.

Flexible in application: The encoder is designed for studio-to-studio, studio-to-transmitter links and cross-media tasks. Even synchronization with microsecond accuracy is possible by an implemented latency control (useful for simultaneous signal output of all decoders of a network or for audio description). In addition, audio streams can be combined to multichannel streams. The Easy2connect feature provides operators as well as reporters with an easy to use connection establishment (SIP phonebook) while being in the field. Moreover, the IP-8e offers DVB-S/S2 multiplexing with program and service tables of up to 8 TS over UDP/Ip tables or of up to 2 TS over ASI interface according to ETSI EN 300 468.

High compatibility: The IP-8e supports a wide range of protocols for streaming, control and monitoring (e.g. EBU TECH 3326, AES67, Ravenna, Livewire+, Dante, SMPTE ST 2110, PTPv2, RTSP, SAP, SIP, Discovery, Bonjour, SNMP, HTTP, HTTPS, FTP, FTPS or Ember+ and more). Furthermore, the exchange of additional information like GPIO and ancillary data between the audio networks is possible.

Pay as you grow: All software and hardware components are individually combinable. The scalability from one to eight audio channels using software licenses gives you flexibility in planning your network and reducing your costs.

Multi-format audio coding: A variety of audio coding algorithms is included, supporting formats such as MPEG-1 Layer 2, MPEG-1 Layer 3, the MPEG AAC familiy including the new xHE-AAC and AAC-ELDv2, OPUS, Ogg Vorbis, PCM and Enhanced aptX.

The optional Dolby Digital Pro Codec adds support for Dolby Digital (AC-3) and Dolby Digital Plus (E-AC-3). Dolby E can be supported on request.

The device can be upgraded with the FRAUNHOFER DAB+ Encoder to support multi-channel remote audio coding for DAB+ systems. The interface to the multiplexer can be realized with EDI/STI-D or FhG MuxEnc.

Transmission robustness: Dual Streaming and Pro-MPEG FEC ensure rock-solid IP transmission or you go beyond with Stream4Sure (the decoder is able to switch seamlessly in between up to 4 streams with different audio qualities forwarded by the encoder). The Reliable User Datagram Protocol (RUDP) ensures highest packet recovery with minimum bandwidth and low latency. Two hot-pluggable power supplies guaranteeing fail-safe operation perfect the whole concept.

Smart management: Configuration set-up via an easy to use web interface for general settings as well as for backup or fall back. For remote control, the codec offers various possibilities – HTTP, FTP, Telnet, NMS, SNMP. Real time monitoring is possible by the “Icecast Live Listening feature”. Perfect synchronization can be achieved by PTPv2 and latency control.

3.2 Software Rights

Software rights enable additional functions. Some rights may be included in the base version of the product, others are available as an optional purchase. The following table displays an overview of the software rights that are available for the IP-8e.

Right	Description
n Channels	Number of channels
n DAB+ Encoder	Number of DAB+ encoders; compliant with the ETSI TS 102 563 specification
FhG AAC	Option to set up a FRAUNHOFER Professional DAB+ Codec with EDI/STI-D output and local insertion of PAD (DLS, SLS), TA, Pty.
FhG MuxEnc	Option to connect to a Fraunhofer DAB ContentServer with central configuration, PAD insertion and monitoring of the DAB/DAB+ encoders at the multiplexer.
n HLS connections	Option to encode HTTP Live Streaming (HLS). Giving the number of supported HLS connections.
Livewire	IP streaming over Livewire
MPE	MPE (Multiprotocol Encapsulation) decoding/encoding
Ravenna	SAP stream announcement and discovery and AES67, RTSP and PTP support.
SFN	Single-frequency network: synchronous playout over the same frequency channel. Accuracy: < 1 µs
SIRC	Option to use Satellite In-Band Remote Control.
SRT Decoder	SRT and RIST functionalities for decoders
SRT Encoder	Option to use SRT or RIST for encoders.
Stream4Sure	Simultaneous reception of up to 4 IP streams of different coding and quality and seamless exchange of audio samples in case of failure.
TS Decoder	Transport stream over IP using UDP/RTP, unicast/multicast for decoders
TS Encoder	Option to use transport stream over IP using UDP/RTP, unicast/multicast for encoders.

3.3 Front Panel

1 **Headphone:** 6.3 mm / 1/4" socket for the connection of headphones

2 **LCD Screen:** Illuminated LCD screen, graphical, 264x64 pixels

3 **[Warning] LED:** LED indicator for alarms. For more information, see 11.1 Status LEDs.

4 **[Input] LED:** LED indicator for signal inputs. For more information, see 11.1 Status LEDs.

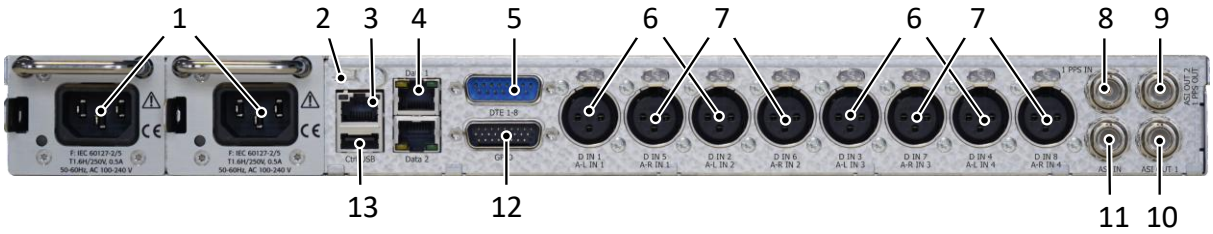
5 **[Output] LED:** LED indicator for signal outputs. For more information, see 11.1 Status LEDs.

6 **[Power] LED:** LED indicator for the dual power supply. For more information, see 11.1 Status LEDs.

7 **Reset pin hole:** Recessed button for resetting the device (warm start and recovery mode)

8 **Jog wheel:** For operating the device via the LCD screen

3.4 Back Panel



1 **Power supply unit:** Mains supply voltage IEC socket.
Optional redundant power supply through a second power supply unit:
- Option 1: standardized IEC hot-swappable power supply connector; 90-260 V, 47-63 Hz; automatic switchover.
- Option 2: power supply 48 V DC.
Combination of power supply 230 V AC and 48 V DC is possible

2 **Grounding stud:** This stud can be used to connect a grounding system if necessary.

3 **[Ctrl]:** RJ-45 connector, 10/100/1000 Base-T interface for controlling and monitoring the device via Ethernet. The device can communicate with the IP network and can be configured via the integrated web interface using an internet browser.
The LEDs show the link status (green, active if a physical network connection exists) and the activity status (yellow, active if data communication is active).

4 **[Data]:** 2x RJ-45 connector; 10/100/1000 Base-T interface for two redundant outputs for data, audio and GPIO transmission via Ethernet.

5 **[DTE]:** 15 pole D-Sub male connector for serial RS-232C data communication, e.g. private data, MPEG ancillary data, UECP/RDS (acc. to TR 101 154). Use a serial breakout cable to provide each input and output with a serial interface.

6 **[D IN][A-L IN]:** AES/EBU female interface for the input of digital audio. Integrated XLR female socket; input of the left channel of the analog audio signal, balanced < 20 Ω.

7 **[D IN][A-R IN]:** AES/EBU female interface for the input of digital audio. Integrated XLR female socket; input of the right channel of the analog audio signal, balanced < 20 Ω.

8 **[1PPS IN]:** 1PPS input for time synchronization – BNC – 75 Ω

9 **[ASI OUT 2 / 1PPS OUT]:** ASI output or 1PPS output for time synchronization – BNC – 75 Ω

10 **[ASI OUT 1]:** ASI output.

11 **[ASI IN]:** ASI input.

12 **[GPIO]:** 26-pole D-Sub male connector; combined connector for inputs (GPI) and outputs (GPO).

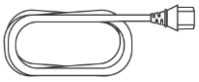
13 **[USB]:** USB 2.0 interface for service, configuration and firmware.

4 First Steps

4.1 Checking the Delivery Contents

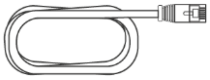
Use the following list to check the completeness of delivery. The delivery contents may vary in exceptional cases.

IP-8e



Power cord

Link to product data



Network patch cable

4.2 Installing the Device

For the device to operate safely, note the following regarding the location:

- Mount the device securely and stable in a 19-inch rack designed for this purpose.
- Avoid direct sunlight, direct proximity to radiators and air conditioners, dust, water and chemicals
- When setting up the device, make sure that it is placed at a suitable viewing angle to the displays and that the device has sufficient heat dissipation.

4.3 Connecting the Signals

Before connecting the device to the power supply, first connect the inputs and outputs of the device to the corresponding connectors:

1. For input of the digital/analog audio signal, connect the signal inputs to [D IN]/[A-L/R IN].
2. Connect a network patch cable to [Ctrl] and to your existing network.
3. Connect network patch cables to [Data] and to your existing network.
4. Optionally, connect the interfaces [DTE], [GPIO], [1 PPS], and [ASI] if needed.
5. Use the headphone output for monitoring the input/output audio signals.

✓ You have connected the device. Continue with connecting the power supply.

4.4 Connecting the Power Supply

NOTICE Risk of equipment damage!

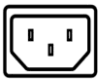
➢ Make sure that the device and the contained cords are compatible to the domestic line voltage and frequency!

Optionally, the device comes with 2 exchangeable plug-in power supply units which can be equipped with different redundant power supply connectors: either IEC sockets or Neutrik powerCON sockets.

If the device is equipped with a primary and a secondary power supply, then the primary power supply is used. If the primary power supply fails, then the device promptly switches to the secondary power supply and the status changes immediately on the **Device** status page. If the secondary power supply fails, then the device does not need to switch the power supply source and it takes at least 1 minute for the status to update on the **Device** status page.

If the device is equipped with hot-pluggable power supplies, both power supply cassettes must be installed and used during operation. Operating the device with only one cassette may result in improper cooling, reduced mechanical integrity, and compromised overall system reliability.

IEC socket

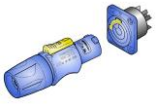


IEC socket: 230 V AC, 90-260 V AC, 47-63 Hz

- Connect the power supply cord fully to the IEC socket at the back panel of the device and to an independent mains power outlet.

✓ You have connected the power supply to the device. The [Power] LED is green if both power supply cords are connected. The [Power] LED flashes green/red if only one power supply cord is connected.

Neutrik powerCON socket

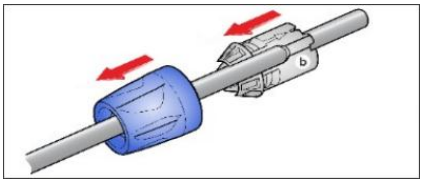


48 V DC Neutrik powerCON socket with aut. switchover (NAC3MPA 1) and Neutrik powerCON connector (NAC3FCA)

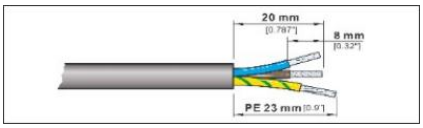
NOTE: The corresponding power cords are not part of the delivery contents!

To prepare and connect the Neutrik powercon connector:

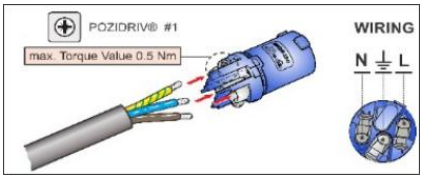
1. Slide the clamping sleeve and collet onto the cable.



2. Remove part of the insulation.

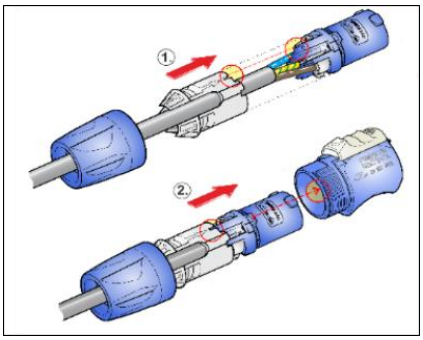


3. Insert the wires into the clamping holes on the inset and fasten them with screw and clamping plate using a screwdriver.



If you use the voltage of +48 V and 0 V, fasten the +48 V wire to **L** in the connector.
If you use the voltage of 0 V and -48 V, fasten the 0 V wire to **L** in the connector.

4. Push the inset and collet into the housing (observe guide ribs and guide slot).



5. Tighten the clamping sleeve with a wrench.
6. Connect the power supply cord fully to the powerCON socket at the back panel of the device and to an independent mains power outlet.

✓ You have connected the power supply to the device. The [Power] LED is green if both power supply cords are connected. The [Power] LED flashes green/red if only one power supply cord is connected.

4.5 Configuring the Network

NOTICE **False connection of the Ethernet interfaces will lead to incorrect operation!**

- ➢ Use the [Data] interfaces only for data transfer.
- ➢ Use the [Ctrl] interface only for the access to the device via the web interface and for SNMP.
  To change the supported services per interface, see 8.1 Configuring the Interface Services.

To transfer data over IP and access the device via the web interface, you must connect the device to your IP network.

For the [Ctrl] interface, DHCP is enabled by default. When you connect the device to your DHCP-enabled network, it will automatically get the IP configuration for the [Ctrl] interface. To view the obtained IP address, turn the jog wheel to the left to see the "System Info" display. Here you will find the obtained IP address and further system information.

To connect the device to your IP network and change the IP setup via the LCD menu:

1. Push the jog wheel to enter the configuration menu.
2. Turn the jog wheel to focus the **Network** tab and push the jog wheel.
3. Push the jog wheel to enter the menu for the [Ctrl] interface.
4. Configure the settings for your existing IP network (IP address, netmask, gateway etc.). Consult the responsible network administrator if applicable.
5. Turn the jog wheel until the **Save** menu item is selected and push the jog wheel.
6. In the dialog window, select **Yes** to save the settings and restart the device.

✓ The device is now connected to the IP network.

4.6 Accessing the Web Interface

The device can be fully operated via the integrated web interface using an internet browser. For this purpose, use a computer that is connected to the same IP network that the device is connected to.

Requirement: You have already connected the [Ctrl] interface to the network.

1. Access the web interface by entering the IP address of the device into a web browser.
   - ➢ A login screen appears.
2. Enter the username and password.

✓ The main page of the web interface appears.

The default login data (case sensitive) are:

- For read-only access: **user / user**
- For full access: **manager / manager** or **admin / admin**

Change the login data as soon as possible to avoid unauthorized access to the IP-8e and document the login data in a safe place.

4.7 General Operation

4.7.1 Operation via web interface

The IP-8e has an integrated web interface. You can make all configurations and operations using a web browser.

Note the following rules when operating the device via web interface:

- If you want to keep any changes made in the configuration of the device, click the corresponding **Save** button.
  The changes in each block must be saved individually. If you change data in several blocks or tabs, click the **Save** button under each block to save all changed data. Otherwise, any unsaved block will be reset to the previously saved status when leaving the page.
- If you do not want to keep the changes, reload the page or leave the page without saving.
- Use a decimal point as the decimal separator in numbers in the input fields (i.e. “6.5” for “six and a half”).

4.7.2 Operation via LCD menu

Some basic functions of the device can be operated via the LCD menu and jog wheel.

The display has 2 main menus:

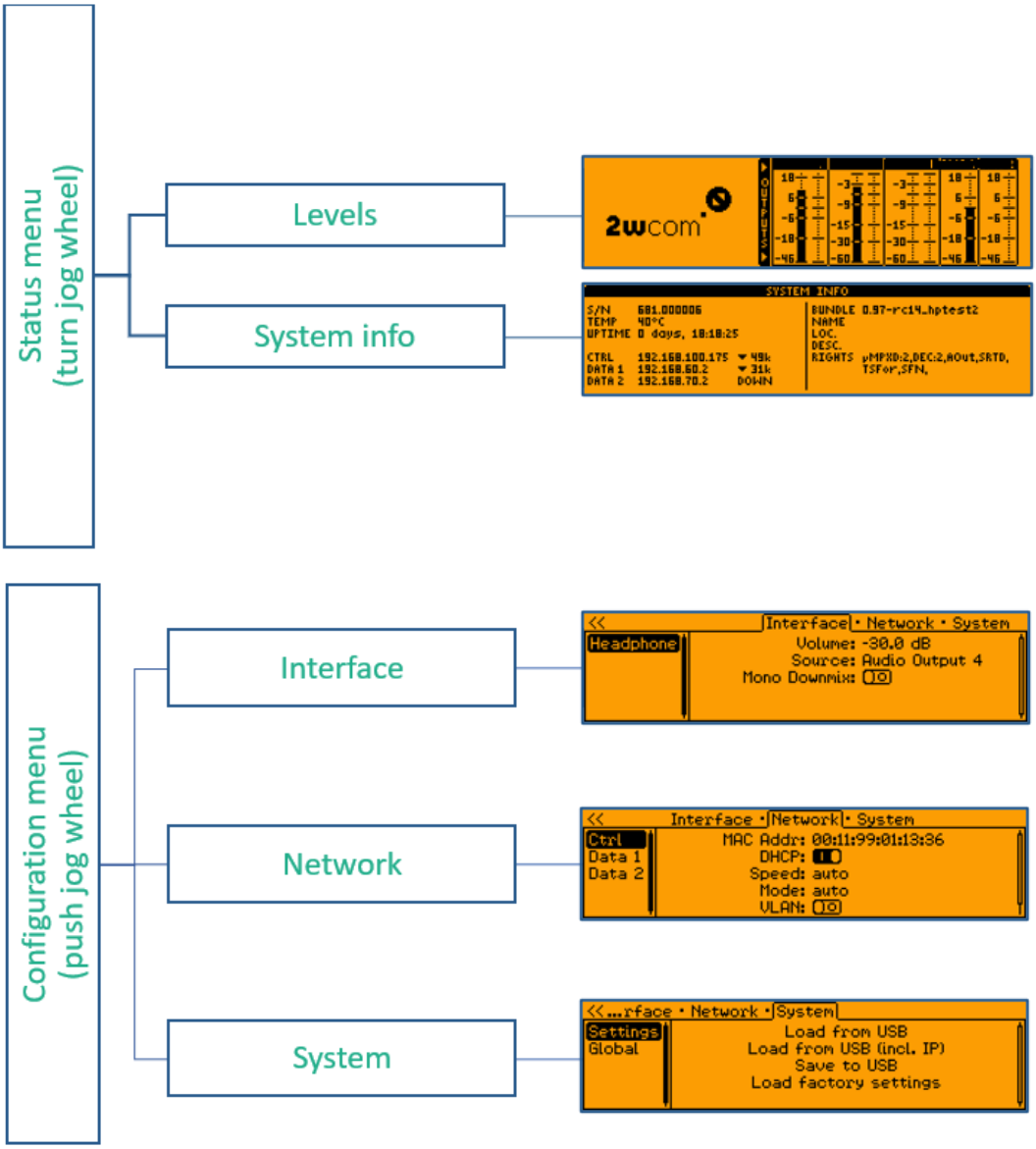
- Status menu (turn jog wheel left or right)
- Configuration menu (push jog wheel)

After a warm or cold start of the device, the display shows the default screen of the status menu. When you navigate in the LCD menu, the display returns to the Status Overview after few minutes of inactivity.

