Advantech VEGA Video Infrastructure Solutions

Accelerating UHD Workflow Transformation

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VEGA-63015



4K/8K UHD Broadcast Encoding & OTT Transcoding Accelerators Virtual Reality & 360° Video

www.advantech.com

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DIGITAL MARKETING APPLICATION

Accelerated 4K Recording and Streaming Solutions for Medical Applications	
The New Era of 3D Medical Video Imaging	
Endoscopic Surgery Image Encoding, Storage, and Streaming	

BROADCASTING APPLICATION

Advantech and France TV Collaboration Demonstrates Effectiveness of 8K Over 5G Technology	
8K Virtual Reality Live Streaming	
Accelerating Smooth 4K Live Streaming Solution for Remote Production (REMI)	

PRODUCT SELECTION GUIDE

STAR AND NEW PRODUCT HIGHLIGHTS

4K AV over LAN SDVoE TX, RX, Bridges



VEGA-1000 VEGA-1100 VEGA-1200 NEW

4K AV over WAN

Portable Encoding / Streaming





VEGA-2002

4K/8K Broadcast Contribution

VEGA F

HEVC 4:2:2 Encoder Decoder



VEGA-6301 VEGA-8300 VEGA-8301D

ULL PRODUCT LINEUP

ProAV Capture Cards

HDMI & SDVoE Ingress



VEGA-3003

ST-2110/SDI Encoder Cards

Multichannel Ingress



VEGA-3311 VEGA-3321

8K **Encoder Cards**

8K Ingress



VEGA-3304

Cloud/Edge Video Processing

VEGA-3310 VEGA-3314 VEGA-3318 VEGA-3500

Reconfigurable Video Intelligence

Xilinx FPGA Accelerator Cards



VEGA-540 VEGA-550 VEGA-4000 **VEGA-4002**

High Density Video Processing

1U Server Appliance



VEGA-7020 VEGA-7110 NEW

ABOUT ADVANTECH VIDEO SOLUTIONS

Advantech's Video Solutions Division has been developing broadcast-quality video solutions for some of the top OEMs in the industry. Customers can leverage our strong video expertise and leading-edge computing and networking design skills to accelerate the deployment of their next-generation media solutions:

Contribution & Live Production		Media Processing & Distribution
Video Acceleration	 Support for a variety of mezzanine compression implementations for 4K video transport over 10GbE. 	 Efficient HD/UHD H.264/H.265 encoder, decoder and transcoder PCIe acceleration for higher density, lower TCO deployments
Networking	 IP media transport supporting different industry standards such as SMPTE 2022 and SMPTE 2110 	 Low latency media-over-IP interfacing & switching Software-defined networking & ToR switching
Computing	 Ethernet, SDI,HDMI, USB, and analog interface flexibility Embedded computing solutions for field applications 	 Application-ready x86 platforms optimized to run compute-intensive video processing applications FPGA expertise for innovative IP integration

We apply our solid media technology knowledge to engineer innovative solutions for our customers. From design through quality assurance and production to global logistics, our teams integrate with our customers' teams to create a highly collaborative environment that minimizes the risk of developing complex solutions. Advantech scalable video platforms are designed with modularity in mind to meet a wide range of application scenarios.

From ultra-light modules that can be embedded into live streaming devices to high-density architectures for live cloud media services, our video processing platforms provide a user space software framework supported by our software engineering team that simplifies their integration into your new IP workflow solutions.



From Acquisition to Distribution

Simpliflying the Customization Process

Advantech has invested heavily in dedicated resources to develop the essential building blocks that enable the deployment of innovative and integrative video infrastructure solutions, including video acquisition, video transport, video processing and video distribution. With Advantech, you are not limited to a standard products offering alone. Our flexible design approach allows OEMs to easily partner with Advantech on customized versions of commercial-off-the-shelf products, a framework we call Customized COTS. The advantage of Customized COTS is its "best of both worlds" approach enabling OEMs to differentiate with unique premium solutions that leverage the cost benefits of full custom ODM designs and offer a significantly faster time to market. In addition, we are open to engage on full custom designs supported by our world-class team of video architects and engineers.



