

User Manual IP-4c V1.93 Screenshots: App Version 1.19, 1.22, 1.23, 1.27 beta 23

September 2020



Content

Conter	nt	2
1. Sy	ymbols in This Manual	5
1.1.	References and Hyperlinks in This PDF File	5
1.2.	Warning Signs and Their Meaning	5
1.3.	Tags and Their Meaning	5
2. In	ntroduction	6
3. Sa	afety Instructions	9
4. Su	upplied Parts	11
5. N	1anufacturer	
6. In	nstallation	
7. 0	peration	14
7.1.	Device Control via Web Interface	14
7.2.	Operation via LCD/Jog Wheel	14
7.	.2.1. Description of the Menu Navigation	14
7.	.2.2. Navigation Structure	16
8. Fi	irst Steps	
8.1.	Power Supply	
8.2.	Network Configuration	
8.3.	Web Interface	
8.4.	Connecting the Device	20
8.5.	Codec Settings	20
8.6.	Set up Alarm	21
9. C	ontrol Elements and Connectors	22
9.1.	Front Panel	22
9.2.	Back Panel	23
10.	Network Settings	24
10.1	I. TCP/IP: Configuration of the Ethernet Interfaces	24
10.2	2. Monitoring Function: Configuration of SNMP	25
10.3	3. Monitoring Function: Configuration of EMBER+	26
10.4	 NTP Settings: Configuration of Date and Time 	27
11.	Preset Input Sources	
11.1	1. Presets for TS/IP	29
11.2	2. Presets for TS/SRT	
11.3	3. Presets for Elementary Stream	
11.4	1. Presets for Livewire	34
11.5	5. Presets for SRT	35
11.6	5. Presets for SIP	

11.7.	. Presets for Icecast	37
11.8.	. Presets for Internal Storage	
11.9.	. Presets for XLR	
12.	Encoder Configuration	40
12.1.	. Preset Codec Profiles	40
12.2.	. Assign Input Source/Codec Profile	41
12.3.	. Set up Encoder Outputs	43
12	2.3.1. Output TS Multiplexer	44
	12.3.1.1. Multiplexer Configuration	44
	12.3.1.2. TS Multiplexer Output over IP	46
	12.3.1.3. TS Multiplexer Output over ASI (optional)	51
12	2.3.2. Output Elementary Streams	51
12	2.3.3. Output SRT	53
12	2.3.4. Output Icecast Source Client	54
12	2.3.5. Output Icecast	55
12	2.3.6. Output Internal Storage	55
12.4.	. Set up Encoder Input Level	55
12.5.	. Set up FEC for Encoder	56
12.6.	. View the Encoder Status	57
13.	Decoder Settings	63
13.1.	. Assign and Activate Source Streams	63
13.2.	. Set up FEC for Decoder	65
13.3.	. Set up Dual Streaming und Stream4sure	65
13.4.	. Set up Decoder Output Level	66
13.5.	. Set up Buffer	67
13.6.	. Define Switch Criteria	67
13.7.	. View the Decoder Status	69
14.	Monitoring and Alarm Control	72
14.1.	. Status LEDs	72
14.2.	. Set up Monitoring for Audio Inputs	73
14.3.	. Set up Monitoring for Audio Outputs	74
14.4.	. Set up the Alarm Control of the Device	75
14.5.	. Audio Monitoring via Live Listening	76
14.6.	. Audio Bypass Relay (optional)	78
15.	Handling of AES67	80
15.1.	. Generate AES67 Stream	80
15.2.	. Receive and decode AES67 Streams	81
16.	Interface Settings	84

16.1	Aud	dio XLR	84
16	5.1.1.	Set up Input and Output Gain	84
16	5.1.2.	SRC Bypass	84
16.2	. Hea	adphone	86
16.3	. DTI	Ξ	86
16.4	. GP	D	88
16.5	. GPI		90
16.6	. ASI	Output	92
17.	Audio	over IP Settings	93
17.1	Set	up SIP Configuration	93
17	7.1.1.	Prepare the SIP connection	93
17	7.1.2.	Create new SIP Phonebook Entries	94
17	7.1.3.	Assign the Codec Profiles to the SIP Contacts	95
17	7.1.4.	Establish Connection via SIP Dial (Easy2Connect)	96
17.2	. Set	up SAP Service	98
17.3	. Set	up PTP Configuration	99
17.4	. Set	up Livewire Configuration	99
18.	Buffe	r Delay Management	. 100
19.	Devic	e Settings	. 101
19.1	. Ent	er the Device Information	. 101
19.2	. Vie	w the System Information	. 101
19.3	. Set	up Rights	. 103
19.4	. Vie	w the Log	. 104
19.5	. Upl	oad and Activate Settings Stored Locally	. 105
19.6	5. Sav	e Settings to Local File	. 105
19.7	'. Upl	oad and Activate Firmware Stored Locally	105
19.8	. Set	up Time	. 106
19.9	. Cor	nfigure User Accounts	. 106
19.1	.0. Set	up the Session Timeout	. 108
19.1	1. Reb	poot the Device	. 109
19.1	2. Res	tore Factory Settings	. 109
20.	Maint	enance and Servicing	. 110
21.	Troub	leshooting	. 111
22.	Techr	ical Data	. 112

1. Symbols in This Manual

1.1. References and Hyperlinks in This PDF File

The original text document of this manual uses bookmarks for reference purposes. If you read this manual as a nonprint version, please note that this PDF file also contains all bookmarks! So you can navigate through the document via the content overview in your PDF viewing software if you activate "bookmarks view".

All references to pages, sections, figures and tables as well as hyperlinks in the text identify a location within this PDF file. Just click the reference to find the referred passage in the text!

1.2. Warning Signs and Their Meaning

The following warning signals are used in this user manual:

	Warning of general danger location
4	Warning of electric shock
	Warning of hot surface
	Warning of fire hazard

1.3. Tags and Their Meaning

The following signal words are used in the product documentation in order to warn the reader about risks and dangers. The tags described here are always used only in connection with the related product documentation and the related product.

	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
NOTICE	Describes precautions necessary to protect the equipment.
!	NOTE: Useful information for the user.

2. Introduction

Description

The IP-4c is a professional Audio over IP Codec. It is equipped with high quality multi-format audio encoder and decoder and is able to distribute audio data using the Internet Protocol (IP) via a 10/100/1000-Base-T network interface. The device has two main operation modes: - transmitting Audio over IP;

- receiving Audio over IP.

The IP-4c is able to encode, decode and transcode several Audio over IP streams (RTP/RTCP, UDP). Furthermore, the IP-4c has up to 4 digital stereo channel inputs and up to 2 stereo analog channel inputs.



Figure 1: Overview of the possible solution for the IP-4c

Stream protection The IP-4c is equipped with a combined mechanism for improving the stability and robustness of the audio data distribution over IP:

- Pro-MPEG FEC (forward error correction) scheme to account for bit errors or packet loss (IP).
- Dual Streaming on two physically separated Ethernet ports for elementary stream and transport stream over IP (RTP/UDP) for redundancy (2x Ethernet LAN 10/100/1000 Base-T (RJ45) interface).

Audio

- The IP-4c is equipped with balanced analogue (2x Stereo L/R, integrated XLR) and digital (4x Stereo AES/EBU integrated XLR) interfaces with a configurable level for the audio inputs (over web interface).
- If you activate 4 channels, no analog audio input/output option is available.
- If you activate 2 channels, the inputs/outputs are switchable between analog and digital.

Stream4Sure

- (optional) enables continuous audio transmission using sample precise seamless data selection:
 - Software for secure redundancy: automatical switch to the data with the best quality
 - up to 4 source streams with different codecs for each encoder
 - combinable with FEC, Dualstreaming (IP packet based redundancy) and SFN
 - must be activated in both devices: encoder as well as decoder (e.g. IP-4c)
 - available only for output type "Elementary stream (RTP/UDP)" and "TS/IP".



Figure 2: 2wcom Stream4Sure Overview

Monitoring

- Audio inputs
- Device functions (power failure, temperature etc.)
- LED, log messages

Alarm reporting via

- SNMP traps
- Activation of floating relay contacts
- LED, log messages

Control

Settings backup

The IP-4c is able to store and load all settings through the web interface to a local file.

SNMP, NMS

Additional monitoring of the device using SNMP. Rudimentary device control, status information and alarm trap generation is featured. Optional: control via centralized Network Management System (NMS).

LCD and jog wheel

Initial configurations and major status information can be called up via LCD menu and jog wheel.

GPIO Forwarding

GPI transmission/forwarding embedded in audio IP streams.

Ember+

Ember+ protocol allows 3rd party application to gain access to parameters of the respective device. You can also receive status information and react to it. These parameters are available via the GUI interface as well.

HTTP web interface

The unit is controlled via built-in web interface.

	IP-4C Name:	Ralfs IP-4c Testdevice	Power	Warning	Live Source: 💀 Audio Output 3 🛛 🗸
2w com'	Location: Description	renmarn :	lnput	🔵 Output	►iiil
Information ^ Overview	Overview				
Codec Settings	Audio Interfaces				Status
Codec TS Multiplever	Inputs		Outputs		Uptime 0 days, 22:57:33
Switch Criteria	Audio 1 Audio 2 Au	o R L R	Audio 1 Audio 2 Audio 3	Audio 4	Last boot 06. April 2020, 11:31:33 Temp 41 °C
Interface Settings	-1010202030 -	-101010	-10 -10 -10 -10 -10 -20 -20 -20 -20 -30 -30 -30 -30 -30 -30 -30 -30 -30 -3	-10	IAN
Audio XLR Headphone	405050	-4040	-40 -40 -40 -50 -50 -50	40 - 50 -	Ctrl UP, 1 Gbit, Full Duplex - 192.168.100.238
DTE	-240.0 -240.0 -41.0 -41.1 -240.	-60	6070	-240.0 -240.0	Data 1 UP, 1 Gbit, Full Duplex - 192.168.100.250 Data 2 DOWN - 192.168.19.250
GPO	dBFS dBFS	dBFS dBFS	dBFS dBFS dBFS	dBFS	Data 2 DOWN - 192.108.19.200
Network Settings	Codec DB TS Mult	inlever			
TCP/IP SNMP		ipiexei	F 1		
EMBER+	Decoder		Encoder		
NIP	Audio 1 Main	۵	Encoder 1	□	Encoder 5
AoIP Settings ^ SIP Phonebook	1LIVE Special	ФРЗ МРЗ	Audio Input 1	MP2 MP2	None
Easy2Connect	wdr-1live- specials.icecast.wdr.de//	SR BR 44100 128k	Ancillary Data: DTE	SR BR 48000 256k	
SAP	Audio 2 Main	п1	Encoder 2	۵î	Encoder 6
External Clock Livewire	Stream from myself	Type	Audio Input 2	MD2 Type	Nere
Live Listening	-I - @:5004	SR BR	Ancillary Data: DTE	SR BR	None
System Settings		48000 256k		48000 256k	
Time	Audio 3 Main	Ц	Encoder 3		Encoder 7
User Alarm	YOL-N	(др.3 Туре МРЗ	None		None
Status ^	www.ndr.de//n-joy.m3u	SR BR 44100 128k			
Device					
DTE Data Storage	Audio 4 Main		Encoder 4		Encoder 8
Log	None		None		None
User: admin	Details - Encoder 1				Reset Counters
	Source	Audio Input	XIR		
Support	Audio Input 1	MP2 -70 -60 -50 -40 -	30 -20 -10 0 -240.0 dBFS Audio Type	SR	
Website	Ancillary Data: DTE	Type SR Bitrate	-240.0 dBFS Digital	48.0 KHZ	
E-Mail		MP2 48000 256k	stereo 16		
	Elementary Streams	naia (ID) Dant		hate (a Bany - tag	Descion Address Last the Descion
	No Name Do 2 192	main / IP A Port A 	Data 1 277k 42	rkets/s A Max size 784	Keceiver Address A Lost A Jitter A Roundtri
	<				>

Figure 3: Web interface of the IP-4c

SIPAudio streaming over IP is possible by means of SIP connection. For a quick SIP connection, anEasy2Connect (SIP) function is available. It uses saved contacts und preconfigured streaming settings
to establish the connection by one click.

User

Only experienced technical personnel or engineers should operate the IP-4c.



3. Safety Instructions

For a secure operation of the device the user should read and hold on all safety instructions mentioned in this manual before the first operation.

\land WARNING

Non-compliance with the safety instructions can lead to serious injury.

Any changes on the device or operation of the parts not having been proved and released by the manufacturer can lead to unforeseen damage.

Every improper use of the device and all actions on the device not mentioned in this user manual are regarded as a not allowed misuse outside the statutory limits for liability of the manufacturer.

If you sell the device or give it to another person, attach this user manual to the device.

Never operate the device, if it does not function properly. If the device or its part is out of order, put it out of operation. Never repair the device by yourself. If there are any damages in the device, send it immediately to 2wcom Systems for maintenance or dispose it professionally according to the regional disposal regulations.

Keep the device away from unauthorized persons.

	DANGER of electric shock	
	Plug the device into a grounded power socket only. Never remove the grounding wire/contact.	
•	Never open the housing of the device by yourself. Never touch open electrical parts.	
4	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 with wet hands.	
	Never expose the device to liquids. If any liquid comes inside the housing, immediately disconnect the device completely from the power supply. Do not continue operating the device.	
	FIRE HAZARD of overheating or electric shock	
	Ensure sufficient heat dissipation during operation. Avoid following when installing the device:	
	 non-ventilated environment, for example a narrow shelve or built-in wardrobe; extremely warm or cold place; 	
	 direct sunlight exposure; 	
	 too high or too low temperature; extremely wet or dusty environment. 	
	Do not operate the device in the presence of flammable gases.	
	Do not cover the ventilation openings of the device to avoid heat accumulation.	
	Do not put objects with open flames such as burning candles on the device.	
	Do not put heavy objects on the supply cord. A damaged cord can lead to fire or electric shock hazards.	
	To disconnect the supply cord, drag always the plug and never the cable to avoid the cord damage.	

^	WARNING of explosive atmosphere
	Risk of the explosion hazard.
	Do not use the device in an explosive environment.
	WARNING of hot surface The device is equipped with an active cooling system. The surface of the device can still heat up during operation. Do not touch the surface of the device during operation.

NOTICE **CAUTION:** Risk of equipment damage Before the first operation: Check the housing, the front panel, the supply cord and the plug for visible damage (e.g. scratches, cracks, damaged isolation and abrasion) In case of damage, unplug immediately the supply cord. Never operate device with a damaged supply cord. All damaged components must be replaced immediately. Installation: Use only a grounded three-wire power supply cord and -plug that complies with the national regulations. If necessary, another than the supplied supply cord has to be used, in compliance with the regulations of the country where the device is operated. Make sure that the AC power outlet is next to the device and readily accessible to the user. Installation of other devices: 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. Cleaning: Do not use corrosive detergents on the device such as benzine, thinner, alcohol or acetone. Clean the surface of the device only with a soft dry cloth.

4. Supplied Parts

- IP-4c
- Power supply cord*
- Breakout cable for 4x DTE input and 4x DTE output (optional)
- User manual in PDF format to download; on request by paper

*available for different countries



NOTE: The scope of delivery may deviate in special cases.

5. Manufacturer

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User Manual IP-4c V1.93

6. Installation

Best setup location	The device should be installed in a 19" rack. Avoid direct sunlight, proximity to radiators and air conditioning, dust, water, and chemicals. Choose a rack location that permits a clear view of the indicators on the device and ensure a sufficient heat dissipation of the device.			
Mains supply connection	The device is designed for operation with 100 to 240 V AC, 50 to 60 Hz. Check the corresponding device labeling for compatibility to the domestic line voltage and frequency before connecting the IEC power connector to the mains supply! Check the corresponding device labeling for compatibility to the domestic line voltage and frequency before connecting the IEC power connector to the mains supply!			
	No power switch is available; unplug mains supply connector to remove power. Keep the mains supply plug readily accessible to the user.			

WARNING



WARNING

Disconnect mains power plug before you open the housing. Repair of the equipment must only be carried out by authorized and qualified personnel. Read also Section "Safety Instructions" (see page 9).

7. Operation

7.1. Device Control via Web Interface

The device has an integrated web interface. All configurations and operations can be made using a web browser.

To control the device via web interface:

Connection: For network configuration and access to the web interface, see section 8.2 "Network Configuration" on page 19.



NOTE: To maintain security, you can activate session timeout function and the current user will be automatically logged out after the configured period of inactivity (for more information see section 19.10 "Set up the Session Timeout" on page 107).

Buttons:

- if you want to save any changes made in the configuration of the device, press the "Save" button;
- if you do not want to save the changes, press the "Cancel" button.



NOTE: Each block has to be saved individually.

If you change data in several blocks, you must click the "Save" button under each block, in order to save all changed data.

Otherwise, the unsaved block will be reset to the previously saved status.

Numbers: use a decimal point as the decimal separator in numbers in the input fields (i.e. "6.5" for six and a half).

Input fields: After entering a number or text in an input field, you must click on the corresponding "Save" or "OK" button to activate the changes. Alternatively you can use the ENTER-key of your computer keyboard.

The next sections explain the separate web interface functions. The operation via jog wheel and LCD on the device is similar to these descriptions.

7.2. Operation via LCD/Jog Wheel

7.2.1. Description of the Menu Navigation

Some basic functions of the device can also be operated via the LCD/jog wheel at the device.

The possible movements of the jog wheel are:



The display consists of the two main navigation menus:

• Status overview (turn the jog wheel left or right)



• Configuration menu (push the jog wheel)

55	Interface • Network • System
Headphone	
Ļ	

Via display and jog wheel you can:

- configure network settings for the first access to the device over the web user interface
- view the device status
- configure outputs headphone interface
- reset admin password
- reset to system defaults
- reboot the device



NOTE: In this user manual, if a certain configuration is possible over the LCD/jog wheel, the corresponding menu path is shown at the end of the section, for example:

LCD menu: Configuration Menu→Network→Data 1

After the warmstart/coldstart of the device the display shows the default screen of the "Status Overview" menu:



NOTE: If you navigate in the LCD menu, the display changes after some minutes to the "Status Overview" menu.

- To change from the default "Status overview" menu to the "Configuration menu", push the jog wheel.
- To move the cursor in the menu structure, turn the jog wheel.
- To open a menu entry or to confirm a setting, push the jog wheel.
- To select a configurable menu entry, turn the jog wheel.
- To adjust a menu entry, push and then turn the jog wheel.
- To confirm the adjustment, push the jog wheel.
- To return to a previous menu level, activate the menu entry "<<".
- Some settings need a restart of the device to be activated.

7.2.2. Navigation Structure

Status Overview menu



Configuration menu



8. First Steps

The following section contains instructions for a quick start.

✓ You have already unpacked and installed the device in an appropriate place.

8.1. Power Supply

NOTI	CE		
	Make sure that the device and the contained cords are compatible to the domestic line voltage and frequency!		
The device has redundant pow	he device has <u>optionally</u> two plug-in exchangeable power supply units which can be equipped with different edundant power supply connectors:		
		230 V AC, 90260 V AC, 4763 Hz If the device is compatible, connect the power supply cord fully to the IEC power connector at the back panel of the device and an independent mains power outlet.	
0		 48 DC Neutrik powerCON socket, aut. switchover (NAC3MPA-1) Neutrik powerCON connector (NAC3FCA) 	

Assembly Instruction for the 48V connector:

To connect your cable to the delivered terminal blocks for [Power IN], insert the wires into the delivered terminals and fasten the screws with a POZIDRIV[®] screwdriver No 1 to maximal torque of 0.5 Nm.

NOTE: the specification for the power supplies and the position of the poles in the connector and in the [Power IN] socket on the back panel of the housing as shown in Figure 4:





Figure 4: Wiring of the 48V connector (left) and of the 48V socket (right), rear side

N – "neutral"

L – phase conductor "line"



 \Rightarrow The "Power" LED will turn on green if both power supply cords are connected.

 \Rightarrow The "Power" LED will blink green/red if only one power supply cord is connected.

If the IP-4c is equipped with the <u>optional</u> plug-in power supply units, the left and the right plug-in power supply units are independent from each other. You can exchange one of them in the IP-4c **during ongoing operation** if one power supply unit fails. To unplug the defect power supply unit, just pull out carefully the plug housing. Exchange the defect power supply unit by an intact power supply unit.

NOTICE

The current information about the operation of the both power supply units you can view over the web interface of the device under **Status**->**Device** (see Figure 90 on page 103).

8.2. Network Configuration

NOTICE	
	False connection of the Ethernet interfaces will lead to incorrect operation
	Use the [Data 1/Data 2] connectors only for the data transfer. Use the [Ctrl] connector only for the access to the device via the web interface and for SNMP.

For the [Ctrl] interface DHCP is enabled per default. When you connect the device to your DHCP enabled network, it will automatically get the IP configuration for the [Ctrl] interface. To find out the obtained IP address turn the jog wheel to the left to see the "System Info" display. Here you will find (besides other system information) the obtained IP address.

To change the IP setup of the device via the LCD menu:

- 1. Push the jog wheel to enter the menu.
- 2. Turn the jog wheel to select the "Network" menu entry 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. When asked if the settings should be saved and restart, select "Yes".
- 7. Connect a network patch cable to the 10/100/1000-Base-T connector of the [Ctrl] interface on the back panel of the device and your existing network.
 - \Rightarrow Your device is now connected to the IP network.

8.3. Web Interface

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

To operate the device via the web interface:

1. Start an internet browser (always use an up-to-date version with Java Script activated).

- 2. Enter the IP address of the device (either the one obtained via DHCP or the one you configured in the step above).
- 3. A login screen with Username/Password appears. Use the default accounts:
 - i. for a read-only access use "user"/"user"
 - ii. for a full access use "manager"/manager" or "admin"/"admin"
 - \Rightarrow After entering the correct login data (case sensitive), the main page appears.



NOTE: Change the login data as soon as possible to avoid unauthorized access to the device and document the login data in a safe place.

You can change your login data under **System Settings→User**.

8.4. Connecting the Device

For operation as an encoder and decoder, connect the device as follows:

- 1. For signal distribution over IP (input/output), use the RJ45 jacks [Data 1/2].
- 2. For input/output of the analog/digital audio signal, use the XLR jacks [A-L/R IN 1-2] / [A L/R OUT 1-2] and [D IN 1-4] / [D OUT 1-4].
- 3. Use the headphone output for monitoring the input/output audio signals. Set up the source for the headphones output under Interface Settings→Headphone (possible options: Mute/"Audio Input 1-4"/"Audio Output 1-4").

NOTICE

False connection of the Ethernet interfaces will lead to incorrect operation

Use the [Data 1/Data 2] connectors only for the data transfer (input/output).

Use the [Ctrl] connector only for the access to the device via the web interface.

8.5. Codec Settings

All necessary settings for encoder and decoder can be done via a single menu "Codec Settings" on the web interface of the IP-4c.

Before you use the IP-4c as an encoder/decoder/transcoder, make some presets for each available input and codec.

Follow the six steps (see Figure 5) for quick operation of the IP-4c as encoder, decoder or transcoder:

- 1. Define presets for input sources (see section 11 "Preset Input Sources" on page 28).
- 2. Define codec profiles (see section 12.1 "Preset Codec Profiles" on page 40)
- 3. Assign preconfigured input sources and preconfigured codec profiles to each encoder (see section 12.2 "Assign Input Source/Codec Profile" on page 41).
- 4. Configure each encoder output (see section 12.3 "Set up Encoder Outputs" on page 43).
- Assign preconfigured input sources to decoder (see section 13.1 "Assign and Activate Source Streams" on page 63).
- 6. Define switch criteria for decoder (see section 13.6 "Define Switch Criteria" on page 67).

2w com [.]	IP-4C Name: IP-4c Reference Device Power Warning Location: Kal's Desk Description: Input Output	
Information Overview	Codec	
Codec Settings Codec	1 nput Sources / Profiles	2 Profiles
Switch Criteria	Name Format Mode SR SW BR Ancillary GPIO	
Interface Settings Audio XLR Headphone DTE GPI GPO	MPEG Layer2 Stereo 48000 16 256k Edit 3 5 Encoder Decoder Source/Profile Assignment) • -
Network Catting	Input Source Profile Input Source Profile	
Network Settings TCP/IP SNMP NTP	1: Distance - chords (radio edit].mo3 * MPEG Layer2, 48000Hz * 5: MPE MPE MPEG Layer2, 48000Hz * 5: MPE	~
AoIP Settings SIP Phonebook	2: Ø None MPEG Layer2, 4000Hz 6: Ø None MPEG Layer2, 4000Hz 256k, Stereo	~
SIP SAP	3: Ø None MPEG Layer2, 48000Hz Y 7: Ø None MPEG Layer2, 48000Hz Y 7: Ø None MPEG Layer2, 48000Hz Z56k, Stereo	~
rtsp Livewire	4: Ø None MPEG Layer2, 48000Hz SEK, Stereo 8: Ø None MPEG Layer2, 48000Hz SEK, Stereo	~
System Settings Global Time User	4 Encoder Outputs	
Alarm	TS/IP 🖳 Elementary Streams SICT 👹 Icecast Server 🔓 File	
Status Device	Active Enc Name Domain name / IP Port Interface Delay FEC	• -
DTE Data Storage Remote Control Log Log		

Figure 5: Codec Configuration

8.6. Set up Alarm

You can set up monitoring of certain device and input parameters which should be measured. In case of failure, an alarm can be sent over SNMP, GPO switching and/or will be indicated by a warning LED in the front of the device and/or through an entry in the log.

To set up alarms for the available parameters:

- 1. Select **System Settings** \rightarrow **Alarm** in the web interface to open the monitoring setup page.
- 2. Activate monitoring for each parameter separately by selecting the corresponding checkboxes in the column "Enable".
- 3. Select for each alarm function the severity level of the alarm in the dropdown menu "Priority" (for more information about alarm priority see Table 2 on page 74).
- 4. Some alarms need a threshold value. Change or enter the threshold value in the corresponding fields.
- 5. For each parameter default values are already preset. T1 vs. T2 is the time a parameter has to be "bad" vs. "good" before an alarm will be generated vs. retracted.
- 6. Activate the way of the alarm distribution (SNMP, GPO, LED) by selecting the corresponding checkboxes.
- 7. In the same menu you can set up the alarm in case of LAN connection failure or device overheating.
- 8. Click the "Save" button to save the changes.
- 9. In the same menu you can see status LEDs of each monitoring parameter and under **Status→Log** details about the sent alarms (for more information about log see section 19.4).

9. Control Elements and Connectors

9.1. Front Panel

•	a o 2wcom o	4audio loga Cataloga
	1	$ \begin{array}{c} \uparrow\\ 2 \end{array} $ $ \begin{array}{c} \uparrow\\ 3-6 \end{array} $ $ \begin{array}{c} \uparrow\\ 8 \end{array} $
1	Headphones	6.3 mm / $1/4''$ socket for the connection of headphones.
2	LCD screen	Illuminated, Liquid Crystal Display (LCD), graphical, 264x64 pixel.
3	[Warning] LED	LED indicator (red); lit if alarm is triggered.
4	[Input] LED	Will correspond to the sum of the alarm status for the inputs. If no input alarms are enabled, the LED will be off. If input alarms are enabled, the LED will be green, if all inputs are OK, yellow if one or more inputs are bad, but at least one is good, and red, if all inputs are bad.
5	[Output] LED	Will correspond to the sum of the alarm status for the decoder outputs. If no output alarms are enabled, the LED will be off. If output alarms are enabled, the LED will be green, if all outputs are OK, yellow if one or more outputs are bad, but at least one is good, and red, if all outputs are bad.
6	[Power] LED	Activated (green) if both power supply cords are connected and the power supply is OK.
		Toggle (green/red) if only one power supply cord is connected and the power supply is OK.
7	Reset (pin hole)	Recessed button for resetting the device (warm start and recovery mode).
8	Jog wheel	Jog wheel for the device operation via the LCD screen on the device. Turn the jog wheel to place the cursor on the desired menu entry and push the jog wheel to activate the highlighted menu entry.

