



**MoIN**  
Software

# MoIN Integration Toolkit Datasheet

## Highlights

- Multi-channel virtual audio over IP encoder/decoder platform
- Supports all common standards, protocols and audio qualities
- Freely assemble all containers according to your needs

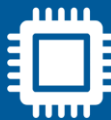
# MolN Integration Toolkit



The MolN Integration Toolkit is a modular Audio-over-IP software framework that enables developers to integrate professional audio contribution, distribution and streaming directly into their own products and platforms. Based on the proven MolN technology, it provides modular components, open APIs and integration support for maximum flexibility, automation and control. It is the ideal solution for system integrators, OEMs, infrastructure providers and enterprise customers building their own broadcast and media platform.



19 audio coding  
formats



Up to 24 channels  
per vCPU



Latency starting  
at 50 ms

## Key Benefits

- **Build into your platform:** Incorporate MolN into existing environments with integration support to ensure straightforward transition.
- **Engineering freedom:** Full control over deployment, orchestration and operation while using your own infrastructure and DevOps processes.
- **Hybrid by design:** Combination of MolN and 2wcom hardware products as a comprehensive and reliable solution.
- **One software instead of point solutions:** contribution, STL, distribution, web streaming and DAB+/µMPX in one solution – one operating concept, one support contact.
- **A translator, not just a transporter:** parallel encoding, decoding and transcoding.
- **Comprehensive codec support:** unmatched interoperability with 18 codecs included, even more available as upgrade options.
- **Interoperability down to the clock:** NTP, PTPv2 and sample rate conversion combine sources with different sample rates and clock domains in one channel.
- **Robustness without a lock-in decision:** PRO MPEG FEC, dual streaming, SRT and RIST in one platform – choose the protection per link.



## Main Features

### Flexible Software Solution

- Software solution for audio-over-IP distribution
- Interoperability with all 2wcom hardware products
- Support of all common audio coding formats for contribution, distribution and streaming
- Several flexible deployment methods to customize the MolN according to your requirements
- Upgradeable with software options according to your needs
- Support via SLA available

### Installation Methods

- Installation for Docker with a docker compose file
- Installation for Kubernetes with a helm chart

## Versatile Compatibility – Complete Audio Codec Support

- 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
- Professional audio streaming: Efficient generation of web streams supporting mp3, OGG, Opus and the complete AAC family
- Specialized broadcasting support: DAB+ encoding\* and µMPX\* as upgrade options

## Smooth Integration – Compatible with various Audio over IP Formats

- 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 and RTP
- Multiplex and de-multiplex from MPEG-TS over IP
- Well-established audio protocols such as AES67, SMPTE ST 2110, Livewire and RAVENNA\*
- HLS\* or Icecast source client for web streaming

## 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 and Stream4Sure

\*optional



## Audio Latency Management – Ensuring Precise Synchronization

- Uses Network Time Protocol (NTP) or PTPv2 to synchronize audio input and output across devices
- Handles all audio signals, also based on different clocks
- Sample rate converter (SRC) to combine different connections with different sample rates or different clocks

## Smart Management and Seamless Integration

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

## Verified IP Security

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



## Formats and Protocols

### Audio

|                   |                                                                                                                                                                                                         |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Codecs (included) | Linear PCM, G.711, G.722<br>Opus, Ogg Vorbis<br>MPEG 1/2 Layer 2, 3<br>MPEG-2/MPEG-4 AAC-LC, MPEG-4 HE-AAC v1 & v2, MPEG-4/MPEG-D<br>xHE-AAC<br>MPEG-4 AAC-LD/ELD/ELdv2<br>Enhanced aptX (E-aptX), FLAC |
| Codecs (optional) | µMPX<br>Fraunhofer DAB+ (HE-AAC v2, ETSI TS 102 563)<br>APTmpX                                                                                                                                          |
| Bit depth         | 16, 20, 24 bit                                                                                                                                                                                          |
| Sample rates      | 16, 22.05, 24, 32, 44.1, 48 kHz<br>(On request: up to 192 kHz)                                                                                                                                          |