LEADING INNOVATION FOR THE NEW IP VIDEO INFRASTRUCTURE

Advantech VEGA Video Platforms and PCI Express Accelerators are designed to boost video infrastructure performance from acquisition to distribution at the lowest power budget while fully complying with the media industry needs. By providing access to the latest 4K/8K video processing and IP media technologies on commercial-off-the-shelf IT platforms we accelerate the deployment of next-generation, open and more efficient solutions across a wide range of media applications from broadcast encoding and OTT transcoding to cloud, mobile and 360° video. Advantech's proven expertise in networking and computing enables us to lead innovation in the IP transition of the industry and get our customers ahead of the curve. Here are the principal issues confronting the industry and how we can help.

The Move to IP

One of the major disruptors in the industry is the migration to IP that improves flexibility, reduces costs, and allows more use of commercial computing and networking gear. Advantech accelerates this transition by working together with key industry partners through industry alliances such as AIMS on standard and interoperable solutions that unlock the full potential of the new IP media infrastructure.





UltraHD and HEVC

The advent of 4K/8K and H.265 are a double whammy for the industry, together significantly outstripping the processing capability of many infrastructure elements. Advantech provides a wide range of easy-to-integrate, ultra-low-power video acceleration cards and application-ready platforms that efficiently scale throughput of high-density video infrastructure solutions to enable next-generation UHD services.

SDVoE

The SDVoE Alliance is a dedicated group of pro AV manufacturers, system designers, integrators and technology managers working together to accelerate the replacement of point-to-point connectivity and the matrix switch with Ethernet-based AV distribution. Through interoperability and standardization, the SDVoE platform enables great AV user experiences.



UHD VIDEO CONVERTER

VEGA 1000 series have been specifically designed for 4K video transmission, with near zero latency and high quality requirements for the next-generation intelligent healthcare video applications.



Ultra-High Definition



Ultra-Low Latency



Video Wall

86

132/60

Streaming VEGA-1200 C-Bow 🐚 **SDVoE Transmitters SDVoE Receivers** Conferencing VEGA-1100 11mm [] rime [] rim II rime [] Vital Monito rima [] VEGA-1200 VEGA-1100 PACS viewer Endocam Video Network 10Gbit/s Ethernet **VEGA-1200 Recorder Plus SDVoE PCIe Capture Card** • Local/Remote Recording • SDVoE Controller • Worklist DICOM - KIS / PACS Preview Documentation Store • Video Interface • USB



VEGA-1000

Bi-directional HDMI 2.0

Transceiver Extender

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VEGA-1100

HDMI 2.0 over IP Multicast Transceiver System



Encoder/Decoder

VEGA-1101 Medical Grade 4K SDVoE -----

VEGA-1200

4K SDVoE Hybrid Encoder/Recorder

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4K PORTABLĖ VIDEO STREAMER

The Advantech VEGA-2000 Series supports video capture, encoding and live streaming over mobile networks for portable applications.



Multi-view



With medical imaging playing an significant role in healthcare, devices capable of capturing precise and detailed videos have become essential. VEGA-1200 hybrid encoder/decoder not only facilitates medical image and video recording, but takes it one step further by also supporting all analog, digital, and IP video input sources. The encoder function converts analog signals into digital streams that can be transmitted over LAN, WAN, and other types of IP networks with zero latency. This allows healthcare providers to record surgical procedures and treatments in real time and live stream/broadcast them to medical schools and teaching hospitals using existing camera infrastructure.

Applications



Operating Room



Hospital Center



Medical School



VEGA-2002 4K H.265/H.264 Live Streaming Encoder



VEGA-2002R 4K H.265/H.264 Live Streaming Encoder Rugged Fanless Design



Advantech's VEGA-1100 HDMI 2.0 over IP Multicast Transceiver System utilizes SDVoE-based AV networking to not only transmit high quality video source at Ultra-HD 4K2K@60 4:4:4, but takes it one step further by also supporting transmission to multiple destinations.