Note the following when operating the device via the LCD menu:

- To switch from the status menu to the configuration menu, push jog wheel.
- To move the focus in the menu structure, turn jog wheel.
- To open a menu tab, focus the tab and push jog wheel.
- To select a configurable menu entry, focus the entry and push jog wheel.
- To configure the selected menu entry, turn jog wheel.
- To confirm changes in a menu entry, push jog wheel.
- To return to the previous menu level, select ≪.

Navigation structure



5 Input Source Settings

5.1 Creating input source configurations for TS/SAT

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
DVB SAT TS/SAT	TS/SAT – Transport stream over satellite (Prerequisite: *Sat Tuner* right)	[RF Sat]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.
7. Create a demux configuration that uses this input source configuration as a source. (See 5.5 Creating demux configurations)

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Name	Enter the name of the stream for better reference.
RF input	Select the RF input to be used.
DVB standard	Select the DVB standard.
Modulation	Select the modulation type of the signal to be received.
Frequency input method	Choose whether you want to enter the L-Band frequency or the transponder frequency and LNB data. The transponder frequency will be automatically translated into the corresponding L-Band frequency.
L-Band Frequency	Enter the L-Band frequency of the channel to be received.
Transponder Frequency	Enter the transponder frequency of the channel to be received. Click **LNB Config** to enter the LNB information.
Symbol rate	Enter the symbol rate used by the transponder.
Roll-Off	Select the roll-off factor used by the receiver filter.
Polarization	Select either horizontal or vertical polarization used by the transponder.
Frequency Range	22 kHz signal used to tell the LNB via Digital Satellite Equipment Control (DiSEqC) to pass on lower band (22 kHz off) or upper band (22 kHz on) signals.
Pilot Mode	If the standard DBV-S2 is used, then select whether a pilot tone is used or not. If unknown, select **Auto**.
FEC	Select the FEC settings used by the transponder. If unknown, select **Auto**. This may result in slightly increased tuning times.

5.2 Creating input source configurations for TS/ASI

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
TS/ASI	TS/ASI – Transport stream over ASI input	[SYNC/AUX]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.
7. Create a demux configuration that uses this input source configuration as a source. (See 5.5 Creating demux configurations)

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Name Enter the name of the stream for better reference.

5.3 Creating input source configurations for TS/IP

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
TS/IP	TS/IP – Transport stream over IP using UDP/RTP, Unicast/Multicast (prerequisite: *TS Decoder* right)	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.
7. Create a demux configuration that uses this input source configuration as a source. (See 5.5 Creating demux configurations)

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Name Enter the name of the stream for better reference.

IP type Select Unicast/Multicast.

Multicast IP	Enter the IP for Multicast, if selected as IP type.
Port	Sender UDP port (the same as set in the encoder settings for output streaming)
IP interface	Select the interface for the input signal.
Protocol	Select the MPEG2 transport stream encapsulation.
Packet reorder/ dejitter delay	The dejitter buffer for IP transforms the variable delay into a fixed delay. It holds the first packet received for a period of time before it sends it out to the decoder. This time period is necessary for reordering the packets as well as to compensate the jitter and optionally to apply FEC correction and/or to combine it with the second, dual streaming input. Enter the value for this holding period in ms. **NOTE:** The delay time of the input source must not exceed 200 ms if the sample rate is 192 kHz.
RIST	Enable RIST to recover lost packets by resending them.
FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay.
FEC column/row port offset	Enter the offset to the main destination port the data should be sent to. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 5006 (5004 + 2). If you do not want to use this offset, enter "0".
Dual streaming	If dual streaming is enabled, configure the IP parameters. You can set up the same or different [Data] sources for the Ethernet input.

5.4 Creating input source configurations for TS/SRT

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
DVB SRT TS/SRT	TS/SRT – Transport stream over IP using SRT (prerequisite: *TS Decoder* and *SRT Decoder* rights)	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.
7. Create a demux configuration that uses this input source configuration as a source. (See 5.5 Creating demux configurations)

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Name	Enter the name of the stream for better reference.
Mode	Select whether you want to use SRT in listener or caller mode.
Port	Specify the port number for SRT connection.

IP interface	Select the interface for the input signal.
Latency	Define the time interval for the latency before the IP-8e starts to decode the signal distributed via SRT protocol.
Encryption	If the input stream is protected by AES encryption, enable end-to-end encryption.
Maximum reorder tolerance	Enter the maximum number of packets that should be reordered.
Passphrase	Enter the password used to secure the SRT stream.

5.5 Creating demux configurations

To use an input source configuration that is TS-based, you must first create a corresponding demux configuration.

1. Navigate to the page **Codec**.
2. In the block **Input Sources**, select the tab of a TS-based input source.
3. In the block **Demux Configurations**, select the tab **Audio** to use the audio and optionally the ancillary data of a stream. Select the tab **Data** to only use the ancillary data of a stream. For more information, see 6.5 Configuring Ancillary Data.
4. To create a new demux configuration, click ⊕.
5. To configure the demux configuration, click **Edit**.
6. Configure the parameters.
7. Click **Save**.

✓ You have created a demux configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

TS source	Select the source for the demultiplexer configuration profile in the dropdown menu.
Configuration mode	Select the configuration mode. • **Manual/PID:** Enter the specific audio PID and a name for better reference. • **Service from list (fixed PID):** Refresh the service list. Select the service and audio track. • **Service from list (auto PID):** Refresh the service list. Select the service. This mode is used for services that switch to another audio track at times. In that case, the IP-8e automatically switches to the new audio PID.
Encapsulation mode	Select an encapsulation mode: Multiprotocol Encapsulation or Packetized Elementary Stream.
Audio sync mode	Select the audio sync mode: Buffer level: synchronization with the rate of the incoming data PCR: synchronization with the PCR PID. This is more precise.
Decoder type	Predefine the codec type for the decoder by choosing the audio codec or selecting “Automatic” from the dropdown menu.
Buffer [ms]	Enter a value for the audio buffer.
Gain	Enter a value for the gain of this input source.
Ancillary data decoding	If the input stream of the decoder contains ancillary data, the IP-8e can forward them to the corresponding outputs. If ancillary data are enabled, private data cannot be enabled.
GPIO tunneling	Enable or disable GPIO tunneling for GPIO switch between encoder and decoder.

Private data	If private data is enabled, enter the data PID and select the configuration mode from the dropdown menu. If private data are enabled, ancillary data cannot be enabled.

5.6 Creating input source configurations for Elementary Streams (UDP/RTP)

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
Elementary Streams	RTP Elementary stream over IP using Unicast/Multicast	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Name	Enter the name of the stream for better reference.
IP type	Select Unicast/Multicast.
Multicast IP	Enter the IP for Multicast, if selected as IP type.
Port	Sender UDP port (the same as set in the encoder settings for output streaming)
IP interface	Select the interface for the input signal.
Protocol	Select the MPEG2 transport stream encapsulation. **Note:** If RTP is used, make sure to also allow RTP Port+1 in your firewall settings, as this port is used for RTCP.
Packet reorder/ dejitter delay	The dejitter buffer for IP transforms the variable delay into a fixed delay. It holds the first packet received for a period of time before it sends it out to the decoder. This time period is necessary for reordering the packets as well as to compensate the jitter and optionally to apply FEC correction and/or to combine it with the second, dual streaming input. Enter the value for this holding period in ms.
RIST	Enable RIST to recover lost packets by resending them.
Decoder type	Predefine the codec type for the decoder by choosing the audio codec or selecting “Automatic” from the dropdown menu.
Synchronous Playout/SFN	Enable Synchronous Playout using SFN or enter a buffer size [ms].
Buffer [ms]	Enter a value for audio buffer.
Gain	Set the source-specific gain. This is useful if the level of this source is either higher or lower than the levels of the other sources in the decoder chain (main - backup).

Ancillary data decoding	If the input stream of the decoder contains ancillary data, the IP-8e can forward them to the [DTE] outputs.
GPIO tunneling	Enable GPIO Tunneling for GPIO switch between encoder and decoder.
FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay.
FEC column/row port offset	Enter the offset to the main destination port the data should be sent to. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 5006 (5004 + 2). If you do not want to use this offset, enter "0".
Dual streaming	If dual streaming is enabled, configure the IP parameters. You can set up the same or different [Data] sources for the Ethernet input.

If the right *Ravenna* is activated, then you can configure the settings automatically by using the Ravenna protocol. For this function, first configure the SAP service. Available streams will then be displayed in the dropdown menu **available streams**. Copy the settings into the input fields by clicking **Copy/use selected stream settings**.

5.7 Creating input source configurations for Livewire

This option is only available if the right *Livewire* is enabled.

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
Livewire	IP Streaming over Livewire (optional: “Livewire” right)	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Livewire Source	In this menu, available advertised Livewire streams will be displayed and can be selected for automatic configuration. To enter the Livewire settings manually, select **Manual**.
Source Channel	Enter a number (16 bit, in the range of 0...65535) describing a stream/channel.
Source Port	Specify the port number for Livewire connection.
Source Interface	Select the [Data] interface for Livewire connection.
Gain	Specify gain for the Livewire source.

5.8 Creating input source configurations for SRT

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
SRT	Elementary stream over IP using SRT (optional: "SRT Decoder" right)	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Name	Enter the name of the stream for better reference.
Mode	Select whether you want to use SRT in listener or caller mode.
Port	Specify the port number for SRT connection.
IP interface	Select the interface for the input signal.
Latency	Define the time interval for the latency before the IP-8e starts to decode the signal distributed via SRT protocol.
Maximum reorder tolerance	Enter the maximum number of packets that should be reordered.
Encryption	If the input stream is protected by AES encryption, enable end-to-end encryption.
Passphrase	Enter the password used to secure the SRT stream.
Decoder profile	Select the codec profile from the dropdown menu.
Buffer [ms]	Enter a value for audio buffer.
Gain	Set the source-specific gain. This is useful if the level of this source is either higher or lower than the levels of the other sources in the decoder chain (main - backup).
Ancillary data output	If the input stream of the decoder contains ancillary data, the IP-8e can forward them to the [DTE] outputs.

5.9 Creating input source configurations for SIP

This option is only available if the right *EBU Tech 3326* is enabled.

The IP-8e supports Audio IP streaming using SIP (Session Initiation Protocol). You can use an SIP connection for bidirectional data flows between encoder and decoder: either directly or via the [Data] interfaces or over a server (registrar).

Input Source	Description	Source Interface
SIP	Stream over IP using SIP – Session Initiation Protocol (optional: "EBU Tech 3326" right)	[Audio IN] [Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Registrar	Enter the Internet domain name of a SIP server if you want the connection to be established over a SIP server.
Proxy	If **Use proxy** is enabled, specify the IP address.
Phone number	Enter your phone number for registration with a SIP server.
Display name	Assign a name to the SIP server for better reference.
Username	Enter your username for registration with a SIP server.
Password	Enter your password for registration with a SIP server.
Interface	For different accounts, you can use different [Data] interfaces or the same interface to set up the connection.
Packet reorder/ dejitter delay	The dejitter buffer for IP transforms the variable delay into a fixed delay. It holds the first packet received for a period of time before it sends it out to the decoder. This time period is necessary for reordering the packets as well as to compensate the jitter and optionally to apply FEC correction and/or to combine it with the second, dual streaming input. Enter the value for this holding period in ms.
Expires	Enter the interval in seconds for the registration renewal.
Connection timeout	Enter the interval in seconds for disconnection if there is no incoming audio signal.
Mono mix mode	Choose Left, Right or Downmix (send audio stream).
RTP port	If **Auto-configure RTP port** is disabled, specify the port number.
RIST	Enable RIST to recover lost packets by resending them. You can enter a limit for the bandwidth used by the stream including re-sent packets.
Buffer	Enter a value for audio buffer.

5.10 Creating input source configurations for Icecast

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
Icecast	Stream over IP using TCP (Icecast/Shoutcast)	[Data]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Name	Assign a name to the Icecast server for better reference.
URL	Enter the URL of an Icecast server in the local network or the internet, e.g. “192.168.99.131” or “www.backup-audio.com”.
Username	Enter the username.
Password	Enter the password.
IP Interface	Select the [Data] interface for the audio stream input.
Buffer	Enter a value for audio buffer.
Gain	Set the source-specific gain. This is useful if the level of this source is either higher or lower than the levels of the other sources in the decoder chain (main – backup).
Ancillary data	To add ancillary serial data to the stream, activate the switch.
GPIO tunneling	Enable GPIO tunneling for GPIO switch between encoder and decoder.

5.11 Creating input source configurations for internal storage (File)

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
File	Files from internal storage	Internal storage (eMMC, optional SSD)

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.

4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Name	Assign a name to the configuration profile for better reference.
File	Select an audio file in the dropdown menu.
Buffer	Enter a value for audio buffer.
Gain	Set the source-specific gain. This is useful if the level of this source is either higher or lower than the levels of the other sources in the decoder chain (main - backup).

5.12 Creating input source configurations for audio interfaces

You can create an input source configuration and use it for encoding and decoding.

Input Source	Description	Source Interface
XLR	Digital (AES/EBU) or analog audio over XLR connector	[D IN] [A IN]
AES 67	Digital (AES67) audio	[D IN]

To create a new configuration profile for an input source:

1. Navigate to the page **Codec** in the section **Codec Settings**.
2. In the block **Input Sources**, select the input source for which you want to create a configuration profile.
3. To create a configuration profile, click ⊕.
4. To set up the new configuration profile, click **Edit**.
5. Configure the parameters.
6. Click **Save**.

✓ You have created an input source configuration. Continue with 6.2 Assigning input source and codec profile to an encoder.

Parameters

Name	Assign a name to the configuration profile for better reference.
Ancillary data source	Select the source for ancillary data in the dropdown menu.

6 Encoder settings

The following steps are necessary to operate the IP-8e as an encoder:

- Creating input source configurations
- Creating codec profiles
- Assigning input source and codec profile to an encoder
- Setting up encoder outputs
- Configuring ancillary data inputs

If the corresponding rights are activated, you can also do the following:

- Creating an HLS stream
- Configuring the TS Multiplexer

6.1 Creating Codec Profiles

You can create codec profiles to assign to the different encoders of the IP-8e.

1. Navigate to the page **Codec**.
2. Click on the tab **Profiles**.
3. To create a new codec profile, click ⊕.
4. To set up the new codec profile, click **Edit**.
   ➢ A dialog window opens.
5. Configure the parameters.
6. Click **Save**.

✓ You have created and edited a codec profile.

Parameters

Name	Assign a name to the codec profile for better reference.
Encoder format	Select the encoder format. Different settings are configurable depending on the selected encoder format.
Frame size	Select the required frame size.
Audio mode	Select the audio mode in the dropdown menu.
Sampling rate	Set up sampling rate in the dropdown menu. The sampling rate for Livewire can only be configured for 48 kHz. For some 2wcom devices, the sampling rate is set to 192,000 Hz.
Sampling width	Set up sampling width in the dropdown menu in the range of 16-24 bits depending on the selected encoder format.
Endianness	Select the endianness (order of bytes).
Bitrate	Select the bit rate in the dropdown menu depending on the chosen audio mode. For some encoder formats, this field shows the calculated bitrate depending on the selected settings.
GPIO Tunneling	Enable GPIO tunneling for GPIO switch between encoder and decoder.

6.2 Assigning input source and codec profile to an encoder

The IP-8e is equipped with parallel encoders that can operate at the same time. One input can be the source for several encoders.

Prerequisite: You have already created configuration profiles for the input sources you want to use.

1. Navigate to the page **Codec**.
2. Click on the tab **Encoder**.
3. In the block **Source/Profile Assignment**, assign an input source configuration to each encoder by selecting it in the dropdown menu **Input source**. Alternatively, drag/drop the input source configuration into this field.
4. Select the source for ancillary data from the dropdown menu **Ancillary Source**. To configure the ancillary data inputs and outputs, see 6.5 Configuring Ancillary Data.
5. Assign a codec profile to each encoder by selecting it from the dropdown menu **Profile**. Alternatively, drag/drop the codec profile into this field.
6. Click **Save**.

✓ You have activated and configured the encoders.

The IP-8e can also operate as a **transcoder** and change the codec format of an input audio stream. For transcoding, assign the corresponding input stream to the encoder and configure the format of the output stream. This function is currently limited to PCM only.

6.2.1 Limitations for IP inputs

When the IP-8e is using IP-based inputs (for example Livewire+ or AES67), it runs into limitations due to high CPU load or receiving a high number of packets on its network inputs. This section explains how many stream inputs are possible at the same time.

The tests were performed with enhanced aptX as audio codec. This setup is the worst-case choice for the IP-8e in terms of CPU load.

Choosing a different codec could enable the IP-8e to use more simultaneous IP inputs as most other codecs do not use as much CPU as enhanced aptX.

Note that the buffer for all IP inputs should be set to at least 50 ms.

6.2.1.1 Livewire+ inputs

Livewire+ has three modes:

1. Low Latency Stereo (1 ms packet time)
2. Standard Stereo (5 ms packet time)
3. Live Stereo (250 µs packet time)

When using standard stereo feeds, the IP-8e can use up to **8 encoders** at the same time, each of them receiving a Livewire+ Standard Stereo feed.

When using low latency stereo feeds, the IP-8e can use up to **8 encoders** at the same time.

Using Live Stereo feeds is not recommended. The IP-8e will accept a Live Stereo feed and will also process it and send an encoded output, but quality and stream continuity must be closely observed.

6.2.1.2 AES67 inputs

AES67 supports several different packet times. The mandatory mode is 1 ms packets. Increasing this to 4 ms can reduce packet load in the network and on the IP-8e.

When using single AES67 flows, the IP-8e can use up to **8 encoders** at the same time, each of them receiving a 1 ms AES67 feed.

When using dual redundant flows (for example SMPTE 2022-7 compliant), the IP-8e can use up to **4 encoders** at the same time.

You can view the packet times of different encoders on the page **Overview** in the tab **Codec**. To show the details of an encoder, click on the corresponding panel. The details displayed below the block **Encoder** include information about the IP input like the received packets per second.

6.3 Setting up encoder outputs

6.3.1 Setting up an Elementary Stream output

You can activate and configure output streams for each encoder.

To set up a converter output:

1. Navigate to the page **Codec**.
2. In the block **Outputs**, select the tab (if applicable) of the output you want to set up.
3. Click ⊕ to create a new encoder output.
4. To set up the new output, click **Edit**.
5. Edit the parameters of the output settings.
6. Click **Save**.

✓ You have set up an encoder output.

Parameters

Activation	To activate this output, set the switch to **ON**.
Encoder	Select the encoder. The same encoder can be assigned to several outputs.
Name	Enter the name of the stream for better reference.
Domain Name / IP	Define the domain name or IP address of the destination.
Port	Specify the port number of the destination.
QoS DSCP	Select the quality of service (QoS). The selected packet will be prioritized.
Multicast TTL	TTL (Time to Live) for multicast packets.
IP interface	Select the interface for the output.
Mode	Select the mode of the output stream in the dropdown menu: RTP or UDP. **NOTE:** Besides UDP/RTP, RTCP packets are also generated for the encoder output and are sent in intervals of 5 s. UDP/RTP allows reordering packets by means of sequence numbers.
RTCP output	Enable or disable the Real-Time Control Protocol (RTCP) output for monitoring and control of the stream. **Note:** If RTP is used, make sure to also allow RTP Port+1 in your firewall settings, as this port is used for RTCP.
Maximum payload size	Select the size limit for the payload. To set no limit, select **Maximum**.

