MPX-2d
FM-MPX over IP Decoder

Datasheet

Highlights

- 2-channel MPX decoder
- 2-channel MPX composite decoder
- Optimized for MPX and µMPX and audio distribution via IP

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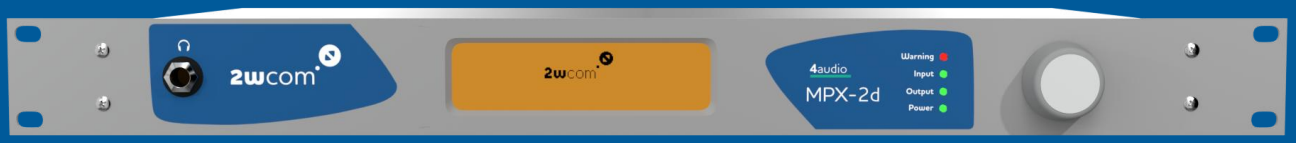
MPX-2d – FM-MPX over IP Decoder



The MPX-2d is a 2-channel decoder for MPX distribution via IP. Supporting MPX using PCM data (2.4 to 4.6 Mbit/s) or compressed µMPX (down to 320 kbit/s), it is the perfect fit for cost-efficient operation of FM distribution networks. In addition to decoding MPX signals, the MPX-2d can be upgraded for decoding of regular audio feeds. The versatility makes it the ideal device for seamless transitions from audio-only distribution to MPX distribution whenever necessary.

Main Features

- decodes MPX from PCM or µMPX*
- decodes audio via IP streaming (RTP/SRT)*
- available with 1 or 2 audio/MPX channels
- analog and digital MPX output
- analog and digital audio output from MPX using stereo decoder* or directly from IP audio decoder*

Flexible in Application – Pay as You Grow

- Versatile in serving various use cases
- Expandable one-channel base unit to a two-channel device for two separate distribution feeds
- Upgradeable with hardware and software options according to your needs
- Easy transition from audio to MPX, be ready to switch over your satellite transponder anytime

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 including Dual Streaming

*optional

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Perfect Audio Latency Management – Ensuring Precise Synchronization

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

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 (90 – 260 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
- Audio monitoring via web interface or any web stream client with Live Listening

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

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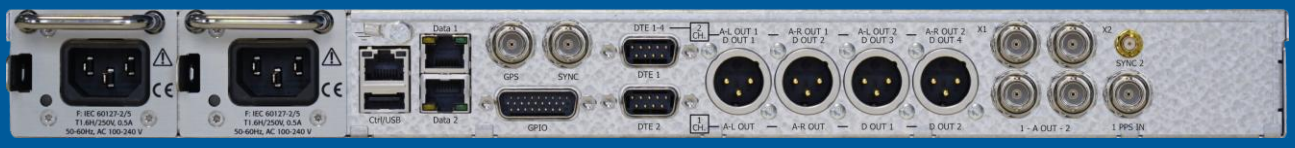
Specifications



Formats and Protocols

MPX

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

FM MPX Signal

Signal	FM MPX digital or analog
Frequency response	20 Hz – 90 kHz: < 0.05 dB
Stereo separation	> 55 dB
Harmonic distortion	< 0.0025 dB
SNR (CCIR-weighted)	> 75 dB
SNR (A-weighted)	> 90 dB

µMPX (optional)

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

FM µMPX Signal

Signal	analog
Frequency response	40 Hz – 15 Hz: < 0.15 dB
Stereo separation	> 36 dB @ 500 Hz > 50 dB
Harmonic distortion	> 56 dB or < 0.16 % @ 500 Hz > 70 dB or < 0.035 %
SNR (CCIR-weighted)	> 69 dB
SNR (A-weighted)	> 78 dB

Specifications

Audio (optional)

Codecs (included)	Linear PCM, G.711, G.722 Opus, Ogg Vorbis MPEG 1/2 Layer 2, 3 MPEG-2/MPEG-4 AAC-LC, MPEG-4 HE-AAC v1 & v2, MPEG-4/MPEG-D xHE-AAC MPEG-4 AAC-LD/ELD/ELDv2 Enhanced aptX (E-aptX)
Sample rates	16, 22.05, 24, 32, 44.1, 48 kHz