9.2. Back Panel



1-2	Left power supply unit; Right power supply unit	Option: 1x internal power supply unit; fuse ratings depending on mains supply voltage: 90-260 V,47-63 Hz: T1.6A, time lag type, 5x20 mm, 230 V
		Option: 2x redundant standardized IEC hot-swappable power supply connector with integrated fuse holder; 90-260 V, 47-63 Hz; automatic switchover.
		Optional: redundant power supply 48VDC
		Combination of power supply 230 VAC and 48 VDC is possible.
3	[Grounding stud]	The stud can be used to connect a grounding system if necessary.
4	[Ctrl]	RJ-45 connector; 10/100/1000 Base-T interface for control and monitoring the device via Ethernet. The device can communicate with the IP network and can be configured in an internet browser via the integrated web interface. The LEDs at the socket show the link status (green; active if a physical network connection exists) and the activity status (yellow, active if data communication is active).
5	[USB]	USB 2.0 interface for service, configuration and firmware.
6-7	[Data 1/2]	2x RJ-45 connectors; 10/100/1000 Base-T interface for two redundant outputs for data, audio and GPIO transmission via gigabit Ethernet.
8	[DTE 1-8]	15 pole D-Sub male connector for the serial RS-232C data communication, e.g. private data, MPEG ancillary data, UECP/RDS (acc. to TR 101 154). Use the supplied serial breakout cable (optional) to provide each input with a serial interface.
9	[GPIO]	26 pole sub-D male connector; Remote Control Inputs/Outputs for GPIO transmission; 8 inputs; 7+1 floating relays; switch contacts of the integrated relays.
10-13	[D OUT 1-4]	4x AES/EBU male interface for the output of the digital audio
14-17	[D IN 1-4]	4x AES/EBU female interface for input of the digital audio
10,12	[A-L OUT 1-2]	double function: 2x integrated balanced XLR male socket; output of the left channel of the analog audio signal, balanced ${<}20\Omega$
11,13	[A-R OUT 1-2]	double function: 2x integrated balanced XLR male socket output of the right channel of the analog audio signal, balanced 110Ω
14,16	[A-L IN 1-2]	double function: 2x integrated balanced XLR female socket; input of the left channel of the analog audio signal, balanced >10k Ω
15,17	[A-R IN 1-2]	double function: 2x integrated balanced XLR female socket; input of the right channel of the analog audio signal, balanced >10k Ω
18	[RF 1/2]	(optional) antenna input for SAT or FM tuner
19	[SYNC/AUX 1]	(optional) connector for SFN synchronization (GPS input)
20	[AUX 2]	(optional) signal output depending on built-in tuner

10. Network Settings

✓ You have already connected the device to the network [Ctrl] and configured the access to the web interface (see page 18, section "First Steps").

10.1. TCP/IP: Configuration of the Ethernet Interfaces

The IP-4c has three Gigabit Ethernet RJ45 interfaces: one for configuration and two for data exchange.

ΝΟΤΙ	CE
	False connection of the Ethernet interfaces will lead to incorrect operation
	Use the [Data 1/Data 2] connectors only for the data transfer.
	Use the [Ctrl] connector only for the access to the device via the web interface.

Under **Network Setting**→**TCP/IP** you can configure the Ethernet interfaces: Control interface to access the web interface of the device [block **Ctrl**], [block **DNS Server**] and both data interfaces [block **Data 1/Data 2**].



NOTE: The IP-4c supports ADSL/VDSL connections by assigning static and dynamic IP addresses. To use a dynamic IP, a DynDNS account is needed.

The following parameters can be configured or changed (see Figure 6):

MAC address:	The current MAC address is shown in the brackets after the block name (e.g. 00,11,99,00,6D,50)
VLAN:	Support on request
IP Address:	Individual address that is necessary to identify hardware in an IP network like the internet or intranet.
Netmask:	Bit mask, which separates an IP address into a network part and a host part.
Gateway:	Address of the local system that is used for the internet access (e.g. the router)
Primary:	IP address of the primary Domain Name Service (DNS) server.
Secondary:	IP address of the secondary Domain Name Service (DNS) server.
DHCP:	Activate or deactivate the Dynamic Host Configuration Protocol which enables the device to get an IP address automatically.
Routing	Activate or deactivate "Routing" switch, which enables the DNS Server to send and to answer the requests over different Data Interfaces [Data 1] or [Data 2].
	Activate "Routing" and select the Data Interface in the drop down menu "Routing Interface".
	If "Routing" is deactivated, the requests will be sent to the interface that is connected to the same network as the DNS Server.

2w com [.]	IP-4c	Name: Location: Description:		wer Warning ut Output		
Information Overview	TCP/IP					
Codec Settings Codec Switch Criteria	DNS Server Primary: Secondary:		192.168.96.11 192.168.96.12	Routing: Routing Interface:		Data 1 v
Audio XLR Headphone DTE GPI GPO	Save Ctrl		Data 1		Data 2	
Network Settings TCP/IP SNMP EMBER+ NTP	MAC: DHCP: IP Address: Netmask: Gateway:	00:11:99:00:90:99 01 192.168.102.97 255.255.240.0 192.168.96.1	MAC: DHCP: IP Address: Netmask: Gateway:	00:11:99:00:90:9A 077 192.168.50.88 255.255.255.0 192.168.50.99	MAC: DHCP: IP Address: Netmask: Gateway:	00:11:99:00:90:98 07 192:168:60.88 255:255:255.0 192:168:60.99
AoIP Settings SIP Phonebook Easy2Connect SIP	Speed: Mode:	auto 💙 full duplex 💙	Speed: Mode:	auto v full duplex v	Speed: Mode:	auto v full duplex v
SAP PTP Livewire System Settings			O O O O.0.0 O O 0.0.0.0 0.0.0.0 O O 0.0.0.0 0.0.0.0	0.0.0 0.0.0 0.0.0 0.0.0	O O O O.0.0.0 O O O 0.0.0.0 O O O 0.0.0.0	0.0.0.0 0.0.0.0 0.0.0.0
Global Time User Alarm	Save					

Figure 6: Network Settings - TCP/IP

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

 $\Rightarrow~$ Save the changed settings by clicking "Save" button.

10.2. Monitoring Function: Configuration of SNMP

As part of the monitoring function, the device is capable to send SNMP traps to the defined IP addresses of the SNMP managers. It is also possible to readout device settings via SNMP Get.

This menu item is available under **Network Settings→SNMP** and is used to setup the IP addresses of the SNMP managers (see Figure 7).

2w com [.]	IP-4c	Name: Location: Description:		Power		Warning Output		
Information Overview	SNMP							
Codec Settings	Read/Write Co	ommunity		Tra	p Man	ager		
Codec Switch Criteria	1. Read community 2. Read community	:	public public	1:	Enable	Version	IP or Domain Name	Port
Interface Settings Audio XLR Headphone	1. Write communit	n a	private	2:	Off	Version 2 Versio		162 162
DTE GPI GPO	Save	f.	private			Version 2] [102
Network Settings								
TCP/IP SNMP								
EMBER+ NTP								

Figure 7: Network Settings – SNMP

Additionally, access data (read community/write community) that is necessary for external SNMP requests to device can be configured here.

You can configure or change in this menu the following parameters for SNMP:

Trap manager:	IP address of the SNMP manager that receives SNMP traps. The trap sending to this address can also be deactivated by a checking "off" at "Send trap:". You can activate up to four addresses.
Read community:	SNMP access data for the external read SNMP access to the device.
Write community:	SNMP access data for the external write SNMP access to the device.

\Rightarrow Save the settings by clicking the "Save" button.

NOTE: In order for the SNMP manager tool to operate correctly, it requires the specific MIB files. These MIB files need to be compiled by the SNMP manager tool.

You can save the active MIB files under **System Settings**→**Global** in the "System information" block in the "MIB version" field.



NOTE: Each activated trap will be sent once at startup for initialization.

You can configure and activate the monitoring functions under **System Settings** -> Alarm. More information about alarm settings you can find in section 14 "Monitoring and Alarm Control" on page 72.

10.3. Monitoring Function: Configuration of EMBER+

As part of the monitoring and remote control function, the device is capable to be controlled over the Ember+ protocol (optional on request).

This menu item is available under **Network Settings→EMBER+** and is used to configure the Ember+ access to the IP-4c (see Figure 8).

2 w com	IP-4c	Name: Location: Description:	Power Warning	
Information Overview	EMBER+			
Codec Settings	Settings			
Codec Switch Criteria	Mode: Timeout:	Off 0	 Interface: Port: 	Ctrl ~ 9000
Interface Settings Audio XLR Headphone DTE	Save			
gpi gpo				
Network Settings TCP/IP SNMP				
EMBER+ NTP				

Figure 8: Network Settings – EMBER+

In this menu you can configure or change the following parameters:

Mode:	Dropdown list options: Off, UDP, TCP, UDP/TCP.
Timeout:	Enter the value for interval in seconds for a timeout.
Interface	Dropdown list options for the Ethernet connector: Ctrl, Data 1, Data 2.
Port:	Enter the port number for the connection.

 \Rightarrow Save the changes by clicking the "Save" button.

10.4. NTP Settings: Configuration of Date and Time

This menu item is available under **Network Settings**→**NTP** and is used to enable the automatical synchronization of the date and time of the device with an external NTP server (see Figure 9).

2 w com [.]	IP-4C Name: Power Warning Location: Description: Output
Information Overview	NTP
Codec Settings Codec Switch Criteria	Update Settings NTP Server Synchronization: INTP Server: Update interval [min. 30 sec]: 3600 2. NTP Server: Image: Server server:
Interface Settings Audio XLR Headphone DTE	Last synchronization: NTP disabled Save
GPI GPO Network Settings	
TCP/IP SNMP EMBER+ NTP	

Figure 9: Network Settings – NTP

In this menu you can activate the automatical synchronization of the device clock via NTP by activating a virtual switch to "ON" and configure or change the following parameters:

1. SNTP Server IP	IP address of the first NTP server to be used.
2. SNTP Server IP	IP address of the second NTP server to be used.
Update interval [min. 30 sec]	Time interval for synchronizing the device clock with the NTP server in seconds.
Last synchronization	Information about the last synchronization.

 \Rightarrow Save the changes by clicking the "Save" button.



NOTE: Additionally, you can read out and <u>manually</u> set up the current date and time in the internal clock of the device under **System Settings**-**Time** (see section 19.8 "Set up Time" on page 106).

11. Preset Input Sources

All input sources you can preset in the web interface of the IP-4c under **Codec Settings**->Codec in the "Input Sources/Profiles" block (see Figure 10).

2 w com	IP-4c	Name: Location: Description:		Power	WarningOutput	
Information Overview	Codec					
Codec Settings Codec	Input Source	es / Profiles Elementary Streams		lcecast 🕞 Fil	e 😨 XLR	Profiles
Switch Criteria	Name	Address	Interface Prot	ocol Delay	FEC ports Backup Address	Backup If.
Interface Settings	Default	@:5004	Data 1 RTP	100		Edit • -
Audio XLR Headphone DTE	Demux Config TS Source	urations Name	Mode Service/PID	Codec	Buffer AudioSync Ancilla	ary Priv.PID Priv.Dest.
GPI GPO						\odot

Figure 10: Input codec profiles

You can create and save up to 16 presets for each input source and use them for encoder and decoder:

Input Source	Description	Source Interface
TS/IP	TS/IP – Transport stream over IP using UDP/RTP, Unicast/Multicast (optional: "TS Decoder" right)	[Data 1/Data 2]
DV3 SRT TS/SRT	TS/SRT – Transport stream over IP using SRT (Secure Reliable Transport) (optional: "TS Decoder" and "SRT Decoder" rights)	[Data 1/Data 2]
Elementary Streams	RTP Elementary audio stream over IP using Unicast/Multicast	[Data 1/Data 2]
? Livewire	IP Streaming over Livewire (optional: "Livewire" rights)	[Data 1/Data 2]
SIRT	Elementary stream over IP using SRT (optional: "SRT Decoder" rights)	[Data 1/Data 2]
SIP SIP	Stream over IP using SIP – Session Initiation Protocol ("EBU Tech 3326" right)	[Audio In 1-4] [Data 1/Data 2]
lcecast	Stream over IP using TCP (Icecast/Shoutcast)	[Data 1/Data 2]
File	Files from internal storage	Internal storage (eMMC, optional SSD)
XLR	Analog and digital (AES/EBU) audio over XLR connector	[Audio IN 1-4] ([D IN 1-4] [A-L/R IN 1-2])

- 1. Click \oplus to create a new configuration preset.
- 2. Click \ominus to delete a configuration preset, if it is not yet assigned to any coder.

- 3. Click "Edit" to set up the new preset.
- 4. Save the changes after each configuration by clicking "Save" in the "Edit" dialog.

11.1. Presets for TS/IP

To configure the presets for input source "Transport Stream" (tab "TS/IP") make the following configurations:

- 1. Create and edit a new preset for input source "TS/IP" as described on page 28 (see Figure 5 "Codec Configuration" on page 21, #1).
- 2. Enter the following data in the fields of the configuration of the input source TS/IP in the "Edit" menu (see Figure 11: Input Source for coder TS/IP):

Name:	Enter the name of the stream for better reference.
IP type:	Unicast/Multicast.
Multicast IP:	IP for Multicast, if selected in the field Type .
Port:	Sender UDP port (the same as configured in the encoder settings for output streaming).
IP Interface:	Choose the interface for the input signal: Data 1 or Data 2.
Protocol:	MPEG2 transport stream encapsulation, either UDP only or UDP/RTP.
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 the combine with the second, dual streaming input. Enter the value for this holding period in ms (for more information see section 18 "Buffer Delay Management" on page 100). NOTE : The delay time of the input source must not exceed 200 ms if the sample rate is 192 kHz
	(see "Demux Configuration" in section 12.2 "Assign Input Source/Codec Profile" on page 41).
Pro-MPEG FEC:	Enable by selecting "ON" in the virtual switch (see section 13.2 on page 65).
Dual streaming:	Enable by selecting "ON" in the virtual switch (see section 13.3 on page 65).

Name: Defa	ult
IP type:	Unicast
Port:	5004
IP interface:	Data 1
Protocol:	RTP
Packet reorder/dejitter delay [ms]:	100
Pro-MPEG FEC:	ON
FEC column (L) port offset (0 if unused):	2
FEC row (D) port offset (0 if unused):	4
Dual streaming:	ON
Dual streaming	
IP type:	Unicast
Port:	5004
ID interface	Data 2

Figure 11: Input Source for coder - TS/IP

- 3. Click the save button to save the changes.
- 4. Configure up to 16 demultiplexer presets for each TS source (TS/IP and TS/SRT) in the "Demux Configurations" block in the same menu (see Figure 12 on page 30).
- 5. Select the source for the demultiplexer preset in the dropdown menu "TS source": TS/IP or TS/SRT.
- 6. Enter the **name** of the stream for better reference.
- 7. Select the **configuration mode**: "Manual/PID" ("Automatic/Service" not available yet).

Codec		Demux configuration			×	
Input Sources / Profiles		TS source:	Edit	Default	*	
D/3 TS/IP Elem	nentary Streams	Name:				Profiles
Name	Address	Configuration mode:		Manual/PID	~	Backup If.
Default	@:5004	Audio PID:			101	Edit •-
Default 2	0.0.0.0:500	Audio sync mode:			PCR 🗸	- Edit 🔶 -
Default 3	@:5004	PCR PID:			101	- Edit 🔶 -
		Decoder type:			MPEG Layer2 V	
Demux Configuration	ns	Decoder Audio Buffer [ms]:			100	
TS Source	Name					y Priv.PID Priv.Dest.
SAT/Default		Ancillary Data (Decoder only)				Edit •
		Data destination:			UDP 🗸	
Encoder D	ecoder	UDP IP address:			0.0.0.0	
		UDP IP port:			8000	
Source/Profile Assignment		UDP IP interface:			Data 1 🗸 🗸	
Input Source		GPIO Tunneling:			Off 🕕	Profile
1: Ø None	÷	Private Data				MPEG Layer2 MP2 MPEG Layer2, 48000Hz
		Private data enabled:			On 🚺	2308, 308/60
2 dame	~	Data PID:			102	MPEG Layer2
2 JØ None	-	Data format:			PES Payload / ES 🗸	256k, Stereo
		Data destination:			TS Adaption	
3: Ø None	~				PES Extension	MPEG Layer2 MP2 MPEG Layer2, 48000Hz
		Save			PES Payload / ES	2.505, 308/60
			_		ES Tandberg	MPEG Layer2
4: Ø None	~	MP2 MPEG Layer2, 48000Hz 2568, Stereo	Ŭ,	8: Ø None		MP2 MPEG Layer2, 48000Hz V 256k, Stereo

Figure 12: TS Demux configuration

8. If you select the configuration mode "Manual/PID", enter the PID number and configure the processing (audio decoding, data retrieval) of this PID out of the received transport stream.

Example: Configurations for PID mode:

Name: PCR1; PID Number: 1035; Audio Synchronisation mode: PCR.

Name: AUDIO1; PID Number: 1036; Audio Synchronisation mode, Decoder Audio buffer: 10 ms.

Name: DATA1; PID Number: 1037; Private data: ON, Data format: PES Extension, Data destination: UDP.

- 9. To predefine the codec type for Decoder, choose the audio codec or set "Automatic" in the dropdown menu **Decoder Type**. For available formats see Figure 15 on page 33).
- 10. Set up a value for audio buffer in the decoder in ms (for more information about buffer see section 13.5 "Set up Buffer" on page 67).
- 11. If the input stream of the decoder contains ancillary data, the IP-4c can forward them to the serial outputs [DTE 1-4]. In this case, choose the serial output DTE or UDP in the dropdown menu "Data destination" in the "Ancillary Data" block (for more information see section 16.3 "DTE" on page 86).
- 12. Click "Save" to save the changes.

11.2. Presets for TS/SRT

To configure the presets for input source "Transport Stream SRT" (tab "TS/SRT") make the following configurations:

- 1. Create and edit a new preset for input source "TS/SRT" as described on page 28 (see Figure 5 "Codec Configuration" on page 21, #1).
- 2. Enter the following data in the fields of the configuration of the input source TS/SRT in the "Edit" menu (see Figure 13 "Input Source for coder TS/SRT" on page 32):

Name:	Enter the name of the stream for better reference.
Mode:	You can use SRT in listener and caller mode.
Port:	Specify the port number for SRT connection.
IP Interface:	Choose the interface for the input signal: Data 1 or Data 2.
Latency (ms):	Define the time interval for the latency (milliseconds) before the IP-4c starts to decode the signal distributed via SRT protocol.
Use Encryption:	If the input stream is protected by AES encryption, activate end-to-end encryption by switching "ON".
Passphrase:	Enter a (defined) password used to secure the SRT stream.

3. Click the "Save" button to save the changes.

2w com [.]	IP-4C Name: Location: Description:	Ralfs IP-4c Testdevice Fehmarn	 Power Warnie Unput Output 	ng Live Source: t b1	🐼 Audio Output 3 🔹
Information ·	Codec				
Codec TS Multiplexer	Input Sources / Profiles	Intary Streams	SIP 🔏 Icecast	File 🐼 XLR	Profiles
Switch Criteria	Name	Mode Host		SrcPort Port Interface	Latency Encryption
Network Settings 🗠	SRT	TS/SRT settings		8000 Data 1	120ms Cont
AolP Settings	TS Source Name	Name:	SRT	illar	ry Priv.PID Priv.Dest.
Status ·	IP/TS Mux 1	Mode: Port:		Listener v 8000	<u>Edit</u>)(•)(•)
User: admin	Encoder Decoder Source/Profile Assignment	IP interface: Latency (ms): Use Encryption:	[Data 1 ~ 120	
Support	Input Source	Passphrase (min. 10 chars):	passphrase		Profile MP2 Layer2, 40000Hz
Website E-Mail	2: Audio Input 2	Save Cancel United States Save Cancel United States Save Cancel United States Save Save Save Save Save Save Save Save	✓ 6: Ø None	-	MP2 Layer2 MP2 MP16 Layer2, 48000Hz
	Anonary cata: Die	256k, Stereo			256k, Stereo

Figure 13: Input Source for coder – TS/SRT

4. Configure up to 16 demultiplexer presets for the TS/SRT source in the "Demux Configurations" block in the same menu as described in steps 4. -12. on page 30 (see Figure 12 on page 30).

11.3. Presets for Elementary Stream

To configure the presets for input source "RTP Elementary stream" (tab "Elementary Streams") make the following configurations:

- 1. Create and edit a new preset for input source "Elementary stream" as described on page 28 (see Figure 5, #1).
- 2. Enter the following data in the fields of the configuration of the input source "Elementary stream" in the "Edit" menu (see Figure 14: Input Source for coder RTP Elementary Stream on page 33):

Name:	Enter the name of the stream for better reference.
Туре:	Unicast/Multicast.
Multicast IP:	IP for the destination Multicast group, if selected in the field Type .
Port:	Sender UDP port (the same as configured in the encoder settings for output streaming).
Protocol:	Elementary stream encapsulation, either UDP only or UDP/RTP.
IP interface:	Choose the Ethernet connector for the input signal: Data 1 or Data 2.
VLAN:	Select a configured VLAN ID.

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 the combine with the second, dual streaming input. Enter the value for this holding period in ms (for more information see section 18 "Buffer Delay Management" on page 100).
	NOTE : The delay time of the input source must not exceed 200 ms if the sample rate is 192 kHz (see "Demux Configuration" in section 12.2 "Assign Input Source/Codec Profile" on page 41).
Pro-MPEG FEC:	Enable by selecting "ON" in the virtual switch (see section 13.2)
Dual streaming:	Enable by selecting "ON" in the virtual switch (see section 13.3).
	Activate Dualstreaming by selecting "ON" in the virtual switch "Dualstreaming" in the last field. The menu will be expanded to the additional configuration field.
	Configure the IP narameters for Dualstreaming. For the Ethernet input you can set up

Configure the IP parameters for Dualstreaming. For the Ethernet input you can set up the same or different sources Data 1/2.

RTP Elementary stream settings		×
Name:	Default	
IP type:		Unicast 🗸
Port:		5004
IP interface:		Data 1 🗸 🗸
VLAN:		101 🗸
Packet reorder/dejitter delay [ms]:		100
Pro-MPEG FEC:		ON O
FEC column (L) port offset (0 if unused):		2
FEC row (D) port offset (0 if unused):		4
Dual streaming:		ON O
Dual streaming		
IP type:		Unicast 🗸
Port:		5004
IP interface:		Data 2 🗸 🗸
VLAN:		101 🗸
Codec		
Decoder type:		Automatic 🗸
Buffer [ms]:		100
Ancillary Data (Decoder only)		
Data destination:		None 🗸
GPIO Tunneling:		
Save Cancel		

Figure 14: Input Source for coder – RTP Elementary Stream

- 3. To predefine the codec type for Decoder, choose the audio codec or set "Automatic" in the dropdown menu **Decoder Type**. For available formats see Figure 15.
- 4. Set up a value for audio buffer in the decoder in ms (for more information about buffer see section 18 "Buffer Delay Management" on page 100).
- 5. If the input stream of the decoder contains ancillary data, the IP-4c can forward them to the serial outputs [DTE 1-4]. In this case, choose the serial output DTE or UDP in the dropdown menu "Data destination" in the "Ancillary Data" block (for more information see section 16.3 "DTE" on page 86).
- 6. For GPIO switch between encoder and decoder activate the function "GPIO Tunneling" by selecting "ON" in the virtual switch "Activation" (for more information see section "GPIO Tunneling" on page 91).
- 7. Click the "Save" button to save the changes.

11.4. Presets for Livewire

To configure the presets for input source (=SRC) "Livewire" (tab "Livewire") make the following configurations:

- 1. Create and edit a new preset for input source "Livewire" as described on page 28 (see Figure 5, #1).
- 2. Click the "Edit" button to configure the selected Livewire input source.
- 3. Enter the following data in the fields of the "Livewire source settings" (see Figure 16: Input Source for coder Livewire on page 34):

Livewire source settings	×
Livewire Source (SRC):	Manual Enter the Livewire settings manually
Source (SRC) Channel:	0
Source (SRC) Port:	5004
Source (SRC) Interface:	Data 1 🗸 🗸
Gain [-12.0 6.0 dB]:	0.0
Save Cancel	

Figure 16: Input Source for coder - Livewire

Livewire Source (SRC):	Manual: Enter the Livewire settings manually. In this menu, available advertised Livewire streams will be displayed and can be selected for automatic configuration.
Source (SRC) Channel:	Enter a number (16 bit, in the range of 065535) describing a stream/channel.
Source (SRC) Port:	Specify the port number for Livewire connection.
Source (SRC) Interface:	Select the interface for Livewire connection: Data 1/2.
Gain:	Specify gain for the Livewire source (-12.06.0 dB).

4. Click the "Save" button to save the changes.

Figure 15: Audio Decoder Format

11.5. Presets for SRT

To configure the presets for input source "SRT" (open source Secure Reliable Transport protocol) make the following configurations:

- 1. Create and edit a new preset for input source "SRT" as described on page 28 (see Figure 5, #1).
- 2. Enter the following data in the fields of the configuration of the input source "SRT settings" in the "Edit" menu (see Figure 17 "Input Source for coder SRT" on page 35):

Codec	SRT settings	×	
Input Sources / Profiles	Name:	SRT	The product
Name Mode	Port:	Caller	
SRT Listener	IP interface:	Listener 120	000Hz (Edit) (+) (-)
Encoder Decoder	Use Encryption:		
Source/Profile Assignment	Encyrption: Passphrase:	AES-128 ~	
Input Source	Codec		Profile MPEG Laver2
1: Ø None	Decoder Profile:	MPEG Layer2 MP2 MPEG Layer2, 48000Hz 256k, Stereo	MP2 MPEG Layer2, 48000Hz 256k, Stareo
2: Ø None v	Buffer [ms]:	100	MPEG Laver2 MP2 MPEG Laver2, 48000Hz
	Save Cancel		MOLG I march
3: Ø None	256k, Stereo	V None	MP2 MPEG Layer2, 48000Hz ¥ 256k, Stareo
4: Ø None •	MPEG Layer2 MP2 MPEG Layer2, 48000Hz 256k, Stereo	8: Ø None 👻	MPEG Layer2 MP2 MPEG Layer2, 48000Hz ¥

Figure 17: Input Source for coder – SRT

Name:	Enter the name of the input stream for better reference.	
Mode:	You can use SRT in listener and caller mode.	
Port:	Specify the port number for SRT connection.	
IP interface:	Select the interface for SRT connection: Data 1/2.	
Latency (ms):	Define the time interval for the latency (milliseconds) before the IP-4c starts to decode the signal distributed via SRT protocol.	
Use Encryption:	To protect your content from contribution to distribution activate end-to-end encryption by switching "ON".	
Encryption:	Available options: 128/192/256 bit AES (Advanced Encryption Standard). 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:	Enter a (defined) password used to secure the SRT stream.	

- 3. Assign an available codec profile in the "Decoder Profile" dropdown menu. To predefine the codec profiles for Decoder click the *★* icon or in the "Profiles" tag under **Codec Settings**→**Codec** (for more information see section 12.1 "Preset Codec Profiles" on page 40).
- 4. Set up a value for audio buffer in the decoder in ms (for more information about buffer see section 18 "Buffer Delay Management" on page 100).
- 5. Click the "Save" button to save the changes.

11.6. Presets for SIP

The IP-4c supports Audio IP streaming using SIP (Session Initiation Protocol).



NOTE: The option "IP streaming over SIP" is only available, if the right "EBU Tech 3326" is activated.

You can use SIP connection for bidirectional data flows between Encoder and Decoder: directly over the Data 1/2 interfaces or over server (registrar).