Send Delay	Set up the send delay, which the encoder should wait in order to send Audio over IP as an offset stream for redundancy
RIST	Enable RIST to recover lost packets by resending them. You can enter a limit for the bandwidth used by the stream including re-sent packets.
Synchronous Playout / SFN	Enable SFN and enter the global delay to ensure synchronous playout.
Stream4Sure	Enable this function to allow the decoder to use this stream as one of up to 4 IP streams for Stream4Sure.
FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay.
FEC column/row port offset	Enter the offset to the main destination port the data should be sent to. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 5006 (5004 + 2). If you do not want to use this offset, enter "0".
Dual streaming	If dual streaming is enabled, configure the IP parameters. You can set up the same or different [Data] sources for the Ethernet input.

6.3.2 Setting up an SRT output

You can activate and configure output streams for each encoder.

To set up a converter output:

1. Navigate to the page **Codec**.
2. In the block **Outputs**, select the tab (if applicable) of the output you want to set up.
3. Click ⊕ to create a new encoder output.
4. To set up the new output, click **Edit**.
5. Edit the parameters of the output settings.
6. Click **Save**.

✓ You have set up an encoder output.

Parameters

Activation	To activate this output, set the switch to **ON**.
Encoder	Select the encoder. The same encoder can be assigned to several outputs.
Name	Enter the name of the stream for better reference.
Mode	Choose between “Caller” and “Listener” mode.
Host	Enter the host domain of the SRT destination.
Auto-configure source port	Activate automatic configuration of the source port.
Source port	If auto-configuration is disabled, enter the source port number manually.
Destination port	Enter the port number of the destination.
IP interface	Select the [data] interface for the output.
Latency	Define the time interval for the latency before the IP-8e starts to output the SRT stream.
Encryption	The type of AES encryption determines the length of the key (passphrase). AES-182 uses a 16-character passphrase (128 bit), AES-192 uses a 14-character (192 bit) and AES-256 uses a 32-character (256 bit) passphrase.

Passphrase	Define a password used to secure the SRT stream.

6.3.3 Setting up an Icecast Source Client output

You can activate and configure output streams for each encoder.

To set up a converter output:

1. Navigate to the page **Codec**.
2. In the block **Outputs**, select the tab (if applicable) of the output you want to set up.
3. Click ⊕ to create a new encoder output.
4. To set up the new output, click **Edit**.
5. Edit the parameters of the output settings.
6. Click **Save**.

✓ You have set up an encoder output.

Parameters

Activation	To activate this output, set the switch to **ON**.
Encoder	Select the encoder. The same encoder can be assigned to several outputs.
Name	Enter the name of the stream for better reference.
Domain Name / IP	Define the domain name or IP address of the destination.
Port	Specify the port number of the destination.
IP interface	Select the [data] interface for the output.
Mountpoint	Specify the mountpoint of the stream in the domain.
User	Enter the username for using the domain.
Password	Enter the password for using the domain.

6.3.4 Setting up an Icecast Server output

You can activate and configure output streams for each encoder.

To set up a converter output:

1. Navigate to the page **Codec**.
2. In the block **Outputs**, select the tab (if applicable) of the output you want to set up.
3. Click ⊕ to create a new encoder output.
4. To set up the new output, click **Edit**.
5. Edit the parameters of the output settings.
6. Click **Save**.

✓ You have set up an encoder output.

Parameters

Activation	To activate this output, set the switch to **ON**.
Encoder	Select the encoder. The same encoder can be assigned to several outputs.
Name	Enter the name of the stream for better reference. This name will be used as the icy name as well.
Port	Specify the port number of the destination.

IP interface	Select the [Data] interface to be used for the output.
TLS/SSL encryption	Enable TLS/SSL encryption.
Burst on connect	Enable bust on connect and enter the number of burst frames to load the buffer and ensure error-free connection.
Ancillary data	To add ancillary serial data to the stream, activate the switch.
GPIO tunneling	Enable GPIO tunneling for GPIO switch between encoder and decoder.

6.4 Generating an AES67 stream

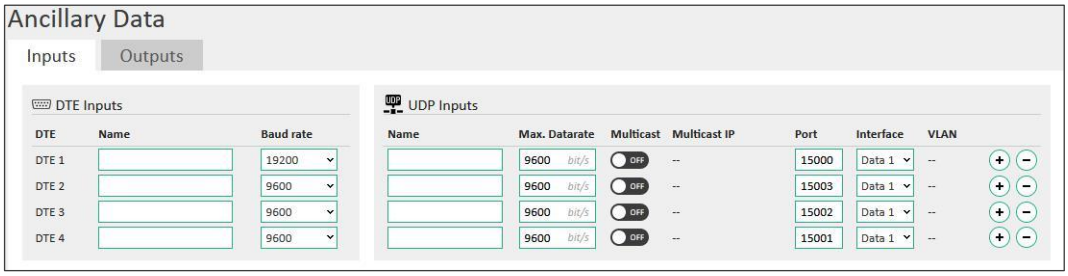
To generate an AES67 stream:

1. Navigate to the page **Codec**.
2. Create a codec profile for Elementary Streams using exactly the following parameters:
    - **Encoder Format:** PCM
    - **Audio Mode:** Stereo
    - **Sampling Rate:** 48 kHz
    - **Sampling Width:** 24 Bit
    - **Endianness:** Big Endian
3. Configure the remaining parameters with individual settings.
4. Assign the codec profile to an encoder.
5. Select the input source for the encoder.
6. Click **Save**.
7. Configure the encoder outputs (see 6.3 Setting up encoder outputs).

✓ The encoder now generates an AES67 stream.

6.5 Configuring Ancillary Data

You can configure ancillary data and add them to the inputs and outputs.



To configure the ancillary data inputs and outputs:

1. Navigate to the page **Ancillary Data**.
2. In the tabs **Inputs** and **Outputs**, enter a name for the DTE input/output and set a baud rate.
3. To add UDP inputs/outputs for ancillary data, click ⊕.
4. Configure the parameters for the UDP inputs/outputs.
5. Click **Save**.
6. Navigate to the page **Codec**.
7. In the tab **Encoder**, add an ancillary source to the input source. Alternatively, select the **Pipe** function to use ancillary data that already exist in the input source.

8. Click **Save**.
9. In the tab **Ancillary Output**, assign sources to the ancillary data outputs. You can either select a specific ancillary data source or one of the decoder audio outputs. If one of the decoder audio outputs is selected, then the IP-8e outputs the ancillary data of the currently active main or backup source.
10. Click **Save**.

✓ The ancillary data are now added to the stream.

Parameters

Name	Enter a name for the input/output for better reference.
Max. Datarate	Enter the maximum data rate that is allowed for this input. The TS encoder uses this parameter to determine the data rate to reserve for private data when using the ancillary source with " Auto calculate required TS bit rate".
Multicast	Choose whether to use multicast.
Multicast IP	Enter the multicast IP.
IP	Enter the IP address. This can be a multicast IP.
Port	Specify the port for ancillary data via UDP.
Interface	Select the [Data] interface to be used.
VLAN	If the selected [Data] interface is an interface with VLAN, then select the VLAN to be used.

6.6 Configuring the TS Multiplexer

The IP-8e can output up to 8 multiplexed streams over IP at the same time. One multiplexed stream can contain up to 16 programs. To each program, you can add up to 16 payload contents. You can use the IP interfaces [Data] redundantly for the same stream content and the same destination or send different stream contents to the same or different destinations.

6.6.1 Setting up a Multiplex with payload content

Prerequisite: You have already configured the input sources.

Prerequisite: You have already assigned input sources and codec profiles to the encoders.

To set up a multiplexed stream with payload:

1. Navigate to the **TS Multiplexer** page.
2. To create a new Multiplex, click **+**.
   ➢ A new tab with TS settings appears.
3. To add a new service to the TS payload content, click **Add Service**.
4. To add encoder audio to the stream, select an available source from the **Payload** dropdown menu. You can either select encoder audio or an ES stream from an external source.
5. To add another payload to the content, click **Add Payload**.
6. To add private data to the stream, select the input source from the **Payload** dropdown menu. Alternatively, drag/drop the input from the tab **Data**.
7. Specify the service ID, service name, service provider name, PMT PID, PCR PID, and PID for the program.

8. Select between the modes PES (program elementary stream) and MPE (multiprotocol encapsulation). If MPE is selected, enter the destination PID, destination port and the protocol.
9. In the **General** block, configure the parameters.
10. Click **Save**.

✓ You have set up a multiplexed stream. Continue with 6.6.3 Setting up Multiplex outputs.

Parameters

Encoding standard	Select the encoding format: DVB or ATSC.
MPEG TS tables	Select MPEG TS tables as needed for the multiplexing process.
Auto-calculate required TS bit rate	Enable this option to automatically calculate the required Transport stream bit rate based on the selected settings.
Bit rate	If auto-calculated TS bit rate is disabled, enter the bit rate manually.
Audio bitrate priority	Select a priority for the audio bitrate: low latency or low bitrate overhead.
Private data mode	Set the mode for handling private data within the multiplexed stream: Elementary stream (ES) or TS adaption.
Network ID	Enter the network ID to identify the network where the multiplexed data will be transmitted.
Original Network ID	Enter the original network ID to indicates the network in which the TS stream was originally created.
Transport Stream ID	Assign a Transport Stream ID to identify the specific Transport Stream being used.
Network name	Enter the name of the network where the multiplexed data will be transmitted.
Audio PID removal on bad input	Enable or disable the removal of PIDs in case the input is bad.

6.6.2 Adding SIRC data

SIRC (Satellite In-Band Remote Control) is a system for remote device control over satellite. SIRC allows you to remotely manage and service equipment without the need of a physical network or internet connection. By adding device control data into the MPEG2 transport stream at the satellite uplink station, the data can later be extracted and processed by the receiving equipment and thus completely remove the need for physical connections. This is especially useful when managing equipment in remote locations that have no or very poor outside connectivity.

Prerequisite: You have already set up a multiplex (see 6.6.1 Setting up a Multiplex with payload content).

To add SIRC data to a multiplexed stream:

1. Navigate to the page **TS Multiplexer**.
2. Select the tab of the multiplex to which you wish to add SIRC data.
3. In the block **SIRC (Satellite In-Band Remote Control)**, enable the SIRC data channel.
4. Configure the parameters.

✓ The multiplexed stream now contains SIRC data. To view the status of the SIRC data, navigate to the page **SIRC data**(11.7 SIRC data status).

Parameters

SIRC PID	Enter the PID for SIRC data.
SIRC Bitrate (reserved)	Enter the bitrate to be reserved for SIRC data.

SIRC UDP Data Receive Port	Enter the port number of the UDP data port that receives the SIRC data.
SIRC UDP Data IP interface	Select the [Data] interface to be used for SIRC data.
SIRC UDP Data VLAN	Select the VLAN ID. To disable VLAN, select "0".

6.6.3 Setting up Multiplex outputs

For each TS Multiplex, you can create and save up to 32 destination streams.

To set up Multiplex outputs:

1. Navigate to the page **TS Multiplexer**.
2. In the block Multiplexer Outputs, click on the tab of the output you want to set up.
3. To create a new output, click ⊕.
4. To configure the output, click **Edit**.
   ➢ A dialog window opens.
5. Configure the parameters.
6. Click **Save**.

✓ The IP-8e now outputs multiplexed streams.

TS/IP output parameters

This option is only available if the *TS Encoder* right is activated.

Activation	Enable this output stream.
Name	Enter the name of the stream for better reference.
Domain name/IP	Enter the IP of the destination.
Port	Specify the port number of the destination.
Multicast TTL	TTL (Time to Live) for multicast packets.
IP interface	Select the [Data] interface for the output.
Mode	Select the mode of the output stream in the dropdown menu: RTP or UDP. **NOTE:** Besides the RTP, the RTCP packets are also generated for the encoder output and are sent in 5 s intervals. RTP allows reordering packets by means of sequence numbers.
RTCP output	Enable or disable Real-Time Control Protocol (RTCP) output, which is used for monitoring and controlling the stream.
Send delay	Enter the send delay, that the encoder should wait in order to send Audio over IP as an offset stream for redundancy.
RIST	Enable RIST to recover lost packets by resending them.
Bandwidth limiting	Specify the total bandwidth for the transport stream, including both the primary stream and RIST retransmissions. For example, if the stream typically uses 500 kbps and the limit is set to 1000 kbps, RIST can use up to 500 kbps for retransmissions. Make sure not to set this parameter to the retransmission overhead alone. A low value can block retransmissions, effectively disabling RIST, while the primary stream remains unaffected.

FEC Mode	Configure the FEC mode depending on the sample rate and the acceptable value for delay. **NOTE:** Enable Pro-MPEG FEC in the corresponding decoder.
FEC column (L)/ FEC row (D) port offset	Enter the offset to the main destination port the data should be sent to. For example, if the main port is 5004, the value "2" for FEC column port offset means that the port is then 2006 (5004 + 2). If you do not want to use this offset, enter "0".
Dual Streaming	Enable or disable dual streaming. If dual streaming is enabled, the menu will expand. Set up the connection for dual streaming in the expanded menu. For the Ethernet input, you can select the same or a different source. **NOTE:** Enable dual streaming in the corresponding decoder.

TS/SRT output parameters

This option is only available if the rights *TS Encoder* and *SRT Encoder* are activated.

Activation	Enable this output stream.
Name	Enter the name of the stream for better reference.
Mode	Select either caller or listener mode.
Host	Enter the host domain of the SRT destination.
Auto-configure source port	Activate automatic configuration of the source port.
Source port	If auto-configuration is disabled, enter the source port number manually (relevant for e.g. firewall)
Destination port	Enter the port number of the destination.
IP interface	Select the [Data] interface for the output
Latency	Define the time interval for the latency before the IP-8e starts to output the SRT stream.
Encryption	Enable SRT encryption. The type of AES encryption determines the length of the key (passphrase). AES-128 uses a 16-character (128-bit) passphrase, AES-192 uses a 24-character (192-bit) and AES-256 uses a 32-character (256-bit) passphrase.
Passphrase	Define a password used to secure the SRT stream. **NOTE:** The same encryption key should be set for this input TS in the corresponding decoder.

ASI output parameters

This option is only available if an ASI output is built in as a hardware option.

Active	Enable this output stream. This change will be saved directly. It is not necessary to click **Save**.
Configuration	To configure the ASI output signal, see 7.7 Enabling the ASI output.

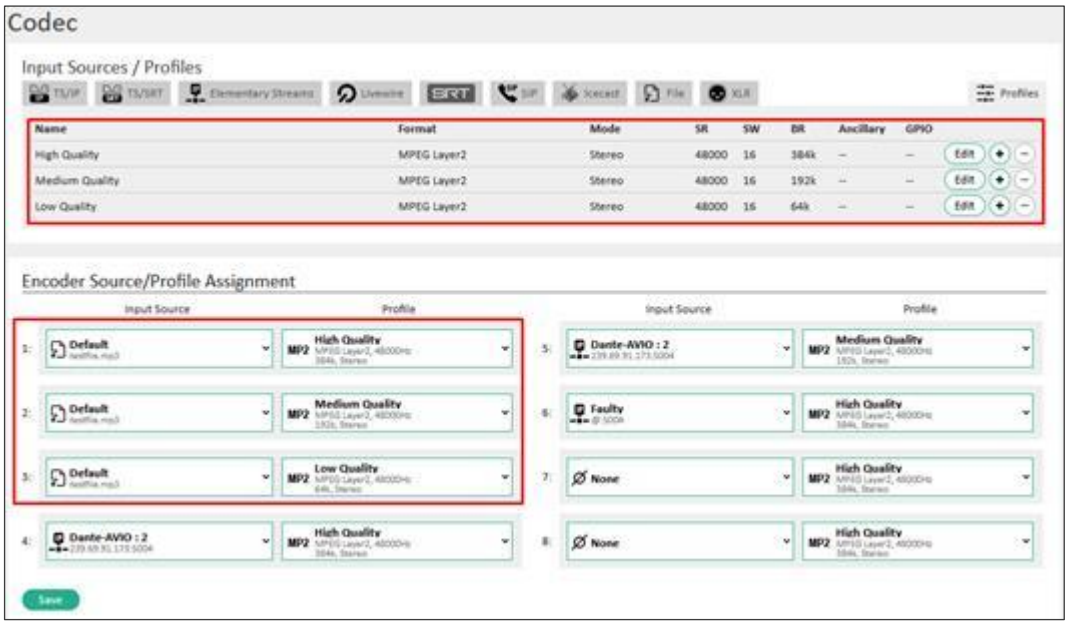
6.7 Generating an HLS stream

This option is only available if the right *HLS Connections* is enabled.

The IP-8e can encode the same signal multiple times in different qualities and create an HLS stream that automatically changes its audio quality depending on the circumstances.

To create an HLS stream:

1. Assign input sources and profiles to the encoders. The same source must be encoded in different qualities.

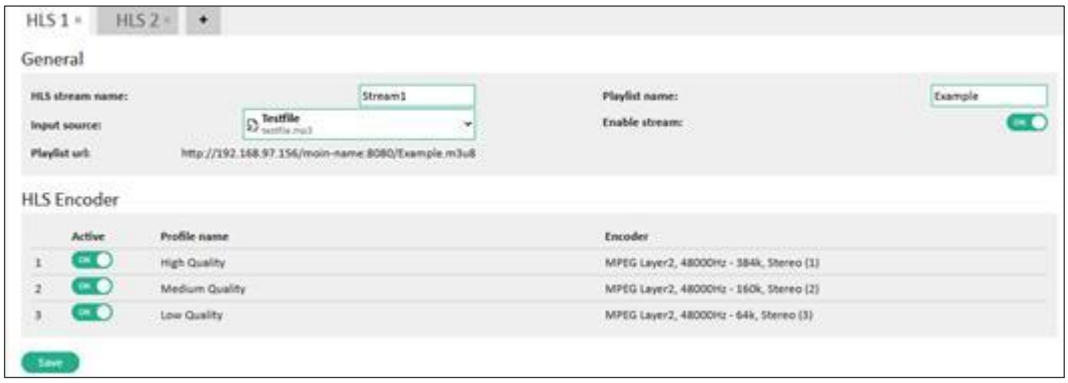


2. Navigate to the page **HLS**.
3. To create a new tab for the HLS stream, click **+**.
4. Configure the parameters of the HLS stream.
5. Click **Save**.

✓ The encoder now generates a HLS stream. Information on active HLS streams are displayed on the page **Overview**.

Parameters

HLS stream name	Enter the name of the stream for better reference.
Input source	Select the input source in the dropdown menu. Alternatively, drag/drop the input source from the block **Input sources** into this field.
Playlist name	Enter the playlist name that will appear in the playlist url.
Playlist url	Use this URL to listen to the stream. Some web browsers need a plug-in to listen to the stream.
Enable stream	Activate the HLS stream.
HLS encoder	Activate the encoders that should feed into the HLS stream. Only the encoders that use the selected input source are listed in this block.



