

# AVP 4000 System Encoder



In a fast changing, highly competitive market, media organisations need encoding solutions that deliver high quality, high reliability and operational flexibility. The number of channels continues to increase. HD is growing fast, offering a better quality viewing experience. Consumers are buying increasingly larger TV sets and now plans are being laid for Ultra High Definition TV. All that means, media organisations need to make the most efficient use of bandwidth and ensure consumers get a quality viewing experience.

The MediaKind AVP 4000 system encoder answers all those needs, delivering high quality system encoding for IPTV, Cable, Satellite and Broadcast. Part of the multiple award winning MediaKind AVP encoder range, the AVP 4000 also incorporates the rich toolset of MediaKind's market leading VPC system encoder.

A compact 1RU form factor offers up to six hot swappable option slots, for combinations of encoding and auxiliary modules. Dual power supplies protect services and an on-board video monitor gives instant operator feedback.

Unlike conventional 'box per application' encoder products, the AVP 4000 shares a common toolset, common chassis and common interface with the rest of MediaKind's award winning AVP products. That means media organisations can use a common encoder for a wide range of encoding needs, without the cost and complexity of a multi-vendor 'mix and match' approach. The AVP 4000 is equally suitable for deployment as a system component, or as part of a MediaKind multi-platform or multiscreen system solution.

## Powered by MediaKind

The AVP 4000 is powered by MediaKind's first ever video processing chip.

This completely new 10-bit MediaKind designed and built encoding chip, builds on two decades of market leadership in encoding algorithms and techniques, delivering outstanding picture quality at HD and SD, in both MPEG-2 and MPEG-4 AVC.



Codecs and resolutions can be upgraded via software, removing the need for complex hardware changes. The MediaKind chip is multi-codec, multi-profile and multi resolution, offering both

encoding and transcoding. The AVP 4000 delivers levels of quality, performance and operational flexibility, not found on conventional encoding products. All of these benefits translate to the bottom line.

## HEVC

The CE-HEVC encoder module brings the latest high performance video compression technology to the market leading AVP 4000 platform. The module has the processing power to be able to encode four HD video inputs or one UHD (4K) video input. What's more it has been designed to support the emerging standards for high dynamic range (HDR) and wider colour gamut (WCG).

## The AVP 'One Platform' Philosophy

### A New Approach to Encoding

The MediaKind AVP 'one encoding platform' approach represents a modern approach to encoding product design.

In the media industry, the speed of change is increasing. New requirements and workflows are emerging. That's why its important not to put unnecessary constraints on products. For example limiting a product to 8 bit operation, or 4:2:0 or a single codec, or a single workflow, may satisfy today's immediate requirements but maybe not tomorrow's.

With the AVP 'one platform approach', there are no such restrictions, as 10 bit, 4:2:2, and 3DTV are available today. SDI, HD-SDI, 3G, IP, ASI and IP connectivity are all supported. Legacy interfaces include Analogue, G.703 and GPI. UHDTV workflow at 4K is also supported.

A rich common toolset allows media organisations with differing encoding applications, to deploy AVP in a wide range of roles, including DSNG, Contribution, Primary Distribution and delivery to the consumer. That offers potential cost savings in commissioning, integration, training and support, compared to a multi-vendor 'mix and match' approach.

## AVP 4000 Base Unit Features

Supports up to 4 encoder or transcoder modules.

- Six slot 1AC PSU AVP4000/BAS/1AC/A
- Four slot 2AC PSU AVP4000/BAS/2AC/A
- Six slot dual 2AC PSU with flying leads AVP4000/BAS/2ACFL/A
- Six slot 1DC PSU AVP4000/BAS/1DC/A
- Six slot 2DC DC PSU AVP4000/BAS/2DC/A
- Six slot 1AC/ED PSU AVP4000/BAS/2AC/ED/A
  - Supports up to 6 encoder or transcoder modules
- SI table generation

## Platform Capacities

- Up to four or 6 encoders or transcoder modules per chassis depending on chassis type
- Feature set, resolution and Codec licensable by software
- Multiple concurrent I/O options

## Base Chassis Functionality Includes:

- Control via 2x electrical Ethernet (100/1000BaseT)
- Data I/O via 4x electrical Ethernet (100/1000BaseT)
- Multiplexing and MPEG-2 Transport Stream generation
- SMPTE 2022-1/-2 (Pro-MPEG) FEC on a single SPTS/MPTS
- Encryption of output MPEG-2 Transport Stream using Basic Interoperable Scrambling System (BISS) for secure contribution links Supports BISS modes 0,1and E
- SI table generation
- Service level Remux (Requires AVP/HWO/ASI/IO/A)

