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

Your audio. Our solution.

2wcom

IP-4c – Audio over IP Codec

The IP-4c is a point-to-point or point-to-multipoint audio codec that uses IP-based audio network technologies for real-time streaming. Based on the know-how of the MM01 and MM08E and customer requirements, the IP-4c offers you a variety of features and opportunities to ease your daily work.

Flexible in Application – Pay as You Grow

- Versatile in serving various use cases
- Expandable to up to 4 channels, allowing you to pay only for as many as needed
- Upgradeable with hardware and software options according to your needs

Versatile Compatibility – Complete Audio Codec Support

- Comprehensive codec support for unmatched interoperability (see specifications)
- Adaptability for audio contribution in varied network conditions with codecs like Opus, Enhanced aptX (E-aptX) and xHE-AAC.
- Optimized studio-to-transmitter links (STL) with efficient coding formats like MPEG-Layer 2 and AAC-LC; ensure highest fidelity and minimal latency with bit-transparent transmission of digital audio and MPX
- Professional audio streaming: Efficient generation of web streams supporting mp3, OGG, Opus and the complete AAC family
- Specialized broadcasting support: Integrates seamlessly with Dolby-enabled systems (AC-3, E-AC-3)* and enables DAB+ encoding* with specialized options

Audio over IP Streaming

- 2wcom provides robust network connections by combining multiple proven technologies to deliver your audio even in stressful conditions.
- Unicast, multiple unicast, and multicast for maximum network control
- Proven multimedia transport protocols such as UDP, SRT, SIP/SDP, RTP
- Well-established audio protocols such as Livewire/Ravenna
- HLS or Icecast source client for web streaming*

*optional

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

Your audio. Our solution.

IP-4c – Audio over IP Codec

Advanced Streaming Robustness – Unmatched Broadcast Resilience

- PRO MPEG Forward Error Correction (FEC) and dual streaming for resilient, redundant streams
- Secure and reliable streaming over unpredictable networks with Secure Reliable Transport (SRT)* and Reliable Internet Stream Transport (RIST)
- Manage packet size, buffering, and Quality of Service (QoS) for a robust streaming performance
- Multiple redundancy options and source switching for uninterrupted streaming

Perfect Audio Latency Management – Ensuring Precise Synchronization

- SPN (Synchronous Playout Network): Uses NTP (Network Time Protocol) to synchronize audio input and output across devices, preventing timing drifts (for example, at transmitter sites) with a precision of < 20 ms
- SFN (Single Frequency Network): Uses 1PPS or GPS for a precision of < 10 µs, enabling SFN operation for FM broadcasting

Reliable and Uninterrupted Operation

- Flexible backup concept with automatic switching between 1 main source and 3 backup sources. Backups can be any kind of input source, including internal storage, physical interfaces, and web stream.
- 2 dedicated IP interfaces for data transmission, along with an extra IP interface for control, allow a dependable IP streaming experience.
- Redundant power supplies (230 VAC or 48 VDC) provide a fail-safe system, ensuring continuous operation even during a power supply failure.

User-Friendly and Streamlined Access

- Modern and easy-to-use web interface
- Uniform operating concept across all 2wcom devices for maximum usability
- LCD menu for direct on-site access

Smart Management and Seamless Integration

- Well-established APIs and physical control seamlessly integrate into your current infrastructure: Rest API, Ember+, SNMP, NMOS, and GPI
- Stay informed: Flexibly configurable alarm events and notifications over SNMP, GPO, and front panel LED

Verified IP Security

- High-level security within open IP infrastructures
- Thoroughly examined by independent audit authorities through whitelist/blacklist penetration tests

*optional

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

Specifications

Formats and Protocols

Codecs

Codecs	Linear PCM, G.711, G.722 Opus, Ogg Vorbis MPEG 1/2 Layer 2, 3MPEG-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) Fraunhofer DAB+ (HE-AAC v2, ETSI TS 102 563) (optional)
Sample rates	16, 22.05, 24, 32, 44.1, 48 kHz

MPX

Format	PCM raw
Bit depth	16, 20, 24 bit
Bitrates	2.4 ... 4.6 Mbit/s (without FEC)
Sample rates	132, 192 kHz

µMPX

Bitrates	320, 384, 448, 576, 800 kbit/s (without FEC)
Sample rates	192 kHz

*optional

Specifications

Streaming

IP protocols	TCP, UDP unicast, multiple unicast & multicast
Audio over IP formats	RTP (RFC 3550, RFC 3551, RFC 3640, RFC 2250) SIP/SAP according to EBU Tech 3326 SMPTE ST 2110* AES67 based on RAVENNA, Livewire, or Dante* Livewire / Ravenna (SAP, RTSP, AES67, PTPv2)* MPEG-TS
Web streaming	Icecast/Shoutcast, Icecast source client*, HLS
Transmission robustness	SRT, RIST Pro-MPEG FEC #3 release 2 Dual Streaming 2wcom Stream4Sure µMPX FEC Adaptive bitrate switching, source switching concept, management of packet size, buffers, QoS

Synchronization

Internal	free-running
External	1PPS, PTP , NTP, digital reference input
Decoder synchronization between different devices	< 20 ms using SPN via NTP (optional) < 1 µs using SFN via 1PPS or PTP (optional)
Sample rate converter	Asynchronal, any ratio