To use the SIP protocol, register with a SIP server and configure the presets for input source "SIP" as follows:

- 1. Create and edit a new preset for input source "SIP" as described on page 28 (see Figure 5, #1).
- Enter the following data for the SIP registrar settings in the "Edit" menu (see Figure 18 on page 37).
 If you use the direct connection over Data1/Data2 interface, leave the first five fields for SIP registrar empty:

Registrar:	Internet domain name of a SIP server if the connection should be established over a SIP server.
Phone number:	Your phone number for registration with a SIP server.
Display name:	Assign a name to the SIP server for better reference
Username:	Your username for registration with a SIP server.
Password:	Your password for registration with a SIP server.
Interface:	For different accounts you can choose different interfaces Data 1/Data 2 or the same interface to set up the connection.
Expires:	Interval in seconds for the renewal registration.
Connection timeout:	Interval in seconds for disconnecting if there is no incoming audio signal.
Mono mix mode:	Left, Right, Downmix (send audio stream).

NOTE: You can register your device with several SIP servers and receive/send audio streams from/to several external devices (users).
2w com [.] ♥	IP-4c Na Lo De	me: cation: scription:		wer 🕒 Warning put 🕘 Output					
Information Overview	Codec								
Codec Settings	Input Sources / Pro	files							
Codec Switch Criteria	TS/IP Element	ary Streams D Livewire	🕊 SIP 🕉 Icecast	🕤 Fde 🐻 XLR				Profiles	
Junch Cherne	Registrar	Phonenumber	Displayname	Username	Interface	Expires	Timeout Mono mix		
Interface Settings Audio XLR	sip.xxx.de	100000000	SIP1 SIP2		Data 1 Data 2	1h :	30s Downmix 30s Downmix	Edit + -	25
Headphone					1				
GPI GPO	Encoder Dec	SIP registrar settings		×					
Network Settines	Source/Profile Assi	Registrar:	sip.xxx.de						
TCP/IP	Input So	Phonenumber:	XXXXXXXXX		rce		Profile		
SNMP	1. Audio Input 1	Displayname:	SIP1			~ 0.7	Backup 1	Ţ	
nir (Ancillary Data: None	Username:	*****				64k, Mono (L)		
AoIP Settings		Password:	*****				Backup 1		
SIP Phonebook Easy2Connect	2: Ø None	Interface:		Data 1 👻		~ 0.71	G.711, 8000Hz 54k, Mono (L)	~	
SIP		Expires [s]:		3000					
SAP PTP	3: Ø None	Mono mix mode:		Downmix Y		~ 0.71	Backup 1 G.711, 8000Hz	~	
RTSP		mono mix model		Downing					
Uvewire	4: Ø None	Save Cancel				~ 6.71	Backup 1 1 G.711, 8000Hz	~	
System Settings									
Time	Sau								

Figure 18: Input Source for coder – SIP registrar settings

3. Click the "Save" button to save the changes.

11.7. Presets for Icecast

To configure the presets for input source "Icecast server" (audio over IP) make the following configurations:

- 1. Create and edit a new preset for input source "Icecast" as described on page 28 (see Figure 5, #1).
- 2. Enter the following data in the fields of the configuration of the input source "Icecast settings" in the "Edit" menu (see Figure 19: Input Source for coder Audio over IP (Icecast) on page 37).

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, i.e. "247.56.38.14" or "www.backup-audio.com".
- **IP interface:** Choose the Ethernet connector for the audio stream input: Data 1 or Data 2.
- Buffer:Set up a value for audio buffer in the decoder in ms before playback is started (for more
information about buffer see section 18 "Buffer Delay Management" on page 100).

Icecast settings			×
Name:	Default		
URL:			
IP interface:		Data	1 ~
Buffer [ms]:		1000	
Save Cancel			

Figure 19: Input Source for coder – Audio over IP (Icecast)

3. Click the "Save" button to save the changes.

11.8. Presets for Internal Storage

The IP-4c can use the audio files uploaded to the internal storage as a source for the audio stream.

Audio files can be uploaded to the internal storage from the local storage of your PC.

To configure the presets for input source "Internal Storage" (tab "File") make the following configurations:

- 1. Upload the audio files that should be played from the local storage in case of failure under **Status→Storage**).
- 2. Create and edit a new preset for input source "File" as described on page 28 (see Figure 5, #1).
- 3. Enter the following data in the fields of the configuration of the input source "File" in the "Edit" menu (see Figure 20 on page 38):

Name: Assign a name to the setting of the audio source "File" for better reference

 File:
 Choose an audio file in the dropdown menu from the list of the uploaded files (under Status-Storage)

Buffer:

Set up a value for audio buffer in the decoder in ms before playback is started (for more information about buffer see section 18 "Buffer Delay Management" on page 100).



Figure 20: Input Source for coder – Audio files from internal storage

4. Click the "Save" button to save the changes.

11.9. Presets for XLR

You can use the intergrated XLR interfaces as audio inputs for encoder and decoder. The IP-4c is equipped with 4 digital **or** 2 analog/digital audio inputs and outputs (channels).

To configure the presets for Audio Inputs 1-4 (analog/digital) make the following configurations:

- 1. Configure the XLR interfaces for digital or/and analog audio inputs (Interface Settings→Audio XLR, see section 16.1 "Audio XLR" on page 84).
- 2. Edit a new preset for input source 1-4 as described on page 28 (see Figure 5, #1).
- 3. Enter the following data in the fields of the configuration of the input source "Audio Input 1-4" in the "Edit" menu (see Figure 21: Input Source for coder Audio Input 1-4 on page 39).

Name:

Assign a name to the Audio Input Setting for better reference.

Ancillary Data Source: Choose the Source for ancillary data in the dropdown menu: none, DTE or UDP.

. ⊗ 2wcom	IP-4C Name: Location: Description		Power	WarningOutput	
Information Overview Codec Settings Codec Switch Criteria Interface Settings Audio XLR Headphone DTE GPI	Codec Input Sources / Profiles INFORMATION Stream Type Audio Input 1 Audio Input 2 Audio Input 3 Audio Input 4	XLR Audio input settings Name: Ancillary Data Source: Save Cancel		X none ~	Ancillary Data Edit Edit Edit

Figure 21: Input Source for coder – Audio Input 1-4

4. Click the "Save" button to save the changes.

NOTE: For further audio interface settings see section 16.1 "Audio XLR" on page 84.

12. Encoder Configuration

✓ You have already connected the IP-4c to the network 10/100/1000-Base-T via the [Ctrl] interface and configured the access to the web interface (see section 8.2 "Network Configuration" on page 19).

The IP-4c can operate as decoder, encoder and transcoder at the same time.

Necessary steps for operating the IP-4c as an encoder are:

- 1. <u>Preset codec profiles</u>
- 2. Assign input source/codec profile
- 3. <u>Set up encoder outputs</u>
- 4. <u>Set up encoder input level</u>
- 5. <u>Set up FEC for encoder</u>
- 6. View the encoder status

The following sections describe the separate steps for encoding:

12.1. Preset Codec Profiles

You can preset all codec profiles in the web interface of the IP-4c under **Codec Settings→Codec** in the "Input Sources/Profiles" block (see Figure 22).

2w com [.]	IP-4C Name: Location: Description:		Power Input	Warning Output			
Information Overview	Codec						
Codec Settings Codec	Input Sources / Profiles	as 🔊 Livewire SRT 🖑 SIP	i 🅁 Icecast 🏳 File	XLR			Profiles
Switch Criteria	Name	Format	Mode	SR	SW BR	Ancillary	GPIO
Interface Settings Audio XLR		MPEG Laye	r2 Stereo	48000	16 256k		Edit + -

Figure 22: Codec Profile Presets

The IP-4c has 8 encoders and you can create and save up to 16 presets for codec profiles and use them for encoder. To define codec profiles make the following configurations:

- 1. Click \oplus to create a new configuration profile.
- 2. Click "Edit" to set up the new profile (see Figure 23 on page 41).
- 3. Enter the following data in the fields of the configuration of the codec profile:

Name:	Assign a name to	the codec pro	ofile for better reference
-------	------------------	---------------	----------------------------

Encoder Format: For available encoder formats see Figure 15 on page 34.

Audio Mode:Set up audio mode in the next dropdown menu. Available audio modes are: Mono (L), Mono
(R), Mono (Downmix), Dual Mono, Stereo, Joint Stereo.

Sampling RateSet up sampling rate in the dropdown menu in the range of 8000 ... 192000 HzNOTE: The sampling rate for Livewire can be configured only for 48 kHz.

NOTE: The delay time of the input source must not exceed 200 ms if the sample rate is
192 kHz.Sampling Width:Set up sampling width in the dropdown menu in the range of 16 ... 24 bit depending on the
chosen audio format.Bit rate:Set up bit rate in the dropdown menu depending on the chosen audio format.Ancillary data:To add the ancillary serial data to the stream, activate the function "Ancillary Data" by
selecting "ON" in the virtual switch "Activation".GPIO:For GPIO switch between encoder and decoder activate the function "GPIO Tunneling" by
selecting "ON" in the virtual switch "Activation" (for more information see section 0 "GPIO
Tunneling" on page 91).

Profile settings			×
Name:	1		
Encoder Format:		MPEG Layer2	~
Audio Mode:		Stereo	~
Sampling Rate (Hz):		48000	~
Sampling Width (Bit):			
Bitrate (kbit/s):		256	~
Ancillary Data			
Ancillary Data:			ON O
GPIO Tunneling:			ON O
Save Cancel			

Figure 23: Codec profile settings

4. Save the changes after each configuration by clicking "Save".

12.2. Assign Input Source/Codec Profile

The IP-4c is equipped with 8 parallel encoders that can operate at the same time. One input can be source for several encoders.

- ✓ You have already configured the presets for input sources (see section 11 "Preset Input Sources" on page 28) and codec profiles (see section 12.1 "Preset Codec Profiles" on page 40).
- ✓ If you have not preset input sources, the default input source is the [XLR] interface.



NOTE: The current version of the IP-4c is equipped with 2 analog and 4 digital input sources. The corresponding rights must be available (see section 19.3 "Set up Rights" on page 103).

If 3 or 4 channels are activated (Rights), no analog option is available.



NOTE: The IP-4c 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 (see section 12.3 "Set up Encoder Outputs" on page 43).

To activate und to configure the encoder:

1. Select **Codec Settings→Codec** in the web interface menu and open tab "Encoder":

2 w com [.]	IP-4c Name: Location: Description:	Power Warning
Information Overview	Codec	
Codec Settings Codec Switch Criteria	Input Sources / Profiles	cecast D File S XLR The Profiles The Profiles Mode SR SW BR Ancillary GPIO
Interface Settings Audio XLR Headphone DTE	Backup 1 G.711 MPEG Layer 3 - 256kbit MPEG Layer 3	Mono (L) 8000 16 64k Edit •- Stereo 48000 16 256k Edit •
GPI GPO Network Settings TCP/IP	Encoder Decoder Source/Profile Assignment Input Source Profile	Input Source Profile
SNMP NTP AolP Settings	1: Andia Input 1 Andilary Data: None	5: Ø None
SIP Phonebook Easy 2 Connect SIP SAP PTP	2: Ø None G.7fl 6.7fl 6.	6: Ø None G.711 G.713 J.600Ht
RTSP Livewire System Settings	4: Ø None Gitter (1) 6/11, 6000Hz (2) 64K, Mono (1)	8: Ø None G.711 6.711 8000Hz Gik, Mono (1)
Global Time User Alarm	Save Encoder Outputs	
Status Device DTE Data Storage	SCT & Icecast Server J Hie Not	yet available
Remote Control Log Log		

Figure 24: Encoder Configuration

2. In the "Source/Profile Assignment" block assign a preconfigured "Input Source" in the dropdown menu or drag and drop the "Input Source" from the "Input Sources" block to each Encoder 1-8.

NOTE: The source for each Encoder 1-8 can be any "Input Source". You can assign the **same** audio input to several encoders (also for option **Stream4Sure**).



NOTE: Input failure can be signaled by sending alarm via SNMP, LED or switching GPO (Relay). To set up alarm control for the inputs see section 14.2 "Set up Monitoring for Audio Inputs" on page 73.

For example, Encoder 1 **and** Encoder 2 can process an audio signal from audio input 1 (interface [D IN 1/A-L IN 1-2], see section 9.2).

- 3. Assign a preconfigured "Codec Profile" in the dropdown menu or drag and drop the "Profile" from the "Profiles" tab (see Figure 22) to each Encoder 1-8.
- 4. Click the "Save" button to save the changes.

12.3. Set up Encoder Outputs

The following outputs for encoder are available in the IP-4c:

- [Data 1-2]
 - TS Multiplexer
 - Elementary Streams
 - o SRT
 - o Icecast Source Client
 - Icecast Server (not yet available)
 - File (not yet available)

You can configure and activate several output streams for each encoder in the web interface under **Codec Settings→Codec** in the "Encoder Outputs" block (see Figure 25 "Encoder Outputs Configuration" on page 43).

For TS Multiplexer outputs configuration see menu **Codec Settings→TS Multiplexer** (section 12.3.1).

	IP-4c	Name: Ra	alfs Testdevice		Power	Warning	Live Source:	NDR 2 SH www.ndr.de/	
2wcom'		Location: Description:			Input	Output		att	
Information Overview	Codec								
Codec Settings	Input Source	ces / Profiles			_	-			
Codec	DV3 TS/IP	Elementary Streams	SIRT	SIP 🆓 I	cecast	File 💽 XLR			Profiles
Switch Criteria	Name	Address	Inte	rface Protocol	Delay	FEC ports	Backup Address	Backup If.	
	Default	@:5004	Data	a 1 RTP	100				Edit + -
Interface Settings Audio XLR	Default 2	@:5004	Data	a 2 RTP	100				Edit + -
Headphone	Demux Conf	igurations							
DTE	TS Source	Name	Mode Sen	vice/PID Cod	ec.	Buffer	AudioSync Ancillar	v Priv PID Priv Dest	
GPI	IP/Default	Hunte	Manual PID	101 Aut		100	Buflevel		Fdit + -
GPO	IP/Default 2		Manual PID	101 Aut	-	100	Buflevel		Edit +
Network Settings	in Delaute 2		Walldar Pib		5	100	burcever		
TCP/IP									
SNMP	Encoder	Decoder							
EMBER+									
NIP	Source/Pro	file Assignment							
AoIP Settings		Input Source	P	rofile		Input	Source	Profi	e
SIP Phonebook	a suite		MP3		1			Profile 1	
Easy2Connect	1: Audio I	Data: None	 MPEG Layer3, 480 160k, Stereo 	00Hz	• 3:	Ø None	~	MP2 MPEG Layer2, 48000H 256k, Stereo	2 *
SIP									
РТР	2: Ø Nana		Profile 1	0011-	. A.	(A Mana	~	Profile 1	· · · · ·
Livewire	2. D None		256k, Stereo	0012] "	20 None		256k, Stereo	2
Live Listening									
0 0	Save								
System Settings	Encoder O	itnuts							
Time									
User			Trecast Source client	TCecast Server		e			
Alarm	Active	Enc Name	D	omain name / IP			Port Interface	e Delay FEC	
									+ -
Status									
DTE Data									
Storage									
Log									

Figure 25: Encoder Outputs Configuration

- 1. Click \oplus to create a new configuration preset for an encoder output.
- 2. Click \ominus to delete a configuration preset.
- 3. Click "Edit" to set up the new preset.
- 4. Save the changes after each configuration by clicking "Save".

NOTE: The same encoder can be assigned to several audio outputs.

12.3.1. Output TS Multiplexer

IP-4c is able to output up to 8 multiplexed streams over IP and optionally over ASI output at the same time. One multiplexed stream can contain up to 16 programs and to each program you can add up to 16 payload contents. You can use both IP interfaces Data 1 and Data 2 outputs for the same stream content and the same destination as a redundancy or send different stream contents to the same or different destinations.

- ✓ You have already defined and preconfigured input sources (see section 11 "Preset Input Sources" on page 28).
- ✓ You have already assigned preconfigured input sources and the coder profiles to the encoder presets (see section 12.2 "Assign Input Source/Codec Profile" on page 41).

12.3.1.1. Multiplexer Configuration

To each multiplexer output stream 1-8 you can assign several configured encoder profiles and one of the Ethernet outputs Data 1 or Data 2 or ASI Output.

To configure and to activate multiplexer output streams 1-8, follow the steps below:

1. Select **Codec Settings→TS Multiplexer** in the web interface menu of the IP-4c. The page *TS Multiplexer* appears (see Figure 26):

2w com [.]	IP-4C Name: Location: Descriptic	Ralfs Testdevice	 Power Warning Input Output 	Live Source: KNDR 2 SH www.ndr.defIndr2_sh.m3u ~
Information Overview	TS Multiplexer			
Codec Settings Codec	Payload sources			
TS Multiplexer	Enc Input Source	Source Description	Profile Name	Profile Description
Switch Criteria	1 💽 Audio Input 1	Ancillary Data: None	MP3	MPEG Layer3, 48000Hz - 160k, Stereo
Interface Settings	2 D/3 Default	@:5004 - PID 101	Profile #1	AAC-ELD, 32000Hz - 20k, Mono (Downmix)
Audio XLR Headphone	3 Default 2	@:5004 - PID 101	Profile #1	AAC-ELD, 32000Hz - 20k, Mono (Downmix)
DTE GPI GPO	4 👹 NDR 2 SH	www.ndr.de//ndr2_sh.m3u	Profile #1	AAC-ELD, 32000Hz - 20k, Mono (Downmix)
Network Settings	•			
TCP/IP SNMP EMBER+		Click on the "+	" tab to create a Multiplex	
NTP				

Figure 26: Available encoder presets for TS Multiplexer

- 2. In the "Payload sources" block (green frame in Figure 26) you can see available encoder presets in the "Encoder Audio" tab and available DTE Input Sources for private data in the "Data" tab (red frame in Figure 27).
- 3. To create a new configuration for Multiplex 1, click the "+" tab below the "Payload sources" block (red frame in Figure 26). A new tab "Multiplex 1" with TS settings appears.

NOTE: You can add and configure up to 8 Multiplex streams (see blue frame in Figure 27).

- 4. Add new service to the TS payload content by clicking the "Add Service" button in the "TS Payload content".
- 5. To add encoder audio to the stream, select available encoder presets configured in section 12.2 in the "Payload" dropdown menu or drag and drop the corresponding encoder preset from the "Encoder audio" tab (see green frame in Figure 27).
- 6. To add a further payload to the content, click the "Add Payload" button.

- 7. To add private data to the stream, select available DTE input source in the "Payload" dropdown menu or drag and drop the corresponding DTE input source from the "Data" tab (see red frame in Figure 27 and green frame in Figure 28).
- 8. Complete the payload configuration by specifying the Service ID, Service Name, Service Provider Name, PMT PID, PCR PID and PID for the corresponding program.
- 9. Set up general configurations for "Multiplex 1" output streams in the "General" block (see blue frame inFigure 27):

"Packetizing format" — possible options: TS/RTP and TS/UDP.

"DVB tables" — possible options: All tables, No tables, PAT/PMT and PAT/PMT/SDT

- 10. Save the changes after each configuration by clicking "Save".
- 11. Repeat instructions 1. -10. on pages 44-45 to configure the rest TS Multiplexer 2-8.

Information Overview	TS Multiplexer
Codec Settings Codec TS Multiplexer Switch Criteria	Payload sources Input Source DTE 1
Audio XLR Headphone DTE	DTE 2 DTE 3 DTE 4
GPO Network Settings	Multiplex 1 × Multiplex 2 × +
TCP/IP SNMP EMBER+ NTP	Packetizing format: TS/RTP Network ID: 1 DVB tables: All tables Original Network ID: 1
AoIP Settings SIP Phonebook Easy2Connect	Auto-calculate required TS bit rate: ON Transport Stream ID: 200 Audio bitrate priority: Low latency v Network name: Private date mode: ES v
SIP SAP External Clock Livewire	TS Payload content Service ID Service Name Service Provider Name PMT PID PCR PID Payload PID
Live Listening System Settings Global	1000 Program 1 100 101 Enc 2 ', from MM08E 101 - - DTE 1 102 - Add Payload - - <
lime User Alarm	2000 Program 2 200 201 Enc 1 ; Audiophile test file 201 - DTE 3 202 - Add Payload
Status Device DTE Data Storage	3000 Program 3 300 301 Enc 7 ; from MM08E 301 - Add Payload Add Payload - - - -
Log User: admin	Add Service Save

Figure 27: Multiplexer payload configuration – encoder audio and private data

Information Overview	TS Multiplexer
Codec Settings Codec TS Multiplexer	Payload sources
Switch Criteria	Input Source
	DTE 1
Interface Settings Audio XLR Headphone DTE GPI GPO	DTE 2 DTE 3 DTE 4
GPO	
Network Settings	Multiplex 1 × Multiplex 2 × +
SNMP	General
EMBER+	Packeting material TS/RTP v Network ID: 1
NTP	
	DVB tables: All tables V Original Network ID:
AoIP Settings	Auto-calculate required TS bit rate: ON Transport Stream ID: 100
SIP Phonebook	Audio bitrate priority: Low latency V Network name:
Easy2Connect	
SIP	Private date mode:
SAP	
External Clock	TS Payload content
Livewire	
Live Listening	service iu service name service provider name print PID PCR PID Payload PID
	1000 Program 1 100 101 🗍 DTE 3 💙 101 🖵
System Settings	
Global	Add Payload
Time	
User	Add service
Alarm	

Figure 28: Drag and drop payload sources to the TS payload content

12.3.1.2. TS Multiplexer Output over IP

The IP-4c can output Transport Stream over two IP interfaces [Data 1/2] and optionally over BNC interface [ASI OUT].

For each TS Multiplex 1-8 you can preset several output destinations for IP and ASI streams in the web interface of the IP-4c under **Codec Settings→TS Multiplexer** in the "Multiplexer Outputs" block (see *Figure 29*).

Information Codec TS Multiplexer Switch Criteria Interface Settings Network Settings AolP Settings Status Multiplex 1 × Multiplex 2 × Year Status Network ID: User: admin Logout Support Weater Support Weater Evaluation TS Payload content Evaluation Support Weater Support Weater TS Payload content Evaluation Support TS Payload content Evaluation Support TS Payload content Evaluation Support Support TS Payload content Evaluation Support	
Codec Settings Codec Settings TS Multiplexer Switch Circle a Interface Settings Interface Settings OFF 1 DFF 2 AolP Settings Global Time User Alarm Status Velostre priority: User admin Logout Support Velostre ate mode: Es v Payload content Estings format: DT Payload content Estings of the family home of the family ho	
Interface Settings Network Settings AoIP Settings OTE 1 DTE 2 AoIP Settings OTE 3 OTE 4 System Settings Global Time User Alarm Status Version DTe in the priority: Logout Support Vebsite E-Mail	
Network Settings DTE 2 AolP Settings DTE 3 System Settings DTE 4 Slobal Time User Multiplex 1 × Multiplex 2 × + General General Status Packetizing format: DVB tables: All tables Oviginal Network ID: 1 DVB tables: All tables Oviginal Network ID: 1 DVB tables: All tables Original Network ID: 1 DvB tables: Auto-calculate required TS bit rate: Own Transport Stream ID: 100 Vebsite ES E-Mail Foreign ID: ES TS Payload content Es E-Mail Foreign ID: Es	
AoIP Settings System Settings Global Time User Alarm General Status Packetizing format: DVB tables: All tables Original Network ID: 1 DVB tables: Auto-calculate required TS bit rate: Original Network ID: 1 User: admin Logout Support Website E-Mail	
System Settings Global Time Multiplex 1 × Multiplex 2 × + User Alarm General Status Packetizing format: TS/RTP × Network ID: 1 User: admin Auto-calculate required TS bit rate: Original Network ID: 1 Logout Auto-calculate required TS bit rate: Original Network ID: 1 Support Audio bitrate priority: Low latency × Network name: Image: Content Vebsite Ession TS Payload content Ession Image: Content Image: Conten	
Time User Alarm General Status Packetizing format: DVB tables: All tables Original Network ID: 1 DVB tables: Auto-calculate required TS bit rate: Concord User: admin Logout Auto-calculate required TS bit rate: One Transport Stream ID: Private date mode: Essive	
Oser General Status Packetizing format: User: admin DVB tables: Auto-calculate required TS bit rate: on User: admin Auto-calculate required TS bit rate: Audio bitrate priority: Low latency Private date mode: ES	
Status Packetizing format: TS/RTP Network ID: 1 User: admin DVB tables: All tables Original Network ID: 1 Logout Auto-calculate required TS bit rate: ON Transport Stream ID: 100 Logout Audio bitrate priority: Low latency Network name: Image: Content Support Website ES Image: Content ES Image: Content F-Mail E-Mail Enviro Ib. Service Name ENVER ND. PER ND. Profeed D. Private of the provide Name Image: Content	
User: admin Auto-calculate required TS bit rate: ON Transport Stream ID: 100 Logout Audio bitrate priority: Low latency Network name: Image: Comparison of the comparison	
Support TS Payload content Website E-Mail E-Mail Service Name	
E-Mail Service Descrice Name Service Previder Name DMT DID DCP DID Davlaget	
Service name Service name PMT PD PCR PD Payload PI	
2000 Program 2 200 201 C1 ¦ Audio Input 1 20	
Add Payload	
3000 Program 3 300 301 🕢 😥 Enc 2 ¦ Audio Input 2 🗸 🗸 30	$\Box \Theta$
Add Payload	
Add Service	
Save	
Multiplexer Outputs	
TS/IP C TS/SRT	
Active Name Domain name / IP Port Interface Delay FEC 1 ON TS Mux 1 229.1.1.1 5004 Data 1 Ec	

Figure 29: Presets for multiplexer outputs

For each TS Multiplex 1-8 you can create and save up to 32 destination streams for all TS outputs over IP and also activate an ASI output (optional):

Output Stream	Description	Output Interface
TS/IP	TS/IP – Transport stream over IP using UDP/RTP, Unicast/Multicast (optional: "TS Encoder" right)	[Data 1/Data 2]
TS/SRT	TS/SRT – Transport stream over IP using SRT (Secure Reliable Transport) (optional: "TS Encoder" and "SRT Encoder" rights)	[Data 1/Data 2]
ASI Output	Transport stream over ASI Output (optional)	[ASI OUT]

Possible streams for IP outputs are TS/IP and TS/SRT. Configure multiplex 1-8 outputs for TS over IP interfaces under Codec Settings→TS Multiplexer as follows:

- 1. To configure TS/IP or TS/SRT outputs for the corresponding Multiplexer, open the "TS/IP" or "TS/SRT" tab in the "Multiplexer Outputs" block (see red frame in Figure 29).
- Click the ⊕ icon, to create a new TS/IP or TS/SRT destination stream for Multiplexer 1-8 (see red frame in Figure 29).

NOTE: You can enable and configure up to 32 destinations.

- 3. Click \ominus to delete a destination stream for a multiplex output.
- 4. Click "Edit" to set up a new destination stream.
- 5. Enter the following data in the fields of the configuration of one **TS/IP** destination in the "Edit" menu of the "TS/IP" tab (see Figure 30):

. ⊗ 2wcom	IP-4C Name: Ralfs IP-4C Testdevice Location: Fehmarn Description:	Power B Warning Live Source: R Audio Output 3 Input Output	
Information ~ Codec Settings ^ Codec ~ TS Multiplexer ~ Switch Criteria ~ Interface Settings ~ Network Settings ~ AoIP Settings ~ Global Time User ~	TS Multiplexer Payload sources C Encoder audio Dtta Input Source DTE 1 DTE 2 DTE 3 DTE 4 Multiplex 1* Multiplex 2*	IP transport stream output settings X Activation: OT Name: TS Mux 1 Domain Name / IP: 229.1.1 Port: 5004 Multicast TTL: 64 IP interface: Data 1 ~ Mode: RTP ~ Send Delay [ms]: 0 Pro-MPEG FEC: OT FEC Mode (Row x Col): 1 x 4 ~	
Alarm Status ~ User: admin Logout Support Website E-Mail	General Packetizing format: T5/RTP DVB tables: Auto-calculate required TS bit rate: Audio bitrate priority: Low latency Private date mode: ES TS Payload content Service ID Service Name Service Provider Name 2000 Program 2	FEC column (L) port offset (0 if unused): 2 FEC row (D) port offset (0 if unused): 4 Dual streaming: Or Dual streaming Or Domain Name / IP:	
	SUC SUC Multiplexer Outputs Multiplexer Outputs Active Name 1 CONTS 135 Max 1	Add Payload Add Payload Add Payload Add Service	

Figure 30: Edit output TS/IP

Activation: Activate this output stream by selecting "ON" in the virtual switch.

