

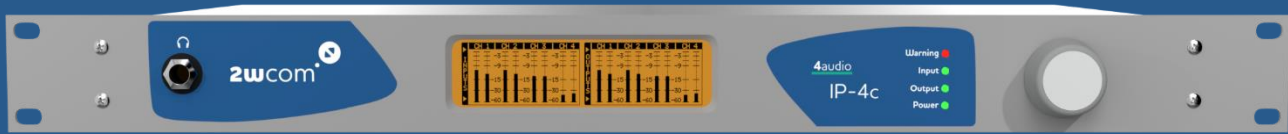
IP-4c

Audio over IP codec

Professional multi-format 4-channel audio coder / decoder



IP-4c - Audio over IP codec 1/2



Audio networks based on different protocols

- ▶ Optional: Broadcast based on EBU TECH 3326, SMPTE ST 2110
- ▶ Optional: 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/ELdv2
- ▶ MPEG 4 HE-AAC v1&v2
- ▶ Extended HE-AAC (xHE-AAC)
- ▶ Enhanced aptX (E-aptX)
- ▶ Optional: Bit transparent transmission of digital audio and MPX / µMPX signals
- ▶ Optional: Dolby codecs

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
- ▶ Optional: SRT Secure Reliable Transport
- ▶ Optional: TS RTP, UDP and SRT 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

- ▶ Optional: HLS, Iccast 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 (Iccast / 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
- ▶ 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
- ▶ Optional: Satellite tuner
- ▶ Optional: FM tuner; capable to receive up to two FM or DAB or HDR programs
- ▶ Optional: Perfect network synchronization for SFN applications

Monitoring

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



IP-4c – Audio over IP codec 2/2

The screenshot displays the 2wcom IP-4c web interface. At the top, there's a header for 'IP-4c' with fields for Name (IP-4c Testdevice), Location (2wcom Systems), and Description. It includes status indicators for Power, Warning, Input, and Output, along with a 'Live Source' dropdown set to 'Audio Output 1' and a signal strength indicator.

The main section is titled 'Codec' and features 'Input Sources / Profiles'. A table lists two profiles:

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

Below the table are tabs for 'Encoder' and 'Decoder'. The 'Source Assignment' section shows four slots: 'Main', 'Backup 1', 'Backup 2', and 'Backup 3'. 'Main' is assigned to 'Default @:5004' (ON). 'Backup 1' is assigned to 'NDR 2 SH www.ndr.de/.../ndr2_sh.m3u' (ON). 'Backup 2' and 'Backup 3' are set to 'None' (OFF).

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
- ▶ Optional: ACIP compliant high audio quality and extremely low latency (PTPv2 network synchronization)



Technical details 1/2



Audio (encoder / decoder)

Codexs

| | |
|------------------------------|---|
| Standard | MPEG 1/2 Layer 2, 3 Linear PCM G.711, G.722 Opus 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) Optional: Dolby codecs Optional: MPX / μ MPX |
| On request | Bit transparent transmission of AES/EBU input |
| Sample rates | kHz: 16, 22,05, 24, 32, 44.1, 48 (On request: up to 192 kHz) |
| Sample rate converter | 8:1 (with bypass modes) |

Interfaces

Performance

| | |
|---------------------------|---|
| Digital (in/out) | 4x AES/EBU, 110 Ω bal., integrated XLR |
| Analog (in) | 2x L/R, > 10 Ω bal., integrated XLR |
| Analog (out) | 2x L/R, < 20 Ω bal., integrated XLR |
| Optional FM tuner | 2x 75 Ω F-Type |
| Optional SAT tuner | 2x 75 Ω F-Type |
| Headphone (out) | L/R, < 10 Ω , 6,3 mm |

| | |
|--------------------------------|---|
| Digital reference input | No dedicated input, selectable by user |
| Digital reference level | 9 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 |

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, UECP/RDS (acc.to TR 101 154) |
| Transmission rate | 1200 to 115200 baud, asynchronous |
| USB | 1x USB 2.0 interface for service |



Technical details 2/2

Interfaces

Contact closure

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

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 |

Control & monitor

Ethernet

| | |
|-----------------------|---|
| User interface | Integrated WebGUI, 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

| | |
|-------------------|-------------------------------|
| LCDisplay | Graphical, 264x64 pixel |
| Jog wheel | Impulse, enter button |
| 4 Duo LEDs | Power, input, output, warning |

General data

| | |
|------------------------------|---|
| Power consumption | <20W |
| Case dimensions | 19", 1 HU, Depth: 310 mm, Width: 424 mm, Front panel: 484 mm |
| Weight | < 5 kg |
| Material | Steel plate (aluminium-zinc coated) |
| Operating temp. range | 0...+45°C |
| Storage temp. range | -40...+70°C |
| Languages | English |

Power supply

| | |
|---------------------------|--|
| Standard | 1x internal, 90...260 VAC, 47...63 Hz, 1x power port (rubber connector) |
| Optional version 1 | Two internal redundant power supplies (230 VAC or 48 VDC), aut. switchover |
| Optional version 2 | Two external hot swappable redundant power supplies (230 VAC or 48 VDC), aut. switchover |