MPX-2d

FM-MPX over IP Decoder

Highlights

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



MPX-2d – FM-MPX over IP Decoder (1/2)

2wcom

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 μ MPX (down to 320 kbit/s), it is the perfect fit for cost-efficient operation of FM distribution networks.

MPX-2d

In addition to decoding MPX signals, the MPX-2d can be upgraded for decoding of regular audio feeds. This versatility makes it the ideal device for seamless transitions from audio-only distribution to MPX distribution whenever necessary.

Features

- Decodes MPX from PCM
- Decodes MPX from μMPX^{*}
- Decodes audio via IP streaming (RTP / SRT)*

2wcom.

- Two audio/MPX channels, can also be bought with only one channel for a lower price
- Analog & digital MPX output
- Analog & digital audio output from MPX using stereo decoder^{*}
- Analog & digital audio output directly from IP audio decoder^{*}
- Robust IP streaming input PRO MPEG FEC, dual streaming, RIST, SRT

Flexible in Application – Pay as You Grow

- Decoding from IP feeds
- One-channel base unit can be upgraded to a two-channel device for two separate distribution feeds
- Easy transition from audio to MPX

Perfect Audio & Latency Management

- Synchronous playout based on NTP (SPN)^{*} also using μMPX
- Perfect latency control in SFN FM networks based on 1PPS or GPS^{*} also using μMPX

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



MPX-2d – FM-MPX over IP Codec (2/2)

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
- Dual IP ports for data and one additional IP port for control interface
- Redundant power supply 90 260 VAC or 48 VDC

Monitoring and Control

- Remote control with various possibilities: HTTP(S), FTP, NMS, SNMP
- Revised configuration via web user interface for easier setup
- SNMP v2c & V3, relays, inputs
- REST-API
- Ember+

IP Security

- High level security in open IP infrastructures
- Tested by independent inspection bodies (white/blacklist penetration tests)



Technical Details (1/4)

Codecs

MPX Decoder

Туре	PCM raw
Bit depth	16, 20, 24 bit
Bitrate	2.4 up to 4.6 Mbit/s (no FEC)
Sample rates	132 and 192 kHz
µMPX Decoder (Optional)	
Bitrates kbit/s	320, 384, 448, 576, 800 (no FEC)
Sample rates	192 kHz
Audio Decoder	
Standards	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
Sample rate converter	8:1 (with bypass modes)
Robust Streaming	
Standards	SRT

Standards	SRT
	RIST
	Pro-MPEG FEC #3 release 2
	µMPX FEC

Decoder Outputs

Synchronization between	< 20 ms using SPN via NTP (optional)
different devices	< 1 µs using SFN via 1PPS (optional)

Technical Details (2/4)



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

FM µMPX Signal

Signal	analog
Frequency response	40 Hz – 15 kHz: < 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

Interfaces

MPX/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 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 – e.g. 48 kHz: 0.1 dB; 20 Hz – 22.5 kHz



Technical Details (3/4)

Ethernet

Connector	3x RJ45 (Control, 2x Data)
Туре	Auto switching 10/100/1000 BASE-T, Unicast, Multicast
Data	Audio, serial data and GPIO transmission, controlling and setup functions MPEG TS or MPE output

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/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
Contact closure	26 pole sub-D male; 8 inputs (GPI); 8 outputs (GPO)

Front Panel

Headphone	6.3 mm / 1/4" socket, < 10 Ω
LEDs	Power, Input, Output, Warning
Operation	Display and Jog Wheel

General Data

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
Languages	English

0

Technical Details (4/4)

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)
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)
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)

Options (1/2)



MPX-2d Base Unit Variations

Each base unit includes one channel for MPX decoding. You can choose between 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 supply	
VER63453	Base unit MPX-2d with slots for 2x hot-plug power supply	
	 2x hot-plug power supplies AC / DC not included. Please order 2 hot-plug power supplies AC (VER45851) or DC (VER45852). 	

MPX-2d 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
VER63412	GPS module	 Output synchronization via GPS input signal. Parallel output of 10 MHz and 1PPS signals. Antenna not included. Requires option SFN (VER68013).
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)
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.

Options (2/2)

MPX-2d 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.
VER63411	SPN (Synchronized Playout Network)(*)	Output synchronization via NTP time server (*) On requestAccuracy: 20 ms
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.
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 μ MPX decoder per unit possible.
		Price per activated channel.
VER63413	TS forwarding over IP	TS Forwarding enables the forwarding of a complete TS or MPE forwarding. Price per unit.
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.
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.
VER63418	Ravenna, AES67, PTP	Audio output according to the Ravenna standard for audio over IP interoperability (including AES67, SAP, RTSP, PTP).
		Price per activated channel.