Applications



AVoIP



Digital Signage



Video Wall



VEGA-1000

Bi-directional HDMI 2.0 Transceiver Extender



VEGA-1100

HDMI 2.0 over IP Multicast Me Transceiver System



VEGA-1101 Medical Grade 4K SDVoE Encoder/Decoder



VEGA-1200

4K SDVoE Hybrid Encoder/Recorder



Advantech VEGA-2002 is a small, low power, real-time encoding module based on video compression from leading video technology provider Ambarella which supports live UHD resolution HEVC and AVC codecs. It features 4Kp60 10bit video acquisition through built-in SDI or HDMI inputs and the encoded video and audio can be streamed to Ethernet or directly to mobile or Wi-Fi networks by connecting a USB wireless adapter.

The VEGA-2002 supports the latest reliable streaming protocols such as SRT, NDI and Zixi in addition to more conventional protocols for ingest to Facebook Live etc. It is available in several configurations to support different SDI requirements including a single 12G-SDI + HDMI version, and can be specified both with and without a customizable metal enclosure for ease of integration. With only 12W power consumption, low latency hardware-based encoding, and an easy to manage web UI, the VEGA-2002 is ideal for various portable or field-based streaming applications such as live reporting, sports video capture and record, and real-time interactive AR/VR services.

Applications



Medical

Sport

Broadcast

Transportation



VEGA-2002 4K H.265/H.264 Live Streaming Encoder



VEGA-2002R

4K H.265/H.264 Live Streaming Encoder Rugged Fanless Design



REAL-TIME VIDEO APPLIANCE

HDR

High-dynamic range image quality Low-latency High-efficient

VEGA-6300 Series

Advantech's VEGA-6300 Series of all-in-one encode appliances are compact and efficient platforms that enable 4K capture and live video contribution in space and power constrained applications.

The family supports the latest HEVC codec to optimize high-resolution video transmission over satellite or mobile networks. The VEGA-6301 & VEGA-6301M appliances can be deployed as part of a flexible, 4K IP-based field production requiring up to four times less cabling than a traditional SDI-based deployment, and HDMI2.0 inputs supported as well. They are both 1U high, less than 290mm deep, and can mount in a standard 19" rack.

VSD MediaFlow on VEGA-6301





VEGA-8300 Series

The new VEGA-8300 encoder platform uses the latest generation of the company's award winning 8Kp60 10bit 4:2:2 capable encoding technology together with a new 4 x SDI-12G interface, remote web-based configuration, and local HLS or RTP encapsulation and streaming outputs. To partner the 8K encoder, the VEGA-8300 8K decoder platform makes use of the same proven Spin Digital 8K live HEVC decoder in a package that is optimized for field or event use, and includes an option for 4 x SDI-12G outputs for contribution links as well as 4 x HDMI 2.0 (with option for HDMI 2.1 in future) for direct interface to large screens or video walls. The decoder/player supports 10bit/HDR play out and contribution grade 4:2:2 profiles.

Applications



8K Contribution & Encoding

Live Streaming Sport



8Kp60 HEVC Video Encoder

8Kp60 HEVC Video Decoder

8Kp60 HEVC Contribution Grade Decoder

UHD EDGE VIDEO SERVER

Scale Your Media Applications More Efficiently



The VEGA 7000 series is a family of highly configurable servers that combine best video and IT practices within an optimized density, power consumption, and functionality, off-the-shelf platform that has been designed to efficiently scale throughput of compute-intensive encoding, decoding and transcoding applications in live broadcast, OTT or cloud workflows. The density and open system architecture advantages of the VEGA 7000 series servers bring greater scalability and agility to media applications from edge contribution to cloud distribution, significantly reducing time-to-market, in-house development efforts and total cost of ownership (TCO) of live 4K/8K video solutions. Configurations of the VEGA 7000 family range from multi-channel UHD HEVC broadcast encoders and decoders to cloud OTT transcoding servers for the data center supporting up to 32 x 4Kp60 live HEVC profiles per rack unit – the highest density available in the market.





VEGA-7020

1U High Density Video Server for Accelerated Video Processing



VEGA-7110

1U Ultra Low Power Video Server for UHD IP Video Processing

IP VIDEO 2. CAPTURE CARDS

The VEGA 3300 Series of 4K/8K PCI Express cards accelerate UHD HEVC/AVC video encoding, decoding and transcoding in broadcast and live streaming workflows.

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The new High Efficiency Video Coding (HEVC) significantly reduces bit rates when compared to AVC. It is particularly relevant for live UHD services which require much higher capacity. But these improvements come at high computational cost with up to 48 server-class cores typically required to perform 1-ch real-time software-based 4K HEVC broadcast encoding.