6.8 Setting up RIST

RIST (Reliable Internet Stream Transport) is a transport protocol for IP streams that is meant to recover lost packets by resending them and to support interoperability with devices that do not have this function. If the decoder detects lost packets in the received stream, then it uses the buffer time to request the lost packets from the encoder. The lost packets are sent again to complete the stream.

As RIST is an attachment for normal RTP streams, the stream can also be processed by receivers that are not equipped with a RIST function and therefore cannot request packets using RIST. Additionally, RIST provides better results in terms of latency, absolute packet recovery and especially packet recovery in case of burst errors compared to FEC.

The bandwidth that is needed for RIST depends on the number of lost packets. If only few packets need to be requested, RIST is a reliable low-bandwidth solution. If too many packets are lost, RIST becomes ineffective and needs lots of bandwidth. If used for multicast, newly requested packets are sent to every single receiver individually.

To set up an encoder with RIST:

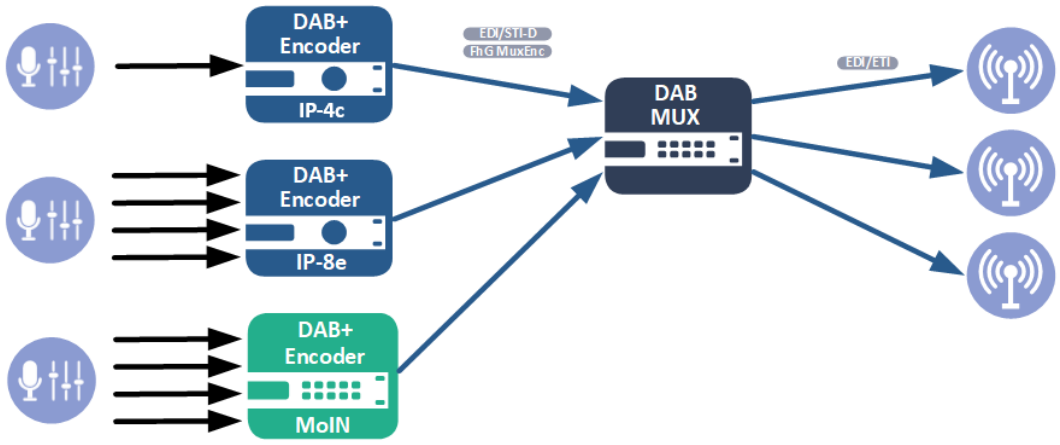
1. Select the **Codec** page.
2. Add an input source configuration. RIST can be used with the input sources TS/IP and Elementary Stream (RTP/UDP).
3. Edit the input source configuration. Make sure to activate the switch for RIST.
4. If you are using TS/IP as an input source, create a profile for demux configurations that uses the input source configuration as the TS source.
5. Add and edit a codec profile.
6. Assign the input source configuration and the codec profile to an encoder.
7. Add an encoder output for Elementary Stream (RTP/UDP).
8. Edit the encoder output. Make sure to activate the switch for RIST. Optionally, set up limit for the bandwidth used by the stream including re-sent packets.
9. Activate the encoder output.

✓ The encoder is now encoding a stream with RIST.

6.9 Setting up a DAB+ encoder

This option is only available if the right *DAB+ encoder* is enabled.

You can set up a DAB+ encoder to encode streams in DCP format and send them to an ensemble multiplexer. The codec profiles can be configured either in the web interface or via the Fraunhofer ensemble multiplexer.



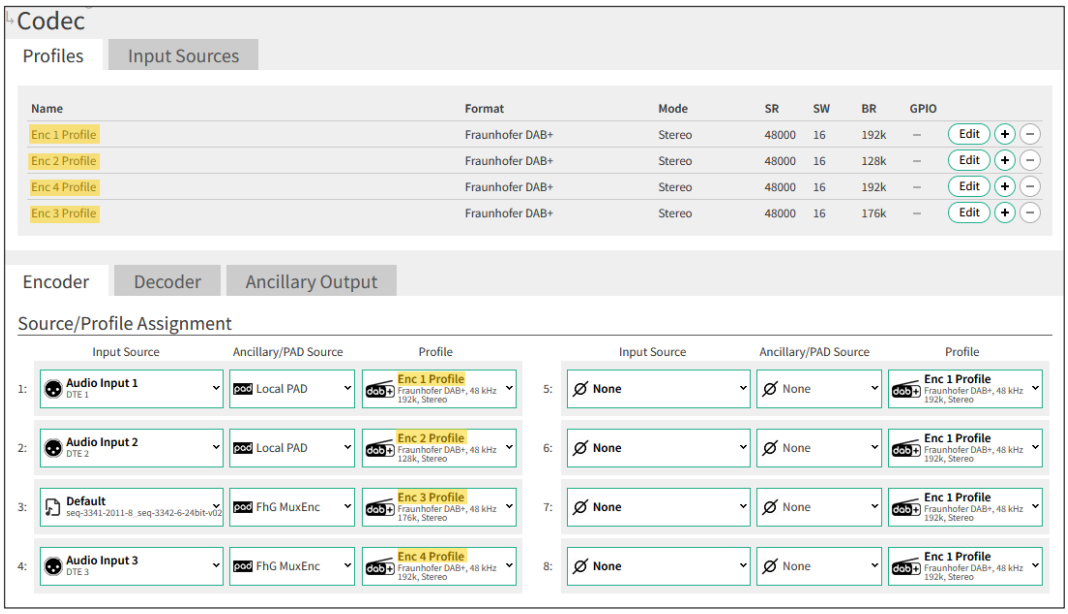
Prerequisite: You have set up synchronization of time and date with an NTP server.

To set up the DAB+ encoder:

1. Navigate to the Codec page.
2. Create a codec profile with the **Fraunhofer DAB+** encoder format. Note: The **Fraunhofer DAB+** encoder format is only available if the *FhG AAC* right is active.
3. Assign an input source and the codec profile to an encoder.

The input source must be either analog, digital or AES67. Other sources are not yet available for the DAB+ audio encoder.

Make sure to use each DAB+ codec profile for 1 encoder only, as they can be changed from the external ensemble multiplexer. Using the same codec profile for more than 1 encoder may lead to unwanted changes.



4. To prevent drift from the Mux, synchronize the DAB+ encoder via NTP using the External Clock settings. For AES/EBU, enable the sample rate converter on the **Audio** page and select the clock source **Extern**. For streaming and file sources, enable encoder SRC in the codec profile.
5. On the Codec page, create an encoder output for **DAB DCP** that uses the previously configured encoder. (See 6.9.1 Setting up a DAB DCP output.)
6. Make sure that the output parameters match the parameters that are set in the external ensemble multiplexer.

✓ You have set up the DAB+ encoder. You can view the encoder status on the **Overview**.

6.9.1 Setting up a DAB DCP output

This option is only available if the right *DAB+ encoder* is enabled.

You can activate and configure output streams for each encoder.

To set up a converter output:

1. Navigate to the page **Codec**.
2. In the block **Outputs**, select the tab (if applicable) of the output you want to set up.
3. Click ⊕ to create a new encoder output.
4. To set up the new output, click **Edit**.
5. Edit the parameters of the output settings.
6. Click **Save**.

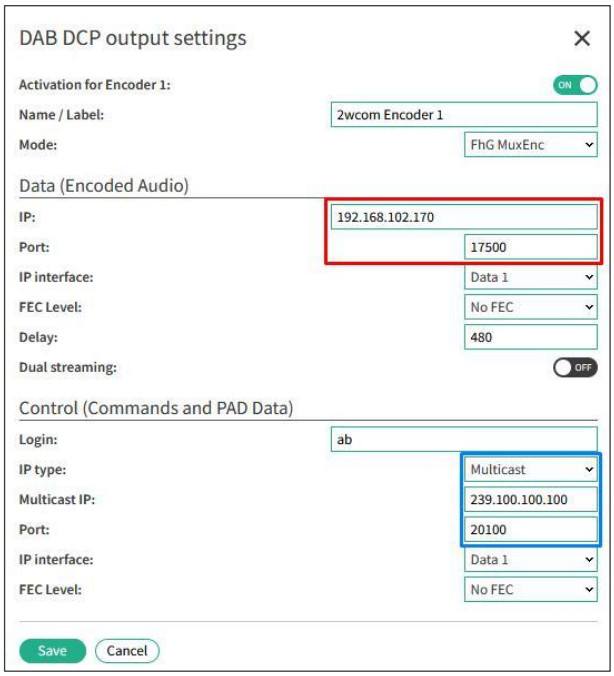
✓ You have set up an encoder output.

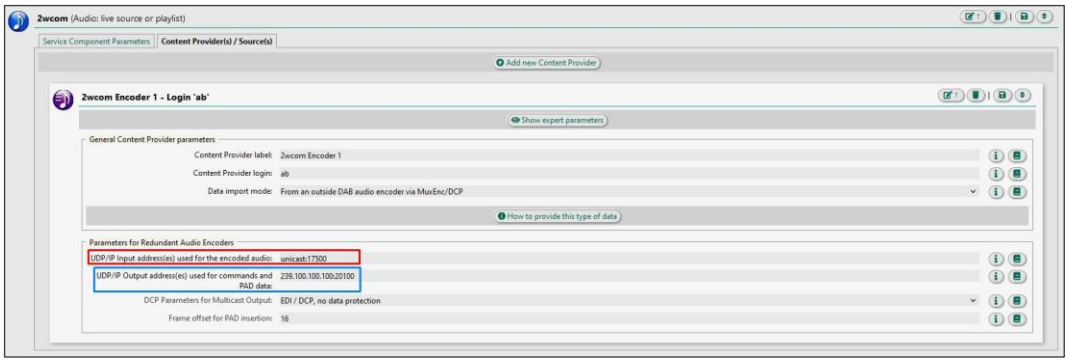
Parameters

Activation for Encoder n	You can activate 1 DAB DCP output per encoder. Output 1 is the output of encoder 1, output 2 is the output of encoder 2 and so forth.
Name /Label	Enter a name for this output for better reference.
Mode	Select the mode for this output. Note: The mode "FhG MuxEnc" is only available if the right *FhG MuxEnc* is active.
IP	Enter the destination IP address for this output.
Port	Enter the destination port for this output.
IP Interface	Select the [Data] interface to be used for this output.
FEC Level	Select the FEC Level to be used for this output.
Delay	Enter the delay to be added.
Dual streaming	If dual streaming is enabled, configure the IP parameters. You can set up the same or different [Data] sources for the Ethernet input.
Login	Enter login information for the Fraunhofer ensemble multiplexer.
IP type	Enter the IP address to be used for commands and PAD data.
Multicast IP	Enter the multicast IP to be used for commands and PAD data.
Port	Enter the port to be used for commands and PAD data.
IP interface	Select the [Data] interface to be used for commands and PAD data.
FEC Level	Select the FEC Level.

Example

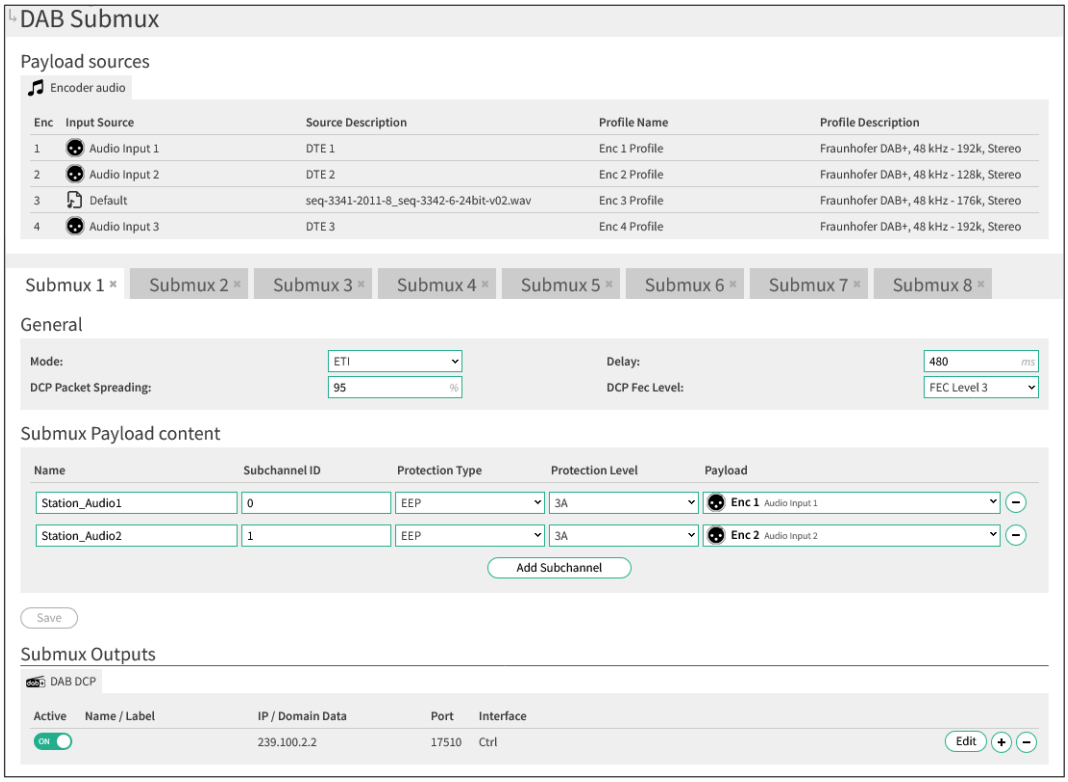
Make sure that the DAB DCP output parameters match the parameters that are set in the Fraunhofer multiplexer.





6.9.2 Setting up the DAB Submux

With the DAB Submux function, you can configure and manage multiple audio streams for DAB transmission. Input sources that are assigned to an encoder can be combined into a single DAB multiplex for broadcast.



Setting up a DAB Submux With Payload Content

- **Prerequisite:** You have already assigned input sources and codec profiles to the encoders.
- **Prerequisite:** The *DAB+ Encoder* right is activated.

To set up the DAB submux:

1. Navigate to the **DAB Submux** page.
2. To create a new submux, select **+**.
   ➢ A new tab with submux settings appears.
3. In the **General** block, configure the stream parameters:

Mode	Select the mode for DAB transmission.
Delay	Set the transmission delay to ensure proper synchronization.
DCP Packet Spreading	Specify the percentage of packet spreading to balance the network load.
DCP FEC Level	Select the FEC level for enhanced error resilience.

4. To add a new subchannel to the Submux payload content, click **Add Subchannel**.
5. Configure the payload content parameters:

Payload	To add encoder audio to the stream, select an available encoder from the **Payload** dropdown menu. Alternatively, drag and drop the encoder from the **Encoder audio** tab.
Name	Enter a name to identify the payload content.

Subchannel ID	Enter a subchannel ID. The subchannel ID takes values from 0 to 63. You cannot use the same identifier twice.
Protection type	Select a protection type. Use UEP (Unequal Error Protection) for classic DAB audio services based on MPEG-1 Layer II. For other data streams, including AAC, use EEP (Equal Error Protection).
Protection level	Select a protection level. For DAB+, the most commonly used FEC code rate is EEP-3A.

6. Select **Save**.

✓ You have configured the submux settings. You can now set up submux outputs.

Setting up Submux Outputs

You can define how the submux will be transmitted to external systems. Each DAB multiplex output can be configured with a primary transmission path and an optional redundant path for reliability.

- **Prerequisite:** You have already set up a DAB submux with payload content.

To set up a submux output:

1. Navigate to the **DAB Submux** page and select the tab of the submux for which you want to set up an output.
2. To create a new output, click ⊕.
3. To configure the output, click **Edit**.
   ➢ The settings window opens.
4. Configure the parameters:

Name	Enter a name to identify the output.
IP	Enter the IP address where the DAB submux stream will be sent.
Port	Enter the port number for the DAB output.
IP Interface	Select the IP interface to transmit the submux.
Send delay	Specify the percentage of packet spreading to balance the network load.
Redundancy Group	Select the FEC level for enhanced error resilience.

5. Select **Save**.
6. Activate the output by enabling the **Active** switch.

✓ The IP-8e now outputs submux streams.

6.9.3 Configuring PAD Data

The PAD (Program-Associated Data) feature allows broadcasters to transmit supplementary metadata alongside the audio stream. This data includes dynamic text labels and images that can be displayed on digital radio receivers, such as DAB. This function is typically used to show information like song titles, artist names, or promotional content. The PAD Data page allows you to configure the data rate, text messages (Dynamic Labels/Dynamic Label Plus), and slideshow content.

The IP-8e supports Dynamic Labels and Dynamic Label Plus. This means that DL Plus tags can be used to allow the receiver to identify the different parts of the text message to create DL Plus objects. The supported tags are *<item.artist>* and *<item.title>*.

If you want to use Dynamic Label Plus, insert the tags into the text message that will be transmitted to radio receivers. You can include the tags in the field **Default DLS** as well as in the files that are used to retrieve the DLS.

A text message with DL Plus tags would look like this:

Now playing: *<item.title>*Title of song*</item.title>* by *<item.artist>*Name of artist*</item.artist>*.

To configure the PAD data:

1. Navigate to the page **PAD Data**.
2. Select the tab of the encoder for which you want to configure the PAD data.
3. Configure the maximum data rate and character set in the block **General Settings**:

Max. data rate	Set the maximum data rate. This controls the amount of bandwidth allocated for the PAD data. **NOTE:** The available data rate depends on the DAB AAC format of the selected encoder. Audio and PAD data share the available bandwidth. The more bandwidth is set for the PAD data the less bandwidth is available for the audio input.
Character set	Select the appropriate character set from the drop-down menu. EBU Latin is selected by default.

4. In the field **Default DLS** in the block **Dynamic Labels / Text Messages**, insert the text message (including Dynamic Label Plus tags if applicable) that will be transmitted to radio receivers.

DLS is limited to 128 characters. If more characters are entered, the message will be cut after 128 characters.

5. To determine how the DLS should be updated, use the drop-down menu **DLS Update**:

Default DLS	This option consistently uses the text entered in the field **Default DLS**.
DLS (Download File)	Select this option to retrieve the DLS by downloading a file from a specified path. **NOTE:** The DLS is connected to the set file and will be updated when the file is changed. The server will be polled every 5 seconds.
DLS (SFTP Update)	Select this option to retrieve the DLS from a remote server via SFTP.

6. To upload a new image to the slideshow, select **Browse / Drop file** or drag the image file into the upload box in the block **Slideshow**.

The supported image formats are .png and .jpg and the image size is set to 320x240 pixel.

7. To add the image to the slideshow, select **Upload**. Note that the file details are displayed in the table including the filename, trigger time (when the slide will appear), expiry time (when the slide will stop appearing), upload time, and size of the image.
8. Select **Save**.

✓ The PAD data is now transmitted to compatible receivers, displaying real-time dynamic content as configured. You can view the status of the PAD data on the page **PAD Data** in the section **Status** (see 11.6 PAD Status).

7 Interface Settings

7.1 Configuring input/output settings

You can configure various settings for the input and output signals to ensure proper transmission and processing. The IP-8e supports up to 8 digital channels, up to 4 analog channels, and a mixed operation of up to 4 digital and 2 analog channels.