Streaming

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

Synchronization

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

Specifications

Interfaces

Audio

Analog MPX (out)	2x integrated 50 Ω BNC socket
Analog RDS (in) (optional)	2x integrated 50 Ω BNC socket
Digital Audio/MPX (out)	110 Ω balanced, integrated XLR male 1-channel configuration: 2x AES/EBU 2-channel configuration: 4x AES/EBU, shared with analog out (configurable)
Analog Audio (out)	< 20 Ω balanced, integrated XLR male 1-channel configuration: 1x L/R 2-channel configuration: 2x L/R, shared with digital out (configurable)
Analog reference level	+9 dBU max. +18 dBU (input/output)
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

Ethernet

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

Synchronization

1PPS input	75 Ω BNC socket
GPS (optional)	75 Ω BNC socket
10 MHz output (optional)	50 Ω SMA socket, from GPS module
1PPS output (optional)	75 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 D-Sub male; combined connector for inputs (GPI) and outputs (GPO)

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

Specifications

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

Options

MPX-2d 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 channel for MPX decoding. You can choose from the following base unit variations:

Article no.	Name
VER63451	Base unit MPX-2d with 1x internal AC power supply
VER63452	Base unit MPX-2d with 2x internal AC power supplies
VER63453	Base unit MPX-2d with slot for 2x hot-plug power supplies Note: 2x hot-plug power supplies AC/DC not included. Please order 2x hot-plug power supplies AC (VER45851) or DC (VER45852).

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
VER63419	FM/DAB tuner (BNC) (*)	FM/DAB multi-band tuner for rebroadcasting, monitoring and control • FM/DAB tuner as audio input • can be combined with FM (RDS)/DAB (PAD) databridge (VER66023) • dual tuner with 50 Ω BNC connector input • controllable via web interface, alarm messages via SNMP or relay (*) Requires option Audio decoder (VER63417).
VER63412	GPS module	Output synchronization via GPS input signal. • Parallel output of 10 MHz and 1PPS signals. • Antenna not included. Requires option SFN (VER68013).

Options

VER63415	Dual MPX/RDS input	2 additional BNC inputs for external MPX/RDS signals. • Provides additional inputs for external MPX or RDS • External 57 kHz RDS signal can be summed to the decoded MPX signal (mono/stereo/19 kHz pilot)
VER65120	Internal SSD storage	128 GB internal SSD storage
VER63416	RS232 Breakout Cable	Extends available RS232 (DTE 1) port into 4x RS232 (DTE 1-4) outputs.
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 DC power supply	Power supply with automatic switch over in case of failure. • 40 – -60 VDC (nominal -48 VDC)

Options

Software Options

Please note that software options can be retrofitted remotely.

Article no.	Name	Description
VER63410	Second decoder output	Activates the second decoder and MPX/audio output. Two programs get decoded and output in parallel.
VER63418	RAVENNA, AES67, PTP	Audio output according to the RAVENNA technology for audio over IP interoperability (including AES67, SAP, RTSP, PTP). Price per activated channel.
VER68013	SFN (single frequency network)	Synchronization of MPX streams for FM-SFN networks accurate to the microsecond. • 1PPS input • Accuracy: < 1 µs Price per unit.
VER63411	SPN (synchronized playout network)	Output synchronization via NTP time server (on request). • Accuracy: 20 ms
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.
VER69013	µMPX decoder – MPX decompression	Algorithm to decompress the full MPX/composite signal, including pilot and RDS from IP to MPX. • 5 available bitrates: 320 and 800 Kbps. Up to 2 µMPX decoder per unit possible. Price per activated channel.
VER63417	Audio decoder	Enables the device to configure each decoder chain to MPX or audio in consequence making it possible to receive standard audio codecs like MPEG or AAC instead of MPX. • Audio decoding from satellite or IP and analog/digital (32, 44.1, 48 kHz) audio output. • Stereo decoding and analog/digital (48 kHz) audio output from MPX source. Price per activated channel.

Options

Article no.	Name	Description
VER66023	FM (RDS)/DAB (PAD) databridge (*)	Enables forwarding of • dynamic RDS data from the FM tuner • dynamic PAD data and signaling data from the DAB tuner to the RDS encoder for retransmission (*) Requires option FM/DAB tuner (F-type) VER66022 or FM/DAB tuner (BNC) VER63419.
VER63413	TS forwarding over IP	TS Forwarding enables the forwarding of a complete TS or MPE forwarding. Price per unit.