Name: Enter the name of the stream for better reference.

Domain Name/IP:	Define the IP for a destination.
Port:	Specify the port number of the destination.
Multicast TTL	TTL (Time to Live) for multicast packets
IP interface:	Select the interface for the output: Data 1/2.
Mode:	Select mode of the output stream in the dropdown menu: RTP or UDP. NOTE that besides the RTP also the RTCP packets are generated for the encoder output and are sent in 5 second intervals. RTP allows reordering packets by means of sequence numbers.
Send Delay:	Set up the send delay time in <i>ms</i> , which the encoder should wait in order to send Audio over IP as an offset stream for redundancy.
Pro-MPEG FEC:	Enable "Forward Error Correction" by selecting "ON" in the virtual switch ((for more information see section 12.5 "Set up FEC for Encoder" on page 56). NOTE : Activate Pro-MPEG FEC in the corresponding decoder.
Dual streaming:	Enable by selecting "ON" in the virtual switch. The configuration menu will be extended to "Dual streaming" menu. Set up connection for dual streaming.
	Configure the IP parameters for Dualstreaming. For the Ethernet input you can set up the same or different sources Data 1/2.
	NOTE : Activate Dual streaming in the corresponding decoder.
NOTE: 1	Fo configure the IP outputs Data 1/2 open the menu Network Settings→TCP/IP and see



Activation:	Activate this output stream by selecting "ON" in the virtual switch.
Name:	Enter the name of the stream for better reference.
Mode	You can use SRT in listener and caller mode
Host	Enter the host domain of the SRT destination.
Auto-configure source port:	Activate automatic configuration of the source port by selecting "ON". If deactivated: enter the port number manually (relevant for e.g. Firewall).
Destination Port:	Specify the port number of the destination.
IP interface:	Select the interface for the output: Data 1/2.

section 10.1.

2w com [.] ⊗	IP-4C Name: Location Descrip	Ralfs IP-4c Testdevice x: Fehmarn Ison:	Power	Warning Live So Output	urce: 🕢 Audio Outpu	t3	>
Information ~	TS Multiplexer		CDT				7
Codec Settings	Deuland courses		SKI transpo	ort stream output se	ettings	X	
Codec TS Multiplexer	Payload sources		Activation:				
Switch Criteria			Name:		SRT	Caller	
Interface Settings 🛛 👻	DTE 1		Host:				
Network Settings 🛛 👻	DTE 2		Auto-configure so	ource port:			
AoIP Settings v	DTE 3		Destination port:	:		8000	
Sustam Sattings	DTE 4		IP interface:			Data 1 🗸 🗸	
Global			Latency:			120	
Time User	Multiplex 1× Mult	iplex 2 × +	Encyrption:			AES-128	
Alarm	General		Passphrase (min.	. 10 chars):	passphrase	AES-128	
Status ~	Packetizing format:	TS/RTP	~			AES-192	
	DVB tables:	All tables	Save Car	ncel		AES-256	H
User: admin	Auto-calculate required TS bit i	ate:	<u>هم</u> ۱	Transport Stream ID:		100	
Logout	Audio bitrate priority:	Low latency	<u> </u>	Network name:			
	Private date mode:	ES					
Support Website	TS Payload content						
E-Mail	Service ID Service Name	Service Provider Name	PMT PID PCR PID	Payload		PID	
	1000 Program 1		100 101		/t 2	✓ 101	Ξ
					Add Payload		
			Add Service				
	Save						
	Multiplexer Outputs						
	TS/IP DG TS/SRT						
	Active Name	Mode	Host	SrcPort Port	Interface Latency Er	cryption	
	1 OR SRT	Caller		8000	Data 1 120ms	Edit	Θ

Figure 31: Edit output TS/SRT

Latency:	Define the time interval for the latency (milliseconds) before the IP-4c starts to output the SRT stream.
Use Encryption:	For the SRT TS output you can use 128 bit, 192 bit or 256 bit AES (Advanced Encryption Standard) end-to-end 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.
	For this purpose activate the radio button "ON" and enter an encryption key in the "Passphrase" field (min 10 characters).
	Note: The same encryption key should be set for this input TS in the corresponding decoder.
Send Delay:	Set up the send delay time in <i>ms,</i> which the encoder should wait in order to send Audio over IP as an offset stream for redundancy.



NOTE: To configure the IP outputs Data 1/2 open **Network Settings** \rightarrow **TCP/IP** and see section 10.1.

7. Click the "Save" button to save the changes or "Cancel" to restore the last settings.

12.3.1.3. TS Multiplexer Output over ASI (optional)

If available, you can use ASI output for each multiplexed stream Multiplex 1-8 for the same stream content and the same destination as a redundancy or send different stream contents to the same or different destinations.

Set up ASI output for TS Multiplex 1-8 under **Codec Settings→TS Multiplexer** as follows:

1. To configure ASI output for the corresponding Multiplexer, open the "ASI Output" tab in the "Multiplexer Outputs" block (see red frame in Figure 32).

	Multiplex 1 × Multiplex 2 × +	
User: admin Logout	General	
Support Website E-Mail	Packetizing format: TS/UDP Network ID: DVB tables: All tables Original Network ID: Auto-calculate required TS bit rate: ov Transport Stream ID: Audio bitrate priority: Low bitrate overhead Network name: Private date mode: ES V	1 1 101
	TS Payload content	
	Service ID Service Name Service Provider Name PMT PID PCR PID Payload	PID
	1000 Program 1 100 101 Ø None Add Payload	v 101 -
	Add Service	
	Save	
	Multiplexer Outputs	
	TS/IP ASI Output	
	Active Multiplex output Configuration ON Multiplex 1 Configure the ASI output signal under Interface Settings->ASI Output	

Figure 32: Activate ASI output for a TS Multiplex

- 2. Activate the ASI output stream by selecting "ON" in the virtual switch or under Interface Settings -> ASI Output
- Assign the corresponding ASI output to a TS Multiplex 1-8 under Interface Settings→ASI Output (see Figure 76: ASI Output Settings on page 92).
 For more information, see section 16.6 "ASI Output" on page 92.
 - ⇒ Activation of the virtual switch "Active" under Codec Settings→TS Multiplexer or "Output enabled" under Interface Settings→ASI Output makes the changes immediately valid. No "save the changes" confirmation is necessary.

12.3.2. Output Elementary Streams

For the output "Elementary Streams" you can predefine up to 64 output streams (destinations) over [Data 1/2] interfaces.

Each "Elementary Stream" output can be assigned to one preconfigured Encoder 1-8 (see 12.2 "Assign Input Source/Codec Profile" on page 41) and to Ethernet outputs Data 1 or Data 2.

To set up output for "Elementary Streams" and destinations under **Codec Settings→Codec** in the block "Encoder Outputs" (tab "Elementary Streams") make the following configurations:

- 1. Create and edit a new preset for encoder output "Elementary stream" as described on page 43 (see Figure 25 "Encoder Outputs Configuration" on page 43).
- 2. Enter the following data in the fields of the configuration of the output source "Elementary stream" in the "Edit" menu (see Figure 33):

Elementary stream output setting	5		×
Activation:			on 🔵
Encoder:		Encoder 1	~
Name:			
Domain Name / IP:			
Port:		5004	
IP interface:		Data 1	~
Mode:		RTP	~
Send Delay [ms]:		0	
Pro-MPEG FEC:			ON 🔵
FEC Mode (Row x Col):		1 x 4	~
FEC column (L) port offset (0 if unused):		2	
FEC row (D) port offset (0 if unused):		4	
Dualstreaming:			ON 🔵
DualStreaming			
Domain Name / IP:			
Port:		5004	
IP interface:		Data 2	~
Send Delay [ms]:		0	
Save Cancel			

Figure 33: Encoder output settings – Elementary stream

Activation:	Activate this output stream by selecting "ON" in the virtual switch.
Encoder:	Select a configured Encoder 1-8 preset for the output stream in the dropdown menu (for configuration see section 12.2 "Assign Input Source/Codec Profile" on page 41).
Name:	Enter the name of the stream for better reference.
Domain Name/IP:	Define the IP for a destination.
Port:	Specify the port number of the destination.
IP interface:	Select the interface for the output: Data 1/2.
VLAN:	Select a configured VLAN ID. Use value "zero", if the VLAN connection should be disabled.
Mode:	Select mode of the output stream in the dropdown menu: RTP or UDP.

	NOTE that besides the UDP/RTP also the RTCP packets are generated for the encoder output and are sent in 5 second intervals. UDP/RTP allows reordering packets by means of sequence numbers.
Send Delay:	Set up the send delay time in <i>ms</i> , which the encoder should wait in order to send Audio over IP as an offset stream for redundancy (for more information see section 18 "Buffer Delay Management" on page 100).
Pro-MPEG FEC:	Enable "Forward Error Correction" by selecting "ON" in the virtual switch (see section 13.2 "Set up FEC for Decoder" on page 65).
Dual streaming:	Enable by selecting "ON" in the virtual switch (see section 13.3). The configuration menu will be extended to "Dual streaming" menu. Set up connection for dual streaming.

3. Save the changes after each configuration by clicking "Save".

12.3.3. Output SRT

For the output of the streams over "SRT" (Secure Reliable Transport) you can predefine up to 32 streams (destinations) for [Data 1/2] interfaces.

Each SRT stream can be assigned to one preconfigured Encoder 1-8 (see section 12.2 "Assign Input Source/Codec Profile" on page 39) and to Ethernet outputs Data 1 or Data 2.

To set up output for "SRT" streaming under **Codec Settings→Codec** in the block "Encoder Outputs" (tab "SRT") make the following configurations:

- 1. Create and edit a new preset for encoder output "SRT" as described on page 41 (see Figure 23 "Encoder Outputs Configuration" on page 40).
- 2. Enter the following data in the fields of the configuration of the output source "SRT" in the "Edit" menu (see Figure 26):

SRT output settings			×
Activation:			
Encoder:		Encoder 1	~
Name:	SRT		
Mode:		Caller	~
Host:			
Port:		8000	
IP interface:		Data 1	~
Latency:		120	
Use Encryption:		(ON O
Encyrption:		AES-128	~
Passphrase:			
Save Cancel			

Figure 34: Encoder output settings – SRT

Activation:	Activate this output stream by selecting "ON" in the virtual switch.
Encoder:	Select a configured Encoder 1-8 preset for the output stream in the dropdown menu (for configuration see section 12.2 "Assign Input Source/Codec Profile" on page 41).
Name:	Enter the name of the stream for better reference.
Mode:	Select "Caller" or "Listener" mode.
Host:	Enter the host domain of the SRT destination.
Auto-configure source port:	Activate automatic configuration of the source port by selecting "ON". If deactivated: enter the port number manually (relevant for e.g. Firewall).
Destination Port:	Specify the port number of the destination.
IP interface:	Select the interface for the output: Data 1/2.
Latency:	Define the time interval for the latency (milliseconds) before the IP-4c starts to output the SRT stream.
Use Encryption:	To protect your content from contribution to distribution activate end-to-end encryption by switching "ON".
Encryption:	Available options: 128/192/256 bit AES (Advanced Encryption Standard).
	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.
	For example, for AES-128 encryption you must enter a 16-character passphrase etc.

3. Save the changes after each configuration by clicking "Save".

12.3.4. Output Icecast Source Client

It the output stream should be sent to an Icecast server, activate and set up an output "Icecast source client" for a selected encoder under **Codec Settings**->Codec in the block "Encoder Outputs" (tab "Icecast source client settings"):

2wcom	IP-4c Name: Location: Description:		wer 🌒 Warning put 🛑 Output	Live Source: 😨 Audio Output 1 🔹 👻
Information				
	Codec	Icecast source client settings		×
Codec Settings Codec	Input Sources / Profiles	Activation: Encoder:	Enc	coder 1
	Name Address	Name: Domain Name / IP:	Enc	coder 1 er Ancillary Clock coder 2 teternal fdt + -
Interface Settings Audio XLR		Port: IP interface:	Enc	coder 3 coder 4
	Encoder Decoder Source/Profile Assignment	Mountpoint: User:	source Enc	coder 5 coder 6 coder 7
Network Settings	1: Input Source	Save Cancel	Enc	coder 8 Profile
	2: FM2 6 5000	TS AAC-1.C, 40000Hr AAC 964, Starro	6: FM6 # 5064 FM6	• 15 16.400004 ALC 500, Barroo
AoIP Settings SIP Phonebook Easy2Connect SIP	3: 05014	AC 16, 4000Ht	7: 0.10 FM7 0.5074 FM7	* 15 14C 1400094s 500, Startes
	4: 5504	55 15 AAC-LC, 40000Hz	8: 0:504 FM8 FM8	• R 15 AAG 958, Steves
	Save			
System Settings Global Time	Encoder Outputs	Icecast Source Client 🐞 Icecast Server 🗜) the	
	Active Enc Name	Domain name / IP	Port Interface	Mountpoint User
Status			8000 Data 1	source (cdit) (+) (-)

Figure 35: Encoder output settings - Icecast source client settings

12.3.5. Output Icecast

Not yet available

12.3.6. Output Internal Storage

Not yet available

12.4. Set up Encoder Input Level

For analog and digital input source you can set up the audio type and the input gain. Follow the steps below:

1. Select Interface Settings→Audio XLR (see Figure 36):

2w com [.]	IP-4C Name: Location: Description:	• •	Power Warning Input Output	
Information Overview	Audio			
Codec Settings Codec Switch Criteria	Audio Input Audio 1 Audio Type:	Digital	Audio Output Audio 1 Audio Type: Digital	v
Interface Settings Audio XLR Headphone DTE GPI GPO	Analog Gain [-9.0 6.0]: Digital Gain [-9.0 6.0]: SRC Bypass	0.0 dB 0.0 dB	Analog Gain [-9.0 6.0]: Digital Gain [-9.0 6.0]: SRC Bypass AES/EBU Mute (when no input source is available)	0.0 dB 0.0 dB Off
Network Settings TCP/IP SNMP EMBER+ NTP	Audio 2 Audio Type: Analog Gain [-9.0 6.0]: Digital Gain [-9.0 6.0]: SRC Bypass	Analog 0.0 dB 0.0 dB 00#	Audio 2 Audio Type: Digital Analog Gain [-9.0 6.0]:	• 0.0 dB 0.0 dB
AoIP Settings SIP Phonebook Easy2Connect SIP SAP PTP Livewire	Save		AES/EBU Mute (when no input source is available)	OFF

Figure 36: Audio input settings

- 2. Configure the audio/analog gain for each audio input in the "Audio 1-2" or "Audio 1-4" block:
 - Type of the audio input: Analog or Digital (if available)
 - Gain Analog/Digital: -9.0 dB 6.0 dB

NOTE: If you activate 3-4 channels, no analog audio input option is available

- 3. Enable "SRC Bypass" by activating the virtual switch "ON" if this mode should be enabled (more about "SRC Bypass" see section 16.1 "Audio XLR" on page 84).
- 4. Click the "Save" button to save the settings.
 - ⇒ The current level of the input gain is displayed on the display of the unit and in the user web interface under Information→Overview in the field "Audio Levels" (see Figure 41).

12.5. Set up FEC for Encoder

The IP-4c coder implements Pro MPEG FEC (Practice #3 release 2) to reduce packet loss and burst errors in the outcoming IP data stream.

You can activate and configure the Pro MPEG Forward Error Correction for "TS/IP" and "Elementary Stream" output stream.

For more information about Pro-MPEG FEC configuration in the encoder outputs see section 12.3.1.2 "TS Multiplexer Output over IP" on page 46 and section 12.3.2 "Output Elementary Stream" on page 51).

To configure the Pro MPEG FEC for encoder inputs, follow the steps below:

1. Activate the Pro MPEG Forward Error Correction by selecting the checkbox "Pro-MPEG FEC Enable". The current menu window will be extended:

RTP Elementary stream settings		×
Name:	Radio 1	
IP type:		Multicast 🗸
Multicast IP:		235.21.50.1
Port:		2004
IP interface:		Data 1 🗸 🗸
VLAN:		101 🗸
Packet reorder/dejitter delay [ms]:		200
Pro-MPEG FEC:		ON O
FEC column (L) port offset (0 if unused):		2
FEC row (D) port offset (0 if unused):		4
Dual streaming:		OFF
Codec		
Decoder type:		Automatic 🗸
Buffer [ms]:		200
Ancillary Data (Decoder only)		
Data destination:		DTE 🗸
GPIO Tunneling:		OFF
Save Cancel		

Figure 37: Pro-MPEG FEC configuration for input streams

2. You can set up the following FEC parameters for the IP output: FEC mode, FEC column (L) port offset and FEC row (D) port offset.

NOTE: Configure the FEC mode depending on the sample rate and the acceptable value for delay. For more information about the delay values see section 13 "Buffer Delay Management" on page 47.

- 3. Enter zero for the *FEC column/row port offset*, if it is unused, or enter the OFFSET to the main destination port, where 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).
- 4. Click the "Save" button to save the changes.
 - ⇒ Under Information→Overview you can call up the status of the FEC in the Encoder Details block (recovered/unrecovered IP packets, see Figure 38 on page 58 and Figure 39-Figure 40 on page 59).

12.6. View the Encoder Status

You can call up the current status of the encoder and of the incoming audio data at any time on the web interface page or in the LCD menu of the device.

- 1. Under Information→Overview you can see the configured inputs and codec profiles for all Encoders 1-8 in the "Encoder" field (see Figure 38, red frame).
- To see more details about the encoder status, select one encoder (e.g. "Encoder 1" in Figure 38, green frame) and the parameters of the currently encoding signal in the selected Encoder will be displayed in the field below ("Details-Encoder 1" in Figure 39, green frame).





- of -9 dBFS for digital interface

- of +9 dBu for analog interface

Green color – The level meter is under the recommended maximum

- 3. In the "Details" view of the selected Encoder you can see the status of the input source, codec profile and of the assigned audio outputs.
- 4. The following Abbreviations are used for the coder parameters:
 - SR Sampling Rate
 - SW Sampling Width
 - FEC Forward Error Correction
- 5. To reset the counters in the status fields, click the "Reset Counters" button.
- Details of the assigned outputs are displayed in the last table in Figure 39 (blue frame). To select the view of an assigned output, click to the corresponding tab.

Details - Encoder 1								Reset Counters
Source	Audio							
Name Audio Input 1 Ancillary Data: DTE	PCM -70 -60 Type SR PCM 48000	-30 -40 -30 -20 Bitrate Mode SV 1.536M stereo 10	-40 0 -9 -40 0 -12 N 5	9.0 dBFS 2.0 dBFS				
Elementary Streams								Reset Table Layout
No - Name - Domain	/ IP 🔺 Port	≜ Eth ≜ Delay	← FEC ←	Bitrate	Packets/s	 Max size 	Jitter 🔺 Roundtrip ti	me 🔺 Fraction Lost
1 Multicast Stream 1 224.1.1.1	1 11000 2 11000	Data 1 Data 2	4x4	1.644M 1.644M	250 250	792 792		
•				1	11			4

Figure 39: Overview – Status Details of the selected Encoder 1

- 7. You can change the sequence and the width of the columns in the table with the outputs.
 - To change the sequence, drag and drop the corresponding column by pointing with cursor to the header. To change the width, move the corresponding frame line.



- 8. To restore the table view, click the "Reset Table Layout" button.
- 9. If the right "TS Multiplexer" is activated, you can see the status of the enabled Multiplex outputs in the "DVB TS Multiplexer" tab under Information→Overview (see Figure 40).
- 10. To see more details about the configured programs in one Multiplex, select the corresponding Multiplex (e.g. "Multiplex 1" in Figure 40, blue frame #1). The menu will extend to the block "Details Multiplex 1".
- To see further details about the payload of one program, select the corresponding Program (e.g. Program 1 in Figure 40, blue frame #2). The menu will extend to the block "Details – Program 1" (see Figure 40, blue frame #3).

Codec Codec TS Mul	tiplexer	
1 Multiplex 1 Service count TS ID TS Bitrate 8 100 1.560 Mbi	Multiplex 2 No outputs	
2 Program 1 Service ID PMT PID PCR PID 1000 101 6769	PID 6769 7-0-50-50-40-30-20-30-0 -16.3 dBFS -16.4 dBFS	Q Program 2 Service ID PMT PID PCR PID PID -1.0 dBFs -1.0 dBFs -1.1 dBFs
2wcom IP-4c 3 Details - Program 1	6770 0	2wcom IP-4c
PID 6769 Audiophile test file 03-12 Guitars, 1 Double-Bass.wav	Audio Input PCM -70 -60 -50 -20 10 0 -16.3 dBFS Type SR Bitrate Mode SW -14.4 dBFS PCM 48000 1.536M stereo 16 -16.3 dBFS Audio Output -16.3 dBFS -14.4 dBFS Audio Output -16.3 dBFS -14.4 dBFS Type SR Bitrate Mode SW LC -70 -60 -50 -40 -30 -10 0 LC 48000 128k stereo 16 -14.4 dBFS	File Date 11. Nov 2019, 13:02:56 Size Position 37.33 MB 02:26 03:23
PID 6770	Raw Data Hexadecimal	ASCII DECP Data PI PS TP/TA PTV CT RT
Program 3 Service ID PMT PID PCR PID 3000 301 6771 Service Provider Name 2wcom IP-4c	PID 6771 70 -60 -50 -40 -30 -20 -10 0 -9.8 dBFS -10.1 dBFS	Program 4 Service ID PMT PID PCR PID PID 4000 401 6772 6772 70 -50 -50 -40 -30 -20 -10 -6.0 dBFS 0 Service Provider Name 2wcom IP-4c
Program 5 Service ID PMT PID PCR PID 5000 501 6773 Service Provider Name 2wcom IP-4c	PID 0.0 dBFS 6773	Program 6 Service ID PMT PID PCR PID PID 6000 601 6774 6774 70 -00 -50 -40 -30 -20 -10 -0 -5.9 dBFS 0 Service Provider Name 2wcom IP-4c

Figure 40: Overview – DVB TS Multiplexer (version with activated "TS Multiplexer" rights)

12. The current level of the inputs is displayed on the display of the unit and in the web interface under **Information→Overview** in the field "Audio Interfaces" (see Figure 41).

2w com [.]	I	P-4c	Nam Local Desc	e: ion: ription:			- (Power Input	Warning Output		
Information Overview	0\	verviev	v								
Codec Settings	A	udio Inte	rfaces Inp	outs			Out	puts		Status Uptime	0 days, 00:23:32
Switch Criteria										Last boot Temp	22. May 2019, 06:45:05 39 °C
Interface Settings Audio XLR Headphone		-10 -20 -30 -40 -50	10 - 20 - 30 - 40 - 50 -	-10 -20 -30 -40 -50	-10 -20 -30 -40 -50	10 20 30 40 50	-10 -20 -30 -40 -50	-10 -20 -30 -40 -50	- 10 - 20 - 30 - 40 - 50	LAN Ctrl	UP, 1 Gbit, Full Duplex - 192.168.102.130
DTE GPI GPO		-240.0 -240.0 dBF5	-240.0 -240.0 dBF5	-240.0 -240.0 dBFS	-240.0 -240.0 dBF5	-240.0 -240.0 dBFS	-240.0 -240.0 dBFS	-240.0 -240.0 dBF5	-240.0 -240.0 dBF5	Data 1 Data 2	DOWN - 192.168.100.109 DOWN - 192.168.19.250



Figure 41: Overview – Audio level (4 and 2 activated channels) Orange color – The level is above the recommended maximum - of -9 dBFS for digital interface - of +9 dBu for analog interface Green color – The level is under the recommended maximum

13. Under **Status→DTE Data** you can view the status of the encoder for the DTE Ancillary Data for DTE 1-4 inputs (s. Figure 42 below).

2wcom.	IP-4c	Name: Location: Description:			Pow	rer 🔍 W nt 💽 O	/arning utput		
Information Overview	DTE Ancill	ary Data							
Codec Settings Codec Switch Criteria	Input DTE 1 DTE 2 Raw Data	DTE 3 DTE 4				Output DTE 1 DTE Raw Data	2 DTE 3 DTE 4		
Interface Settings Audio XLR Headphone DTE GPI GPO	Hexadecimal			ASCII		Hexadecim	1		ASCII
Network Settings									
SNMP	UECP Data				-	UECP Data			
EMBER+	Last MECs:				_	Last MECs:			
AoIP Settings	PI:	PS:	TP/TA:	PTY:		PI:	PS:	TP/TA:	PTY:
SIP Phonebook Fasy2Connect	CT:				_	CT:			
SIP	RT:				_	RT:			
SAP					~				
PTP Livewire				Clear Data					Clear Data
Livewire									
System Settings									
Global									
User									
Alarm									
Status									
Device									
DTE Data									
Storage									
Log									

Figure 42: Status - DTE Ancillary Data

- 14. To monitor the current input audio signal over headphone, open the field **Headphone** under **Interface** Settings→Headphone (see Figure 69 on page 86). Select the audio input for monitoring in the "Source" dropdown menu.
- 15. Under **Status→Log** you can call up information about the encoder status, device operation, data distribution and errors since the last event log deleting. A list with a description of the events with the timestamps is displayed in this menu (see section 19.4 "View the Log" on page 104, Figure 92).



NOTE: Configure alarm monitoring under **System Settings** Alarm (see section 14.2). If the alarm monitoring for any parameter is deactivated, no information about the corresponding error will be shown in the log.

To invert the GPOs and see the status of the switched GPO in case of a triggered alarm, open the menu **Interface Settings** \rightarrow **GPO** and see step 4. on page 90 in section 16.4 "GPO".

13. Decoder Settings

The IP-4c receives audio streams from the encoder over two independent IP interfaces (as TS/IP, Elementary Streams, Livewire and via SRT, Icecast or SIP) or internal storage (optional), decodes and outputs the signal as an analog or/and digital audio over Analog OUT or AES/EBU OUT outputs.



NOTE: If the IP-4c is activated for 2 channels, you can switch the audio inputs and outputs between analog and digital and use them as backup input sources as a redundancy solution from an external device (for example a satellite receiver) or for a loop-back test.

To set up decoder, you need to log in to the "admin" account.

- ✓ You have already connected the IP-4c to the network [10/100-Base-T] and configured the access to the web user interface (see section 8.2 "Network Configuration" on page 19)
- ✓ You have already defined alternative presets for input sources (see section 11 "Preset Input Sources" on page 28).

Further necessary steps for operating the IP-4c as a decoder are:

- 1. Assign and activate source streams
- 2. <u>Set up FEC for decoder</u>
- 3. <u>Set up dual streaming und Stream4sure</u>
- 4. <u>Set up decoder output level</u>
- 5. <u>Set up buffer</u>
- 6. Define switch criteria
- 7. <u>View the decoder status</u>

The following sections describe the separate steps for decoding:

13.1. Assign and Activate Source Streams

For each audio output, you can activate up to 4 input streams for decoding and assign one of them to the "Main Source" and the remaining streams use as alternative backups for decoding.

The decoder receives and processes all activated input sources from the encoder and outputs one audio signal that has the higher priority (Main Source – Backup 1...3) and is error-free.

To define the switch criteria see section 13.6 "Define Switch Criteria" on page 67.

✓ You have already configured the presets for input sources (see section 11 "Preset Input Sources" on page 28).



NOTE: The current version of the IP-4c is equipped with 2 analog and 4 digital input sources. The corresponding rights must be available (see section 19.3 "Set up Rights" on page 103).

If 3-4 channels are activated (Rights), no analog option is available.

To assign the predefined input streams to the Main Source (and/or Backup Sources 1-3) and to configure the decoder settings:

- 1. Select **Coder Settings→Codec** in the web interface menu and open tab "Decoder" (see Figure 43: Decoder Configuration on page 64).
- 2. Activate an input signal in the "Main Source" block for decoding by selecting "ON" in the virtual switch.