## Hardware Options

### EI9001 Encoder Module (AVP/HWO/EI9001/A)

- One slot per module. Up to four or six modules per chassis depending on configuration
- SDI/HD-SDI, video input
- MPEG-2 Video and MPEG-4 AVC encoding capabilities
- Up to eight stereo pairs of audio encoding
- VANC data extraction and support for generic VANC (SMPTE 2038)

### EI9001T Encoder/Transcoder Module (AVP/HWO/EI9001T/A)

- One slot per module. Up to four or six modules per chassis depending on configuration
- SD/HD-SDI, video input
- MPEG-2 Video and MPEG-4 AVC encoding capabilities
- Up to eight stereo pairs of audio encoding
- VANC data extraction and support for generic VANC (SMPTE 2038)
- Confidence monitor loop through of I.P. input

### External Synchronization Module (AVP/HWO/EXTSYNC/A,)

- One slot per module. Up to one module per chassis
- Supports synchronization of all encoders in the chassis to an external clock reference
- 10 MHz or HSYNC input

### ASI Module (AVP/HWO/ASI/IO/A,)

- One slot per module
- 2 x ASI MPEG-2 Transport Stream outputs configured as mirrored or independent

### GPI Module (AVP/HWO/GPI/A)

- One slot per module
- Supports GPO relay triggers for “Alarm” and “Failure” modes
- Supports manual SCTE-35 splice point insertion

### CE-HEVC Encoder Module (CE/HWO/CE-HEVC/BNC/A,)

- HEVC Encoding Card with 4 x BNC connections

### (CE/HWO/CE-HEVC/SFP/C/A)

- HEVC Encoding Card with SFP copper connections

### (CE/HWO/CE-HEVC/SFP/F/A)

- HEVC Encoding Card with SFP fibre connections

## EI9001/EI9001T Value Packs

### SD Value Pack (AVP/SWO/VP/SD)

- MPEG-2 SD encode
- MPEG-4 SD encode
- Premium quality encoding
- 2 x 2.0 MPEG-1 LayerII audio decode
- 2 x 2.0 MPEG-1 LayerII audio encode including ALC
- 4:2:0 8-bit Transcode
- Splice point conditioning
- Picture in Picture for MPEG-4
- VBR (Reflex), CBR and Capped VBR encoding
- PSIP Carouselling
- Teletext to DVB SUBS bit maps

2 Instances required for multiplatform outputs

### HD Value Pack (AVP/SWO/VP/HD)

- MPEG-2 SD and HD encode
- MPEG-4 SD and HD encode
- Premium quality encoding
- 4 x 2.0 MPEG-1 LayerII audio decode
- 4 x 2.0 MPEG-1 LayerII audio encode including ALC
- 4:2:0 8-bit Transcode
- Splice point conditioning
- Picture in Picture for MPEG-4
- VBR (Reflex), CBR and Capped VBR encoding
- PSIP Carouselling
- Teletext to DVB SUBS bit maps (SD only)

### ABR HD Value Pack (AVP/SWO/VP/ABR/HD)

- MPEG-4 ABR encode for up to 10 profiles from an HD input
- 4 x 2.0 MPEG-1 LayerII audio decode
- 4 x 2.0 AAC audio encode including ALC
- 4:2:0 8-bit Transcode
- 4:2:2 10-bit Transcode
- Splice point conditioning

### Contribution Value Pack (AVP/SWO/VP/CONT)

- 4:2:2 10-bit precision encode

### Audio Contribution Value Pack (AVP/SWO/VP/CONT/AUDIO)

- 2 x 2.0 MPEG-1 LayerII audio encode including ALC
- Phase Aligned Audio (PAA) for up to 4 x 2.0 MPEG-1 LayerII audio encode

### 8 Channel Dolby® E Decode Value Pack (AVP/SWO/VP/DOLBYE/DEC)

- 8 channels of Dolby® E decode

### Dolby® Digital Decode Value Pack (AVP/SWO/VP/DOLBY/AC3/DEC)

- One decode of Dolby® Digital (AC3) or Dolby® Digital Plus up to a maximum of a 5.1 mix

### Dolby® Digital Encode Value Pack (AVP/SWO/VP/DOLBY/AC3)

- One 1.0 (centre from left), 1.0 (centre from right), 1.0 (L+R/2) or 2.0 encode of Dolby® Digital (AC3)
- Includes 2.0 ALC capability