To configure the signal inputs and outputs:

1. Navigate to the page **Audio**.
2. Select the device mode in the drop-down menu **Interface Signal Type**: digital only or analog/digital.
3. Configure the parameters in the blocks **Inputs** and **Outputs**.
4. Click **Save**.

✓ You have configured the signal inputs and outputs.

Parameters

Signal Type	Select the signal type for the input and output interfaces.
Digital Gain	Adjust the gain of the input and output signals. This is useful if the signal's level is too high or too low.
Sample Rate Converter	To convert the sample rate to a specific frequency, enable the Sample Rate Converter. For more information, see 7.2 Enabling the Sample Rate Converter.
Sampling Rate	If the Sample Rate Converter is enabled, select the sampling rate.
Clock Source	Select the clock source for the Sample Rate Converter. To configure the external clock, see 10.14 Configuring Time / Clock settings.
AES/EBU Mute	Enable this function to mute an output if no input source is available.
Digital Reference Input	Select a reference input for digital signals to which the input and output clocks will be matched respectively.

7.2 Enabling the Sample Rate Converter

The IP-8e is equipped with an internal sample rate converter (SRC) that converts stereo audio from one sample rate to another. The IP-8e sample rate converter allows different rates at the digital AES/EBU interfaces.

To enable the sample rate converter:

1. Navigate to the page **Audio**.
2. Set the switch **Sample Rate Converter** to **ON**.
3. Select a sampling rate in the dropdown menu.
4. Click **Save**.

✓ The sample rate converter generates an exact sampling rate in the input/output audio.

The configured sample rate and sample width must be correct and correspond to the real values of the signal!

Sample processing with enabled Sample Rate Converter:

- The IP-8e transports the decoded audio samples (PCM) through the sample rate converter (SRC) to the output.
- The sample rate converter generates the exact sampling rate for the output, which was configured in the web interface.
- In the SRC input, the jitter of the sampling rate is converted into a constant determined sampling rate for the output.

Sample processing without enabled Sample Rate Converter:

- The IP-8e transports the decoded audio samples (PCM) directly to the output interface without converting the sample rate.

According to the AES-3 standard, data jitter varies between max +/- 20 ns. Depending on the bit depth, the signal-to-noise ratio has a better quality if the SRC is enabled.

During startup, the sampling frequency can vary up to +/- 20 ns according to the AES/EBU standard. After complete startup of the sample rate converter, the sampling frequency varies less.

7.3 Setting the Critical Level Marker

The audio level of the inputs and outputs is displayed on the overview page. You can set the critical level marker to specify when the bar should turn orange.

To set the critical level marker:

1. Navigate to the page **Audio**.
2. In the block **Critical Level Marker**, define the threshold above which the bar should turn orange.
3. Click **Save**.

✓ The bar indicating the audio level of the inputs and outputs now turns orange whenever the audio level is above the set value.

7.4 Changing the Headphone Volume

The input signal can be monitored via the headphone interface.

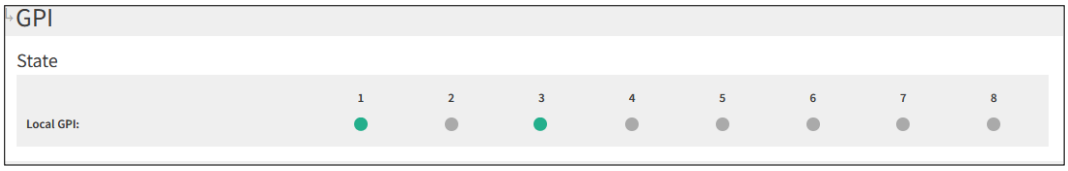
To change the volume of the headphone output:

1. Navigate to the page **Headphone**.
2. In the block **Headphone**, select the source for the headphone output.
3. Set the volume for the headphone output in a range from -40.0 to 0.0 dB.
4. Toggle the switch next to enable **Mono Downmix**.
5. Click **Save**.

✓ The volume of the headphone output is now adjusted.

7.5 Viewing the GPI Status

The IP-8e is equipped with 8 GPI contacts housed in the same 26-pole D-sub male connector as the GPOs. The inputs can be used for remote control (in combination with remote control software).



- To actuate a GPI, pull the corresponding control pin electrically to ground (pin 9). The resulting control current is less than 5 mA.
- To view the status of the GPIs, navigate to the page **GPI**.

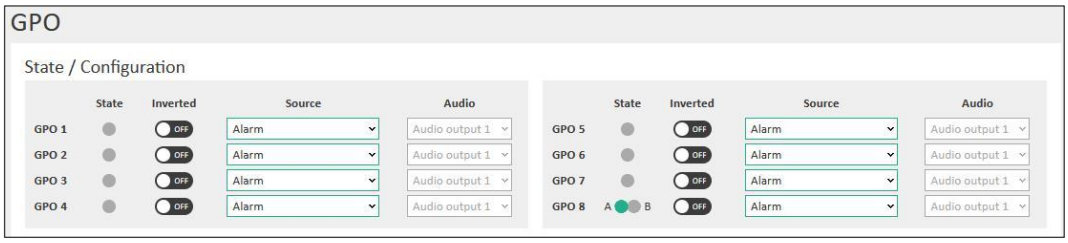
For information on the GPI pin layout, see 13.2 Interface Pin Layouts.

7.6 Configuring GPO Settings

To configure the GPO settings and view the status of the GPOs:

1. Navigate to the page **GPO**.
2. To invert a GPO, enable the corresponding switch.
3. Select the source for the GPO switch in the field **Source**. Only GPOs that are selected for the source **Alarm** can be used to indicate a triggered alarm.
4. If you set GPIO Tunneling as the source, then select the audio to be used for this function.
5. Click **Save**.

✓ You have configured the GPO settings.



The virtual LED **State** indicates the status of the GPOs (green: ON, grey: OFF). The state of a relay is ON if the alarm which is assigned to this relay is triggered.

For information on the GPO pin layout, see 13.2 Interface Pin Layouts.

7.7 Enabling the ASI output

The IP-8e is equipped with 2 ASI interfaces (BNC 75 Ω) for TS output. If ASI output 2 is not enabled, the interface can be used for 1PPS output.

To enable the ASI output:

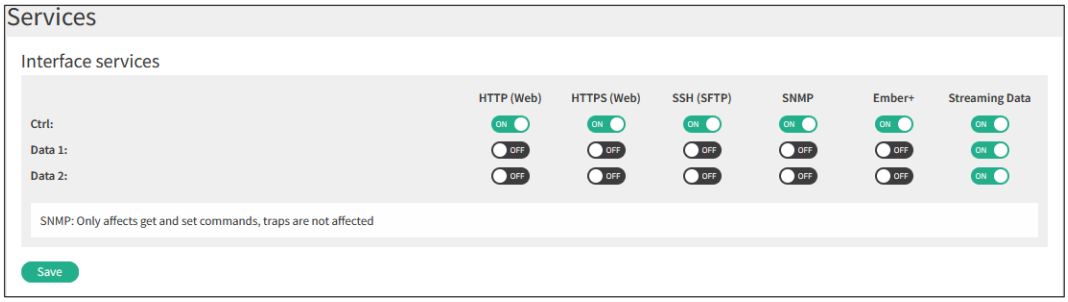
1. Navigate to the page **ASI Output**.
2. Enable an ASI output by setting the switch to **ON**.
3. In the dropdown menu **Output signal**, assign to each ASI output one TS Multiplex that is to be sent over ASI output.
4. Click **Save**.

✓ The TS is now sent over the ASI output. For more information on TS Multiplex configuration, see 6.6 Configuring the TS Multiplexer.

8 Network Settings

8.1 Configuring the Interface Services

For each ethernet interface, you can select the services by which the interface can receive and send data.



To select the supported services:

1. Navigate to the page **Services**.
2. For each individual interface, define which data can be received and sent.
3. Click **Save**.

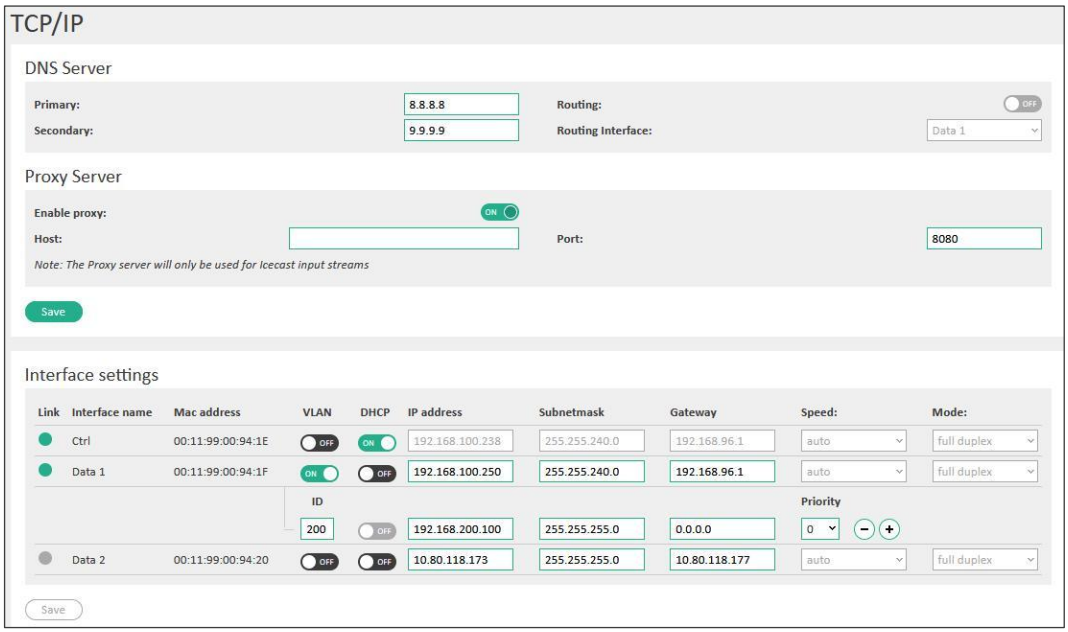
✓ The interfaces now only support the selected services.

8.2 TCP/IP: Configuring the Ethernet Interfaces

The IP-8e has several Ethernet interfaces: 1 for configuration and the others for data exchange. Configure the interfaces for data transmission.

NOTICE **False connection of the Ethernet interfaces will lead to incorrect operation!**

- ➢ Use the [Data] interfaces only for data transfer.
- ➢ Use the [Ctrl] interface only for the access to the device via the web interface and for SNMP.
  To change the supported services per interface, see 8.1 Configuring the Interface Services.



To configure the ethernet interfaces:

1. Navigate to the page **TCP/IP**.
2. Configure the parameters for the DNS Server, Ctrl and Data interfaces.

   The necessary address settings depend on the individual network and should be assigned by the responsible network administrator, if applicable.

3. Click **Save**.

✓ The ethernet interfaces are now configured.

Parameters

Primary	Enter the IP address of the primary domain name server (DNS).
Secondary	Enter the IP address of the secondary domain name server (DNS).
Routing	Enable the Routing, which enables the DNS server to send and answer the requests over different [Data] interfaces.
VLAN	Enable VLAN and enter a VLAN ID (1-4095).
Priority	Assign a priority (1-7) to this stream to add a priority code point (PCP) according to the IEEE 802.1Q specification. Select 0 to disable the priority and use best-effort delivery.
DHCP	Enable dynamic host configuration protocol (DHCP) which enables the device to get an IP address automatically.
IP Address	If DHCP is disabled, then assign an IP address to the interface.
Subnetmask	Enter the subnetmask for the IP address.
Gateway	Enter the address of the local system that is used for the internet access (e.g. the router).
DNS Server	Enter the IP address of the DNS server used.
Speed	Set the network connection speed in Mbps or select **Auto**.

8.3 Using TCP/IP Tools for Network Testing

The IP-8e features built-in TCP/IP tools for testing and diagnosing network connections. Use the ping tool for quick connectivity checks and basic latency measurements. Use the traceroute tool for a detailed analysis of the network path and to diagnose routing issues.

Using the Ping Tool

The ping tool helps you determine the connectivity status and latency between the IP-8e and a specified network destination.

1. Navigate to the **TCP/IP** page and select the **Tools** tab.
2. Configure the parameters in the **Ping** block:

Destination	Enter the hostname or IP address of the destination you want to ping.
Interface	Select the network interface to use for the ping request
Count	Specify the number of ping requests to send. The default is 10.
TTL	Set the maximum number of hops (routers) the ping request can pass through. The default is 255.
Data size	Define the size of the ping packet in bytes. Enter 0 to use the default size.

3. Select **Start** to initiate the ping test.
4. Select **Stop** to end the ping test at any time.

✓ The results are displayed in the **Output** block. The ping results show each packet's response time and any packet loss, indicating the connection quality and latency.

Using the Traceroute Tool

The Traceroute tool helps you trace the path that data packets take from the IP-8e to a specified network destination. This helps identify any delays or issues occurring along the path.

1. Navigate to the **TCP/IP** page and select the **Tools** tab.
2. Configure the parameters in the **Traceroute** block:

Destination	Enter the hostname or IP address of the destination you want to trace.
Interface	Select the network interface to use for the traceroute.
Max. hops	Specify the maximum number of hops (routers) the traceroute should attempt.

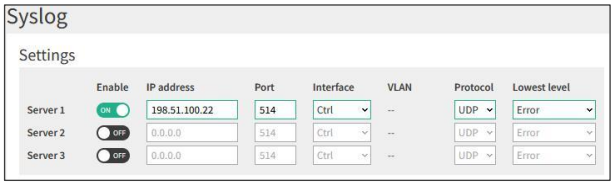
Time to wait	Set the maximum time (in seconds) to wait for each hop's response.

3. Select **Start** to initiate the traceroute test.
4. Select **Stop** to end the traceroute test at any time.

✓ The results are displayed in the **Output** block. The traceroute results list each hop's IP address and response time.

8.4 Monitoring the Device via Syslog

In addition to saving information about events in the log, you can also send them to a syslog server. Syslog eases monitoring the IP-8e.



To send event information to a syslog server:

1. Navigate to the page **Syslog**.
2. Enable at least one of the servers.
3. Configure the parameters.
4. Click **Save**.

✓ The IP-8e now sends event information to the syslog server(s).

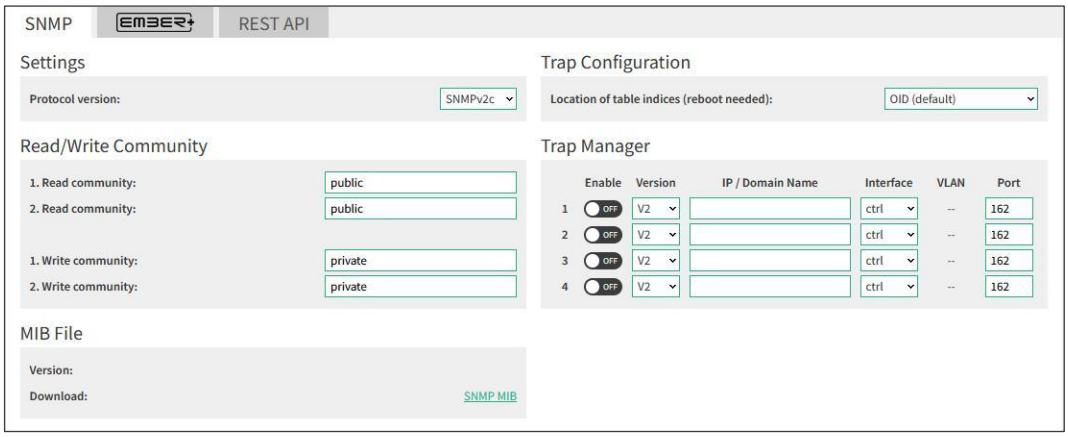
Parameters

IP address	Enter the IP address of the syslog server.
Port	Enter the port number.
Protocol	Select the protocol to be used.
Lowest level	Select the lowest level of a message that will be sent to the syslog server. For more information, see 11.11 Priority of Alarm Messages.
Interface	Select the [Data] interface to be used.
VLAN	If the selected [Data] interface is an interface with VLAN, then select the VLAN to be used.

8.5 SNMP: Configuring Access Data for External Requests

You can configure access data (read community/write community) that is necessary for external SNMP requests to the IP-8e.

SNMP (Simple Network Management Protocol) is a protocol used for managing and monitoring network devices. SNMP requests can be used to retrieve information such as the IP-8e's current settings and performance metrics. This information can be used to diagnose problems and optimize network performance. SNMP requests can also be used to configure the IP-8e remotely, allowing administrators to adjust settings.



For the SNMP manager tool to operate correctly, it requires the specific MIB files. These MIB files must be compiled by your SNMP manager tool. You can save the MIB files in the block **MIB File**.

1. Navigate to the page **External APIs**.
2. Click on the tab **SNMP**.
3. Select the protocol version in the block **SNMP Protocol**.
4. Configure the parameters in the block **Read/Write Community** or **SNMP3 / Security**. The parameters differ depending on the selected protocol version.
5. Click **Save**.

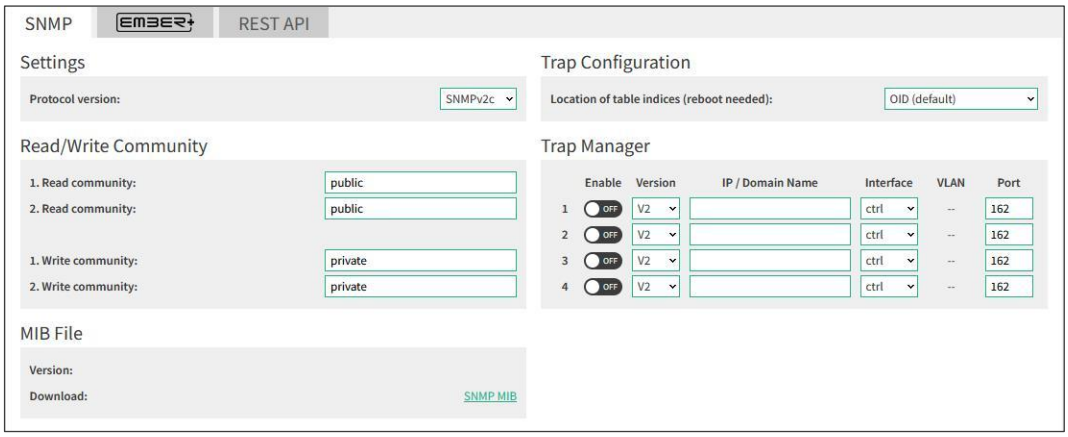
✓ You have configured the access data for external SNMP requests.

Parameters

Read Community	Enter SNMP access data for the external read-only SNMP access to the device.
Write Community	Enter SNMP access data for the external write SNMP access to the device.
Read/Write user	Enter username and password for the external write SNMP access to the device.
Read/Write user	Enter username and password for the external read-only SNMP access to the device.
Security protocols	Select an authentication protocol and a privacy protocol.

8.6 SNMP: Configuring Trap Managers

As part of the monitoring function, the device can send SNMP traps to the defined IP addresses of the SNMP managers. SNMP traps are messages that are sent from a network device to a central management system when a specific event or condition occurs. SNMP traps are used as a means of notifying network administrators of important events, such as errors or performance issues, allowing them to take corrective action as needed. You can also read out the settings via SNMP Get.