2 w com [.]	IP-4c	Name: T Location: F Description: 2	Fest Decoder Flensburg 2wcom Systems Gr	nbH		•	Power Input	Warning Output			
Information Overview	Codec										
Codec Settings Codec Switch Criteria	Input Sources /	Profiles mentary Streams	S Livewire	SRT .	SIP SIP	K Icecas	st 🎵 File	XLR	- "		Profiles
Interface Settings Audio XLR Headphone DTE	Name Odbiór Radio ZET - p unicast-dual-vlan Odbiór Radio ZET - re	odstawa 23 @ @ @ ezerwa 23 23	ddress 35.21.50.1:2004 35.21.60.2:2004 ::8004 ::8004 35.21.50.21:2004 35.21.60.22:2004	D D D D D D D D D D	ata 1 ata 2 ata 1.101 ata 2.108 ata 1.103 ata 1 ata 2	200 200 200	2006 / 2008 8006 / 8008 2006 / 2008	Codec Auto Auto Auto	Butter 200 200 200	DTE DTE DTE DTE	Edit + - Edit + - Edit + -
GPO Network Settings TCP/IP SNMP	Antyradio Encoder	23 23 Decoder	35.21.50.3:2004 35.21.60.4:2004	D	ata 1.102 ata 2.107	200	2006 / 2008	Auto	200	DTE	Edit + -
EMBER+ NTP AoIP Settings	Source Assignm	Main			Backup 1			Backup 2		Back	kup 3
SIP Phonebook Easy2Connect SIP SAP	Audio 1	icast-dual-vlan 3004 3004	×	Odbiór I 235.21.50 235.21.60	Radio ZET - n .21:2004 .22:2004	ezerwa		dio Input 3 illary Data: None	▼ Ø №	lone	~
PTP Livewire System Settings	Audio 2	tyradio .21.50.3:2004 .21.60.4:2004	~	Fiele 11	P2-48000Hz-Ste	eo-64kbits.m		cast-dual-vlan 004 004	▼ Ø №	lone	~
Global Time User Alarm	Audio 3	1 5004 Iv News	~	ON Audio In Ancillary D	put 1 Data: None		▼ Ø No	ne	~ Ø N	lone	~
Status Device DTE Data Storage	Audio 4	ne	~	Ø None			✓ Ø No	ne		lone	~
Log	Save										

Figure 43: Decoder Configuration

3. To configure the "Main Source" for each audio output, assign a preconfigured "Input Source" in the "Source/Profile Assignment" block, that should be received and decoded, in the corresponding dropdown menu

by clicking the arrow i or drag and drop the "Input Source" from the "Input Sources" block.

NOTE: You can use [XLR] audio inputs as a backup source fed from an external device (for example a satellite receiver) or for a loop-back test.

NOTE: You can decode and play files from an internal storage. This option is recommended as an advanced redundancy for Backup Sources in case of IP input failure.



NOTE: If you have activated FEC and use buffer, see section 13.5 "Set up Buffer" on page 67 for more information about the delay configuration.

- 4. Analogously configure the Backup Sources 1-3.
- 5. Click the "Save" button to save the changes.
 - You can quickly edit the Main source or Backup Sources 1-3 directly for each decoder in the "Input Source Assignment" block by clicking the symbol in the corresponding source field (see Figure 44).
 - ⇒ You can also change the "Source Assignment" directly in the dropdown menu for each decoder in the "Input Source Assignment" block by clicking the arrow in the corresponding source field (see Figure 44).

Encoder	Decoder	
Source As	ssignment	
	Main	Backup 1
Audio 1	ON Audio Input 1 Anciliary Data: None	Ø None
Audio 2	ON Audio Input 2 Ancillary Data: None	ØR None

Figure 44: Edit Source Assignment

13.2. Set up FEC for Decoder

The IP-4c coder implements Pro MPEG FEC (Practice #3 release 2) to reduce packet loss and burst errors in the incoming IP data stream. If the incoming data stream is provided with Pro-MPEG FEC, you can activate it in the "TS/IP" and "Elementary Stream" input stream.

For the Pro-MPEG FEC configuration of the streams in the decoder inputs see section 11.1 "Presets for TS/IP" on page 29 and section 11.2 "Presets for Elementary Stream" on page 30.

✓ To activate und to configure the error correction FEC for decoding the input audio over IP, follow the steps 1. -4. on page 57 in section 12.5 "Set up FEC for Encoder".



NOTE: If you activated FEC and use buffer, see section 13.5 "Set up Buffer" on page 67 for more information about the delay configuration.

⇒ Under Information→Overview you can call up the current status of the FEC in the *Decoder* Details block (recovered/unrecovered IP packets, see section 13.6 "Define Switch Criteria" on page 67.

13.3. Set up Dual Streaming und Stream4sure

The IP-4c is equipped with two IP Ports that serve for dual streaming redundancy. The device is able to receive the same audio signal over dual IP inputs from different IP addresses and in different quality as a redundancy and to decode it to one digital/analog audio.



NOTE: For receiving and decoding of 4 source streams with different codecs, use **Stream4Sure** (<u>optional</u>; for more information see section "Introduction" on page 7). This function is combinable with dual streaming.

In case of alarm the IP-4c can automatically switch to a configured backup stream. The Main Stream and Backup Sources can use different stream types and different IP inputs.



NOTE: The decoder can receive and process one or dual stream over the same IP input or dual stream over two IP inputs as a redundancy.

Preset the dual streaming or/and (optional) activate **Stream4Sure** for separate input streams in the source stream configuration (see section 11 "Preset Input Sources" on page 28) and then select the input stream under the menu "Source Assignment" (see section 13.1 "Assign and Activate Source Streams" on page 63).

13.4. Set up Decoder Output Level

You can use the intergraded XLR interfaces as audio outputs for encoder and decoder. The IP-4c is equipped with 4 digital **or** 2 analog/digital audio inputs and outputs (channels).

The IP-4c outputs the decoded audio signal as a digital and analog audio over both outputs [A-L/R OUT 1-2] and/or [D OUT 1-2] or 4 digital outputs (extra rights).

For analog and digital output you can set up the audio type and the output gain.

Follow the steps below:

1. Select Interface Settings→Audio XLR (see Figure 45 for 4 channels and the right block in Figure 36 on page 56 for 2 channels):

2w com [.]	IP-4C Name: Location: Description:	Power Warning
Information Overview	Audio	
Codec Settings Codec Switch Criteria	Audio Input Audio 1 Digital Gain [-9.0 6.0]: 0.0 di	Audio Output Audio 1 Digital Gain [-9.0 6.0]:
Interface Settings Audio XLR Headphone DTE GPI GPO	SRC Bypass Orf Audio 2 Digital Gain [-9.0 6.0]: 0.0 d	SRC Bypass OIL AES/EBU Mute (when no input source is available) OIL Audio 2 Digital Gain [-9.0 6.0]:
Network Settings TCP/IP SNMP EMBER+ NTP	SRC Bypass 077 Audio 3 Digital Gain [-9.0 6.0]: 0.0 d	SRC Bypass ON AES/EBU Mute (when no input source is available) ON Audio 3 Old B Digital Gain [-9.0 6.0]: 0.0 dB
AoIP Settings SIP Phonebook Easy2Connect SIP SAP PTP Livewire	Audio 4 Digital Gain [-9.0 6.0]: 0.0 di SRC Bypass	SNC Bypass OI AES/EBU Mute (when no input source is available) OPP Audio 4 Oppital Gain [-9.0 6.0]: 0.0 dB SRC Bypass OPP AES/EBU Mute (when no input source is available) OPP
System Settings Global Time User Alarm	Save	

Figure 45: Audio output settings

- 2. Configure the audio/analog gain for each audio output in the "Audio 1-2" or "Audio 1-4" block:
 - Type of the audio output: Analog or Digital (if available)
 - Gain: Analog/Digital: -9.0 dB 6.0 dB

NOTE: If you activate 4 channels, no analog audio output option is available

- 3. Enable "SRC Bypass" by activating the virtual switch "ON" if this mode should be enabled (more about "SRC Bypass" see section 16.1 "Audio XLR" on page 84).
- 4. Enable "AES/EBU Mute" by activating the virtual switch "ON" if the corresponding output source is not available.
- 5. Click the "Save" button to save the settings.

- ⇒ The current levels of the output gain are displayed on the display of the unit and in the user web interface under Information→Overview in the field "Audio Interfaces" (see Figure 51 on page 70).
- ⇒ If the input stream of the decoder contains ancillary data, the IP-4c can forward them to the serial outputs [DTE 1-8]. To set up the forwarding see section 11.1 "Presets for TS/IP" on page 29 and section 11.2 "Presets for TS/SRT" on page 31). For more information see section 16.3 "DTE" on page 86).

13.5. Set up Buffer

The IP-4c codec is equipped with an audio buffer and a dejitter buffer for IP.

 <u>Audio buffer</u> is a delay buffer for decoded audio. It saves for example 100ms decoded audio to output it in case of failure; the device can use this time buffer for example to switch to the backup source or external source.

Set up the value for audio delay separately for each input stream, under **Codec Settings**->Codec->Input **Sources** (see section 11 "Preset Input Sources" on page 28 and section 12.1 "Preset Codec Profiles" on page 40).

• <u>The dejitter delay for IP</u> 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 and to compensate the jitter.

You can set up the value for this holding period in ms separately for each input stream under **Codec** Settings→Codec→Input Sources (see section 11 "Preset Input Sources" on page 28).

For more information see section 18 "Buffer Delay Management" on page 100.

⇒ You can view the current state of the Audio and IP buffer separately for each decoder and encoder under Information→Overview in the details view (see Figure 52 on page 71). For more information see section 13.7 "View the Decoder Status" on page 69 and section 13.6 "Define Switch Criteria" on page 67.

13.6. Define Switch Criteria

The IP-4c decoder is able to automatically switch over between alternative sources as redundancy solution in case of failure. For each audio output (digital or analog) you can configure up to 4 input streams and assign one of them to the Main Source and 3 Backup Sources for decoding (section 13.1 "Assign and Activate Source Streams" on page 63).

The IP-4c decoder receives and processes input streams from all activated input sources (for each of the audio outputs 1-4) and outputs one audio signal that has the higher priority (Main Source – Backup 1...4) and is error-free. The device is able automatically to switch over between the Main and Backup sources for each audio output, if one of the signals fails.

You can define the switch criteria separately for each streaming source and audio input under **Codec Settings** \rightarrow **Switch Criteria** in the IP-4c web interface.

The following switch criteria for input sources in the decoder can be activated:

No input data	The decoder will switch to the next best input source, if no signal is available in the activated Gigabit IP input Data 1/2
Packet jitter	The decoder will switch to the next best input source, if the period of packet jitter in the activated input stream is above of the minimal threshold value of this delay in ms.
Packet loss	The decoder will switch to the next best input source, if packet errors are detected in the input signal received over the activated Gigabit IP input Data1/2. You can set up the minimal threshold value for the PER (packet error rate).
No decoder audio output	The decoder will switch to the next best input source, if the it doesn't detect audio in the activated input stream or can't decode audio (digital or analog)
Audio silence detection	The decoder will switch to the next best input source, if it detects silence in the decoded audio signal (L/R analog or digital) in the input stream. You can set up the threshold value to define the silence level.

To set up switch criteria for each input streaming and audio input in the decoder:

- 1. Open the window *Switch Criteria* under **Codec Settings→Switch Criteria** in the web interface of the IP-4c.
- 2. See the switch criteria for input streaming sources and audio inputs in Figure 46 Figure 50 on page 68.
- 3. Enable each switch criterion separately by activating the virtual switch "Enable", if this parameter should be monitored.
- 4. Enter the maximal threshold values to define minimal delay period for "Packet jitter" in ms, the minimal percentage value for the "Packet loss" and the silence level in dBFS in the decoded audio signal.
- 5. Define for each criterion the delay time *T1* (in milliseconds) for switching release. The delay time from this defined value will be regarded by the system as "bad", so that after the delay time *T1* the device switches the input stream to the configured backup source.
- 6. Define for each criterion the delay time *T2* (in milliseconds) for switching end, how long a "good" signal for this parameter in the previous input stream should be available, before the system switches back.
- 7. Click the "Save" button to save the changes.
 - \Rightarrow The device switches to the next best input source.
 - ⇒ The virtual LED lights green or red in the field "Source Assignment" in the tab "Decoder" under Codec Settings → Codec near the active source (see Figure 43 "Decoder Configuration" on page 64).
 - ⇒ Some switch criteria can be also configured for sending alarm. These alarms for audio inputs will be signaled via SNMP, by switching LED and/or a relay if enabled (see section 14.2 "Set up Monitoring for Audio Inputs" on page 73).



Figure 46: Switch criteria for input streams "TS/IP", "Elementary Streams", "Livewire" and "SIP" in the decoder

D/3 TS/IP Elem	entary Streams	9 Livewire	SRT	SIP 🕌 Icecast	t 🕞 File 💽 XLR				
Streaming input					Audio				
	Enable	Value	T1	T2		Enable	Value	T1	T2
No input data			100 ms	100 ms	No decoder output			100 ms	100 ms
Packet loss		> 0.1 %	60 s	60 s	Silence detection		< -60 dBFS	5 s	5 s
Save									

Figure 47: Switch criteria for input streams over "SRT" in the decoder

DV3 TS/IP Elem	entary Streams	S Livewire	SRT	SIP SIP	🕌 Icecast	File	💽 XLR				
Streaming input						Audio					
	Enable	Value	T1	T2				Enable	Value	T1	T2
No input data			500 ms	500	ms	No deco	der output			100 ms	100 ms
						Silence o	letection		< -60 dBFS	5 s	5 s
Save											

Figure 48: Switch criteria for input streams over "Icecast" in the decoder

D/3 TS/IP Elem	nentary Streams	S Livewire	SRT	SIP SIP	🕌 Icecast	File	💽 XLR				
File input						Audio					
	Enable							Enable	Value	T1	T2
No input data						No deco	der output			100 ms	100 ms
						Silence d	letection		< -60 dBFS	5 s	5 s
Save											

Figure 49: Switch criteria for redundant audio input from the internal storage "File" in the decoder

D/3 TS/IP Eleme	ntary Streams	D Livewire	SRT 📢	SIP A Icecas	t 🗗 File	💽 XLR		
Audio								
	Enable	Value	T1	T2				
AES/EBU no signal			100 ms	100 ms				
Silence detection		< -60 dBFS	5 s	5 s				
Save								

Figure 50: Switch criteria for redundant audio inputs from the XLR interfaces (digital/analog) in the decoder

13.7. View the Decoder Status

You can view the current status of the decoder and of the incoming data at any time on the web user interface page or in the LCD menu of the device.

- 1. Under Information→Overview you can see the details of the configured parameters of the decoding signal for all audio outputs in "Decoder" field (see Figure 51, red frame).
- To see more details about the decoder status, select one "Audio 1-4" output (e.g. "Audio 1" in Figure 51, green frame) and the active source as well as the parameters of the currently decoding signal in the selected audio output will be displayed in the field below ("Details-Decoder / Audio 1" in Figure 39, green frame).
- 3. In the "details" view of the selected decoder audio output you can see the status of the input source, of the codec details and of the assigned audio outputs.
- 4. The following abbreviations are used for the coder parameters:
 - SR Sampling Rate
 - SW Sampling Width
 - FEC Forward Error Correction
- 5. To reset the counters in the status fields, click the "Reset Counters" button.

2wcom.	IP-4C Name: TestDecoder Location: TestDecoder Description: TestDescr	Power Warning	
Information Overview	Overview		
Codec Settings Codec Switch Criteria Interface Settings Audio XLR Headphone DTE GPI GPO	Audio Interfaces Inputs	Audio 1 Audio 2 Audio 3 Audio 4 L 0 8 L 0 8 L 0 8 L 0 8 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30 -30	Uptime 0 days, 00:42:54 Last boot 17. June 2019, 08:44:33 Temp 51 °C LAN V Ctrl UP, 100 Mbit, Full Duplex - 192.168.100.46 Data 1 UP, 1 Gbit, Full Duplex - 192.168.50.46 Data 2 UP, 1 Gbit, Full Duplex - 192.168.60.46
Network Settings TCP/IP SNMP	Decoder	Encoder Encoder 1	Encoder 5
EMBER+ NTP		None	None
AolP Settings SIP Phonebook Easy2Connect SIP SAP DTD	Audio 2 Main MP2 MP2 Stream2 SR BR 48000 SR BR	Encoder 2 None	Encoder 6 None
Livewire	Audio 3	Encoder 3	Encoder 7
System Settings Global Time User	Main Type	None	None
Alarm	Audio 4	Encoder 4	Encoder 8
Device DTE Data Storage Log	Stream4 2277.1.1.113000 SR BR 48000 256k	None	None
User: admin Logout	Details - Decoder / Audio 1 Main Source Audio MP2 00 00 MP2	Image: 100 million P 30 30 9 9 120 9 192.168.50.88 49079 2 Marketter 100 Buffert 100 20 100	Itrate Jitter Matrix Recov. Unrecov.
Support Website E-Mail	MP2 48000 256k	stereo 16 101 2	opinicase neoropered bitrate-coli bitrate Row

Figure 51: System Information – Decoder State

The status color means:

- active for decoding and is currently used for audio output
- deactivated
- 🕨 error
- 6. In the left block you can view the name of the input stream, the type and the address of the activated data inputs Data 1/2.
- 7. In the "Audio" block you can view the status and the current parameters of the decoding audio (see decoder settings under **Codec Settings→Codec→Input Sources**, see section 11 "Preset Input Sources" on page 28).

The following abbreviations are used for the configured coder parameters:

- Bitrate audio bit rate
- SR Sampling Rate
- Buffer Delay Buffer for decoded audio
- Error the number of errors in the decoder (e.g. failed samples, no audio, PER etc.)

Details - Decoder / Audio	1				Reset Counters
Main Source	Audio	IP		FEC	
Name unicast-dual-vlan @:8004 @:8004	PCM -70 40 -30 40 -30 -20 -10 0 -20 40F5 Type SR Bitrate Mode SW Buffer Err PCM 48000 1.536M stereo 16 199 3	Src Address 192.168.101.97 Missed Packets/s 0 251	Src Port Bitrate Ji 50387 1.651M 0 PER Duplicate R 0.0 % 0 0	tter Matrix Recov. .1 ms 10x10 0 eordered Bitrate Col Bit 201k 16	Unrecov. O rate Row 7k
		P 2nd Input			
		Src Address 192.168.105.197	Src Port Bitrate Ji 33624 1.651M 0	tter .2 ms	
		Missed Packets/s 0 251	PER Duplicate R 0.0 % 0 0	eordered	
Backup 1 - Source	Audio	IP		FEC	
Name Odbiór Radio ZET - rezerwa		Src Address	Src Port Bitrate Jit 0 0 0.	tter Matrix Recov. .0 ms	Unrecov.
235.21.50.21:2004 235.21.60.22:2004	Type SR Bitrate Mode SW Buffer Err None 0 0	Missed Packets/s 0 0	PER Duplicate Re 0.0 % 0 0	eordered Bitrate Col Bitr	rate Row
		ID 2nd Input	000		000
		Src Address	Src Port Bitrate Jit	tter	
		Marcal Desired	0 0 0	.0 ms	
		0 0	0.0% 0 0	eoraerea	

Figure 52: Overview – Status Details of the selected decoder output 1

8. In the "IP" block you can view the current settings of the input streams over IP (Some IP settings can be set up under Codec Settings→Codec→Input Sources, see section 11 "Preset Input Sources" on page 28).

The following abbreviations are used for the configured coder parameters:

Bitrate – bit rate of the incoming IP packets (> than Audio bitrate because it includes the IP Header) Jitter – packet jitter of the incoming IP stream Missed – the number of the lost/missing packets PER – packet error rate of the input stream Reordered – the number of the carried out reorderings of the IP packets FEC – the current FEC matrix in the stream Recov. – the number of the recovered packets Unrecov. – the number of the unrecoverable packets

- 9. To monitor the current outputting audio signal over headphone, set up the headphone interface under Interface Settings→Headphone (see section 16.2 "Headphone" on page 86).
- 10. Under **Status→Log** you can call up information about the decoder status, device operation, output status, data distribution and errors since the last event log deleting. A list with a description of the events with the timestamps is displayed in this menu (see section 19.4, "View the Log" on page 104, Figure 92).

NOTE: Configure alarm monitoring under **System Settings** Alarm (see section 14.2). If the alarm monitoring for any parameter is deactivated, no information about the corresponding error will be shown in the log.

To invert the GPOs and see the status of the switched GPO in case of a triggered alarm, open the menu **Interface Settings** \rightarrow **GPO** and see step 4. on page 90 in section 16.4 "GPO".

14. Monitoring and Alarm Control

The IP-4c is able to monitor the audio signal and to recognize errors in the inputs and outputs. You can individually set up separate parameters for monitoring the audio inputs/outputs and for sending alarm.

A triggered alarm is signaled by sending SNMP traps, activating of an available relay and, if configured, of the "Warning" LED on the web user interface page or on the front panel of the device.

14.1. Status LEDs

The IP-4c is equipped with 4 front-panel status LEDs that indicate the status of the inputs, outputs, power supply and alarm control (see section 9.1 "Front Panel" on page 22).



The same LEDs are displayed in the top the web interface (see Figure 53):

Figure 53: Status LEDs

The meaning of the colors of each LED is explained in the table below (see Figure 1).

LEDs	Color	Meaning
Power		Both supply cords are connected and the power supply is OK
		Toggles (green/red) if only one power supply cord is connected and the power supply is OK
Warning		LED is off, if no alarms are triggered
	•	At least one monitoring alarm is triggered
	•	no input monitoring alarms are enabled
		input monitoring alarms are enabled and all inputs are OK
πραι	•	one or more inputs are bad, but at least one is good
	•	all inputs are bad
		no decoder output monitoring alarms are enabled
Output		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

Table 1: Monitoring LEDs on the IP-4c Web Interface
14.2. Set up Monitoring for Audio Inputs

The IP-4c is able to monitor and to recognize errors in the audio inputs.

The following alarm functions for audio inputs can be activated for each audio input (Audio 1-4 depending on activated channels):

Silence detection	Alarm is set off, if the device detects silence in the left and/or right channel of the analog audio input. You can set up the minimum value of the audio level under that the alarm should be triggered.
AES/EBU no signal	Alarm is set off, if no decoded digital audio is available in the audio input [D IN 1-4].

To set up the monitoring and alarm function for each available audio input:

1. Open the configuration menu "Audio Input" in the window "Alarm" under **System Settings→Alarm** in the web interface of the IP-4c (Figure 54).



Figure 54: Alarm Settings – Indication of audio data in the audio inputs

- The LED color means:
 - Monitoring is activated, no alarm is triggered
 - Monitoring is deactivated
 - Monitoring is activated, alarm is triggered
- 2. Enable each alarm function separately by activating the virtual switch "Enable" if this parameter should be monitored.
- 3. Select for each alarm function the severity level of the alarm in the dropdown menu "Priority":

Level/Code	Priority	Meaning
0	Emergency	System is unusable
1	Alert	Action must be taken immediately

2	Critical	Critical conditions
3	Error	Error conditions
4	Warning	Warning conditions
5	Notice	Normal but significant condition
6	Informational	Informational messages
7	Debug	Debug-level messages

Table 2: Alarm Priority

The value 0 or Priority Emergency is the most critical and emergent level. 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 is the alarming case and what measures are necessary.

- 4. Define for each monitoring function the delay time T1 (in seconds) for alarm trigger. The delay time from this defined value will be regarded by the system as "bad", so that after the delay time T1 an alarm will be set off.
- 5. Define for each monitoring function the delay time T2 (in seconds) for alarm end, how long a "good" signal for this parameter should be available, before the system switches off the alarm.
- 6. Enable checkbox "SNMP", if the alarm should be signaled by sending SNMP traps.
- 7. Enable checkbox "LED", if the alarm should be signaled by the Warning LED on the web interface page or on the front panel of the device (see Table 1: Monitoring LEDs on the IP-4c Web Interface on page 72).
- Choose in the dropdown menu "Relay" one of the available relays 1-8 that should switch to signal the alarm.
 NOTE: The corresponding Relay/GPO must be activated for the source "Alarm" under Interface Settings→GPO (see step 4. on page 90 in section 16.4 "GPO".)
- 9. Click the "Save" button to save the changes.

14.3. Set up Monitoring for Audio Outputs

The following alarm functions can be activated for each audio output (Audio 1-4 depending on activated channels):

Silence	Alarm is set off, if the device detects silence in the left and/or right channel of the audio output.
detection	You can set up the minimum value of the audio level under that the alarm should be triggered.

To set up the monitoring and alarm function for each available audio output:

1. Open the configuration menu Audio Output 1-4 in the window "Alarm" under **System Settings→Alarm** in the web interface of the IP-4c (see Figure 55).

2w com	IP-4c	Name: Location: Description:		Power	WarningOutput				
Information Overview	Alarm								
Codec Settings Codec Switch Criteria	Device Power PSU 1	Enable	Priority Emergency	Values		T1 [sec] T2 [:	sec] SNMP		Relay
Interface Settings Audio XLR Headphone DTE GPI GPO	 Power PSU 2 Temperature LAN Ctri Link LAN Data 1 L LAN Data 2 L 	ink or	Emergency V Emergency V Emergency V Emergency V Emergency V	> 70 °C	:				3 × × 2 ×
Network Settings TCP/IP	Audio Input								
SNMP EMBER+ NTP	Audio 1 - Sile	Enable ence detection	Priority Emergency	Values	ls: L + R 💌	T1 [sec] T2 [s	sec] SNMP		Relay
AoIP Settings SIP Phonebook Easy2Connect SIP	Audio 2 - Sile Audio 2 - AE	ence detection OFF	Emergency V Emergency V	< -60 dBFS Channe	ls: L + R 🗸		1 0 0 F F 1 0 0 F F		¥
SAP PTP Livewire	Audio Output	Enable	Priority	Values		T1 [sec] T2 [:	sec] SNMP	LED	Relay
System Settings Global Time	 Audio 1 - Sile Audio 2 - Sile 	ence detection	Emergency v Emergency v	< -60 dBFS Channe < -60 dBFS Channe	ls: L + R	1	1 0ff 1 0ff		2 ×
User Alarm	Save								

Figure 55: Alarm Settings – monitoring of audio data in the audio outputs

The LED color means:

- Monitoring is activated, no alarm is triggered
- Monitoring is deactivated
- Monitoring is activated, alarm is triggered
- 2. For the further settings follow the same instructions as described in section 14.2. "Set up Monitoring for Audio Inputs" on page 73

14.4. Set up the Alarm Control of the Device

The following parameters and alarms for device monitoring of the IP-4c can be activated:

Power failure	Alarm is set off, if the device detects an error in a power supply unit.
Temperature	Alarm is set off if the device temperature exceeds the configured value.
LAN Link	Alarm is set off in case of Ethernet data communication error

To set up the monitoring and alarm functions for the device:

1. Open the configuration field "Device" in the window "Alarm" under **System Settings→Alarm** in the web interface of the IP-4c (see Figure 56).

2w com [•]	IP-4C Name: Location: Description:	i	Power Warning Input Output		
Information Overview	Alarm				
Codec Settings Codec Switch Criteria	Device Power PSU 1 failure	Enable Priority	Values	T1 [sec] T2 [sec] SNMP	LED Relay
Interface Settings Audio XLR Headphone DTE GPI GPO	 Power PSU 2 failure Temperature LAN Ctrl Link LAN Data 1 Link LAN Data 2 Link 	ON Emergency ON Emergency	> 70 *C	1 1 0rf 0 1 1 0rf 0	3 N N N 2 N
Network Settings TCP/IP	Audio Input				
SNMP EMBER+ NTP AolP Settings SIP Phonebook	 Audio 1 - Silence detection Audio 1 - AES/EBU no signal Audio 2 - Silence detection Audio 2 - AES/EBU no signal 	Enable Priority Orf Emergency ~ Orf Emergency ~ Orf Emergency ~ Orf Emergency ~	Values < -60 dBFS Channels: L+R ▼ < -60 dBFS Channels: L+R ▼	T1 [sec] T2 [sec] SNMP	LED Relay
SAP	Audio Output				
Livewire System Settings Global Time User Alarm	Audio 1 - Silence detection Audio 2 - Silence detection Save	Enable Priority ON Emergency ON Emergency	Values < -60 dBFS Channels: L + R ▼	T1 [sec] T2 [sec] SNMP 1 1 0rF 0 1 1 0rF 0	LED Relay

Figure 56: Alarm Settings – Monitoring of the device

The LED color means:

- Monitoring is activated, no alarm is triggered
- Monitoring is deactivated
- Monitoring is activated, alarm is triggered
- 2. For the further settings follow the same instructions as described in section 14.2. "Set up Monitoring for Audio Inputs" on page 73.