3 instances required for 5.1

### Dolby® Digital Plus Encode Value Pack (AVP/SWO/VP/DOLBY/PLUS)

- One 1.0 (centre from left), 1.0 (centre from right), 1.0 (L+R/2) or 2.0 encode of Dolby® Digital Plus
- Includes 2.0 ALC capability

3 instances required for 5.1

### AAC Audio Encoding License (AVP/SWO/VP/AAC)

- 1 x 2.0 of Advanced Audio Coding (AAC-LC, HE-AAC, HE-AACv1) stereo audio encoding
- Includes 2.0 ALC capability

3 instances required for 5.1

### MPEG-1 layerII 2.0 Value Pack (AVP/SWO/VP/M1L2)

- One 1.0 (centre from left), 1.0 (centre from right), 1.0 (L+R/2), 1+1 Mono, or a 2.0 encode of MPEG 1 Layer II encoding
- Includes 2.0 ALC capability

## CE-HEVC Value Packs

### CE-HEVC Encoder Value Packs - Single Channel HD (CE/SWO/VP/HEVC/HEVC/HD)

- Enables HEVC HD encoding
- 4 x 2.0 MPEG-1 LayerII audio encode including ALC

### (CE/SWO/VP/HEVC/MP4/HD)

- Enables MPEG 4 HD encoding
- 4 x 2.0 MPEG-1 LayerII audio encode including ALC

### (CE/SWO/VP/HEVC/CONT)

- Enables 4:2:2 10bit for a single HD encoding channel

### (CE/SWO/VP/HEVC/SLD)

- Enables super low delay encoding for a single HD HEVC encoding channel

### (CE/SWO/VP/CONT/AUDIO)

- 2 x 2.0 MPEG-1 LayerII audio encode including ALC
- Phase Aligned Audio (PAA) for up to 4 x 2.0 MPEG-1 LayerII audio encode

### CE-HEVC Encoder Value Packs - Single Channel UHD/4K CE-HEVC Encoder Value Packs - Single Channel UHD/4K or 4 x HD\*

### (CE/SWO/VP/HEVC/HEVC/4K)

### CE-HEVC Encoder Value Packs - other audio options

### (CE/SWO/VP/AAC)

- 1 x 2.0 Advanced Audio Coding audio encode including ALC

### (CE/SWO/VP/DOLBY/AC3)

- One 1.0 (centre from left), 1.0 (centre from right), 1.0 (L+R/2) or 2.0 encode of Dolby® Digital (AC3)
  - Includes 2.0 ALC capability
- 3 instances required for 5.1

### (CE/SWO/VP/DOLBY/M1L2)

- 1 x 2.0 MPEG-1 LayerII audio encode including ALC
- Enables HEVC UHD encoding or 4CH HD\*
- 16 x 2.0 MPEG-1 LayerII audio encode including ALC

### (CE/SWO/VP/HEVC/MP4/X4)

- Enables 4 x MPEG 4 HD\*
- 16 x 2.0 MPEG-1 LayerII audio encode including ALC

### (CE/SWO/VP/HEVC/CONT/X4)

- Enables 4:2:2 10bit for a single UHD or HD encoding channel

### (CE/SWO/VP/HEVC/SLD/4K)

- Enables super low delay encoding for a single UHD or HD HEVC encoding channel

### (CE/SWO/VP/CONT/AUDIO/X4)

- 8 x 2.0 MPEG-1 LayerII audio encode including ALC
- Phase Aligned Audio (PAA) for up to 4 x 2.0 MPEG-1 LayerII audio encode