For the SNMP manager tool to operate correctly, it requires the specific MIB files. These MIB files must be compiled by your SNMP manager tool. You can save the MIB files in the block **MIB File**.

1. Navigate to the page **External APIs**.
2. Click on the tab **SNMP**.
3. Select the protocol version in the block **SNMP Protocol**.
4. Select the location of the table indices in the block **Trap Configuration**: OID or OID plus additional index.
5. Configure the parameters in the block **Trap Manager**.
6. Click **Save**.

✓ You have configured the trap managers. If you change the location of table indices, the IP-8e must reboot. Each enabled trap is sent once at startup for initialization.

Parameters

Version	Select the format version of the SNMP traps.
IP or Domain Name	Enter the IP address or domain name of the trap receiver.
Port	Enter the port number.

8.7 Ember+: Configuring Access for Monitoring

As part of the monitoring and remote-control function, the device is capable to be controlled via the Ember+ protocol.

1. Navigate to the page **External APIs**.
2. Click on the tab **Ember+**.
3. Configure the parameters in the block **Settings**.
4. Click **Save**.

✓ You have configured the Ember+ access.

Parameters

Mode	Select the mode from the dropdown menu.
Timeout	Enter the value for interval in seconds for a timeout.
Port	Enter the port number for the connection.

9 Audio over IP Settings

9.1 Setting Up SAP

This function is only available if the *Ravenna* right is activated.

The IP-8e supports SAP (Session Announcement Protocol) for stream announcement.

Prerequisite: You are logged in as an admin.

To set up the SAP connection:

1. Navigate to the page **SAP**.
2. Configure the parameters.
3. Click **Save**.

✓ You have set up the SAP connection.

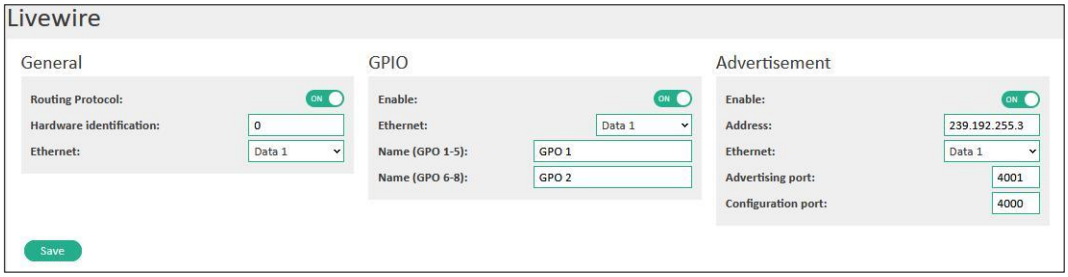
Parameters

Mode	To enable SAP, select the service mode. "Client/Server" is recommended.
Announce interval	Enter the time interval between sending SAP announcement.
Multicast loop	Multicast loop to make the IP-8e receive its own SAP announcements. The default setting is OFF.
Receive address and port	Set the multicast address and port to receive SAP announcements.
Ethernet port	Select the [Data] interface for transmission of SAP announcements in the dropdown menu.
Bandwidth limit	To avoid overhead, set a bandwidth limit for SAP announcements.
Destination address and port	Set the destination multicast address and port for SAP announcements.

9.2 Configuring Livewire Settings

This option is only available if the right *Livewire* is enabled.

Livewire is an audio-over-IP system used for routing and distributing broadcast-quality audio. The livewire routing protocol is used to route audio as well as GPIO ports.



Prerequisite: You are logged in as an admin.

To configure livewire settings:

1. Navigate to the page **Livewire**.
2. Enable **Routing Protocol**.
3. Configure the parameters.
4. Click **Save**.

✓ You have configured the livewire settings.

Parameters

Hardware identification	Enter the hardware ID.
Ethernet	Select the [Data] interface to be used.
GPIO	Assign names to [GPO 1-5] and [GPO 6-8].
Advertisement	Enter the ports for Livewire Advertising and for its configuration.

9.3 Monitoring Audio via Live Listening

Live Listening is a function for audio monitoring via web interface or any web stream client. Live Listening enables you to listen "live" to any of the audio input sources as well as the audio outputs directly over the web interface. The IP-8e is equipped with an adjustable bit rate encoder that can encode the input audio signal in five different formats. You can manually set up the parameters for audio encoding depending on the bandwidth available for data distribution.

Prerequisite: You have already configured the input sources and assigned them to the encoder and decoder.

To set up audio monitoring via Live Listening:

1. Navigate to the page **Live Listening**.
2. Configure the parameters.
3. Set the switch **Activation** to **ON**.
4. Click **Save**.
5. In the banner, select an available audio source from the dropdown menu **Live Source**.

6. To change the playback volume, click the green volume levels.
7. To start streaming, click the play button.

✓ The IP-8e now plays the audio over the web interface.

Parameters

Port	Enter the port number for streaming. The URL for Icecast streaming is "`IP address of the device:streaming port`". The standard port for live streaming is 8000. Example: `http://192.168.12.23:8000`.
Encoder Format	Select an audio format for streaming.
Audio Mode	Select a stereo or mono audio mode.
Sampling Rate	Select a sampling rate for streaming.
Bitrate	Select a bit rate for the selected audio format quality.

10 System Settings

10.1 Rebooting the Device

To reboot the device:

1. Navigate to the page **Global**.
2. In the block **Control**, click **Now** in the field **Reboot Device**.

✓ The device restarts. After the restart, you will have to log in again.

10.2 Restoring Factory Settings

Restoring the factory settings will delete all configurations that were made by a user except for the IP address of the CTRL interface. This also applies to the access accounts.

To reset the device to factory settings:

1. Navigate to the page **Global**.
2. In the block **Control**, click **Now** in the field **Load Factory Settings**.

✓ You have restored the factory settings.

10.3 Entering Device Information

For better identification of the IP-8e, you can enter device-specific data.

1. Navigate to the page **Global**.
2. Configure the parameters in the block **System info**.
3. Click **Save**.

✓ The saved information is now displayed in the banner.

Parameters

Name	Enter the name of the device for better reference.
Location	Enter the location of the device.
Description	Enter further important information on the device.

10.4 Setting Up Session Timeout

Session timeout is a security feature that automatically logs out the user after a period of inactivity. You can define the period of inactivity or disable session timeout.

1. Navigate to the page **Global**.
2. In the field **Session timeout**, enter the value in minutes for the period of inactivity necessary to automatically log out the user. Enter "0" to disable this function.
3. Click **Save**.

✓ You will now be automatically logged out after the set period of inactivity.

10.5 Changing the Title of the Browser Tab

You can change the title of the browser tab to display the information you need for better reference.

1. Navigate to the page **Global**.
2. Configure the parameters in the field **Browser tab config**.
3. Click **Save**.

✓ The title of the browser now displays the configured information.

Parameters

Favicon	Set the look of the favicon (tab icon). Some favicons dynamically display the sum status of the status LEDs. If there is a red status LED, the favicon status also turns red. If there is no red status LED but an orange one, the favicon status turns orange. Otherwise, the favicon remains blue.
Title	Enter the information you want to display. You can use variables for specific information. Variables will update automatically if the corresponding information changes. View the possible variables by hovering over the input filed.

10.6 Updating the Firmware with a File

You can upload ARM firmware stored locally and activate it via the web interface. Alternatively, you can load a firmware file from a USB stick.

To install a firmware file via the web interface:

1. Navigate to the page **Global**.
2. In the block **Upload / Activate**, click **Browse/Drop** and select the firmware file you want to upload. Alternatively, you can select a firmware file that was previously uploaded to the **Storage** page.
3. Click **Upload / Activate** to install the firmware file. This may take a while. Do not interrupt this process.
4. After a successful activation, follow the prompt to restart the device.

✓ After the reboot, the new firmware is active.

To manually install firmware from a USB stick via the LCD menu:

1. Insert a USB stick with the firmware file into the [USB] port.
2. Use the jog wheel to select **Config menu ➞ System ➞ Global ➞ Update firmware from USB**.
3. Select the firmware file you want to upload.
4. Select **Update**. The installation may take a while. Do not interrupt this process.
5. Select **OK** to reboot the device.
6. Remove the USB stick from the device.

✓ After the reboot, the new firmware is active.

10.7 Activating rights

Some functions of the IP-8e are optional and licensed. To use these functions, you must activate additional rights by uploading a rights file. To receive rights files, please contact your 2wcom sales representative. For more information, see 3.2 Software Rights.

1. Navigate to the page **Global**.
2. In the block **Upload / Activate**, click **Browse/Drop**.
3. Select the rights file (*.2wcom_key) that you want to upload.
4. Click **Upload**. The upload may take a while. Do not interrupt this process.
5. After a successful upload, follow the prompt to restart the device.

✓ The new rights will be active after restart. You can view the current rights in the block **System information**.

10.8 Uploading and Activating an SSL Certificate

An SSL certificate is a digital certificate that provides authentication for a website and enables an encrypted connection.

To upload and activate an SSL certificate:

1. Navigate to the page **Global**.
2. In the block **Upload / Activate**, click **Browse/Drop**.
3. Select the SSL certificate file (*.pem) you want to upload.
4. Click **Upload**. The upload may take a while. Do not interrupt this process.

✓ You have uploaded an SSL certificate.

10.9 Loading Settings from a File

You can upload a settings file to restore previous settings or copy the settings from another device. You can do this either via the web interface or the LCD menu. You can load the settings either without or including IP settings such as IP addresses and VLANs. This enables you to easily swap out a device. Note that if you load settings including IP via the web interface, you will lose the connection to the device due to the new IP address. For information on how to generate a settings file, see 10.10 Generating and Saving a Settings File.

To load a settings file via the web interface:

1. Navigate to the page **Global**.
2. In the block **Upload / Activate**, click **Browse/Drop** and select the settings file you want to upload. Alternatively, you can select a previously uploaded or saved file from the internal storage of the device.
3. Click **Upload / Activate** to install the settings file. The file upload may take a while. Do not interrupt this process.

✓ The new settings are now active. If you chose to also load the IP settings, the device now has a new IP address.

To load a settings file via the LCD menu:

1. Insert a USB stick with the settings file into the [USB] port.
2. Use the jog wheel to select **Config menu** ➞ **System** ➞ **Settings** ➞ **Load from USB** or **Load from USB (incl. IP)**.
3. Select the settings file you want to upload.
4. Select **Upload**. The file upload may take a while. Do not interrupt this process.

✓ The new settings are now active. If you chose to also load the IP settings, the device now has a new IP address.

10.10 Generating and Saving a Settings File

You can download the current settings and save them as a file either to your local storage or to the internal storage of the IP-8e. You can use this file later to restore the settings or upload it to another device to copy the settings.

1. Navigate to the page **Global**.
2. In the block **Settings Download**, enter a file name and click **Generate**.
   - ➢ A file is being created. This may take a few seconds.
   - ➢ The download option with the time and date of file creation appears.
3. Click **Download**.
4. Save the file to a location of your choice.
5. Click **Save**.

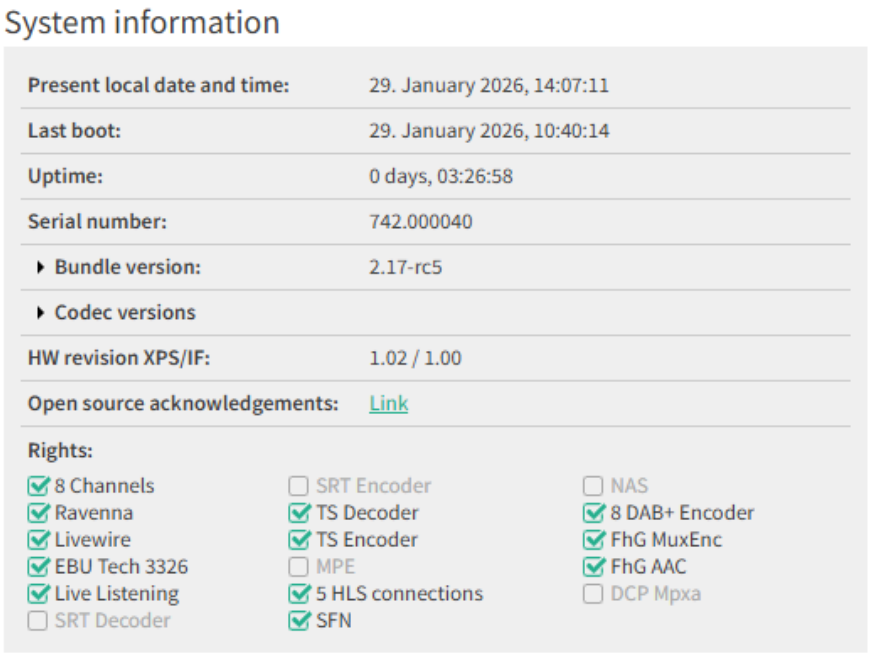
✓ You have saved settings to a local file. To upload and activate the settings stored locally, see 10.9 Loading Settings from a File.

10.11 System Information

The block **System information** on the page **Global** gives an overview of all general information about the device and the system including the present local date and time, the time of the last boot, the uptime, serial number and software version of the system.

The current version of your IP-8e is the bundle version.

Furthermore, the block includes a list of all available rights for the device. The activated rights are indicated by the green check marks next to them. The rights that are not activated are grayed out.



10.12 Generating and Downloading a Diagnostic Report

In case of any problems or failures, you can generate and download a diagnostic report to send to 2wcom.

To generate and download a diagnostic report:

1. Navigate to the page **Global**.
2. In the block **Diagnostic Report**, select the time period for which the device captures all activities.
3. Click **Generate**. A file is being created. This may take a while. Do not interrupt this process.
   ➢ The download option with the time and date of file creation appears.
4. Click **Download**.
5. Save the file to a location of your choice.

✓ You have generated and downloaded a diagnostic report.

10.13 Uploading a Debug Script

To identify a specific error, you can upload a debug script that you have received from 2wcom. Depending on the expected error, the debug script monitors extra status information and records the incoming data. When the error occurs, the recording stops and a debug.log file is generated which contains all information that 2wcom needs to fix it.

To upload a debug script:

1. Navigate to the page **Global**.
2. In the block **Debug Report**, click **Browse/Drop file**.
3. Select the debug script file (*.upd) you want to upload.
4. Click **Upload**. The upload may take a while. Do not interrupt this process.
5. To start the debugging process, click **Start**. This may take a while. Do not interrupt this process.

➢ When an error occurs, the script is automatically stopped. A download link for the debug.log file appears.

6. To download the debug.log file, click on the link.
7. Send the file to your 2wcom contact person.

✓ 2wcom can now identify the error and determine further action.

10.14 Configuring Time / Clock settings

The page **Time / Clock** lets you set the time and date, and configure settings for GPS, PTP, NTP and External Clock. You can view the status of these options in the section **Status** on the page **Time / Clock** (see 11.4 Time / Clock Status).

Time

To change time zone, time and date:

1. Navigate to the tab **Time**.
2. Set the preferred time zone in the block **Local time**.
3. To change the time and date, enter new time and date in the block **Time and date settings**. Note that this setting might not be available when PTP or NTP synchronization is enabled.

✓ You have changed the time zone and time and date.

PTP

The IP-8e can automatically synchronize its date and time with a PTP (Precision Time Protocol) server.

This function is only available if the right *Ravenna* is enabled.

To synchronize time and date with a PTP server:

1. Navigate to the tab **PTP**.
2. Configure the parameters.
3. Click **Save**.

✓ You have synchronized the time and date with a PTP server.

Parameters

Interface	Select the Ethernet interface to use for PTP.
Domain number	Enter the domain number.
Delay mechanism	Select a delay mechanism. Available mechanisms are Auto, E2E, P2P and None.
QoS DSCP general	Select a Differentiated Services Code Point (DSCP) to determine the Quality of Service (QoS) for general messages.
QoS DSCP event	Select a Differentiated Services Code Point (DSCP) to determine the Quality of Service (QoS) for event messages.
Unicast	Toggle the switch to enable Unicast. If PTP Unicast is enabled, enter the unicast URL or IP address.

NTP

The IP-8e can automatically synchronize its date and time with an external NTP (Network Time Protocol) server. The configurable parameters on this page may differ depending on the activated rights.

To synchronize time and date with an external NTP server:

1. Navigate to the tab **NTP**.
2. Configure the parameters.
3. Click **Save**.

✓ You have synchronized the time and date with an external NTP server.

Parameters

Enable	Select to enable NTP.
Bind to interface	To bind the NTP synchronization to a specific IP interface, set the switch to **ON**. Select the IP interface and VLAN.
QoS DSCP	Select a Differentiated Services Code Point (DCSP) to determine the Quality of Service (QoS). The selected packet will be prioritized.
NTP Quality rating	Select the quality of the NTP server. Low: Event logging, device time synchronization. Medium: For NTP servers that are accessed through the Internet and are used as External Clock source. High: For Stratum 1 NTP servers that are connected locally and are used as External Clock source. (SPN) For Medium and High settings, NTP will be rated as valid once the clock discipline algorithm has converged to acceptable RMS offset and skew values. For the Low setting, NTP becomes valid much quicker with reduced accuracy, however it will increase over time.
Expert settings	Set the switch to **ON** to show further parameters.
1.-4. Server URL / IP	Enter the URL or IP address of the NTP servers to be used.

External Clock

You can synchronize the IP-8e with an external clock. Precise synchronization of time across devices on a network is critical to avoid audio distortion or loss of quality. By using an external clock source, audio codecs can ensure that they are operating with the same time base, allowing them to maintain a consistent audio stream. By keeping all devices synchronized to an external clock source, audio codecs can ensure that their output remains high-quality and reliable. You can configure 1 main and up to 2 backup clocks. Available external clock sources for the main and backup clock sources are PTP, 1PPS, NTP, GPS and None. Note that if you want to set both NTP and PTP as external clock sources, PTP has to be set as the superior source.

To synchronize time and date with an external clock source:

1. Navigate to the tab **External Clock**.
2. Select the main clock source.
3. Select clock sources for Backup 1 and 2.
4. Click **Save**.

✓ You have synchronized the time and date with external clock sources.

Switch Criteria

The IP-8e can automatically switch between different clock sources in case of failure. The device receives data from all configured clock sources but only uses the source of the highest priority that is error-free. The source with the highest priority is the main source. As soon as an error is detected the clock source is changed to the source with the next highest priority.

To define switch criteria:

1. Navigate to the tab **Switch Criteria**.
2. Configure the parameters.
3. Click **Save**.

✓ You have defined the switch criteria.

Parameters

Fallback mode	Set which clock source should be used in case all configured external clock sources fail. Select **Holdover** to use the last available clock source. Select **Internal clock** to use the internal clock of the system.
Expert settings	Select to enable expert settings.
PTP	View the state of PTP and configure the master offset and time settings for PTP.
1PPS	View the state of 1PPS and configure the time settings for 1PPS.
NTP	View the NTP server availability and configure the time settings for NTP.
GPS	View the state of GPS and configure the time settings for GPS.

10.15 Changing Login Data

The default accounts are a read-only access (Guest account), a full access without a permission to manage the user accounts (Manager account), and a full access (Admin account). The user account SFTP service is used only for the access from an external SFTP client for uploading audio files and saving them in the internal storage.

Change the login data after the first login to the web interface.

