

IP-4c

Audio over IP codec

Highlights

- Multi-format 4-channel audio encoder/decoder
- Robust audio streaming and enhanced redundancy
- Up to 4 digital or 2 analog stereo inputs and outputs



IP-4c – Audio over IP Codec (1/3)

Audio networks based on different 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 decoding and encoding

- MPEG-1/2 Layer 2, 3
- G.711, G.722, Linear PCM
- Opus, Ogg Vorbis
- AAC-LC, HE-AAC v1 & v2, AAC-LD, AAC-ELD, AAC-ELDv2, xHE-AAC
- Enhanced aptX (E-aptX)
- Bit transparent transmission of digital audio and MPX*
- Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3), Dolby E on request*
- FRAUNHOFER DAB+ Encoder with EDI/STI-D interface or FhG MuxEnc (MPEG 4 AAC LC, HEv1 & v2)*

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)
- PRO MPEG FEC, Dual streaming
- SRT Secure Reliable Transport*
- TS RTP, UDP and SRT streaming*
- Livewire / Ravenna (SIP, SAP, RTSP, AES67, PTPv2)*
- Stream4Sure: 2wcom streaming technology with different codecs / qualities and seamless switching of up to 4 Streams*
- HLS, Icast source client*

Backup / advanced redundancy management

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 (Icast, Shoutcast)
- Dual IP ports for data + 1 IP port for control interface
- Redundant power supply 230 VAC or 48 VDC*

* This function is optional. Please find the complete list of options at the end of the document.



IP-4c – Audio over IP Codec (2/3)

The screenshot displays the IP-4c web interface. On the left is a navigation menu with sections: Information (Overview), Codec Settings (Codec, TS Multiplexer, Switch Criteria), Interface Settings (Audio XLR, Headphone, DTE, GPI, GPO), and Network Settings (TCP/IP, SNMP, EMBER+, NTP). The main content area shows the device name 'IP-4c' and details: Name: IP-4c Testdevice, Location: 2wcom Systems, Description: (empty). Status indicators for Power (green), Warning (grey), Input (green), and Output (red) are shown. The Live Source is set to 'Audio Output 1'. Below this is the 'Codec' section with 'Input Sources / Profiles' and a table:

Name	Address	Interface	Delay	FEC ports	Codec	Buffer	Ancillary	Clock	
Default	@:5004	Data 1	100	--	Auto	100	--	Internal	Edit + -
Default	@:6004	Data 1	100	--	Auto	100	--	Internal	Edit + -

The 'Encoder' and 'Decoder' tabs are visible. The 'Source Assignment' section shows four slots: Main (Audio 1, Default @:5004), Backup 1 (NDR 2 SH www.ndr.de/.../ndr2_sh.m3u), Backup 2 (None), and Backup 3 (None). Each slot has a status indicator (ON/OFF) and a dropdown menu.

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
- Ember+

Special

- Energy efficient 24/7 broadcast quality
- RDS decoding (built in RDS / UECP decoder)
- Embedded auxiliary data (RBDS / RDS or PAD) and GPIO forwarding
- Satellite tuner / ASI input*
- FM tuner; capable to receive up to two FM or DAB or HDR programs*
- Perfect network synchronization for SFN*

Monitoring

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

Advanced control functionalities

- High-quality multi-format audio de-/encoding:
- HTTP/HTTPS: via web interface
- NMS: Control via a centralized Network Management System

Perfect audio quality

- Balanced analog and digital AES/EBU (integrated XLR connector)



IP-4c – Audio over IP Codec (3/3)

Advanced IP robustness functionalities

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

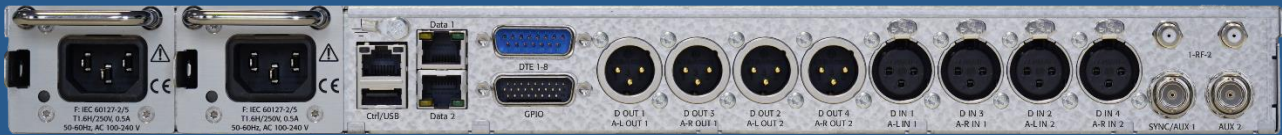
Perfect audio & latency management

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

Highly sophisticated monitoring and alarm concept

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

* This function is optional. Please find the complete list of options at the end of the document.



Technical details (1/3)

Audio (encoder / decoder)

Codecs

Standard	Linear PCM, G.711, G.722 Opus, Ogg Vorbis MPEG 1/2 Layer 2, 3 MPEG-2/MPEG-4 AAC-LC, MPEG-4 HE-AAC v1 & v2, MPEG-4/MPEG-D xHE-AAC MPEG-4 AAC-LD/ELD/ELDV2 Enhanced aptX (E-aptX) Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3), Dolby E on request. (optional) MPX (optional) DAB+ (HE-AAC v2, ETSI TS 102 563) (optional)
On request	Bit transparent transmission of AES/EBU input
Sample rates	16, 22.05, 24, 32, 44.1, 48 kHz (On request: up to 192 kHz)
Sample rate converter	8:1 (with bypass modes)