### Streaming

|                         |                                                                                                                                                                                                                                                        |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| IP protocols            | TCP, UDP<br>unicast, multiple unicast & multicast                                                                                                                                                                                                      |
| Audio over IP formats   | RTP (RFC 3550, RFC 3551, RFC 3640, RFC 2250)<br>SIP/SAP according to EBU Tech 3326<br>SMPTE ST 2110 (optional)<br>AES67 based on RAVENNA, Livewire, or Dante (optional)<br>Livewire / RAVENNA (SAP/SDP, RTSP, AES67, PTP, PTPv2) (optional)<br>MPEG-TS |
| Web streaming           | Icecast/Shoutcast Client<br>Icecast Source Client<br>Icecast Server<br>HLS encoder (optional)<br>HLS decoder (optional)                                                                                                                                |
| Transmission robustness | SRT, RIST<br>Pro-MPEG FEC #3 release 2<br>Dual Streaming<br>µMPX FEC<br>Adaptive bitrate switching, source switching concept, management of packet size, buffers, QoS                                                                                  |
| Latency                 | Starting at 50 ms depending on the selected codec and buffer settings                                                                                                                                                                                  |



## Synchronization

|                                                   |                                                                    |
|---------------------------------------------------|--------------------------------------------------------------------|
| Internal                                          | free-running                                                       |
| External                                          | PTP, PTPv2, NTP                                                    |
| Decoder synchronization between different devices | < 20 ms using SPN via NTP (optional)<br>SFN passthrough (optional) |
| Sample rate converter                             | Asynchronous, any ratio                                            |

## Data Transmission

|                     |                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------|
| Audio streams (in)  | up to 512 (more on request), depends on CPU and memory<br>MoIN Solo: up to 8, depends on CPU and memory |
| Audio streams (out) | Up to 512 (more on request), depends on CPU and memory<br>MoIN Solo: up to 8, depends on CPU and memory |
| UECP (RDS)          | Linked/synchronous to the audio                                                                         |

## Control and Monitoring

|                             |                                            |
|-----------------------------|--------------------------------------------|
| Interfaces/Protocols (APIs) | Rest API, Ember+, SNMP, NMOS               |
| Configuration               | via web interface and APIs                 |
| Live Listening              | via Icecast                                |
| Alarms                      | SNMP traps, web interface and log messages |
| RDS/UECP                    | Realtime decoder                           |

## Minimum Server Requirements

### Server not included (can be chosen by the customer)

|                        |                  |
|------------------------|------------------|
| Processor power (min.) | 4 CPU cores      |
| Memory                 | 8 GB RAM         |
| SSD                    | 50 GB            |
| Network                | 1 port with 1 GB |

### Additional hardware interfaces (on request)

|                |                                                                                     |
|----------------|-------------------------------------------------------------------------------------|
| AES/EBU/Analog | Analog/digital audio in/out                                                         |
| Madi           | Multi-channel audio digital interface (available as internal or external extension) |
| Dante          | AES67 from Audinate (available as internal and external extension)                  |
| GPIO           | Relays/Contact closures                                                             |



## Editions

Please choose one of the following editions. Even after you purchase a MoIN Edition, you can change the edition according to your requirements. Alternatively, you can customize your MoIN with MoIN Flex (for more information see 3.3 Software Options).

| Feature                              | Basic                                                               | Advanced                                                                                       | Tonmeister                                                                                     | FLEX                                                                                           |
|--------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Audio Channel                        | 1 encoder/<br>transcoder<br>per channel<br>no decoder<br>redundancy | 1 encoder/<br>transcoder<br>per channel<br>1 decoder with 3<br>backup instances<br>per channel | 1 encoder/<br>transcoder<br>per channel<br>1 decoder with 3<br>backup instances<br>per channel | 1 encoder/<br>transcoder<br>per channel<br>1 decoder with 3<br>backup instances<br>per channel |
| Audio Codecs*                        | ●                                                                   | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| Ancillary Data*                      | ●                                                                   | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| Ravenna, AES67, PTP                  | ●<br>(input only)                                                   | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| Icecast Server and<br>Source Client  | ●                                                                   | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| Livewire+                            | ●                                                                   | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| Live Listening                       | ●                                                                   | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| EBU Tech 3326                        |                                                                     | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| SRT/RIST en-/decoder                 |                                                                     | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| SPN (Synchronous<br>Playout Network) |                                                                     | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| HLS en-/decoder                      |                                                                     | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| Flexible backup switching            |                                                                     | ●                                                                                              | ●                                                                                              | ●                                                                                              |
| MPEG-2 TS en-/decoder                |                                                                     |                                                                                                | ●                                                                                              | ●                                                                                              |
| MPE                                  |                                                                     |                                                                                                | ●                                                                                              | ●                                                                                              |
| Stream4Sure                          |                                                                     |                                                                                                | ●                                                                                              | ●                                                                                              |
| TS forwarding                        |                                                                     |                                                                                                | ●                                                                                              | ●                                                                                              |
| 192 kHz                              |                                                                     |                                                                                                | ●                                                                                              | ●                                                                                              |
| Mixer                                |                                                                     |                                                                                                | ●                                                                                              | ●                                                                                              |
| Loudness Measurement                 |                                                                     |                                                                                                | ●                                                                                              | ●                                                                                              |

\*Included in every edition. For a full list of all codecs see Specifications.