The default login data for the first login are (case sensitive):

- Guest account: “guest”/ “guest”
- Manager account: “manager”/ “manager”
- Admin account: “admin”/ “admin”
- FTP service: “sftpuser”/ “sftpuser”

To change the login data:

1. Log in as an admin.
2. Change the login data for an account in the corresponding block and repeat the new password.
3. Click **Save**.

✓ You have changed the login data.

10.16 Adapting the Access for User Accounts

You can configure the access to certain web interface pages for the manager and guest accounts.

Prerequisite: You are logged in as an admin.

To adapt the access for manager and guest accounts each individual IP-8e menu:

1. Navigate to the page **User**.
2. Click on the tab **Menu Access**.
3. Enable or disable the access to the separate menus by setting the corresponding switch to either **ON** or **OFF**.
4. Click **Save**.

✓ The new access configuration is now active.

10.17 Accessing the recovery mode via reset pin hole

If you cannot access the IP-8e via the web interface, you can reboot the device using the reset pin hole. You can also use the reset pin hole to access the recovery mode in which you can flash the device or restore factory settings.

- To restart the device, press the reset button for a second.

1. To access the recovery mode, press the reset button for a few seconds until all LEDs on the front panel turn off and only power LED starts flashing quickly.
   ➢ The device starts in recovery mode.
2. Access the recovery web interface by entering the IP address of the device into a web browser. In recovery mode, you can upload and activate firmware, reset the system to factory settings or reboot the device.

3. After flashing or resetting the device, reboot the device by clicking **Reboot**.

✓ After a few seconds, the device will be ready for operation.

10.18 Setting Up Alarms

You can set several alarms that trigger in case of defined events. You can monitor the following:

1PPS clock status	Alarm is triggered if 1PPS signal is not present.
AES/EBU CRC Error	Alarm is triggered if a cyclic redundancy check error is detected.
AES/EBU No Signal	Alarm is triggered if no decoded digital audio is available in the audio input.
Ancillary timeout	Alarm is triggered if the encoder/decoder has not received any ancillary data for a set amount of time.
DTE input timeout	Alarm is triggered if no ancillary data has been received on this DTE interface for a set amount of time.

Encoder input low level detection	Alarm is triggered if the encoder input level is below the threshold for the set amount of time.
Encoder input silence detection	Alarm is triggered if silence occurs in the encoder input for the set amount of time.
LAN link	Alarm is triggered in case of an error in Ethernet data communication.
No input data	Alarm is triggered if no input data is detected.
NTP clock status	Alarm is triggered if no NTP server is available.
Power failure	Alarm is triggered in case of an error in one of the two power supply units.
PTP clock status	Alarm is triggered if PTP signal is not present.
Silence Detection	Alarm is triggered if the device detects silence in the left and/or right channel of the audio output.
Temperature	Alarm is triggered if the device temperature exceeds the configured value.
TS sync	Alarm is triggered if a loss of transport stream synchronization is detected.

To set up alarms:

1. Navigate to the page **Alarm**.
2. For each alarm, configure the corresponding parameters.
3. Click **Save**.

✓ Enabled alarms will now be saved in a log entry and signaled over SNMP, LED or GPO if triggered.

Parameters

Enable	Enable or disable an alarm.
Priority	Select the priority of the alarm message. (see 11.11 Priority of Alarm Messages)
Values	Enter the value below or above which the alarm triggers.
T1	Set the delay time for alarm trigger.
T2	Set the delay time for alarm end.
SNMP, LED, GPO	Enable the corresponding switch if the alarm should be signaled by SNMP traps, an LED or GPO switch. The corresponding GPO must be activated for the source “Alarm” (see 7.6 Configuring GPO Settings).

11 Status Information

11.1 Status LEDs

The IP-8e is equipped with 4 status LEDs on the banner of the web interface that display the status of the inputs, outputs, power supply and alarms.

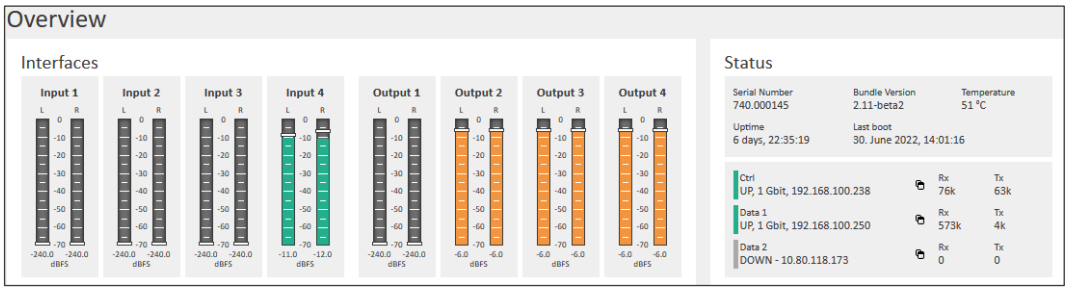
The following table displays the meaning of each LED:

LED	Color	Meaning
Power	●	All supply cords are connected and the power supply is OK.
	● ●	Toggles (green/red) if only one power supply is connected or OK.
Warning	●	LED is off if no alarms are triggered.
	●	At least one alarm is triggered.
Input	●	No input monitoring alarms are enabled.
	●	Input monitoring alarms are enabled and all inputs are OK.
	●	One or more inputs are bad, but at least one is good.
	●	All inputs are bad.
Output	●	No decoder output monitoring alarms are enabled.
	●	Output monitoring alarms are enabled and all outputs are OK.
	●	One or more outputs are bad, but at least one is good.
	●	All outputs are bad.

11.2 General Overview

Overview page

The page **Overview** gives you general information on the status of your IP-8e. The appearance of this page might differ depending on the activated rights, built-in modules and settings.



The audio levels of the inputs and outputs are displayed in the left block. To change the threshold above which the bar turns orange, see 7.3 Setting the Critical Level Marker.

The block **Status** gives general device-specific information as well as information on the ethernet interfaces.

Encoder Status

To get a quick and detailed overview, you can view the current status of the encoder and the incoming audio data. To view the encoder status, navigate to the page **Overview** and click on the tab **Codec**.

In the block **Encoder**, you can see the status of the currently active encoders.

- To view more details of an encoder, click on the corresponding panel.
  - ➢ The **Details** view below the block **Encoder** now displays the status of the input source, codec profile, and the assigned audio outputs.
- To reset the counters in the status fields, click **Reset Counters**.
- Details of the assigned outputs are displayed in the table. To view the status of an assigned output, select the corresponding tab.
- To change the order of the table columns, drag/drop the column headings.
- To change the column width, hover over the frame line until the cursor changes into a two-headed arrow. Click and move the frame line.

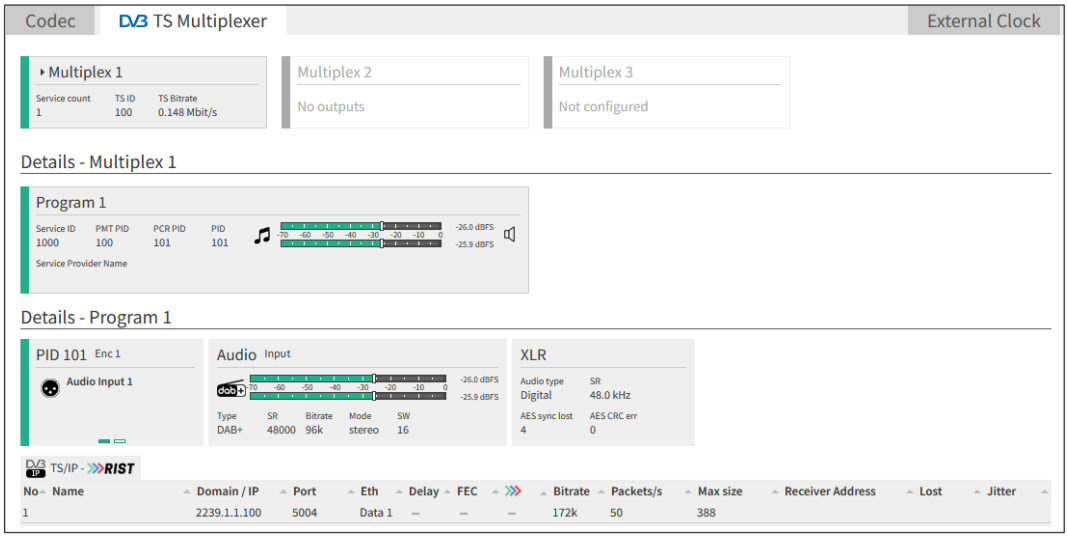
The encoder output displays the following counters:

Lost	Lost indicates the number of lost packets.
RIST/Requested	This indicates the number of packets that the receiver requested for retransmission by the sender.
RIST/Retransmitted	This indicates the number of packets that were retransmitted by the sender. Some requests may not answered due to timing and jitter.

TS Multiplexer status

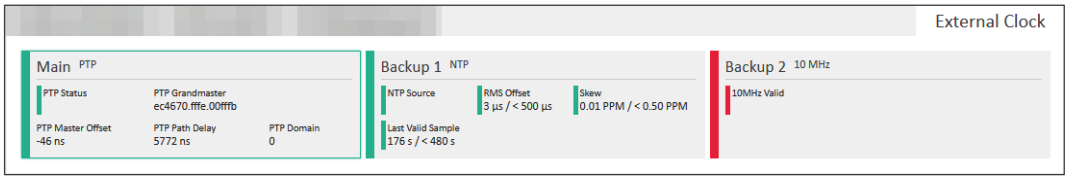
The Tab **TS Multiplexer** on the page **Overview** gives a detailed overview on the status of the enabled multiplex outputs.

- To see more details on the configured programs in one multiplex, click on the corresponding Multiplex.
- To see more details on the payload of a program, click on the corresponding program.



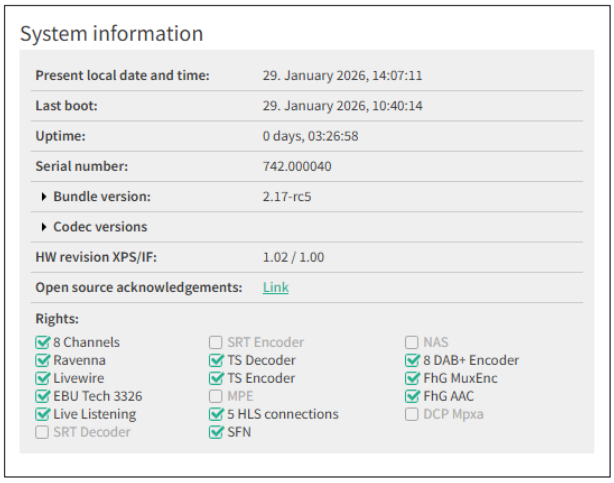
External Clock Status

If an external clock is used, then it is displayed as on the page **Overview**. The tab **External Clock** gives quick status information on the external clock. This block shows the active clock source and the configured backup sources as well as their status information.



System Information

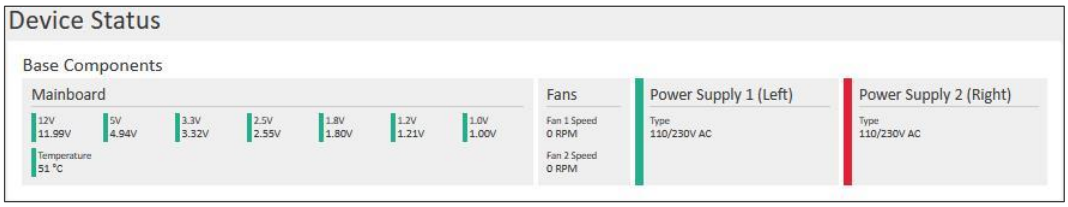
The page **Global** gives specific information on the device, such as the uptime and time of the last boot, serial number, activated rights and software version. The current version of your IP-8e is the **Bundle Version**.



11.3 Device Status

The **Device** page gives information on the current status of the hardware.

- The block **Mainboard** displays the voltages on the mainboard and the device temperature.
- The block **Fans** displays the speed of the fans.
- The blocks **Power Supply** display the status and type of the left and right power supplies. The colored bar indicates the status: green – ok, red – no power. If only one power supply module is built in, only one block is displayed on this page.
- The block **Expansion Modules** displays built-in hardware options. If no expansion modules are built in, this block is not shown.



11.4 Time / Clock Status

The page **Time / Clock** gives information on the status of GPS, PTP, NTP and External Clock.

In the tab **PTP / NTP**:

Depending on the activated rights, the tab might only say PTP or NTP.

- The block **Present Date / Time** displays the current set date, time and time zone.
- The block **Synchronization Status** displays information about the synchronization source.
  The table below explains the data that is displayed in this block:

Sync source	Displays the source that is currently used for synchronization.
Last reference time (UTC)	The time (UTC) at which the last measurement from the reference source was processed.
Stratum	The stratum value indicates how many levels away the NTP server is from the primary reference source. Lower stratum values indicate a closer and more accurate clock source.
Frequency	The rate by which the clock would be wrong if it were not corrected.
Skew	The frequency offset to the clock standard.
RMS offset	The root-mean-spare offset is a long-term average offset to the currently estimated time.

- The block **Clock Sources** displays the configured clock sources. If no clock source is configured, this block is not shown.
  The table below explains the data that is displayed in this block:

Source state	Current best: the best source which is currently selected for synchronization Combined: other sources selected for synchronization which are combined

	with the best source. Not combined: any other source.
Stratum	The stratum value indicates how many levels away the server is from the primary reference source. Lower stratum values indicate a closer and more accurate clock source.
Frequency	This is the estimated residual frequency for the server.
Freq. skew	The frequency offset to the clock standard.
Measured offset	The measured time difference between the local clock and the server's clock at the time of synchronization.
Estimated error	The total worse-case timing error accumulated between the stratum 1 server and the client.
Poll	Polling interval, which is the frequency at which the device queries the server for time updates.
Reach	Indicates the reachability of the server. This is a bitmask value that shows how successfully the device has been able to reach and communicate with the server.
Last RX	Shows how long ago the last good sample was received from the source.

In the tab **External Clock**:

- The block **Main** displays information about the external clock source that is set as the main source.
- The blocks **Backup 1** and **Backup 2** display information about the external clock sources that are set as backup sources.

11.5 Ancillary Data Status

The status page **Ancillary Data** gives information on the status of the ancillary data inputs and outputs.

- The different Tabs display information on the DTE inputs, DTE outputs, and the DAB Inputs (PAD data).
- The block **RAW Data** displays the data in the hexadecimal and ASCII code as well as the total bytes.
- The block **RDS/UECP Data** displays the information on the active RDS/UECP data as well as the total frames.
- To pause the data recording, click **Pause**.
- To clear the log, click **Clear**.

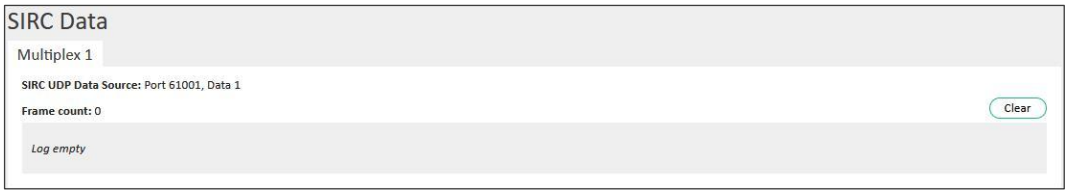
11.6 PAD Status

The status page **PAD Data** gives information on the status of the PAD Data for each encoder.

- The tab **DAB Inputs** lists all available encoders.
- Click **Pause** to pause the transmission of the PAD Data.
- Click **Clear** to delete the set PAD Data.
- The block **Raw Data** displays information about the set PAD Data and the total bytes transmitted.

11.7 SIRC data status

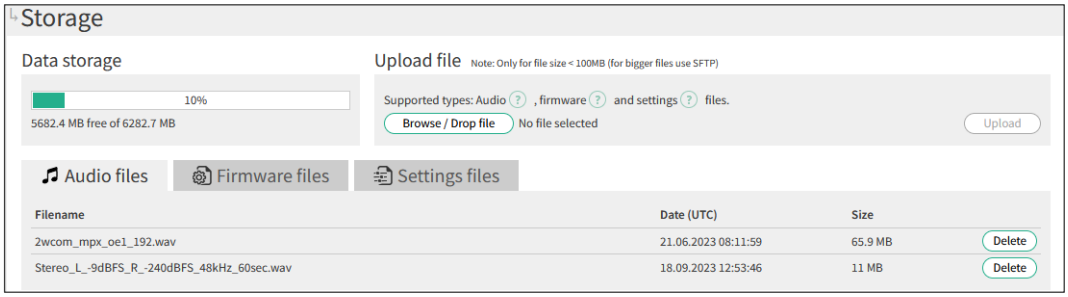
The page **SIRC Data** gives information on the current status of SIRC.



11.8 Internal Storage

You can upload audio files to the internal storage to use them e.g. as a backup input source. You can also upload settings files and firmware files to install later. Generated settings files also appear on the **Storage** page.

If the *Ravenna* right is activated, the **Storage** page also lists downloadable SDP files that contain vital information on the stream.



- Prerequisite: You are logged in as an admin.

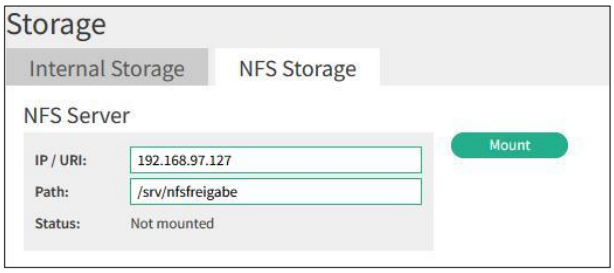
To upload a file to the internal storage:

1. Navigate to the **Storage** page.
2. In the **Upload file** block, select **Browse/Drop file**.
3. Select the audio file, firmware file, or settings file that you want to upload.
4. Click **Upload**. The upload may take a while. Do not interrupt this process.
   - ➢ The uploaded file is now displayed in the corresponding tab.

✓ You have uploaded a file to the internal storage. The percentage of used storage is displayed in the block **Data storage**. You can install an uploaded settings file or firmware file on the **Global** page.

11.9 NFS storage status

You can connect to an NFS storage to use audio files as a backup input source. NFS (Network File System) storage is a type of file-level storage protocol that allows remote users to access files over a network as if they were stored locally on their own device. NFS works by allowing a server to share its file system resources with one or more clients over a network. Clients can access the shared files by mounting them as if they were local file systems.



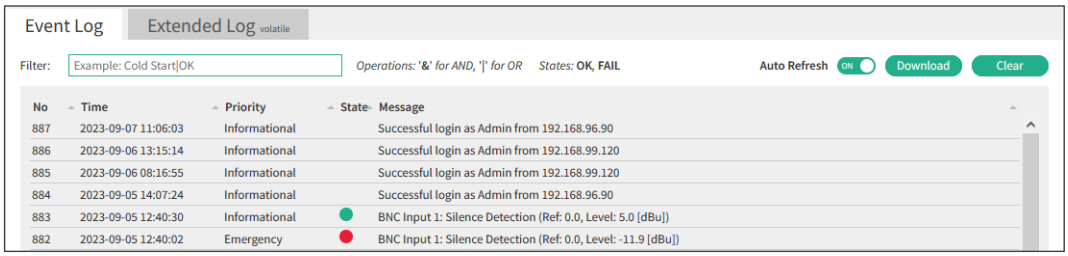
To connect to an NFS storage:

1. Navigate to the page **Storage**.
2. In the tab NFS Storage, enter the IP / URL of the NFS Server.
3. Enter the path on the server that contains the audio files.
4. Click **Mount**.