Audio

Digital (in)	4x AES/EBU, 110 Ω balanced integrated XLR female, shared with analog in (configurable)
Digital (out)	4x AES/EBU, 110 Ω balanced integrated XLR male, shared with analog out (configurable)
Analog (in)	2x L/R, > 10 k Ω balanced integrated XLR female, shared with digital in (configurable)
Analog (out)	2x L/R, < 20 Ω balanced integrated XLR female, shared with digital in (configurable)
Headphone (out)	L+R, < 10 Ω , 6.3 mm
Analog reference level	+9 dBu, max. +18 dBu (input/output)
Digital reference input	No dedicated input, selectable by user
Digital reference level	-9 dBFS



Technical details (2/3)

Digital silence detection	-90 ... 0 dBFS
Adjustable gain	-9 ... +6 dB
Dynamic range	16 Bit: > 89 dB; 24 Bit: > 130 dB
Frequency response	Depends on sample rate – e.g. 48 kHz: 0.1 dB; 20 Hz ... 22.5 kHz

Tuner, ASI

Optional FM tuner	2x 75 Ω F-Type
Optional SAT tuner	2x 75 Ω F-Type, ASI input
Optional ASI input	BNC, 270 Mbps, MPEG2 TS

Ethernet

Data	Audio, serial data and GPIO transmission, controlling and setup functions
Connector	3x RJ45
Type	Auto switching 10/100/1000 BASE-T
Protocol	RTP/RTCP/UDP, SRT Secure Reliable Transport, IGMP, ICMP, DHCP, HTTPS, SFTP, SNMP, NTP, TCP (Icecast), HLS, PTPv2, SMTP ST 2110

Serial

Interface	8x RS-232C (rear), Sub D-15 (breakout cable needed)
Data	Private data, MPEG ancillary data, UECPR/RDS (acc.to TR 101 154)
Transmission rate	8x RS-232C (rear), Sub D-15 (breakout cable needed)
USB	1x USB 2.0 interface for service

GPIO

Connector	26 pole sub-D male
Inputs	8 inputs
Outputs	7+1 floating relays 7 relays SPST (from A) 1 relay SPDT (from C) DC: max. 30 V, 1 A, 10 W

Internal storage

Data	internal audio files
Size	7 GB (optional 1000 GB)
Type	eMMC (optional SSD)

Time synchronization (optional)

PTPv2	Network synchronization according to IEEE 1588-2008
SYNC/AUX 1	BNC – 75 Ω



Technical details (3/3)

Control & Monitor

Ethernet

User interface	Integrated Web GUI, LCD display
Data	Control and setup functions
Optional	Private data, MPEG ancillary data (IRT)
USB	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, HLS)

Front panel

Display: LCD	Graphical, 264x64 pixel
Jog wheel	Impulse, enter button
4 duo LEDs	Power, input, output, warning

General data

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

Power supply

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



Options (1/4)

IP-4c Editions

Choose from our range of software and hardware options to customize your device, or select one of our off-the-shelf option packages. These editions are tailored for specific use cases and offer shorter delivery times.

Article no.	Name	Description
VER62001-BSC	Basic edition	Includes the most relevant audio coding formats and a single power supply. Includes the Live Listening feature for monitoring of audio sources and outputs directly over the web interface.
VER62001-SIP	SIP edition	Studio-to-studio (SSL) audio codec for highest interoperability. Base unit with single power supply, including EBU Tech 3326 RTCP/SDP/SAP/SIP functionality (VER63011).
VER62002-STL	STL edition	Audio codec for mission-critical studio-to-transmitter links (STL). Base unit with dual power supplies, including SRT/RIST decoder (VER63016), SRT/RIST encoder (VER63017), and live listening (VER63013).

IP-4c Base Unit Variations

To customize your device, start by selecting a base unit variation, then choose from our range of hardware and software options to fit your needs. Each unit includes one audio channel by default. You can choose from the following base unit variations:

Article no.	Name
VER62001	Base unit IP-4c with 1x internal AC power supply
VER62002	Base unit IP-4c with 2x internal AC power supplies
VER62003	Base unit IP-4c with slot for 2x hot-plug power supply <ul style="list-style-type: none">• 2x hot-plug power supplies AC / DC not included• Please order 2 hot-plug power supplies AC (VER45851) or DC (VER45852)
VER62004	Base unit IP-4c with 1x AC / 1x DC (DC leading) internal power supplies
VER62005	Base unit IP-4c with 1x DC internal power supply



Options (2/4)

IP-4c Hardware Options

Please note that hardware options are installed at the factory in Flensburg, Germany, and can only be retrofitted independently in individual cases.