\*3 x 1080p HEVC. 2 x 1080p MPEG-4

## EI9001 EI9001T Encoder Specifications

### Video Encoding

<b>Input</b>	SDI and HD-SDI serial digital video Up to 8 stereo pairs embedded in HD-SDI Audio Sampling frequency 48kHz
<b>Profiles</b>	SD MPEG-2 Main Profile Main Level 4:2:0 8bit 0.5-15Mbit/s requires AVP/SWO/VP/SD SD H.264 Main Profile Level 3.0 4:2:0 8bit 0.5-10Mbit/s requires AVP/SWO/VP/SD SD H.264 High Profile Level 3.0 4:2:0 8bit 0.5-12.5Mbit/s requires AVP/SWO/VP/SD HD MPEG-2 Main Profile High Level 4:2:0 8bit 2-80Mbit/s requires AVP/SWO/VP/HD HD H.264 Main Profile Level 4.0 4:2:0 8bit 1-20Mbit/s requires AVP/SWO/VP/HD HD H.264 High Profile Level 4.0 4:2:0 8bit 1-25Mbit/s requires AVP/SWO/VP/HD HD H.264 High Profile Level 4.1 4:2:0 8bit 1-62.5Mbit/s requires AVP/SWO/VP/HD HD H.264 Hi 422 Profile Level 4.1 4:2:2 10-bit 1-62.5Mbit/s requires AVP/SWO/HD + AVP/SWO/VP/CONT
<b>HD Resolutions</b> Requires AVP/SWO/VP/HD	1,920/1,440 x 1,080i 25 1,920/1,440 x 1,080i 29.97 1,280/960 x 720p 50 1,280/960 x 720p 59.94
<b>SD Resolutions</b> Requires AVP/SWO/VP/SD or AVP/SWO/VP/HD	720/704/640/576/544/528/480/352 i25 720/704/640/576/544/528/480/352 i29.97 GOP processing includes adaptive GOP structure and adaptive GOP length
<b>ABR Resolutions</b> Requires AVP/SWO/VP/ABR/HD	<b>HD input:</b> Maximum output 1,280 x 720 p50/59.94 Minimum output 288 x 128 p25/29.97 <b>SD input:</b> Maximum output 1,024 x 576 p25/29.97 Minimum output 288 x 128 p25/29.97 Horizontal up-scaling for SD inputs only
<b>ABR Profiles</b>	High 1Mb/s to 17.5Mb/s. Main 0.75Mb/s to 14Mb/s. Baseline 0.15Mb/s to 4Mb/s.
<b>Dolby® Digital requires AVP/SWO/VP/DOLBY/AC3</b>	Mono 1.0 centre from left 56-640kbit/s Mono 1.0 centre from right 56-640kbit/s Mono 1.0 (L+R/2) 56-640kbit/s Stereo 2.0 96-640kbit/s Multi-channel 5.1 224-640kbit/s
<b>Dolby® Digital Plus requires AVP/SWO/VP/DOLBY/PLUS</b>	Mono 1.0 centre from left 32-640kbit/s Mono 1.0 centre from right 32-640kbit/s Mono 1.0 (L+R/2) 32-640kbit/s Stereo 2.0 64-640kbit/s Multi-channel 5.1 192-640kbit/s
<b>AAC requires AVP/SWO/VP/AAC</b>	AAC-LC 64-512kbit/s HE-AAC 48-192kbit/s HE-AACv2 32kbit/s

<b>MPEG1 LAYERII requires AVP/SWO/VP/M1L2</b>	<p>Mono 1.0 centre from left 32-192kbit/s</p> <p>Mono 1.0 centre from right 32-192kbit/s</p> <p>Mono 1.0 (L+R/2) 32-192kbit/s</p> <p>1+1 Dual Mono 64-384kbit/s</p> <p>Stereo 2.0 64-384kbit/s</p> <p>Joint Stereo 2.0 64-384kbit/s</p>
<b>VANC Data Extraction HD (no license)</b>	<p>SMPTE 334-1 Closed Captions</p> <p>SMPTE 2016-3 AFD and Bar Data</p> <p>SMPTE-2031 Teletext</p> <p>OP-47 Teletext Subtitles</p>
<b>VANC Data and VBI Extraction SD (no license)</b>	<p>World Standard Text (WST –ETS300472) 625 only</p> <p>Closed Captioning EIA-608, EIA-708 and SCTE20</p> <p>SMPTE-334-1</p> <p>SMPTE 2016-3 AFD and Bar Data</p>

## CE-HEVC Specifications

### CE-HEVC Encoder Module

<b>CE-HEVC Encoder Module</b>	<p>Single slot module</p> <p>Up to four CE-HEVC option modules per chassis</p>
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### Inputs

<b>Video</b>	<p>4 x 3G/HD/SD-SDI Level A serial digital video either electrical (SMPTE 292M/SMPTE 424M) or optical (SMPTE 297M) on SFP on Fibre connections</p>
<b>Audio</b>	<p>Up to eight stereo pairs embedded on HD-SDI</p> <p>Up to sixteen stereo pairs embedded on 3G SDI</p> <p>48 kHz sampling rate</p>