14.5. Audio Monitoring via Live Listening

Activated input sources of the encoder and decoder as well as audio outputs can be monitored via "Live listening".

Live Listening enables you to listen "live" to any of the audio input sources as well as the audio outputs directly over the IP-4c web interface.

The IP-4c is equipped with an adjustable bit rate encoder that can encode the input audio signal in five different formats: MPEG Layer2, MPEG Layer 3, AAA-LC, HE-AACv1 and HE-AACv2.

You can manually set up the parameters for audio encoding depending on the bandwidth available for data distribution.

Set up "Live listening" over the IP-4c web interface as follows:

- ✓ The device should be connected to the available network via the [10/100/1000-Base-T] connector.
- ✓ The input sources are configured and assigned to the encoder and to the decoder.
- 1. To activate and to set up the live streaming, open the configuration menu under **AoIP Settings→Live Listening** (see Figure 57).



Figure 57: Live listening settings

- 2. Enable the live streaming by activating the virtual switch "ON".
- Enter the port number for streaming.
 NOTE: The URL for Icecast streaming "IP address of the device:streaming port" (standard port for live streaming is 8000, e.g. http://192.168.12.23:8000).
- 4. Select an audio format for streaming in the dropdown menu "Encoder Format": MPEG Layer2, MPEG Layer 3, AAA-LC, HE-AACv1 and HE-AACv2.
- 5. Select stereo or mono audio mode for live streaming in the dropdown menu "Audio Mode": Mono (L/R), Mono (Downmix), Dual Mono, Stereo, Joint Stereo.
- 6. Select a sample rate for the streaming in the dropdown menu "Sampling Rate".

Available options are: 16 kHz/24 kHz/32 kHz/44.1 kHz/48 kHz.

- 7. Select bit rate for the selected audio format quality in the dropdown menu "Bitrate".
- 8. Click the "Save" button to save the changes.
- 9. To start audio streaming, use the menu in the right top corner of the IP-4c web interface (see red frame in Figure 59):
 - a) In the "Live Source" field, select available configured audio sources for Streaming (see Figure 58).
 - b) Start/stop the streaming by clicking the play/pause button.
 - c) Change the playback value by clicking the green volume levels.
 - d) Alternatively, you can start/stop live streaming directly for each audio input individually by clicking the "Loudspeaker" icon in the corresponding source field (see red frame in Figure 59).



Figure 58: Live source choice

2w com [.]	IP-4C Name: Location: Description:	P-4c Testdevice 2wcom Systems	Power	Warning Output	Live Source: 😧 Audio Output 1 🔹 👻
Information Overview	Overview				
Codec Settings Codec TS Multiplexer Switch Criteria Interface Settings Audio XLR Headphone DTE GPI COD	Audio Interfaces Inputs	Audio 4 Audio 1 10 8 1 0 8 10 70 70 70 70 70 70 70 70 70 70 70 70 70	Outputs Audio 2 0 0 0 0 0 0 0 0 0 0 0 0 0	Audio 4 L 8 	Status Uptime 2 days, 19:31:33 Last boot 03. September 2019, 15:09:04 Temp 36 °C LAN UP, 1 Gbit, Full Duplex - 192.168.100.238 Data 1 UP, 1 Gbit, Full Duplex - 192.168.100.250 Data 2 UP, 1 Gbit, Full Duplex - 192.168.19.40
Network Settings TCP/IP SNMP EMBER+ NTP AolP Settings SIP Phonebook Easy2Connect SIP	Codec Decoder Audio 1 Main Control Default Codec Audio 2 Main	rer Type None SR BR C	ncoder 1		Encoder 5 None
SAP External Clock Livewire Live Listening	50 TestAccount1	Type None SR BR	lone		None
System Settings Global Time User Alarm	Audio 3 Main Pefault @:6004	C] Type None SR BR	Encoder 3 None		Encoder 7 None
Status Device DTE Data Storage Log	Audio 4 Main FlexDSR04+ ©:7000 Radio POS Euro AC	Type None SR BR	Incoder 4		Encoder 8 None

Figure 59: Live listening – internal media player

14.6. Audio Bypass Relay (optional)

The bypass relay is a hardware option in the IP-4c.

In case of a power failure, the bypass relay automatically switches the audio inputs to the outputs. The bypass relay is therefore looping through the audio signal from inputs to the outputs (see Figure 60).

If the power is back again and the device boots up, the normal mode will be switched back (see Figure 61).

ΝΟΤΙ	CE
	If the IP-4c boots up incorrectly after voltage recovery, the relay will not switch back.
	To get to normal mode, restart the device.



Figure 60: Bypass relay and power failure.



Figure 61: Normal mode after the voltage recovery and correct reboot.

15. Handling of AES67

The encoder can generate and the decoder can receive elementary streams. If the output streams should be compatible with Dante, RAVENNA etc., use AES67 in the IP-4c.

There is no automatic integration of AES67 streams into Dante systems. You have to add separate configuration profiles for the encoder and the decoder.

15.1. Generate AES67 Stream

To generate AES67 streams, use PCM for encoder format and make the following configurations for the codec settings in the web interface:

1. Create a profile under **Codec Settings→Codec** with the following parameters (see section 12.1 "Preset Codec Profiles" on page 40):

NOTE: Set <u>exactly</u> the same values as listed here.

Encoder Format:	PCM
Audio Mode:	Stereo
Sampling Rate:	48 kHz
Sampling Width:	24 Bit
Endianness:	Big Endian

The remaining parameters can be configured with other values, e.g. "1 ms" for "frame size".

2w com [.] ♥	IP-4c	Name: I Location: I Description: N	HA Codec Remote Radio Hagen Wird ztw. vom Sendesystem geste	uert. 🧶 Inp	wer 🛑 Warr ut 🛑 Outp	ning rut	Live Source	: ⊗^	udio Output	1			-
Information Overview	Codec		Profile setting	s			×						
Codec Settings Codec TS Multiplexer	Input Source	s / Profiles	Name: Encoder Format:	A	ES67	PCM	~				117	Profi	les
Switch Criteria	Default		Audio Mode:		[4 ms Stereo	~	8R 256k	Ancillary yes	GPIO yes	Edit	••	5
Interface Settings Audio XLR	Default		Sampling Rate (Hz): Sampling Width (Bit):	[48000 24	~	256k 128k	yes yes	yes yes	Edit Edit	Θ	20
OTE GPI GPO	Opus 10ms 48/1 Opus 20ms 48/1	28	Endianness: Bitrate (bit/s):		[Big Endian	✓ 2304000	128k 128k 256k	-	-	Edit Edit		
Network Settings	AAC-LC 128 ARIE	8	Ancillary Data					128k	-	-	Edit	00	5
TCP/IP SNMP EMBER+	AAC-LC 128 MPE AAC LC 48/128	EG-4	Ancillary Data: GPIO Tunneling:				OFF OFF	128k 128k	-	 yes	Edit Edit	Θ	2
NTP	aptX PCM/16		Save					576k 1536k	yes	-	Edit Edit	Θ	20
AoIP Settings SIP Phonebook	AES67				Mereo		000 24	2304k	-	-	Edit	€.	Ð

Figure 62: Profile Configuration for the AES67 Stream

2. Assign the coder profile configured for AES67 to an encoder as described in Section 12.2 "Assign Input Source/Codec Profile" on page 41.

NOTE: You can drag and drop the coder profile directly to the encoder (see red frames in Figure 63).

	IR Ac								-			
	11-40	Name:		e Po	ower	Warning	Liv	e Source	: 💀 AL	idio Output 1		
2wcom'		Descriptions		— In	unut	Output						
					iput	Output						
Information	Codec											
Overview	couec											
	Input Sources	/ Profiles										
Codec Settings	D/3 TS/ID D/3	TS/SPT				🖌 Irecast 🛛 🖪 Fil		YIP				Profiles
Codec TS Multiplexer	IP 1 Sy 11 SRT	-I- Elementary stre			4	and the second s		ALIN				
Switch Criteria	Name		Format			Mode	SR	SW	BR	Ancillary	GPIO	
			MPEG La	yer2		Stereo	48000	16	256k			Edit + -
Interface Settings	AAC-LC ARIB		AAC-LC			Stereo	48000	16	96k			Edit + -
Audio XLR	AES67		PCM			Stereo	48000	24	2304k			Edit + -
Headphone												
GPI												
GPO	Encoder	Decoder										
Network Settings	Source/Profil	e Assignment										
		Input Source	Profile			Input	ource				Profile	
EMBER+	p o from FM2	rs	AES67			n ofrom FM2TS			6	AAC-LC ARI	в	
NTP	1: @:8000 PID 101 -	× I	PCM PCM/24, 48000Hz 2304k, Stereo	~	5:	@:8000 PID 501 -			× AAC	AAC-LC, 48000 96k, Stereo	Hz	~
	_											
AoIP Settings	2- Audio Inpu	ıt 2 🗸	Acis ARIB		6.	D/3 from FM2TS			。 、	AAC-LC ARI	В	~
SIP Phonebook	Ancillary Data	: None	AG 90k, Stereo			PID 601 -			AAC	96k, Stereo	112	
SIP						-						
SAP	3: 0/3 from FM2	rs 🗸 🕻	AAC-LC ARIB AAC-LC, 48000Hz	~	7:	e:8000			~ (AAC-LC ARI AAC-LC, 48000	B Hz	~
External Clock	PID 301 -		AAC 96k, Stereo			PID 701 -			AAC	96k, Stereo		
Livewire	from the second	re.				from FRANTS					0	
Live Listening	4: 0/3 (000 FM2)	· ·	AAC-LC, 48000Hz	~	8:	@:8000 PID 801-			~ (C	AAC-LC ARI AAC-LC, 48000	D Hz	~
System Settings	10401-	J [_	rore son, stereo			10.001-			2040	, son, stered		
Global	Save											
Time	Save											

Figure 63: Encoder Input and Coder Profile Setup for AES67

- 3. Click the "Save" button to save the settings.
- 4. Configure the encoder outputs as described in section 12.3 "Set up Encoder Outputs" on page 43.

15.2. Receive and decode AES67 Streams

To receive and to decode AES67/Dante streams, make the following configurations for the decoder:

- To receive AES67/Dante streams, create and configure corresponding presets for input source "Elementary Stream" under Codec Settings->Codec as described in section 11.3 "Presets for Elementary Stream" on page 32.
- 2. If RAVENNA streams are available in the input stream, you can copy and save the settings of this stream as a preset for Elementary Stream for the decoder.

NOTE: Consider the default settings for SAP (**AoIP Settings**→**SAP**): SAP must be set into the "Client/Server" mode and use the right receive address and port (RAVENNA is using 239.255.255.255 for SAP announcements, see Figure 85: SAP Settings on page 99).

- a) Choose a RAVENNA stream in the "available streams" menu (see red frame in Figure 64).
- b) Click "copy/use selected stream settings" to apply the stream settings to the input source preset (see green frame in Figure 65).
- c) If no RAVENNA streams are available, configure the input source settings manually. **NOTE**: Set the correct multicast address and port (normally 5004).
- d) Click the "Save" button to save the settings.

0	IP-4c Nam	e:		Warning	Live Source: 🔇	Audio Output				~
2 w com'	Desc	RTP Elementary stream setti	ngs	×	►il	I		_		
Information	Codec	Available streams								
Overview	Innut Sources / Deef		Dante-AVIO : 2 - 239.69.47. 239.69.47.32:5004, Data 1, w/o FE	32 ~ ~						
Codec Settings	D/3 TS/IP D/3 TS/SRT		Copy/Use selected s	eo tream settings	C XLR				Profi	
TS Multiplexer		Name	Tect LIDE 5200 D1			. An allow	Clark			
Switch Criteria	Name	IP type:	1651 ODF 5200 D1	Unicast ~	Bulle	r Ancillary	Clock	Edit	A	5
Interface Settings	Test APT 365 Dual D1 10041	Port:		5200	120	-	internal	Eun		
Audio XLR Headabone	DEC3 Test AAC FEC Dual D1,	IP interface:		Data 1 🗸	200	-	Internal	Edit		2
DTE	DEC2 Test APT/PCM 383 FE	Packet reorder/dejitter delay [ms]:		210	70	-	Internal	Edit		5
GPI GPO	Test APT 383 FEC 5/5 D1 10	Pro-MPEG FEC:		OFF	100	-	Internal	Edit	Θ	5
	DEC1 Test APT/PCM FEC 5/5	Dual streaming:		OFF	50	-	Internal	Edit	•	Ē
Network Settings	Test APT 383 FEC 5/5 D2 21	Codec			440	-	Internal	Edit	\odot	Э
SNMP	Test APT 383 FEC 5/5 D2 21	Decoder type:		Automatic 🗸	440	-	Internal	Edit	Θ	Ð
EMBER+ NTP	Test UDP 5200 D1	Buffer [ms]:		440	440	-	Internal	Edit	Θ	2
	Test UDP 5200 D1	Clock Source:		Internal 🗸	440	-	Internal	Edit	Θ	2
AoIP Settings SIP Phonebook		Ancillary Data (Decoder only)								
Easy2Connect	Encoder Deco	Data destination:		None ~						
SIP SAP	Source Assignment	GPIO Tunneling:		OFF						
External Clock		Save			2		Backup	3		
Live Listening	•	Cancer		_		017				
Sustam Cattings	Audio 1 DEC1 Test	APT/PCM FEC 5/5 D1 V Ø None	v	Ø None	~	Ø None				~
Global										
Time	🔍 🔴	011 0		017 .		017				
Alarm	Audio 2 DEC2 Test	APT/PCM 383 FEC 1/4 🗸 🖉 None	~	Ø None	~	Ø None				~

Figure 64: Input Source Settings for Elementary Streams

0	IP-4c					Warning		rce: 😡 Audio	Outpu	
2 µµcom [.]										
		Description			RTP Elementary stream se	ettings		:	×	
									_	
Information Overview	Codec				Available streams	Dente M//O 2 2	0 60 47 22			
	Input Sou	reas / Profiles			RAVENNA	239.69.47.32:5004, Dat PCM, 48000Hz - 2304k,	a 1, w/o FEC 24 Bit, Stereo	<u>.</u>	~	
Codec Settings	Прис зоц	D/3 TS/SBT	Flementary Streams	0		Copy/Use s	elected str	eam settings		-t- Probles
Codec TS Multiplexer	a rate	-II-	ciententary acreants	25	Name	Danta-AVIO - 2				-to routes
Switch Criteria	Name		Address		ID type:	Dante-Avio . 2		Multicact		Clock
1 f f	Dante		@:5004		IP type:		L		Ľ.	Internal Edit + -
Audio XLR					Porti		6	2004	=	
Headphone	Encoder	Decoder			ID interface		L L	Data 1		
DTE	Lincoder	Decoder			Packet reorder (delitter delay [ma])		L F	100	Ť	
GPI GPO	Source As	signment			Packet reorder/dejitter delay [msj:			100	155	
		м	lain		Pro-Mired FEC:					Backup 3
Network Settings				C	Dual streaming:			0.		
TCP/IP SNMP	Audio 1	0 Name		6	Codec					
EMBER+		De none		Ľ	Decoder type:		[PCM	~	
NTP				-	Audio mode:		[Stereo	~	
AoIP Settings	Audio 2			2	Sampling rate:		[48000	v	
SIP Phonebook	A0010 2	Dante -===@:5004		Q	Sample width:		[24 Bit	~	
Easy2Connect					Endianness:		[Big Endian	v	
SIP		0		C	Buffer [ms]:		:	100		
External Clock	Audio 3	Ø None			Clock Source:		[Internal	~	
Livewire					And the Data (Data data and A					
Live Listening				C	Ancillary Data (Decoder only)					
System Settings	Audio 4				Data destination:		L	None	×	
Global		Ø None		2	GPIO Tunneling:				DFF	
Time										
Alarma	Save				Save Cancel					

Figure 65: Copied RAVENNA Input Stream Settings and Decoder Configuration

3. In the "Codec" block set PCM for decoder type and make the following configuration for the decoder (see red frame in Figure 65) :

NOTE: Set <u>exactly</u> the same values as listed here.

Decoder type:	PCM
Audio mode:	Stereo
Sampling rate:	48 kHz
Sampling width:	24 Bit
Endianness:	Big Endian

The remaining parameters can be configured with other values.

4. Assign the corresponding Input Source configured for AES67 to a decoder as described in Section 13.1 "Assign and Activate Source Streams" on page 63.

NOTE: You can drag and drop the "Input Sources" presets directly to the decoder (see red frames in Figure 66).

2w com [.]	IP-4c	Name: Location: Description:	Powe	r 🕒 Warning Live Source: Output	↔ Audio Output 1 ×
Information Overview	Codec				
Codec Settings Codec TS Multiplexer Switch Criteria	Input Sol	Urces / Profiles	Livewire SRT SIP	File Codec	Suffer Ancillary Clock
Interface Settings Audio XLR Headphone DTE	Dante Encoder	@:5004	Data 1 100	Auto 1	00 Internal (Edit) (+) (-)
GPI GPO	Source A	ssignment _{Main}	Backup 1	Backup 2	Backup 3
Network Settings TCP/IP SNMP EMBER+ NTP	Audio 1	01 ● D/3 from FM2TS ■ #0000 P/D 101-	Ørr	▼ 077 ● Ø None	v Ø None v
AoIP Settings SIP Phonebook Easy2Connect	Audio 2	Dante	Ø None	× Ø None	▼ Ø None ▼
SIP SAP External Clock Live listening	Audio 3	Ørr Ø	Ø None	v None	v None v
System Settings Global Time	Audio 4	Ø None	Ø None	● OFF ●	V None V
User Alarm	Save				

Figure 66: Decoder Input Setup for AES67/Dante Stream

5. Click the "Save" button to save the settings.

 $\Rightarrow~$ The IP-4c is now decoding digital/analog audio from the AES67 input stream.

16. Interface Settings

16.1. Audio XLR

You can use the intergraded XLR interfaces as audio inputs for encoder and decoder. The IP-4c is equipped with 4 digital **or** 2 analog/digital audio inputs and outputs (channels).

16.1.1. Set up Input and Output Gain

If you operate the device as an encoder or/and as a decoder you can set up the level for digital/analog inputs and for digital/analog outputs.

To set up the level for audio inputs and outputs, follow steps below:

- 1. Select Interface Settings→Audio XLR (see Figure 68).
- 2. For each audio input and output select the type of audio interface: Analog or Digital (if available).

NOTE: If you activate 4 channels, no analog audio input option is available

- 3. Set the gain for analog/digital audio inputs and outputs: -9.0 dB 6.0 dB
- 4. Click the "Save" button to save the settings.

16.1.2. SRC Bypass

The IP-4c is equipped with an internal sample rate converter that converts stereo audio from one sample frequency to another. The IP-4c sample rate converter allows different rates ranging from 1:7.5 (down) to 8:1 (up) at the digital AES/EBU inputs/outputs (16kHz, 24kHz, 32kHz, 44.1kHz and 48kHz are now supported).

- Sample processing <u>with</u> enabled "Sample Rate Converter":
 - The IP-4c transports the decoded audio samples (PCM) through the sample rate converter (SRC) to the output.
 - The sample rate converter generates an exact sampling rate for the output, which the user has configured in the web interface (see section 12.1 "Preset Codec Profiles" on page 40).
 - If the user has configured 48 kHz in the encoder, the sample rate converter generates the same frequency of 48 kHz in the output of the decoder.
 - In the input of the SRC the jitter of sampling rate is being converted into a constant determined sampling rate for the output.
 - Sample processing without enabled "Sample Rate Converter":
 - The IP-4c transports the decoded audio samples (PCM) <u>without</u> converting the sample rate <u>directly</u> to the output interface.

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 "Sample Rate Converter" is <u>activated</u>.

The sample rate of the decoder follows the sample rate of the encoder by using a PLL. The PLL is a software block in the decoder that determines the encoder speed. It does that by evaluating the Speed/Timing Interval of the incoming IP Packets matching against the resulting buffer level. The PLL has some phases. At startup the control has an init phase until the encoder speed is found. Here the sampling frequency can vary up to +/- 20ns according to the AES/EBU standard. After the init phase the PLL is locked and does only vary less.

NOTE that the configured sample rate and sample width must be correct and correspond to the real values of the signal.

To generate a constant determined sampling rate for digital AES/EBU inputs/outputs, follow steps below:

1. Select Interface Settings→Audio XLR in the web interface of the IP-4c (see Figure 67).

2 w com [.]	IP-4c	Name: Ralfs IP-4c Testdevice Location: Fehmarn Description:	P.	ower 🛑 Warning nput 🔵 Output	Live Source: 💀 Audio Output 3	<u> </u>
Information ~	Audio					
Codec Settings ^ Codec	Audio Input			Audio Output		
Switch Criteria	Audio 1			Audio 1		
Interface Settings ^ Audio XLR	Digital Gain [-9.0 Sample Rate Conve	. 6.0 dB]: erter:	0.0 ON	Digital Gain [-9.0 6.0 dB]: AES/EBU Mute (when no ing	put source is available):	0.0
Headphone DTE	Audio 2			Audio 2		
gpi gpo	Digital Gain [-9.0	. 6.0 dB]:	0.0	Digital Gain [-9.0 6.0 dB]:		0.0
Network Settings 🗸 🗸	Sample Rate Conve Audio 3	erter:		AES/EBU Mute (when no ing Audio 3	put source is available):	OFF
AoIP Settings ·	Digital Gain [-9.0	. 6.0 dB]:	0.0	Digital Gain [-9.0 6.0 dB]:		0.0
System Settings ^ Global	Sample Rate Conve	erter:		AES/EBU Mute (when no inp	put source is available):	OFF
Time	Audio 4			Audio 4		
User Alarm	Digital Gain [-9.0	. 6.0 dB]:	0.0	Digital Gain [-9.0 6.0 dB]:		0.0
Status ~	Save	nter:		AES/EBU Mute (when no inj	put source is available):	Off

Figure 67: Interface settings – Audio XLR (> 1.26 App version)

- 2. Activate "Sample Rate Converter" by selecting "ON" in the corresponding virtual switch for available digital audio inputs and outputs.
- 3. Click the "Save" button to save the settings.
 - ⇒ The sample rate converter generates an exact sampling rate in the input/output audio, which the user has configured in the web interface.

NOTE: "Sample Rate Converter" switched off corresponds to the activated "Transparent Mode" in the MM01 devices and to the activated "SRC Bypass" in earlier IP-4c versions (< 1.26 App version, see Figure 68).

2 w com [.]	IP-4c	Name: Location: Description:	•	Power Input	 Warning Output 	
Information Overview	Audio					
Codec Settings Codec Switch Criteria	Audio Input Audio 1 Audio Type:		Analog	Audio C Audio 1 Audio Tyj	Dutput 	Digital 🗸
Interface Settings Audio XLR Headphone DTE GPI GPO	Analog Gain [-9./ Digital Gain [-9./ SRC Bypass Audio 2	0 6.0]: 6.0]:	0.0 dB 0.0 dB	Analog G Digital Ga SRC Bypa AES/EBU Audio 2	iain [-9.0 6.0]: ain [-9.0 6.0]: ass Mute (when no input source is available)	0.0 dB 0.0 dB 0.0 v 0 v 0 v 7
Network Settings TCP/IP SNMP EMBER+ NTP	Audio Type: Analog Gain [-9. Digital Gain [-9.0 SRC Bypass	0 6.0]: 1 6.0]:	Digital 0.0 dB 0.0 dB 0.0	Audio Typ Analog G Digital Ga SRC Bypa	pe: iain [-9.0 6.0]: ain [-9.0 6.0]: sss	Analog Analog
AoIP Settings SIP Phonebook Easy2Connect SIP SAP PTP Livewire	Save			ALS/EDU	אמתה לאוובוו ווה ווואמר פרקונה וף ממשמחה)	

Figure 68: Interface settings - Audio XLR (< 1.26 App version)

16.2. Headphone

If you operate the device as an encoder or decoder you can monitor the audio signal over headphone or set it mute.

To configure the headphone interface, follow the steps below:

- To monitor the current audio signal over headphone, open the field Headphone under Interface Settings→Headphone (see Figure 69). Select the audio input or output for monitoring in the "Source" dropdown menu.
- 2. Set the volume of the headphone output: [-40.0 ... 0.0 dB].
- 3. Click the "Save" button to save the settings.

2w com [.]	IP-4C Name: Power Warning Location: Input Output	
Information Overview	Headphone	
Codec Settings	Volume / Source	
Codec Switch Criteria	Volume [-40.0 0.0 dB]: -20.0 Source:	Mute 🗸
Interface Settings	Save	Audio Input 1
Audio XLR		Audio Input 2
DTE		Audio Input 3
GPI		Audio Input 4
GPO		Audio Output 1
Network Settings		Audio Output 2
TCP/IP		Audio Output 3
SNMP		Audio Output 4
EMBER+		
NTP		

Figure 69: Headphone interface settings

16.3. DTE

The IP-4c unit is equipped with a 15 pole male D-Sub connector for data communication. To connect the serial interfaces, use the serial breakout cable (optional).

The pin assignment of the DTE interface is defined in the IP-4c as follows:



You can configure the serial RS-232 interfaces [DTE 1-8] under Interface Settings→DTE (see Figure 70).

2w com	IP-4c	Name: Location: Description:	- •	Power Input	 Warning Output 	
Information Overview	DTE					
Codec Settings Codec Switch Criteria	Input baud r DTE 1: DTE 2:	rates	9600 v 9600 v	Output dte 1: dte 2:	t baud rates	9600 v 9600 v
Interface Settings Audio XLR Headphone DTE	DTE 3: DTE 4: Save		9600 × 9600 × 1200 2400	DTE 3: DTE 4:		9600 ~ 9600 ~
GPO Network Settings TCP/IP SNMP EMBER+			4800 9600 14400 19200 28800			
NTP AolP Settings SIP Phonebook Easy2Connect SIP SAP GRP			38400 57600 115200			
Livewire						

Figure 70: Interface Settings for DTE 1-4 outputs and inputs

Configurable settings are the baud rate for DTE 1-4 inputs and outputs.

Possible baud rates: 1200, 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600 and 115200 baud.

- \Rightarrow Save the settings by clicking the "Save" button.
- \Rightarrow To view the status of the 8 Data Interfaces, open the menu **Status** \rightarrow **DTE Data**:

	IP-4C Name:	Power 🕒 Warning
2wcom	Location: Description:	🛑 Input 🛑 Output
Information Overview	DTE Ancillary Data	
Codec Settings Codec Switch Criteria	Input DTE 1 DTE 2 DTE 3 DTE 4	Output DTE 1 DTE 2 DTE 3 DTE 4
Interface Settings Audio XLR Headphone	Raw Data Hexadecimal ASCII	Raw Data Hexadecimal ASCII
GPI GPO Network Settings		
TCP/IP	UECP Data	UECP Data
EMBER+	Last Frame:	Last Frame:
NTP	Last MECs:	Last MECs:
AoIP Settings	PI: PS: TP/TA: PTY:	PI: PS: TP/TA: PTY:
SIP Phonebook Easv2Connect	CT:	CT:
SIP	RT:	RT:
SAP		(class Data)
Livewire		
System Settings		
Time		
User		
Alarm		
Status		
Device		
DTE Data		
Storage		
Log		

Figure 71: Status of the Data Interfaces

16.4. GPO

The IP-4c unit is equipped with a 26 pole D-sub male connector with 8 floating relay contacts. The relays can be used for alerts of the monitoring function.