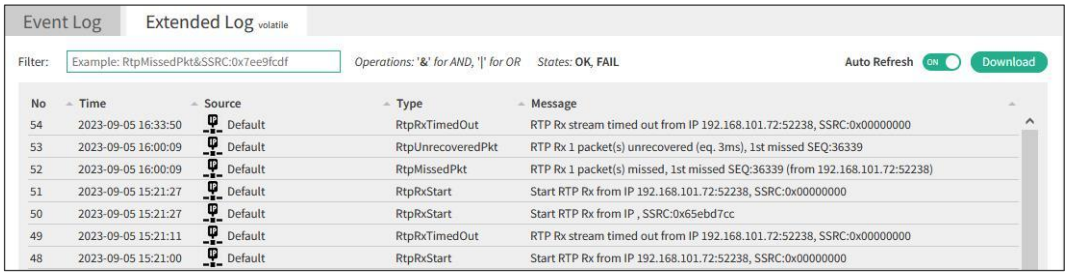
✓ The IP-8e now mounts the files. This process may take a while.

11.10 Log

The **event log** is a record of significant system events, such as system restarts and error messages, which are crucial for monitoring the performance of the device. These events have an alarm priority and may require immediate attention or action to resolve issues or ensure proper operation (see also 10.18 Setting Up Alarms).



The **extended log** contains less critical information compared to the event log, and is primarily intended to provide insights into general events. The log entries in the extended log are informational and do not carry alarm priorities, they are volatile and do not persist over restarts.



- To automatically refresh the page and immediately see new entries, toggle the switch **Auto Refresh**.
- To sort the log entries, click on the column header of the parameter by which you want to sort the entries. To reverse the order, click the same header again.
- To search for a specific entry, enter a term into the search bar.
- To save the list to a log file, click **Download**.
- To delete all log entries, click **Clear**. Confirm your decision in the dialog window.

11.11 Priority of Alarm Messages

In case of an alarm, an error report with the priority of the error will be sent to the Network Operations Center (NOC). The responsible second-level support will decide by means of this information how urgent the alarming case is and what measures are necessary. The event will be recorded in a log entry.

Priority	ID/Code	Definition
Emergency	0	System is unusable
Alert	1	Actions must be taken immediately
Critical	2	Critical condition
Error	3	Error condition
Warning	4	Warning condition
Notice	5	Normal but significant condition
Informational	6	Informative message
Debug	7	Debug-level message

12 Maintenance and Support

12.1 Maintenance and Disposal

No special maintenance is necessary on the device. Do not use corrosive detergents on the device such as benzene, thinner, alcohol or acetone.

Remove dust on the housing of the device with a soft, dry cloth.

Electrical appliances do not belong in domestic waste. Dispose of the device in an environmentally friendly manner via suitable collection systems in accordance with the local regulations.

12.2 Troubleshooting and Warranty

More often than not, it is only a small detail that has been overlooked and leads to a problem. Therefore, read the user manual carefully, as this will help you to understand, prevent and eliminate typical problems. Use the following table to self-check common error sources prior to contacting our support.

For information on the warranty of 2wcom products, visit *https://www.2wcom.com/terms-and-conditions/*.

Problem	Possible Causes	Solution
Device does not turn on	• Power cable is connected improperly • Mains supply failure • Blown fuse	• Check power supply cord. • Make sure that the power plug is fully inserted. • Check mains supply. • Replace fuse by same type.
Device is not accessible via Ethernet	• Network cable is not connected • IP address/TCP port is unknown • A device with the same IP address was connected a few minutes before. Thus, the ARP table thill assigns the old MAC address to the IP address.	• Connect the network cable. • Check IP address obtained from DHCP via LCD menu. • The operation system refreshes the ARP table every few minutes. For instant access to the device, reset the ARP table of your computer, e.g. by entering `arp-d` in the Windows command prompt.
Device does not respond		• Reboot the device. • Update the software.

12.3 Support

The section **Support** is located in the lower left corner of the web interface. In this section you can check for updates, manuals and documents and access the 2wcom support center.

12.3.1 Checking for Updates

You can check for updates and install them, if available. You can also view the release notes and details about the available updates. Additionally, it is possible to download the firmware file to install at a later point in time.

To install an available update:

1. In the menu **Support**, click **Check for updates**.
   ➢ The window **Available Firmware Versions** opens.
2. Select the update you want to install.
   ➢ The dialog window **Firmware Update** opens.
3. Click **Yes, update now**. The update may take a while. Do not interrupt this process. Since the device reboots during this process, you will be logged out.

✓ The firmware is now updated.

In the window **Available Firmware Versions**, firmware bundles that are newer than the currently installed one are marked with ★. Important updates are marked with ❗. Click **Open** to view the change notes and details about a bundle version. To download a firmware bundle for later installation, click 💾.

In the window **Available Firmware Versions**, you can enable an **automatic update check** every 24 hours. If a new update is available, it will be indicated by the ★ icon next to the **Check for Updates** menu item. You can also enable a notification dialog that informs you of any new updates.

12.3.2 Checking for manuals and documents

You can check which manuals and documents are available for your device.

To show the current version of the manual and other available documents:

1. Click on **Manuals / Documents** in the section **Support**.
   ➢ The window **Manuals / Documents** opens.
2. Choose a manual or document you want to view.
   ⓘ The list shows the language the document is written in, the name, date, version and type of the document.
3. Click **Open** to open the manual or document.

✓ You have opened the current version of the manual or another document.

12.3.3 Accessing the support center

Report failures and request support via the 2wcom support center.

For a support request to 2wcom, please have the serial number of the device ready. You can find the serial number of your device on the page **Global** and on the sticker on the rear side of the device: “S/N xxx.xxxxxx”.

To access the support center:

1. Click on **Support Center** in the section **Support**.
   ➢ The page **Support** of the 2wcom website opens as a new browser tab.
2. Click on **2wcom Support Center**.
   ➢ The 2wcom support center opens as a new browser tab.

✓ You have accessed the 2wcom support center.

12.4 Manufacturer

2wcom Systems GmbH
Am Sophienhof 8
24941 Flensburg
Germany

Phone (+49) 461 662830-0
Fax (+49) 461 662830-11
Email contact@2wcom.com
Web www.2wcom.com

13 Technical Details

13.1 Specifications

13.1.1 Formats and Protocols

13.1.1.1 Audio

Codecs (included)	Linear PCM, G.711, G.722 Opus, Ogg Vorbis MPEG 1/2 Layer 2, 3 MPEG-2/MPEG-4 AAC-LC, MPEG-4 HE-AAC v1 & v2, MPEG-4/MPEG-D xHE-AAC MPEG-4 AAC-LD/ELD/ELDv2 Enhanced aptX (E-aptX)
Codecs (optional)	Dolby Digital (AC-3) Dolby Digital Plus (E-AC-3) Dolby E (on request) MPX Fraunhofer DAB+ (HE-AAC v2, ETSI TS 102 563)
On request	Bit transparent transmission of AES/EBU input
Sample rates	16, 22.05, 24, 32, 44.1, 48 kHz (On request: up to 192 kHz)

13.1.1.2 Streaming

IP protocols	TCP, UDP unicast, multiple unicast & multicast
Audio over IP formats	RTP (RFC 3550, RFC 3551, RFC 3640, RFC 2250) SMPTE ST 2110 (optional) AES67 based on RAVENNA, Livewire, or Dante (optional) Livewire / RAVENNA (SAP, RTSP, AES67, PTPv2) (optional) MPEG-TS
Web streaming	Icecast/Shoutcast Client Icecast Source Client Icecast Server HLS encoder (optional)
Transmission robustness	SRT, RIST Pro-MPEG FEC #3 release 2 Dual Streaming 2wcom Stream4Sure µMPX FEC Adaptive bitrate switching, source switching concept, management of packet size, buffers, QoS

13.1.1.3 Synchronization

Internal	free-running
External	1PPS, PTP, PTPv2, NTP, digital reference input
Decoder synchronization between different devices	< 20 ms using SPN via NTP (optional) < 1 µs using SFN via 1PPS or PTP (optional)
Sample rate converter	8:1 (with bypass modes)

13.1.2 Interfaces

13.1.2.1 Audio

Digital (in)	8x AES/EBU, 110 Ω balanced integrated XLR female, shared with analog in (configurable)
Analog (in)	4x L/R, > 10 kΩ balanced integrated XLR female, shared with digital in (configurable)
Analog reference level	+9 dBU
Digital reference level	-9 dBFS
Digital Silence detection	-90 – 0 dBFS
Adjustable gain	-9 – +6 dB
Dynamic range	16 Bit: > 89 dB; 24 Bit: > 130 dB
Frequency response	Depends on sample rate. For example: 48 kHz: 0.1 dB; 20 Hz – 22.5 kHz

13.1.2.2 Interface Extensions

ASI input	75 Ω BNC socket, 270 Mbit/s, MPEG2 TS
ASI output 1	75 Ω BNC socket
ASI output 2	75 Ω BNC socket Note: Configurable to be either ASI output 2 or 1PPS SYNC output.

13.1.2.3 Ethernet

Connector	3x RJ45 (1x Control, 2x Data)
Type	Auto-switching 10/100/1000 BASE-T

13.1.2.4 Synchronization

1PPS input	75 Ω BNC socket
1PPS output	75 Ω BNC socket Note: Configurable to be either 1PPS SYNC output or ASI output 2.

13.1.2.5 Serial and GPIO

DTE	15 pole D-Sub male connector for serial RS-232C data communication
USB	USB 2.0 interface for service, configuration, and firmware updates
GPIO	26 pole D-Sub male; combined connector for inputs (GPI) and outputs (GPO)

13.1.2.6 Internal Storage

Size	7 GB (optional 128 GB)
Type	eMMC (optional SSD)

13.1.2.7 Front Panel

Headphone	6.3 mm / 1/4" socket, < 10 Ω. For Live Listening
LEDs	Power, Input, Output, Warning
Operation	Display and Jog Wheel
Display	LCD, graphical, 264x64 pixel

13.1.3 General Data

13.1.3.1 Integrated Web GUI

Languages	English
Web technologies	HTML5, Java Script

13.1.3.2 Device

Power consumption	< 20 W
Case dimensions	19", 1 RU, depth: 310 mm, width: 424 mm, front panel: 484 mm
Weight	< 5 kg
Material	Steel plate, aluminum-zinc coated
Operating temp. range	0 – +45 °C
Storage temp. range	-40 – +70 °C

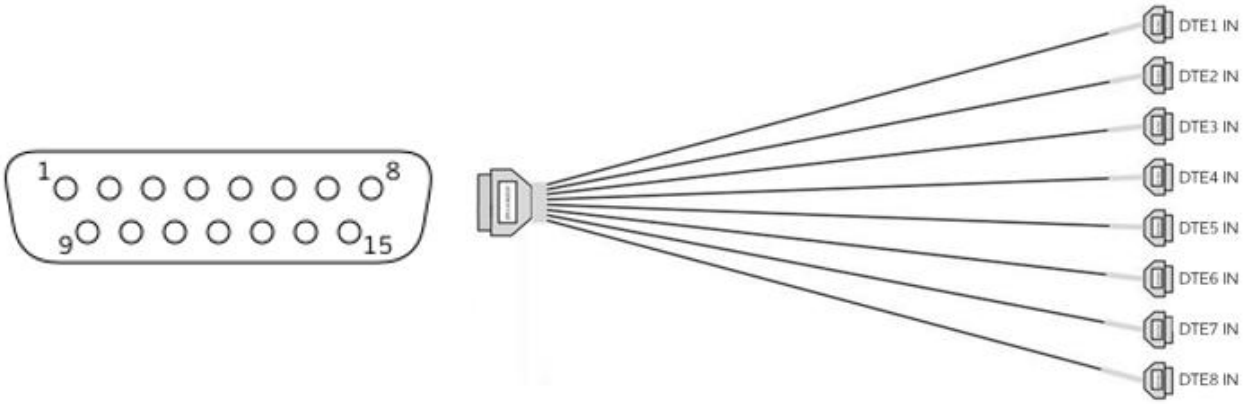
13.1.3.3 Power Supply

Standard AC	1x internal IEC power connector voltage range 90 – 260 VAC (nominal 100 – 240 VAC) frequency range 47 – 63 Hz (nominal 50 – 60 Hz)
Standard DC (optional)	1x internal (Neutrik powerCON) voltage range -40 – -60 VDC (nominal -48 VDC)
Dual internal (optional)	2x internal redundant power supplies (AC or DC) automatic switchover and prioritization AC: 90 – 260 VAC (nominal 100 – 240 VAC), 47 – 63 Hz (nominal 50 – 60 Hz) DC: -40 – -60 VDC (nominal -48 VDC)
Dual hot-plug (optional)	2x hot-swappable redundant power supplies (AC or DC) automatic switchover and prioritization AC: 90 – 260 VAC (nominal 100 – 240 VAC), 47 – 63 Hz (nominal 50 – 60 Hz) DC: -40 – -60 VDC (nominal -48 VDC)

13.2 Interface Pin Layouts

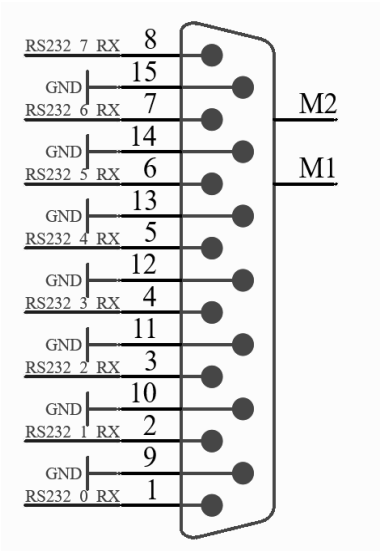
13.2.1 DTE

The device features a 15-pole D-Sub male interface for DTE data communication. Connect the delivered breakout cable to use 8 9-pole interfaces.



The pin layout for **DTE** is as follows:

Sub-D	RS232
1	0 RX
2	1 RX
3	2 RX
4	3 RX
5	4 RX
6	5 RX
7	6 RX
8	7 RX

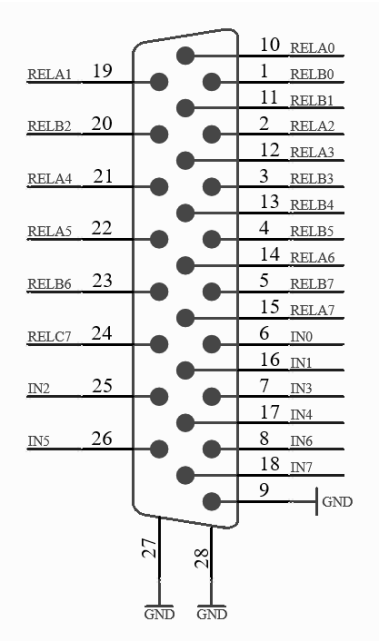


13.2.2 GPIO

The IP-8e features 8 GPI and 8 GPO contacts that are housed in the same 26-pole D-Sub male connector. The inputs can be used for remote control (in combination with remote control software). The outputs include 7 SPST relays (form A) and 1 SPDT relay (form C) that can be used for alarms of the monitoring function.

The pin layout for **GPI** is as follows:

GPI No.	Sub-D pin name (pin no.)
1	IN0 (6)
2	IN1 (16)
3	IN2 (25)
4	IN3 (7)
5	IN4 (17)
6	IN5 (26)
7	IN6 (8)
8	IN7 (18)
–	GND (9)



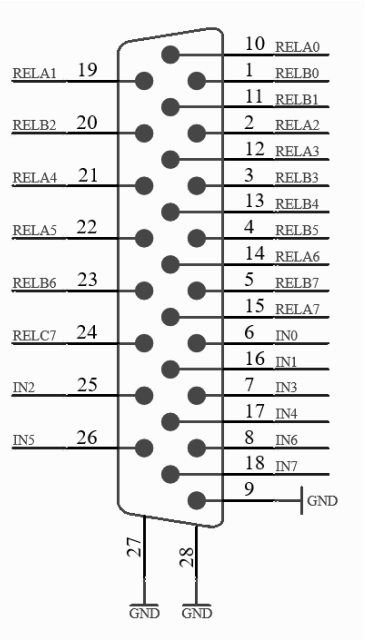
- To actuate a GPI, pull the corresponding control pin electrically to ground (pin 9). The resulting control current is less than 5 mA.

NOTICE Risk of equipment damage!

➢ The voltage on GPI contacts must not be negative or exceed +0.7 V.

The pin layout for **GPO** is as follows:

GPO No.	Sub-D pin name (pin no.)	Switch type	
1	RELA0 (10), RELB0 (1)	SPST, NO	
2	RELA1 (19), RELB1 (11)	SPST, NO	
3	RELA2 (2), RELB2 (20)	SPST, NO	
4	RELA3 (12), RELB3 (3)	SPST, NO	
5	RELA4 (21), RELB4 (13)	SPST, NO	
6	RELA5 (22), RELB5 (4)	SPST, NO	
7	RELA6 (14), RELB6 (23)	SPST, NO	
8	RELA7 (15), RELB7 (5), RELC7 (24)	SPDT	
–	GND (9)	–	



SPST: a simple on/off switch: single pole, single throw
SPDT: single pole, double throw
NO: normally open

NOTICE Risk of equipment damage!

- The relay contacts have a maximum load of 0.5 A at 30 V DC. Do not exceed these values.

13.3 Certificates and Declarations

EC declaration of conformity

The manufacturer

2wcom Systems GmbH
Am Sophienhof 8
24941 Flensburg
Germany

hereby confirms that the product:

IP-8e

in its conception, construction and form put into circulation is in accordance with all the relevant essential health and safety requirements of the following EC/EU directives as amended and the national laws and regulations adopting these directives:

- Audio/video, information and communication technology equipment - Part 1: Safety requirements — EN IEC 62368-1:2021
- Electromagnetic Compatibility (EMC) Directive — 2014/30/EU
- Low Voltage (LVD) Directive — 2014/35/EU
- Radio Equipment Directive (RED) — 2014/53/EU
- Restriction of Hazardous Substances (RoHS 2) Directive — 2011/65/EU

This EC-declaration of conformity is the result of a test, which was accomplished in accordance with the standards EN 301489-1:2020-06, EN 300422-1:2022-05, EN 300422-2:2017-07, EN 55011:2023-10, EN 55035:2022-06, EN 55032:2022-08, EN IEC 61000-3-2:2023-10, EN 61000-3-3:2023-02, EN 61000-4-2:2009-12. EN 61000-4-3:2021-11, EN 61000-4-4:2013-04, EN 61000-4-5:2021-04, EN 61000-4-6:2014-08, EN 61000-4-11:2021-10, EN 61000-4-16:2016-10, EN 63000:2019-05.

This declaration is no longer valid if the machine is modified without our consent.

2wcom Systems GmbH — February 20, 2026