### Video Encoder

<b>HEVC Main 10 Level 4.1/4.0 High Tier</b>	<p>720p: 2 Mbps to 50/30 Mbps*</p> <p>1080i: 3 Mbps to 50/30 Mbps*</p> <p>1080p: 4 Mbps to 50 Mbps*</p>
<b>HEVC Main 4:2:2 10 Level 4.1/4.0 High Tier</b>	<p>720p: 2.5 Mbps to 50/30 Mbps*</p> <p>1080i: 3.5 Mbps to 50/30 Mbps*</p> <p>1080p: 6 Mbps to 50 Mbps*</p>
<b>HEVC Main 10 Level 5.1 High Tier</b>	<p>UHD: 9 Mbps to 140 Mbps</p>
<b>HEVC Main 4:2:2 10 Level 5.1 High Tier</b>	<p>UHD: 12 Mbps to 12 Mbps</p> <p>H.264 Main Profile Level 4.0 4:2:0 8bit (HD)</p> <p>(1 Mbps to 20 Mbps)</p> <p>H.264 High Profile Level 4.1 4:2:0 8bit (HD)</p> <p>(1 Mbps to 62.5 Mbps)*</p> <p>H.264 Hi 422 Profile Level 4.1 4:2:2 10-bit (HD)*</p> <p>(1 Mbps to 80 Mbps)</p> <p>Low delay modes as standard</p> <p>Optional super low delay mode (~ 160 ms latency depending on configuration)</p> <p>*Max bitrate in Multi-channel mode is 30Mbps</p>

## Video Resolutions

<b>HD</b>	1920 x 1080i 25 1920 x 1080i 29.97 1280 x 720p 50 1280x 720p 59.94 1920 x 1080p 50 1920 x 1080p 59.94
<b>UHD (4K)</b>	(HEVC only) 3840 x 2160P 50 3840 x 2160P 59.94

## Audio Encoder

<b>Audio Encoder</b>	Up to 32 x stereo audio channel processing depending on licensing and configuration
<b>MPEG-1 Layer II encoding standard</b>	Encoding rates from 32 kbps to 384 kbps Dolby® Digital (AC-3) Encoding rates from 56 kbps to 640 kbps Pass-through of pre-encoded Dolby Digital
<b>Advanced Audio Coding (AAC)</b>	Encoding of AAC-LC (64 kbps to 320 kbps), HE-AAC (48 kbps to 128 kbps), HE-AACv2 (32 kbps) Linear PCM pass-through Dolby®E pass-through Phased Aligned Audio (PAA)

## Ancillary Data

<b>Ancillary Data</b>	SMPTE 334-1 Closed Captions SMPTE 2016-3 AFD and Bar Data SMPTE 12-2 Time code extraction and carriage (ETSI TS101 154) SMPTE 2038 Generic VANC data extraction, up to 2 Mbps
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## Physical and Power

<b>Approximate Weight</b>	0.35 kg per CE-HEVC option module
<b>Power Consumption per module</b>	Less than 45 Watts

## Environmental Conditions

<b>Operating Temperature</b>	-10°C to 50°C (14°F to 122°F)
<b>Operating Humidity</b>	< 95% non-condensing



## Chassis Specifications

### Transport Stream Interfacing

<b>Input</b>	2x Electrical Ethernet (100/1000BaseT)
<b>Output</b>	2x Electrical Ethernet (100/1000BaseT) Physical port redundancy with active-active and active-standby operation Multicast streaming

### Management

<b>Management</b>	2x Electrical Ethernet (100/1000BaseT) SNMP v1/v2/v3, for alarm traps User management via web browser Support for nCompass management system
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### Physical and Power

<b>Dimensions (W x H x D)</b>	17.40 x 1.75 x 23.50 inches (44.20 x 4.45 x 59.69 cm)
<b>Weight</b>	8.0 kg (17.6 lbs) unpopulated
<b>Input Voltage</b>	100-240 VAC 50/60 Hz (AC chassis) -48 VDC (DC Chassis)
<b>Input Power</b>	70W (chassis only) 80W per each EI9001 90W per each EI9001T

### Environmental Conditions

<b>Operating Temperature</b>	-10°C to +50°C (14°F to 122°F) 1-2 EI9001/EI9001T fitted -10°C to +45°C (14°F to 113°F) 3-4 EI9001/ EI9001T fitted -10°C to +30°C (14°F to 86°F) 5-6 EI9001/ EI9001T fitted (AVP4000/BAS/1AC/ED only)
<b>Storage Temperature</b>	-40°C to +85°C (-40°F to 185°F)
<b>Relative Operating Humidity</b>	10% to 90% (non-condensing)

### Compliance

<b>Compliance</b>	CE marked in accordance with EU Low Voltage and EMC Directives
<b>EMC Compliance</b>	EN55022, EN55024, AS/NZS3548, EN61000-3-2 and FCC CFR47 Part 15B Class A
<b>Safety Compliance</b>	EN60950, IE60950