D-Sub male connector, high density, 26 pole

Table 3 displays the scheme of the possible switch contacts:

Relay/GPO No.	Switch contacts	Switch type
1	RELAO, RELBO	SPST, NO
2	RELA1, RELB1	SPST, NO
3	RELA2, RELB2	SPST, NO

4	RELA3, RELB3	SPST, NO	1600 10090926-P264VLF
5	RELA4, RELB4	SPST, NO	RELAI 19 1 RELBO 11 RELBI 11 RELBI
6	RELA5, RELB5	SPST, NO	RELB2 20 2 RELA2 12 RELA3 3 RELB3
7	RELA6, RELB6	SPST, NO	13 RELB4 RELA5 22 4 RELB5 14 RELA6
8	RELA7 RELB7 RELC7	SPDT	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$

Table 3: Relay Output – switch contacts

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

NOTICE The relay contacts have maximum rating of 0.5 A at 30 V DC.

The IP-4C is equipped with 8 GPO outputs, that you can use for GPIO forwarding or alarm signaling. To set the source of the inputs:

1. Open the menu "GPO" under Interface Settings \rightarrow GPO (see Figure 72.

2 w com [.]	IP-4c	Name: Location: Description:			Power	Warning			
Information Overview	GPO								
Codec Settings Codec Switch Criteria Interface Settings Audio XLR Headphone	Status / Con State: Inverted: Source:	figuration 1 Off Alarm V Alarm	2 Orfo Alarm V	3 Orp Alarm V	4 Orf Alarm	5 Off Alarm	6 Orf Alarm	7 Off Alarm ~	8 A • B
GPI GPO	Save	GPIO Livewire							





- 2. Select GPO to enable the control of the relay via GPIO-forwarding over the encoder inputs.
- 3. Choose the source in the drop down menu for the relays 1-7.

NOTE: Relays 1-7 are normal switchers, whereas relay 8 is a changeover relay (position A/B). The state of a relay is ON if the alarm, which is assigned to this relay, is triggered (see Table 3 on page 89).

4. Select "Alarm" for the relays that should be used for alarm forwarding.

NOTE: Under **System Settings**→**Alarm** you can configure monitoring and alarm functions of some operation processes and use an available GPO for alarm signaling (see section 14 "Monitoring and Alarm Control" on page 72). An example in Figure 73 shows a case of failure, when a triggered alarm activates a configured GPO (in the example GPO4).

- 5. Select "GPIO" to enable the control of the relay via GPIO-forwarding over the encoder inputs (see section 16.5 "GPI" on page 90).
- 6. Save the settings by clicking the "Save" button.



Figure 73: Figure: Alarm trigger over GPO

16.5. GPI

The IP-4c is equipped with 8 GPI inputs, housed in the same D-Sub connector as the GPOs.



D-Sub male connector, high density, 26 pole

Table 4 displays the scheme of the pin assignment in the GPI contacts:

GPI No.	Control Pin No.	
1	INO	

2	IN1	J600 10090926-P264VLF
		10 _{RELAO}
3	IN2	RELAI 19 1 RELBO
-		11 RELB1
4	1012	$\begin{array}{c c} RELB2 & 20 \\ \hline \end{array} \\ \hline \\ \\ \hline \end{array} \\ \hline \end{array} \\ \hline \end{array} \\ \hline \\ \\ \hline \end{array} \\ \hline \\ \\ \hline \end{array} \\ \hline \end{array} \\ \hline \\ \\ \hline \end{array} \\ \hline \end{array} \\ \\ \\ \hline \end{array} \\ \\ \hline \end{array} \\ \hline \\ \\ \hline \end{array} \\ \\ \\ \hline \end{array} \\ \\ \hline \end{array} \\ \\ \\ \hline \end{array} \\ \\ \\ \\$
4	IN3	PELAA 21 3 PELB3
		13 RELBA
5	IN4	RELA5 22 4 RELB5
		14 _{RELA6}
6	IN5	RELB6 23
Ŭ		15 RELA7
7	1010	RELC7 24 0 IN0
/	ING	IN2 25 7 IN3
		17 _{IN4}
8	IN7	IN5 26 8 IN6
		18_IN7
		GND
		27
		GND GND

Table 4: GPI – Pin assignment

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

ΝΟΤΙ	CE
	Voltage on inputs must not be negative or exceeding +0.7 V!
You can view t	he current state of the inputs under Interface Settings→GPI (see Figure 74).

2 w com [.]	IP-4c	Name: Location: Description:			Pow	ver 🔵 Wa ut 🛑 Ou	rning tput			
Information Overview	GPI									
Codec Settings Codec Switch Criteria	Status _{State:}		1	2	3	4	5	6	7	8
Interface Settings Audio XLR Headphone DTE GPI GPO										

Figure 74: Interface Settings – GPI



GPIO Tunneling

If you enable "GPIO tunneling" mode in the input streams under **Codec Settings** \rightarrow **Codec** (see section 11 "Preset Input Sources" on page 28), an actuation of a GPI at the encoder activates a corresponding GPO in the destination device for example for relay switch (GPI1 \rightarrow GPO1, GPI2 \rightarrow GPO2,... as shown in Figure 75).



Figure 75: Figure GPIO Tunneling

16.6. ASI Output

The IP-4c can be optionally equipped with an ASI interface (BNC 75 Ω) for TS output.

To set up ASI output, follow steps below:

1. Select Interface Settings→ASI Output (see Figure 76).

Information	ASI Output	
Codec Settings	ASI OUT 1	
Interface Settings Audio XLR Headphone	∧ Output enabled: Output signal:	ON ON Multiplex 1
GPO	Save	None Multiplex 1
Network Settings	~	Multiplex 2 Multiplex 3 Multiplex 4
AoIP Settings	*	Multiplex 5
System Settings	·	Multiplex 6 Multiplex 7
Status ~	×	Multiplex 8
User: admin Logout		
Support Website E-Mail		

Figure 76: ASI Output Settings

- Activate an ASI Output by selecting "ON" in the corresponding virtual switch "Output enabled".
 NOTE: Alternatively, you can activate ASI output under Codec Settings→TS Multiplexer in the "Multiplexer Outputs" block (tab "ASI Output").
- 3. In the dropdown menu "Output signal" assign to each output one preset for transport stream Multiplex 1-8 that should be sent over ASI output (more information about TS Multiplex configuration see section 12.3.1 "Output TS Multiplexer" on page 44).
- 4. Save the changes after each configuration by clicking "Save".

17. Audio over IP Settings

17.1. Set up SIP Configuration

The IP-4c supports Audio IP streaming using SIP (Session Initiation Protocol).



NOTE: The option "IP streaming over SIP" is only available, if the right "EBU Tech 3326" is activated.

You can use SIP connection for the Encoder output and Decoder input directly over the Data 1/2 interfaces or over server (registrar). For direct SIP connection no registrar entry is necessary.

17.1.1. Prepare the SIP connection

Prepare and establish the first SIP connection with your device as follows:

1. Define presets of your device for SIP connection. For more details about configuration of the presets for SIP input sources of your device see section 11.6 "Presets for SIP" on page 36.

Codec								
Input Sources / Profiles								
TS/IP Elementary Streams		SIP Kecast	File 💽 XLR					Profiles
Registrar	Phonenumber	Displayname	Username	Interface	Expires	Timeout	Mono mix	
sip.xxx.de	XXXXXXXXX	SIP1	*****	Data 1	1h	30s	Downmix	Edit + -
sip.xxxx.de	10xxxxxxxx	SIP2	*****	Data 2	1h	30s	Downmix	Edit + -

Figure 77: SIP Profiles as input sources

- 2. Preset codec profiles that should be sent from the encoder and to the decoder (see section 12.2 "Assign Input Source/Codec Profile" on page 41).
- 3. Assign the "SIP presets" to the "Audio Outputs 1-4" in the decoder by using the drop menu or dragging the preset to the corresponding field (see section 13.1 "Assign and Activate Source Streams" on page 63).



NOTE: As soon as a SIP preset is assigned to one of the audio outputs (Decoder), the device is reachable for calls.

4. Configure the local SIP port for the IP-4c under AoIP Settings→SIP (see Figure 78). Set "zero" for direct SIPconnection.

2 w com [.]	IP-4c	łame: ocation: Oescription:		Power	 Warning Output 		
Information Overview	SIP (Session I	nitiation Protocol)					
Codec Settings Codec Switch Criteria	Configuration Port:		0				
Interface Settings	Save						

Figure 78: Audio over IP Settings – local SIP port configuration



NOTE: The IP-4c is compliant with the mandatory directives N/ACIP EBU Tech 3326.

5. Click the "Save" button to save the changes.

17.1.2. Create new SIP Phonebook Entries

You can preconfigure up to 60 entries in the SIP phonebook.

Create and configure new contacts in the SIP phonebook as follows:

1. Open the menu **AoIP Settings→SIP Phonebook** (see Figure 79).

2w com [.]	IP-4c	Name: Kai's IP-4c Location: Description:	Power War	ning put	
Information Overview	SIP Phone	book			
Codec Settings	Search:				
Codec Switch Criteria	Name	- Connect	- Encoder Profile	 Decoder Profile 	▲ FEC ▲
Interface Settings Audio XLR Headphone DTE GPI			Phonebook is empty! + Create first entry		First Prev 1 Next Last
GPO Network Settings TCP/IP SNMP EMBER+ NTP					
AoIP Settings SIP Phonebook Easy2Connect					

Figure 79: Preconfiguration of SIP contacts

- 2. For the first contact entry click the button "Create first entry".
- 3. Click the "Edit" button to configure a new SIP contact. The window "SIP Contact settings" appears:

SIP Contact settings	×
Name:	
Connect:	
Encoder Profile:	MP2 1 MPEG Layer2, 48000Hz 256k, Stereo
Decoder Profile:	MP2 1 MPEG Layer2, 48000Hz 256k, Stereo
Delay [ms]:	100
Port [0 = auto]:	0
Reconnect Count:	0
FEC enable:	OFF
Save Cancel	

Figure 80: SIP Phonebook – Contact settings

4. Define the name of the contact in the "Name" field.

5. Enter Username/Address of the connecting device (registered second user agent) in the "Connect" field.



6. Click the "Save" button to save the new entry in the SIP Phonebook.

17.1.3. Assign the Codec Profiles to the SIP Contacts

To each entry in the SIP phonebook you can assign the preconfigured codec profiles for encoder/decoder and specify other options for connection:

1. To configure a SIP Phonebook entry open the "SIP Contact settings" menu under AoIP Settings→SIP Phonebook by clicking the corresponding "Edit" button.

Information Overview Codec Switch Criteria Interface Settings Addo XLR Headphone DTE GRO Network Settings SMAP ExhiP SMAP ExhiP SMAP ExhiP SMAP ExhiP SMAP Exhips SDP Donebook Eanstein Sip Phonebook Eanstein Sig Phonebook	2w com [.] ♥	IP-4c	Name: Kai's IP-4c Location: Description:	 Power Warning Input Output 	
Codec Settings Codec Switch Criteria Interface Settings Audob XLR Headphone OTE GPU Network Settings Strike? Strike? Meter Layer2, 48000Hz Meter Layer2, 48000Hz Interface Settings Meter Layer2, 48000Hz SIP Contact settings Meter / Decoder Profile: Sip Phonebook EayoP <th>Information Overview</th> <th>SIP Phoneb</th> <th>ook</th> <th></th> <th></th>	Information Overview	SIP Phoneb	ook		
Codec Switch Criteria Interface Settings 1 123 MPEG Layer2, 48000Hz - 1 123 MPEG Layer2, 4800Hz - 1 123 MPEG Layer2, 4800Hz - 1 123 MPEG Layer2, 4800Hz - 1 123 Name: - Connect: 123 SNAP - Name: - Connect: 123 Encoder / Decoder Profile: - MP2 - SNP - SIP Phonebook - SIP	Codec Settings	Search:			
Interface Settings Audio XLR Headphone DTE GPI GPO SIP Contact settings Network Settings TCP/IP SNAP EMBER+ NTP AolP Settings SIP Phonebook Early Connect SIP Phonebook Early Connect SIP Contact settings FEC enable:		Name	~ Connect	← Encoder Profile	ecoder Profile ~ FEC ~
Interface Settings 1 123 MPEG Layer 2, 48000Hz - €dit + • Audio XLR 1 123 MPEG Layer 2, 48000Hz - €dit + • Headphone 0 File • • €dit + • GPI GPI SIP Contact settings × Network Settings Name: 1 ICC/IP Connect: 123 SNMP Encoder / Decoder Profile: • EMBER+ Port [0 = auto]: 0 SIP Phonebook Reconnect Count: 0 SIP Phonebook FEC enable: O		1	123	MPEG Layer2, 48000Hz MI	PEG Layer2, 48000Hz - Edit -
Autor XLK 1 123 MPEG Layer2, 48000Hz - Edit • • • Headphone DTE GP0 SIP Contact settings Network Settings TCCP/P SNAP ENDER+ NTP AoIP Settings SIP Phonebook Ease SIP Phonebook Ease SIP Strings SIP Contact settings	Interface Settings	1	123	MPEG Layer2, 48000Hz MI	PEG Layer2, 48000Hz Edit •
CP SIP Contact settings Connect: 1 Connect: 123 SNMP Encoder / Decoder Profile: EMBER* Impr Profile 1 NTP Delay (ms): AcIP Settings 0 SIP Phonebook Reconnect Count: Essp2Connect 0 SIP FEC enable:	Audio XLR Headphone	1	123	MPEG Layer2, 48000Hz MI	PEG Layer2, 48000Hz Edit
GPI GPO SIP Contact settings Improvement SIP Phonebook Easy2Connect SIP Phonebook Reconnect Count: GPO SIP Phonebook Reconnect Count: GPO SIP Phonebook GPO SIP Phonebook GPO SIP Phonebook GPO GPO GPO GPO GPO					First Prev 1 Next Last
Network Settings Name: 1 TCP/IP Connect: 123 SNUP Encoder / Decoder Profile:) ENDER+ Imp? Profile 1 NTP Delay (ms): 100 AolP Settings Port [0 = auto]: 0 SIP Phonebook Reconnect Count: 0 Easy2Connect FEC enable: 0			SIP Contact settings	×	
COP/IP Connect: 123 SNAP Encoder / Decoder Profile: > Encoder / Decoder Profile: > > MP2 Profile 1 > NTP Delay (ms): 100 AoIP Settings Port [0 = auto]: 0 SIP Phonebook Reconnect Count: 0 Easy2Connect FEC enable: 0	Network Settings		Name:	1	
SNAP ENDER+ NTP AoIP Settings SIP Phonebook Easy2Connect SIP SAP			Connect:	123	
NTP Delay [ms]: AoIP Settings Do SIP Phonebook Reconnect Count: Easy2Connect O SIP FEC enable:	SNMP EMBER+		Encoder / Decoder Profile:	Profile 1	
AoIP Settings Delay [ms]: 100 Port [0 = auto]: 0 SIP Phonebook Reconnect Count: Easy2Connect 0 SIP FEC enable:				256k, Stereo	
AolP Settings Port [0 = auto]: 0 SIP Phonebook Reconnect Count: 0 Easy2Connect 0 FEC enable: SIP Save Cancel			Delay [ms]:	100	
SIP Proceedook Reconnect Count: 0 Easy2Connect 0 SIP FEC enable: SAP Save	AoIP Settings		Port [0 = auto]:	0	
SIP FEC enable: 007	SIP Phonebook Easy2Connect		Reconnect Count:	0	
SAP Save Cancel			FEC enable:	OFF)	
			Save		

Figure 81: SIP Phonebook - Edit SIP Contacts

2. Enter the following data in the fields of the configuration of the SIP Audio Stream for the chosen contact:

NOTE:
 "Profile Encoder" defines the audio format that the IP-4c (encoder) should send;
– "Profile Decoder" defines the audio format that the external encoder device should send.

Delay:Set up the send delay time in ms, which the encoder should wait in order to send
Audio over IP (SIP). For more information see section 13.5 "Set up Buffer" on page
67.

Port:	Applicable only if you connect a remote encoder directly via the IP address. Enter the UDP/RTP port of the sender/destination. Enter "zero" for automatic port.
FEC:	Enable by selecting "ON" in the virtual switch (see section 13.2 "Set up FEC for Decoder" on page 65).

3. Click the "Save" button to save the changes.

17.1.4. Establish Connection via SIP Dial (Easy2Connect)

- You have already assigned and activated presets for SIP input sources to decoder audio outputs (see section 13.1 "Assign and Activate Source Streams" on page 63)
- ✓ You have already defined SIP contacts (see section 17.1.2 "Create new SIP Phonebook Entries" on page 94).
- ✓ You have already assigned the codec profiles to the SIP phonebook entries for encoder and decoder (see Figure 82).

2 w com [.]	IP-4C Nam Local Desc	e: iion: ription:	Power V	Varning Nutput	
Information Overview	SIP Phonebook				
Codec Settings	Search:				
Switch Criteria	Name xxx-1	- Connect	 Encoder Profile AAC-LD, 44100Hz (AAC-LD 	 Decoder Profile 44100Hz) AAC-LC, 48000Hz (AAC-LC, 4 	- FEC - (Edit) + -
Interface Settings Audio XLR Headphone	xxx-A2	xxxxx2	MPEG 1 (MPEG Layer3, 44	AAC-LC, 48000Hz (AAC-LC, 4	B000Hz) 1x4 Edit + - Prev 1 Next Last
dte Gpi Gpo					
Network Settings TCP/IP					
EMBER+ NTP					
AoIP Settings SIP Phonebook Easy2Connect					

Figure 82: Configured SIP contacts for encoder and decoder

To establish the connection and to start data transmission:

1. Select **AoIP Settings→Easy2Connect** in the web interface. The page "Overview/Easy2Connect (SIP)" appears:

2 w com [.]	IP-4C Name: Locatio Descrip	n: tion:	Power Warning	
Information Overview Codec Settings	Overview / Easy Audio 2 - Main Audio 3	2Connect (SIP) - Main Details / Overview		
Codec	Source	Audio Remote	Phonebook	Search:
Switch Criteria Interface Settings Audio XLR Headphone DTE GPI GPI GPO Network Settings	Name xox.sip.de xoxcoccc SiP1	10000 -240.0 defs 12 -40 -20 -10 -240.0 defs 12 -40 -20 -10 -240.0 defs Type SR Birrate Mode SW Buffer Err None 0 1 -	Name xxx-1 xxx-A2	Connect xxxxxx1 xxxxxx2 First Prev 1 Next Last
TCP/IP SNMP	Call			
EMBER+ NTP	Status: Registrar:	Not connected		
AoIP Settings SIP Phonebook	Phonenumber:	XXXXXXXXX SIP1		
Easy2Connect SIP SAP PTP Livewire	Connect: Encoder / Decoder Profile: Use default settings:	MPEG Layer2 MP2 MPEG Layer2 MP2 MPEG Layer2 256k, Stereo		

Figure 83: SIP Dial Easy2Connect – connection and data transfer

- 2. In the "Phonebook" block you can see the contacts configured in section 17.1.2 "Create new SIP Phonebook Entries" on page 94. Select a SIP contact entry for data transfer and click the green icon on the entry.
 - $\Rightarrow~$ The selected contact appears in the "Call" block and is now ready for connection.
- 3. Click the green icon 💿 in the "Call" block to establish the connection.
- 4. To hang up the connection click the red icon 📀 in the "Call" block.
- 5. For a **quick dial** change the encoder configuration manually in the "Encoder/Decoder" block and enter the dial number directly into the "Connect" field. For manual access to the connection settings for decoder, deactivate the virtual switch "Use default settings":

Call	
Status:	Not connected
Registrar:	Data 1
Phonenumber:	
Connect:	2569
Encoder Profile:	3 PCM PCM/16,48000Hz 1536k, Stereo
Use default settings:	
Manuel Settings	
Decoder Profile:	BCM PCM/15,48000Hz ↓ 1536k, Stereo
Port: [0 = auto]	0
Delay: [ms]	100
Reconnect Count:	0
FEC enable:	

6. In the "Details/Overview" tab in the same menu you can see the details of the activated SIP connections for decoder and of the current data transfer (see Figure 84):

0	IP-4C Name:		🔵 Power 🛛 🔵 Warning	
2w com' ¯	Descrip	niion:	Input Output	
Information Overview	Overview / Easy	2Connect (SIP)		
Codec Settings	Audio 2 - Main Audio 3	- Main Details / Overview		
Codec Switch Criteria	Audio 2 - Main	Audio Remote	IP Input	FEC Input
Interface Settings Audio XLR Headphone	SIF Name xxx.sip.de x0000000	-22 -40 -40 -40 -20 -20 -240.0 eFF5 -22 -40 -30 -20 -20 -240.0 eFF5 Type SR Bitrate Mode SW Buffer Err None 0 1 -200.0 -240.0 -240.0 eFF5	SIP/URI Missed Packets/s PER Bitrate Jitter 0 0 0.0 % 0 0.0 ms	Matrix Recov. Unrecov. Bitrate Col Bitrate Row
DTE		Audio Local	[P Output	Counters
GPI GPO		-240.0 dBF5 -70 +60 -70 -40 -70 -20 -20 -240.0 dBF5 -240.0 dBF5 Type SR Bitrate Mode SW	Bitrate Packets/s Max size Receiver Address 0 0 0 Lost Jitter Roundtrip time Fraction Lost	Reset
Network Settings		None		
SNMP	Audio 3 - Main	Audio Remote	IP Input	FEC Input
EMBER+ NTP	Name xxx.sip.de 10xxxxxxxx SIP2	0 -10 -10 -10 -240.0 dBFS -30 -40 -40 -30 -20 -240.0 dBFS -31 -40 -40 -30 -20 -240.0 dBFS Type SR Bitrate Mode SW Buffer Err None 0 0 0 0 0	SIP/URI Missed Packets/s PER Bitrate Jitter 0 0 0.0.0% 0 0.0.0ms	Matrix Recov. Unrecov. Bitrate Col Bitrate Row
AoIP Settings				000
Easy2Connect		Audio Local	IP Output	Counters
SIP SAP PTP		140.0 eers 140.0	O O Lost Jitter Roundtrip time Fraction Lost	Reset

Figure 84: Overview – Details of the configurated SIP connections and current data transfer The status color means:

- green the SIP connection is active
- red the SIP connection is not active; SIP registration has failed

orange - the SIP connection is not active; SIP registration is successful

- 7. In the corresponding SIP connection "Overview" block you can see the details of all configured SIP connections and the status of the encoded and decoded audio streams.
- 8. To see all details click the symbol.
- 9. To rest the counters click the "Reset" button.

17.2. Set up SAP Service

The IP-4c supports SAP (Session Announcement Protocol) Announcements for stream announcement.

To set up the SAP connection, you need administrator rights.

Log in to the "admin" account and open the menu "Session Announcement Protocol (SAP)" under AolP Settings→SAP (see Figure 85).

Enter the following data in the fields of the configuration of the SAP:

Mode:	To activate SAP, select mode: "Client", "Sever" or "Client/Server" in the dropdown list. "Client/Server" mode is recommended.
Announce interval:	Set up the time interval in seconds between sending SAP messages.
Multicast loop:	Activate "Multicast loop", if the IP-4c should receive its own SAP announcements. Default setting is "OFF".
Receive address and port:	Set the multicast address and port to receive SAP messages.
Ethernet port:	Select the Ethernet connector in the dropdown list: "Data 1"or "Data 2" for transmission of SAP announcements

Bandwidth limit:

Enter the maximal value for bandwidth in bytes for SAP messages that should be sent per second to avoid overhead.

Destination address and port:

Set the destination multicast address and port for SAP announcements.



Figure 85: SAP Settings

17.3. Set up PTP Configuration

Optionally, the IP-4c supports the PTP V2 (Precision Time Protocol) network synchronization that allows fully synchronized stream operations. To set up the PTP connection, you need administrator rights.

Not yet available.

17.4. Set up Livewire Configuration

To set up the Livewire connection, you need administrator rights. Log in to the "admin" account and open the menu "Livewire" under **AoIP Settings → Livewire** (see Figure 86).

2w com [.]	IP-4C Na Loc De	me: ation: scription:	Power Input	 Warning Output
Information Overview	Livewire			
Codec Settings	General			
Codec Switch Criteria	Routing Protocol:			
Interface Settings Audio XLR	Save			

18. Buffer Delay Management

When using the IP-4c there are different stages where delay is introduced by processing or for security (i.e. FEC or dejitter buffer). For uninhibited operation, the user needs to make sure, that delay settings are in a safe area.

Delay is calculated in the following matter for a basic setup:

Encoder processing delay + transmission delay on IP network + decoder processing delay

Encoder delay typically is <5ms, transmission delay on IP network can vary by a large degree, depending on the network employed. Decoder processing delay needs to be broken down into multiple stages:

Dejitter/Reorder or FEC output delay + additional delay + decoder processing delay

When no FEC is used a Dejitter/Reorder buffer can be used which will add delay in the length it is setup to. When FEC is used, there is a minimum delay that is required for safe operation (in the length of two full FEC matrices), anything on top of that is used for additional dejittering reordering of the input stream, as the FEC also includes this task as well. If the user setting is too small, it is overwritten internally, to ensure safe operation. The current active setting to each decoder can always be seen in **Information Overview** in the "Details – Decoder / Audio 1-4" block. The user can use the additional delay setting to further delay the output up to 1000ms and the decoder will also have a small delay of <5ms.

Recommended default buffer configuration:

Packet reorder delay: 100 ms, Audio delay: 100 ms

The minimal needed additional buffer sizes depend on the chosen FEC Mode (Row x Col):

FEC Mode (2 x matrix size)	1x4	4x4	5x5	10x10
Codec (Packets/Sec.)	(8)	(32)	(50)	(200)
PCM (250)	0,03	0,13	0,20	0,80
MPEG1 Layer-2 (42)	0,19	0,76	1,19	4,76
MP3 (42)	0,19	0,76	1,19	4,76
AAC LC (47)	0,17	0,68	1,06	4,25
AAC HE v1 (24)	0,33	1,33	2,08	8,33
AAC HE v2 (24)	0,33	1,33	2,08	8,33

Table 5: Minimum FEC delays sizes

2 x size of matrix / IP packets per seconds = additional delay in seconds

19. Device Settings

19.1. Enter the Device Information

To enter the name and description of the device for identification:

- 1. Open the window *Global* under **System Settings→Global**.
- 2. Enter the identification information of the device in the **System parameter** field (see Figure 87).

2 w com [.]	IP-4c	Name: Location: Description:	• P	Power 🕒 Warning nput 🕒 Output	
Information Overview	Global				
Codec Settings	Control			System information	
Codec				Present local date and time:	24. May 2019, 09:47:46
Switch Criteria	Reboot Device:	Now Load Factory Settings:	Now	Last boot:	24. May 2019, 07:38:19
				Uptime:	0 days, 02:09:27
Interface Settings	System Info			Serial number:	740.000015
Audio XLR	Manag			File/Recovery system version:	1.02 / 0.99
Headphone	Name:			App version:	1.10
DTE	Location:			Webinterface version:	1.42
GPI	Description:			FPGA version:	0.98b6 / 0
GPO				System Controller version:	1.02
Network Settings	Web interface			MIB version:	<u>device_mib.zip</u> 20.05.2019 09:10:28:0 + 01:00
TCP/IP	Session timeout (0 =	= disable):	0 min	HW Revision XPS/IF:	1.00 / 1.00
SNMP				Rights:	CH:2
EMBER+	Save			Open source acknowledgements:	Link
NTP					

Figure 87: Global System Settings – System parameter

- 3. Click the "Save" button to save the changes or the "Reset" button to restore the last settings.
 - \Rightarrow The saved information is always displayed in the web interface above the main menu.

19.2. View the System Information

On the web interface, you can view general settings of the device and current system information like uptime, serial number, firmware version, the temperature etc.