## Upgrade Options

Additionally to the options connected to the MolN editions, there are even more upgrade options that can be separately added to your MolN application. These upgrade options are listed below:

| Article no. | Name                                                  | Description                                                                                                                                                                                                                                                                                                  |
|-------------|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VER43123    | µMPX encoder –MPX compression                         | Algorithm to compress the full MPX/composite signal including pilot and RDS to IP.<br>5 available bitrates: 320 – 800 kbps.<br>Price per encoder.                                                                                                                                                            |
| VER43124    | µMPX decoder –MPX decompression                       | Algorithm to decompress the full MPX/composite signal including pilot and RDS to IP.<br>5 available bitrates: 320 – 800 kbps.<br>Price for activation as µMPX decoder.<br>Price per decoder.                                                                                                                 |
| VER43125    | DAB+ encoder license                                  | Fraunhofer Professional DAB+ Codec with EDI/STI-D output.<br><ul style="list-style-type: none"><li>• Local insertion of PAD (DLS, SLS), TA, PTY</li><li>• Per DAB+ subchannel instance</li></ul>                                                                                                             |
| VER43127    | Fraunhofer MuxEnc license                             | For connection to Fraunhofer DAB ContentServer. With central configuration, PAD insertion and monitoring of the DAB/DAB+ encoders at the multiplexer.                                                                                                                                                        |
| VER43134    | THIMEO Stereo Tool sound processing (FM professional) | Sound processing by THIMEO stereo Tool including Declipper and Advanced Dynamics.<br><ul style="list-style-type: none"><li>• Stereo/RDS/RBDS generation</li><li>• Multiband sound processing with advanced dynamics (AGC, compressors, etc.)</li><li>• Audio and FM clipper</li><li>• µMPX encoder</li></ul> |



## Software Options

For the MoIN Flex edition, please select the options you want to include:

| Article no. | Name                                                           | Description                                                                                                                                                                                               |
|-------------|----------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| VER43115    | HLS en-/decoder                                                | HLS streaming protocol en-/decoder functionality for adaptive bitrate streaming.                                                                                                                          |
| VER43113    | SRT/RIST en-/decoder                                           | SRT functionality for en-/decoder according to SRT standard of the SRT Alliance (including UDP).<br>RIST functionality for en-/decoder according to IETF standard "RIST Simple Profile" and RFC 4585.     |
| VER43112    | MPEG-2 TS en-/decoder                                          | EN-/decoding of a MPEG-2 TS (transport stream) according to ISO/IEC 13818-1 or ITU-T Rec. H.222.0.                                                                                                        |
| VER43130    | MPE                                                            | MPE (Multiprotocol Encapsulation) encoding/decoding.                                                                                                                                                      |
| VER43131    | TS forwarding                                                  | TS Forwarding enables the forwarding of a complete TS or MPE-forwarding (requires MPE Option)                                                                                                             |
| VER43129    | SPN (Synchronous Playout Network)                              | Output synchronization via NTP time server with an accuracy of 20 ms.                                                                                                                                     |
| VER43117    | Ravenna, AES67, PTP                                            | According to the standard Ravenna of audio over IP interoperability (including AES67, SAP, RTSP, PTP)                                                                                                     |
| VER43114    | Icecast Server and Source Client                               | Audio web stream server (supports various audio codecs such as MP3, Ogg Vorbis and AAC)                                                                                                                   |
| VER43116    | 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.                                                   |
| VER43118    | EBU Tech 3326                                                  | According to the standard of audio over IP interoperability EBU Tech 3326 (including SDP, SIP, SIP phonebook, 2wcom Easy2connect).                                                                        |
| VER43119    | Livewire+                                                      | According to the standard of audio over IP interoperability Livewire+ (including AES67, LWRP, LWCP, Livewire Advertisement).                                                                              |
| VER43128    | Loudness measurement                                           | Loudness measurement for the audio outputs according to EBU R128 and ITU-R BS.1770/BS.1771.<br>Measures and displays momentary/short-term/integrated loudness, loudness range (LRA) and True Peak (dBTP). |
| VER43132    | Mixer                                                          | Integrated audio mixer supporting mixing of up to 5 audio channels.                                                                                                                                       |
| VER43133    | 192 kHz                                                        | High-resolution audio support up to 192 kHz sample rate.                                                                                                                                                  |