Article no.	Name	Description
VER63010	Dual satellite tuner(*)	DVB-S/S2 Dual-tuner module <ul style="list-style-type: none">• QPSK, 8PSK, 16APSK, 32APSK• Supported symbol rates: 1 MSym/s - 45 MSym/s (*) Excludes options FM tuner (VER63020) and ASI expansion module (VER63021)
VER63020	FM/DAB dual tuner (*)	FM/DAB multi-band tuner for rebroadcasting, monitoring & control <ul style="list-style-type: none">• Dual tuner with 75Ω F-Type connector input• Alarm messages via SNMP or relay (*) Excludes options SAT tuner (VER63010) and ASI expansion module (VER63021)
VER63005	192 kHz sample rate for MPX	Higher sample rate to support digital MPX (AES/EBU at 192 kHz)
VER63021	ASI expansion module (*)	Adds 1x ASI input and 1x ASI output to the device. Hardware option. (*) Excludes options SAT tuner (VER63010) and FM tuner (VER63020)
VER63009	Breakout cable RS232 8-times	Cable for in- and output of 8x ancillary data (e. g. UECP RDS data) via RS232 cable
VER65120	Internal SSD storage	128 GB internal SSD storage
VER45851	Hot-plug AC power supply	Power supply with automatic switchover in case of failure. <ul style="list-style-type: none">• 90 – 260 VAC (nominal 100 – 240 VAC), 47 – 63 Hz (nominal 50 – 60 Hz)
VER45852	Hot-plug DC power supply	Power supply with automatic switchover in case of failure. 40 – -60 VDC (nominal -48 VDC)



Options (3/4)

IP-4c Software Options

Please note that software options can be retrofitted remotely.

Article no.	Name	Description
VER63000-2	Activation of second audio channel	Activation of second audio channel for IP-4c unit incl. all ordered audio codecs.
VER63000-3	Activation of third audio channel	Activation of third audio channel for IP-4c unit incl. all ordered audio codecs.
VER63000-4	Activation of fourth audio channel	Activation of fourth audio channel for IP-4c unit incl. all ordered audio codecs.
VER63001	Ravenna, AES67, PTP	According to the standard Ravenna of audio over IP interoperability (including AES67, SAP, RTSP, PTP). Price per activated channel.
VER63011	EBU Tech 3326	According to the standard of audio over IP interoperability EBU Tech 3326 (including SDP, SIP, SIP phonebook, 2wcom Easy2connect). Price per activated channel.
VER63012	Livewire+	According to the standard of audio over IP interoperability Livewire+ (Including AES67, LWRP, LWCP, Livewire Advertisement). Price per activated channel.
VER63002	Stream4Sure - Quad streaming with different coding and quality	Simultaneous transmission/reception (IP-4d) of up to four IP streams of different coding and quality and seamless exchange of audio samples in case of failure. Price per activated channel.
VER63013	Live listening	Audio monitoring via web interface or any web stream client. Price per activated channel.
VER63003	SFN (single frequency network)	Perfect timing and network synchronization for SFN applications.
VER63014	MPEG-2 TS decoder	Decoding of a MPEG-2 TS (transport stream) according to ISO/IEC 13818-1 or ITU-T Rec. H.222.0. Price per activated channel.
VER63015	MPEG-2 TS encoder	Encoding of a MPEG-2 TS (transport stream) according to ISO/IEC 13818-1 or ITU-T Rec. H.222.0. Price per activated channel.
VER63016	SRT/RIST decoder	SRT functionality for decoder according to SRT standard of the SRT Alliance (including UDP). RIST functionality for decoder according to IETF standard "RIST Simple Profile" and RFC 4585. Price per activated channel.



Options (4/4)

Article no.	Name	Description
VER63017	SRT/RIST encoder	SRT functionality for encoder according to SRT standard of the SRT Alliance (including UDP). RIST functionality for encoder according to IETF standard "RIST Simple Profile" and RFC 4585 Price per activated channel.
VER63018	Dolby Digital Pro Encoder	Supports Dolby Digital (AC-3), Dolby Digital Plus (E-AC-3). Support of Dolby E on request. Price per activated channel.
VER65116	HLS encoder	Adds HLS, HTTP Live Streaming Encoder function. <ul style="list-style-type: none">• Max number of output coding qualities and number of playlists per container: 2 per activated channel Price per activated stereo channel
VER63028	HLS decoder	Adds HLS, HTTP Live Streaming Decoder function. Price per activated stereo channel.
VER63024	MPE	MPE (Multiprotocol Encapsulation) encoding/decoding. Price per unit.
VER63025	TS forwarding over IP	TS Forwarding enables the forwarding of a complete TS or MPE-forwarding (required MPE Option VER63024) The SAT tuner is used as source. Price per activated channel.
VER63023	DAB+ encoder license	FRAUNHOFER Professional DAB+ Codec with EDI/STI-D output. <ul style="list-style-type: none">• Local insertion of PAD (DLS, SLS), TA, PTy.• Per DAB+ subchannel instance Price per DAB subchannel instance, requires audio channel VER63000.
VER63026	DAB classic encoder license	MPEG 1 Layer 2 with EDI/STI-D output. Local insertion of PAD (DLS, SLS), TA, PTY. Price per DAB subchannel instance, requires audio channel VER63000.
VER63027	Fraunhofer MuxEnc license	For connection to Fraunhofer DAB ContentServer. With central configuration, PAD insertion and monitoring of the DAB/DAB+ encoders at the multiplexer. Price per unit.