To view the system information:

- 1. Open the window *Global* under **System Settings** \rightarrow **Global** (see Figure 91 on page 103).
- 2. The device information is displayed in the "System information" field (see Figure 88).

NOTE: The current version of the IP-4c is the "App version". The parameter "HW Revision XPS/IF" specifies hardware information: XPS - eXtendable Processor System;

IF - Interface Board.

2w com [.]	IP-4c	Name: Location: Description:		Power Warning		
Information Overview	Global					
Codec Settings Codec Switch Criteria	Control Reboot Device:	Now Load Factory Settings:	Now	System informati Present local date and the Last boot: Uptime:	on me: 24. May 2019, 09:45:11 24. May 2019, 07:38:19 0 days, 02:06:52	
Interface Settings Audio XLR Headphone DTE GPI GPO	System Info Name: Location: Description:			Serial number: File/Recovery system ver App version: Webinterface version: FPGA version: System Controller versio	740.000015 rsion: 1.02 / 0.99 1.10 1.42 0.9866 / 0 n: 1.02	
Network Settings TCP/IP SNMP EMBER+ NTP	Web interface Session timeout (0 = Save	disable):	0 min	MIB version: MIB version XPS/IF: HW Revision XPS/IF: Rights: Open source acknowledg	device, mib.zip 20.05.2019 0 1.00 / 1.00 CH:2 gements: Link	9:10:28:0 + 01:00
AolP Settings SIP Phonebook Easy2Connect SIP SAP PTP Livewire	Firmware upda Upload and activate Browse / Drop fil Rights	te firmware file (*_bundle_*.upd, recovery_*.upd, xpsc eNo file selected	_*.tar.gz)	Settings update Upload and activate settin Browse / Drop file	ngs file (*.xml) No file selected	Upload
System Settings Global Time	Upload and activate Browse / Drop fil	rights file (*.2wcom_key) e No file selected	Upload	Generate and download s	ettings	Generate
User Alarm Status Device	SSL-Certificate Upload and activate Browse / Drop fil	SSL-Certificate file (*. <i>pem</i>)	Upload	Diagnostic report	eport	Generate
DTE Data						

Figure 88: Global System Settings – System information

3. To view the status of the device, open the field **Status** under **Information**→**Overview**.

2w com	IP-4C Name: Location: Description:	• •	Power Warning Input Output
Information Overview	Overview		
Codec Settings Codec Switch Criteria Interface Settings Audio XLR Headphone DTE GPI GPO	Audio Interfaces Inputs	Audio 1 Audio 2 1 0 1 0 <	Status Uptime 0 days, 02:14:19 Last boot 24. May 2019, 07:38:19 Temp 52 °C LAN
Network Settings TCP/IP SNMP EMBER+ NTP	Decoder Audio 1 Main None	Encoder Encoder 1 S Audio Input 1	PCM Type PCM PCM PCM None
AoIP Settings SIP Phonebook Easy2Connect SIP SAP PTP Livewire	Audio 2 Main None	Encoder 2 Control of the second seco	48000 1.536M PCM PCM PCM sR BR 48000 1.536M
System Settings Global Time User Alarm	-	Encoder 3 None	Encoder 7 None
Status Device DTE Data Storage Log		Encoder 4 None	None

Figure 89: Information – status of the device

4. To view the current status of the device, the status of both power supply units and of electric voltages on the main board, open the window *Device Status* under **Status**→**Device** (see Figure 90).

2w com [.]	IP-4C Name: Location: Description:		Power Warning Input Output	
Information Overview	Device Status			
Codec Settings Codec Switch Criteria Interface Settings Audio XLR Headphone DTE GPI GPO	Mainboard (Dual Supply) Supply 1 State: 12 V Fan 1 Speed: 0 RPM Fan 2 Speed: 0 RPM	Supply 2 State: 12 V Temp: 53 °C	12V: 11.89 V 3.3V: 3.28 V 1.8V: 1.78 V 1.0V: 0.99 V	5V: 4.98 V 2.5V: 2.53 V 1.2V: 1.19 V

Figure 90: Status – Current electric voltages on the main board and power supply status

19.3. Set up Rights

Some functions are optional such as 2 or 4 Channels and other. To use these functions, additional rights must be set. To upload and activate a rights file stored locally:

1. Open the window *Global* under **System Settings→Global**.

2w com [.]	IP-4C Name: Location: Description:	Power 🕒 Warning Input Output
Information Overview	Global	
Codec Settings Codec Switch Criteria Interface Settings Audio XLR Headohone	Control Reboot Device: Now Load Factory Settings: Now System Info Name:	System information Present local date and time: 09. January 2019, 09:31:43 Last boot: 09. January 2019, 05:17:35 Uptime: 0 days, 04:14:08 Serial number: 740.000017 File/Recovery system version: 1.02 / 0.99
DTE GPI GPO	Location: Description: Web interface	App version: 1.30 Webinterface version: 1.42 FPGA version: 0.9866 / 0 System Controller version: 1.02 MIB version: device mib zio 20.05 2019 09:10:28:0 + 01:00
Network Settings TCP/IP SNMP EMBER+ NTP	Session timeout (0 = disable): 0 min	HW Revision XPS/IF: 1.00 / 1.00 Rights: CH:2 Open source acknowledgements: Link
AoIP Settings SIP Phonebook Easy2Connect SIP SAP	Firmware update Upload and activate firmware file (*_bundle_*.upd, recovery_*.upd, xpsc_*.tar.gz) Browse / Drop file No file selected Upload	Settings update Upload and activate settings file (*.xml) Browse / Drop file No file selected Upload
Livewire System Settings Global Time	Rights Upload and activate rights file (*.2wcom_key) Browse / Drop file No file selected Upload	Settings download Generate and download settings Generate
User Alarm Status	SSL-Certificate Upload and activate SSL-Certificate file (*.pem)	Diagnostic report Generate and download report Generate
Device DTE Data Storage Log	Browse / Drop file No file selected	

Figure 91: System Settings - Global

- 2. Click the Browse button in the **Rights** field (see Figure 91 on page 103). The "Open file" dialog of your system software will be displayed.
- 3. Choose the rights file in your browser.
- 4. Click the "Upload" button to upload and to activate rights file. The file upload can take longer and may not be interrupted.
- 5. Follow the prompt to restart the device after successful upload
 - \Rightarrow The new rights will be activated after the restart of the device.
 - \Rightarrow You can view the active rights in the same menu in the "System information" block in the "Rights" field (see Figure 91).

19.4. View the Log

The unit records the important system events such as cold start, warm start, firmware update, error messages etc. in a "Log".

To view and to edit the log:

1. Open the window *Log* under **Status** \rightarrow **Log** in the end of the menu (see Figure 92).

N	IP-4c	C Name:			Power	Warning		
2wcom'		Location:			lingut	Output		
Information								
Overview	Log							
							Priority Filter: No filter	Clear
Codec Settings								
Codec Switch Criteria	Nr	- Time	- Priority	 Message 				<u> </u>
Switch Citteria	47	2019-05-22 06:45:15	Informational	Cold Start				<u>^</u>
Interface Settings	46	2019-05-21 06:28:01	Informational	Cold Start				
Audio XLR	45	2019-05-20 12:45:17	Informational	Warm Start				
Headphone	44	2019-05-20 12:44:47	Informational	Firmware update				
GPI	43	2019-05-20 09:20:38	Informational	Warm Start				
GPO	42	2019-05-20 09:20:08	Informational	Firmware update				
	41	2019-05-20 06:47:43	Informational	Cold Start				
Network Settings	40	2019-05-17 06:02:33	Informational	Cold Start				E
TCP/IP	39	2019-05-16 06:31:59	Informational	Cold Start				
EMBER+	38	2019-05-15 10:27:43	Informational	Warm Start				
NTP	37	2019-05-15 10:27:14	Informational	Firmware update				
	36	2019-05-15 06:02:21	Informational	Cold Start				
AoIP Settings	35	2019-05-14 12:07:43	Informational	Warm Start				
SIP Phonebook	34	2019-05-14 12:07:14	Informational	Firmware update				
SIP	33	2019-05-14 12:02:48	Informational	Warm Start				
SAP	32	2019-05-14 12:02:20	Informational	Firmware update				
РТР	31	2019-05-14 11:14:06	Informational	Cold Start				
Livewire	30	2019-05-14 09:46:23	Informational	Warm Start				
System Settings	29	2019-05-14 09:45:54	Informational	Firmware update				
Global	28	2019-05-14 08:21:36	Informational	Warm Start				
Time	27	2019-05-14 08:07:12	Informational	Warm Start				
User	26	2019-05-14 08:06:43	Informational	Firmware update				
Alarm	25	2019-05-14 06:47:18	Informational	Cold Start				
Status	24	2019-05-13 08:19:36	Informational	Warm Start				
Device	23	2019-05-13 08:19:07	Informational	Firmware update				
DTE Data	22	2019-05-13 08:14:37	Informational	Cold Start				-
Storage							First Prev 1 Next	
105								

Figure 92: Status – Log

- 2. For more information about the priority of the messages see Table 2 "Alarm Priority" on page 74.
- 3. To save the list of messages as log file, click the "Download" button and choose the archive location on the directory tree and confirm the choice.
- 4. To clear the log, click the "Clear" button and confirm the choice.

19.5. Upload and Activate Settings Stored Locally

IP-4c is able to store and load all settings through the web interface to any local storage.

To upload settings stored locally:

- 1. Open the window *Global* under **System Settings→Global**.
- 2. Click the Browse button in the **Settings update** field (see Figure 91 on page 103). The "Open file" dialog of your system software will be displayed.
- 3. Choose the settings file in your browser.
- 4. Click the "Upload" button to upload the file. The file upload can take longer and may not be interrupted.
- 5. Follow the prompt to restart the device after successful upload.
 - \Rightarrow The new settings will be activated after the restart of the device.

19.6. Save Settings to Local File

You can download the current settings and save them as a file.

To save settings to local file:

- 1. Open the window *Global* under **System Settings→Global**.
- 2. Click the "Generate" button in the **Settings download** field to start the generation of a settings file (see #4 in Figure 91 on page 103).
- 3. A link to that file will be shown. Right-click on it to save it to a location of your choice.
 - \Rightarrow The saved settings can be uploaded in the "Settings update" field (see section 19.3).

19.7. Upload and Activate Firmware Stored Locally

You can upload an ARM firmware stored locally.

To upload and to activate the new firmware:

- 1. Open the window *Global* under **System Settings→Global**.
- 2. Click the Browse button in the **Firmware update** field (see Figure 91 on page 103). The "Open file" dialog of your system software will be displayed.

Firmware update					
Upload and activate firmware file (*_bundle_*.upd, recovery_*.upd, xpsc_*.tar.gz)					
Browse / Drop file No file selected	Upload				

Figure 93: Global System Settings – Firmware update

- 3. Choose the firmware file.
- 4. Click the "Update" button, to start the file upload in the web browser. The file upload can take longer and may not be interrupted.
- 5. Follow the prompt to restart the device after successful upload.
 - \Rightarrow The new firmware will be activated after the restart of the device.

19.8. Set up Time

You can set up or change manually the present local time zone and date of the internal clock of the device.

To set up the internal clock of the device:

1. Open the window *Time* under **System Settings→Time** (see Figure 94).

2w com [.]	IP-4c	Name: Location: Description:	Pov	wer 🕒 Warning Dut 🕒 Output	
Information Overview	Time				
Codec Settings	Local time			Time and date settings	
Switch Criteria	Time zone	Etc 🗸 UTC	~	Present local data and time: New date [dd.mm.yyyy]:	26. June 2019, 07:51:34 26 . 06 . 2019
Interface Settings Audio XLR	Save			New time [hh:mm:ss]:	07 : 51 : 23
Headphone DTE GPI				Save	
GPO					
Network Settings TCP/IP					
SNMP EMBER+ NTP					
AoIP Settings					
SIP Phonebook Easy2Connect SIP					
SAP PTP					
Livewire					
Global Time					
User Alarm					

Figure 94: System Settings – Time

- 2. Choose the current time zone of the device in the **Time zone** field in the dropdown menu.
- 3. Click the "Save" button to save the changes or the "Reset" button to restore the last settings.
- 4. In the **Time and date settings** field, set up the internal time in the 24h format and the datum.
- 5. Click the "Save" button to save the changes or the "Reset" button to restore the last settings.

19.9. Configure User Accounts

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). Change the login data for the access after the first login to the web interface.

NOTE: Certain settings are <u>not</u> available in the "Manager" account. The access to separate menus can be adapted by the "admin" (see Figure 96 on page 108).

To change the login data:

- 1. Open the window User settings under **System Settings→User**.
- 2. Change the login data for the full access in the Admin account field and repeat the new password.
- 3. Click the "Save" button to save the changes or the "Reset" button to restore the last settings.

4. Change the login data in the **Manager account** and **Guest account** field and repeat the new passwords.

2w com [.]	IP-4c	Name: Location: Description:	Pow	wer 🕒 Warning ut 🕒 Output	
Information Overview	User				
Codec Settings Codec Switch Criteria Interface Settings Audio XLR Headphone DTE	Admin account Username: Password: Password (repeat): Save	admin		Manager account Username: Password: Password (repeat):	manager
GPI GPO TCP/IP SNMP EMBER+ NTP AOIP Settings	Guest account Username: Password: Password (repeat): Save	guest		SFTP service Username: Password: Password (repeat):	sftpuser
SIP Phonebook Easy2Connect SIP SAP PTP Livewire System Settings Global Time User Alarm					

Figure 95: User accounts configuration

5. Click the "Save" button to save the changes or the "Reset" button to restore the last settings.



NOTE: 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.

The default password at delivery is "sftpuser".

If you are logged in as an "admin", there are additional fields "Manager-" and "Guest adapted menu access" in the same menu under **System Settings**-**User**. Here you can configure the access to certain web interface pages for the manager and guest accounts.

To adapt the access for manager and guest accounts to the separate IP-4c menus:

- 1. Open the window "User settings" under **System Settings→User**.
- In the additional fields "Manager-" and "Guest adapted menu access", below the configuration menus for user accounts, you can activate or deactivate the access to the separate menus by activating a virtual switch to "ON" or "OFF" (see Figure 96):

	Manager adapted menu access	Guest adapted menu access
2w com	Codec Settings	Codec Settings
	Codec 💿 🔿	Codec
Information	Switch Criteria	Switch Criteria
Overview	Interface Settings	Interface Settings
Codec Settings	Audio XLR ON O	Audio XLR OFF
Codec	Headphone ON O	Headphone
Switch Criteria	DTE ON O	DTE
	GPI ON O	GPI OFF
Interface Settings	GPO ON O	GPO OFF
Audio XLR Headphone	Network Settings	Network Settings
DTE		
GPI		
GPU		
Network Settings		
ТСР/ІР		
SNMP EMBER+	AoIP Settings	AoIP Settings
NTP	SIP Phonebook	SIP Phonebook
	Easy2Connect	Easy2Connect Off
SIP Phonebook	SIP	SIP
Easy2Connect	SAP ON O	SAP
SIP	PTP OFF	PTP
SAP PTP	Livewire ON O	Livewire
Livewire	System Settings	System Settings
Live Listening	Time	Time
System Settings	Alarm	Alarm
Global		
Time	Status	Status
Oser Alarm	Device ON O	Device OFF
	DTE Data	DTE Data
Status	Storage	Storage OFF
Device DTE Data		Log
Storage		
Log	Save	Save

Figure 96: User - Configuration of the menu access

3. Click the "Save" button to save the changes.

19.10. Set up the Session Timeout

To set up the session timeout for the web interface of the device:

- 1. Open the window *Global* under **System Settings→Global** (see Figure 97 on page 109).
- 2. Enter the value in min for the session timeout in the **Web interface** field:
| 2w com | IP-4C Name:
Location:
Description: | Power Warning |
|-------------------------|---|--|
| Information
Overview | Global | |
| Cadao Sattinga | Control | System information |
| Codec Settings
Codec | | Present local date and time: 26. June 2019, 08:05:37 |
| Switch Criteria | Reboot Device: Now Load Factory Settings: | Now Last boot: 26. June 2019, 05:24:19 |
| | | Uptime: 0 days, 02:41:18 |
| Interface Settings | System Info | Serial number: 740.00001 |
| Audio XLR | Name | File/Recovery system version: 1.10 / 1.03 |
| Headphone | | App version: 1.14 |
| DIE | Location: | Webinterface version: 1.50 |
| GPI | Description: | FPGA version: 0.98b6 / 0 |
| GPO | | System Controller version: 1.02 |
| Network Settings | Web interface | MIB version: device_mib.zip 1.1 |
| тср/ір | Session timeout (0 = disable): | 0 min HW Revision XPS/IF: 0.20 / 0.10 |
| SNMP | | Rights: CH:4 |
| EMBER+ | Save | Open source acknowledgements: Link |
| NTP | | |

Figure 97: Session timeout for the web interface

- 3. Enter "zero" to deactivate the function.
- 4. Click the "Save" button to save the changes.

 \Rightarrow The current user will be automatically logged out after the configured period of inactivity (session timeout).

19.11. Reboot the Device

To reboot the device:

- 1. Open the window *Global* under **System Settings→Global** (see Figure 97 on page 109).
- 2. Click the "Reboot" button in the last field of the web page to reboot the device

 \Rightarrow The device restarts.

19.12. Restore Factory Settings

ΝΟΤΙ	CE
	CAUTION : If you restore factory settings, all saved configurations made earlier by user will be deleted except for the IP address!
	This applies also for the access accounts!

To reset the device to the factory settings:

- 1. Open the window *Global* under **System Settings→Global** (see Figure 97 on page 109).
- 2. In the "Control" block click "Now" in the Load Factory Settings field to restore factory settings.

20. Maintenance and Servicing

Maintenance

No special maintenance is necessary on the device. Dust can be removed with a dry duster. For cleaning use only neutral, non-corrosive detergents applied to a cloth - not the device.

Servicing

The modules of the device are complex and should be serviced only by authorized personnel.

ΝΟΤΙ	ICE
	You can exchange one of the two plug-in power supply units in the IP-4c during ongoing operation if one power supply unit fails.
	The current information about the operation of the both power supply units you can view over the web interface of the device under System Settings \rightarrow Global (see Figure 90 on page 103).

The IP-4c is optionally equipped with a left and right plug-in power supply unit that are independent from each other. You can exchange one of them in the IP-4c **during ongoing operation** if one power supply unit fails. To unplug the defect power supply unit, just pull out carefully the plug housing. Exchange the defect power supply unit by an intact power supply unit.

The 2wcom Systems GmbH is equipped with special measurement and repair kits. Therefore a repair by the user is not intended.

Calibration

Due to the design and construction of the device, no calibration is necessary.

21. Troubleshooting

The following chart is designed to help you to correct minor problems with the use of the device prior to contact our service department (report failures by email to *contact@2wcom.com* or fax to +49 461-662830-11).

Problem	Possible Cause	Solution
Device does not turn on	 Power cable is improperly connected Mains supply failure Blown fuse 	 Check supply cord Make sure that the power plug at the device is fully inserted Check mains supply Replace fuse by same type Replace one of the plug-in power supply units (see section 21)
Device cannot be operated via Ethernet	 Network cable not connected IP address / TCP port is not known. A device with the same IP address was connected a few minutes before. Then the ARP table still assigns the old MAC address to the IP address. 	 Connect the network cable. Check IP address obtained from DHCP via LCD. If the address was changed and is not known, please see page 19. Usually the ARP table is refreshed automatically after a few minutes by the operation system. For an instant access to the device please reset the ARP table of your computer e.g. by entering "arp –d" in the Windows Command Prompt.

Read also the entire manual carefully, as this often helps in understanding and fixing typical problems.

For a support request to 2wcom team, please write the serial number of the device. The sticker with the serial number is normally on the rear side of the device: "S/N xxx.xxxxx".

22. Technical Data

IP-4c Audio over IP codec 1/2



Audio networks based on different

2wcom.

6

protocols

- Broadcast based on EBU TECH 3326, SMPTE ST 2110
- AES67 based on RAVENNA, Livewire or Dante

Audio coding – fitting to your needs

High quality multi-format audio de- /encoding

- MPEG ½ Layer 2, 3
- G.711, G.722, Linear PCM
- Opus
- Ogg Vorbis
- MPEG 2/4 AAC LC
- MPEG 4 AAC LD/ELD
- MPEG 4 HE-AAC v1&v2
- Extended HE-AAC (xHE-AAC)
- Enhanced aptX (E-aptX)
- On request: Bit transparent transmission of digital audio and MPX signals
- On request: Dolby Digital plus (AC3)

IP streaming (unicast, multiple unicast & multicast)

Rock solid network connection even in stress conditions according to standards RFC 3550, RFC 3551, RFC 3640, RFC 2250

- Professional audio IP streaming using UDP, RTP and SIP/SDP (standardized by EBU N/ACIP Tech 3326)
- Unicast, Multiple Unicast & Multicast
- PRO MPEG FEC
- Dual streaming
- Optional: Livewire/ Ravenna (SIP, SAP, RTSP, AES67, PTPv2)
- Optional Stream4Sure: 2wcom streaming technology with different codecs/qualities and seamless switching of up to 4 Streams
- Icecast source client

2wcom Systems GmbH – Am Sophienhof 8 – 24941 Flensburg – Germany +49 461 662830-0 (Fax11) – <u>contact@2wcom.com</u> – www.2wcom.com

Backup / advanced redundancy

management

audio IP-4c

- Flexible automatic switch over concept with free definition of alternative input sources as redundancy solution in case of failures
- Playing files from internal storage or using alternative streams (Icecast / Shoutcast)
- Dual IP ports for data + 1 IP port for control interface
- Optional: redundant power supply 230 VAC or 48 VDC

Control

- Remote control with various possibilities: HTTP/S, FTP, Telnet, NMS, SNMP,
- Revised configuration via web user interface for easier setup
- Insertion of localized advertisement
- SNMP v2c, relays, inputs

Special

- Energy efficient DSP based 24/7 broadcast quality
- RDS decoding (built in RDS/UECP decoder)
- Embedded auxiliary data (RBDS/RDS or PAD) and GPIO forwarding
- Optional: Perfect network synchronization for SFN applications

Monitoring

- IP and MPEG parameters via SNMP v2c and relay
- Headphone output
- Icecast Live Listening



IP-4c – Audio over IP codec 2/2

2wcom [.]	IP-4c	Name: IP-4c Testdevice Location: 2wcom Systems Description:	Power Input	 Warning Live Source: Output 	😧 Audio Output 1 🛛 👻
Information Overview	Codec				
Codec Settings Codec	Input Source	s / Profiles Elementary Streams	SRT 🕊 SIP 🕉 Icecast 🗜	File 😨 XLR	Profiles
TS Multiplexer Switch Criteria	Name	Address	Interface Delay FEC ports	Codec B	uffer Ancillary Clock
	Default	@:5004	Data 1 100	Auto 10	00 Internal Edit + -
nterface Settings udio XLR leadphone YTE ;PI ;PO	Encoder Source Assign	@:5004 Decoder	Data 1 100	Auto 10	00 Internal (Edit) (+) (-)
Network Settings		Main	Backup 1	Backup 2	Backup 3
CP/IP				011	
NMP MBER+ ITP	Audio 1	Default v	NDR 2 SH www.ndr.de//ndr2 sh.m3u	Ø None	* Ø None *

Advanced control functionalities

High quality multi-format audio de-/ encoding:

- HTTP/HTTPS: via web interface
- FTP: XML file control
- NMS: Control via centralized
- Network Management System

Highly sophisticated monitoring and

alarm concept

- Adjustable silence detection
- IP buffer and jitter check
- PLL control
- SNMP, alarm, source switch & event logging

Perfect audio quality

 Balanced analogue and digital AES/EBU (integrated XLR connector)

Advanced IP robustness functionalities

- Even to operate in standard IP networks
- PRO MPEG FEC
- Management of packet size, buffer and QoS
- Optional: Stream4Sure 2wcom streaming technology with different codes / qualities
- And seamless switching of up to 4 streams

Perfect audio & latency management

- Optional: GPS based 2wcom latency control solution usage in SFN FM networks
- ACIP compliant high audio quality and extremely low latency (PTPv2 network synchronization

Technical details 1/2



9 dBFS (adjustable)

-9....+6 dB



Digital reference level

Gain

Audio (encoder / decoder)

Codecs		Dynamic range	16 Bit, > 89 dB
Standard	MPEG 1/2 Layer 2, 3 Linear PCM G.711, G.722 Opus	Frequency response	24 Bit, > 130 dB Depends on sample rate – e.g. 48 kHz: 0,1 dB; 20 Hz 22,5 kHz
On request	Ogg Vorbis MPEG 2/4 AAC LC MPEG 4 AAC LD/ELD/ELD v2 MPEG 4 HE-AAC v1&v2 Extended HE-AAC (xHE- AAC) Enhanced aptX (E-aptX) Dolby digital plus (AC3)	Ethernet Data Connector Type Protocol	Audio, serial data and GPIO transmission, controlling and setup functions 3x RJ45 Auto switching 10/100/1000 BASE-T BTP/BTCP/LIDP_SBT
On requestl Sample rates	ask for other codecs Bit transparent transmission of AES/EBU input kHz: 16, 22,05, 24, 32,		Secure Reliable Transport, IGMP, ICMP, DHCP, HTTPS, SFTP, SNMP, NTP,
	44.1, 48 (On request: up to 192 kHz)		TCP (Icecast), PTPv2, SMTP ST 2110
Sample rate converter	8:1 (with bypass modes)	Serial	
Interfaces		Interface	8x RS-232C (rear) Sub D-15
Performance Digital (in/out)	4x AES/EBU, 110 Ω bal.,	Data	Private data, MPEG ancillary data, UECP/RDS (acc.to TR 101 154)
Analog (in)	integrated XLR 2x L/R, > 10 Ω bal., integrated XLR	Transmission rate	1200 to 115200 baud, asynchronous 1x USB 2.0 interface for
Analog (out)	2x L/R, < 20 Ω bal., integrated XLR	000	service
Headphone (out)	L/R, < 10 Ω, 6,3 mm		
Digital reference input	No dedicated input, selectable by user		

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Technical details 2/2

Interfaces

General data

Contact closure		Power consumption	<20W
Inputs	8x 26 pole sub-D female	Case dimensions	19", 1 HU,
Outputs	7+1 floating relays		Depth: 310 mm,
	7 relays SPST (from A)		Width: 424 mm,
	2 relays SPDT (from C)		Front panel: 484 mm
	DC: max. 30 V, 1 A, 10 W	Weight	< 5 kg
	26 pole sub-D male	Material	Steel plate
			(aluminium-zinc coated)
Internal storage		Operating temp. range	0+45°C
Data	internal audio files	Storage temp. range	-40+70°C
Size	7 GB (optional 1000 GB)	Languages	English
Туре	eMMC (optional SSD)		
		Power supply	
Time synchronization (opti	onal)	Standard	1x internal, 90260 VAC,
PTPv2	Network synchronization		4763 Hz,
	according to IEEE 1588-		1x power port (rubber
	2008		connector)
1PPS	SMA connector	Optional version 1	Two internal redundant
			power supplies (230 VAC
Control & monitor			or 48 VDC),
control & monitor			aut. switchover
Ethomat		Optional version 2	Two external hot
Ethernet	Interneted Web CUIL LCD		swappable redundant
User Interface	diaplaced webGOI, LCD		power supplies (230 VAC
Data	display		or 48 VDC),
Data	Control and setup		aut. switchover
OSB	USB 2.0 Interface for		
	service, configuration		
-	and firmware updates		
Protocol	2wcom NMS, Telnet,		
	HTTPS, SNMP, UDP,		
	RTCP, SRT Secure		
	Reliable Transport, SFTP		
	IGMP, ICMP, NTP, DHCP,		
	SNMP, SSH, PTPv2, TCP		
	(Icecast)		
Front nonal			
Front panel	Creative 201 Chains		
LEDISPIAY	Graphical, 264x64 pixel		
Jog wneel	Impulse, enter button		
4 Duo LEDs	Power, input, output,		
	warning		

Datasheet Version 27.11.2019

These data are subject to modifications and amendments. Errors excepted.