*optional

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

Specifications

Interfaces

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 female, shared with analog out (configurable)
Analog (in)	2x L/R, > 10 kΩ balance integrated XLR female, shared with digital in (configurable)
Analog (out)	2x L/R, > 10 kΩ balance integrated XLR female, shared with digital out (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
Digital silence detection	-90 ... 0 dBFS
Adjustable gain	-9 ... +6 dB
Dynamic range	16 bit: > 89 dB 24 bit: > 130 dB
Frequency response	Depends on sample rate. For example: 48 kHz: 0.1 dB; 20 Hz ... 22.5 kHz

Tuner, ASI

FM tuner (optional)	2x 75 Ω F-type
SAT tuner (optional)	2x 75 Ω F-type
ASI input (optional)	BNC, 270 Mbps, MPEG2 TS

Ethernet

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

Synchronization

1PPS input	50 Ω BNC socket
GPS (optional)	50 Ω BNC socket
10 MHz output (optional)	50 Ω SMA socket, from GPS module
1PPS output (optional)	50 Ω BNC socket, from GPS module

Serial and GPIO

DTE 1+2	2x 9 pole D-Sub male connector for serial RS-232C data communication
USB	USB 2.0 interface for service, configuration, and firmware updates
GPIO	26 pole sub-D male; 8 inputs (GPI); 8 outputs (GPO)

*optional

Specifications

Front Panel

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

General Data

Integrated Web GUI

Languages	English
Web technologies	HTML5, Java Script

Device

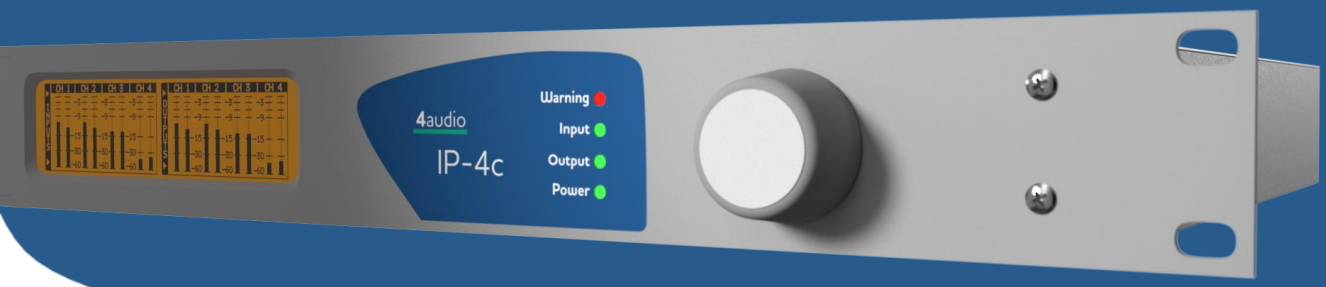
Power consumption	< 20 W
Case dimensions	19", 1 RU, depth: 310 mm, width: 424 mm, front panel: 484 mm
Weight	< 5 kg
Material	Steel plate, aluminum-zinc coated
Operating temp. range	0 – +45°C
Storage temp. range	-40 – +70°C

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)	2 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)	2 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)

*optional

Options



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 Includes RTCP/SDP/SAP/SIP functionality (VER63011)
VER62001-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 1 internal AC power supply
VER62002	Base unit IP-4c with 2 internal AC power supplies
VER62003	Base unit IP-4c with slot for 2 hot-plug power supplies Note: 2 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 1 AC and 1 DC (DC leading) internal power supplies
VER62005	Base unit IP-4c with 1 DC internal power supply

Options

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 • 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 • Dual tuner with 75 Ω F-Type connector input • Alarm messages via SNMP or relay (*) Excludes options SAT tuner (VER63010) and ASI expansion module (VER63021)
VER63021	ASI expansion module (*)	Adds 1x ASI input and 1x ASI output to the device. (*) Excludes options SAT tuner (VER63010) and FM tuner (VER63020)
VER63005	192 kHz sample rate for MPX	Higher sample rate to support digital MPX (AES/EBU at 192 kHz)
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 switch over in case of failure. • 90 – 260 VAC (nominal 100 – 240 VAC) • 47 – 63 Hz (nominal 50 – 60 Hz)
VER45852	Hot-plug AC power supply	Power supply with automatic switch over in case of failure. • 40 – -60 VDC (nominal -48 VDC)

Software Options

Please note that software options can be retrofitted remotely.

Article no.	Name	Description
VER00000-2	Activation of second audio channel	Activation of second audio channel for IP-4c unit incl. all ordered audio codecs.
VER00000-3	Activation of third audio channel	Activation of third audio channel for IP-4c unit incl. all ordered audio codecs.
VER00000-4	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.

Options

Article no.	Name	Description
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 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.
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. 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.

Options

Article no.	Name	Description
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. • 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.
VER63029	Loudness measurement	Loudness measurement for the audio outputs according to EBU R128 and ITU-R BS.1770/BS.1771. Measures and displays momentary/short-term/integrated loudness, loudness range (LRA) and True Peak (dBTP). Price per activated channel.