Applications



SDVoE 4K Live-Video Capture Card



Broadcasting video contribution



8K sport live streaming



ST-2110 IP video production



VEGA-3003

SDVoE 4K Live-Video Capture Card



VEGA-3304 8Kp60 Real-time HEVC Encoder Card



VEGA-3311

4K HEVC Broadcast Video Encoding Card (10G VoIP)



VEGA-3321

4K HEVC Broadcast Video Encoding Card (25G VoIP)

ACCELERATOR CARDS



High Video Quality Encoding

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Latest IP Video Technology



Flexible video format transformation

VEGA-3000 Series

Advantech VEGA-33xx encoder, decoder, and transcoder cards enable real-time, professional-grade HEVC video processing at up to 20x less power consumption than a software-only solution. These low power PCI Express add-on cards can deliver unrivaled video processing capability to IT-based infrastructure platforms, allowing servers to do more of what they are good at, and significantly reducing power, cost and footprint of high-density solutions. Advantech's compact plug-in accelerators provide video equipment manufactures with the required technology to accelerate the heavy-lifting parts of the workflow without otherwise losing capacity or adding more servers, helping them successfully address the challenges of UHD video processing in a cost-effective manner.

Applications



Edge Video Processing



VEGA-3500

Multi-Channel UHD Video HEVC/AVC/VP9/AV1 Transcoding Accelerator Card



Broadcasting Video Encoding



VEGA-3310

4K HEVC Broadcast Video Encoding/ Decoding / Transcoding Card



OTT Video Streaming



VEGA-3314

4-ch 4K HEVC/AVC/MPEG2 Broadcast Video Encoding/ Decoding / Transcoding Card



Remote Video Editing



VEGA-3318

8-ch 4K HEVC/AVC/MPEG-2 Encoding, Decoding & Transcoding Accelerator

FPGA ACCELERATOR

Advantech FPGA Platforms for Video Intelligence Acceleration

• FPGAs are becomingly increasingly well regarded for their ability to run the deep neural networks behind AI more efficiently than CPUs or GPUs, yet still retain the software re-programmability that sets them apart from ASIC options. Advantech's VEGA Series of Xilinx FPGA-based PCI Express cards have been designed to accelerate AI deep learning workloads, offering a range of integration options to suit customer needs. In particular, the range focuses on the needs of video-based, real-time AI inference applications at the edge where fastest and more efficient video processing is critical.



Flexibility for Reconfiguration



Ready for Multi-Code AV1, VP9, H.264/AVC , H.265/HEVC



Solution-Ready Platform

VEGA-4000 Series Cloud-based Video Processing & Intelligence

The Advantech VEGA 4000 Series are based on Xilinx's Virtex UltraScale+ VU9P FPGA which are also deployed widely in public cloud installations thanks to their high performance coupled with excellent power efficiency. FPGA are considered by many as the optimum engines for cloud-based video processing and intelligence applications, and with VEGA 4000 Series, customers are able to add this capability to their cloud edge appliances and private or hybrid cloud installations.

VEGA-500 Video Content Analysis

The Advantech VEGA 500 Series are based on the Xilinx Zynq Ultrascale+ ZU7EV MPSoC which adds dedicated video encoding/decoding blocks and ARM processor cores to the programmable logic array for extra scalability. That makes the VEGA 500 series especially suitable for applications that require a lot of video processing as part of the workflow. This is especially relevant when used in parallel with power efficient inference engines running in the programmable logic.



VEGA-4000

Xilinx Ultrascale+ FPGA Accelerator for Video Processing



VEGA-4002

Dual Xilinx Ultrascale+ FPGA Accelerator for Video Processing



VEGA-540

Reconfigurable Video Content Intelligence Accelerator



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VEGA-550

Reconfigurable Video Content Intelligence Accelerator

Digital Medical Application

Accelerated 4K Recording and Streaming Solutions for Medical Applications

Solutions

Medical services and Operating Rooms (OR) are being transformed by video. Taking a lead from the rest of the video industry, high resolution 4K/UHD cameras, instruments, displays, and visualizations are proliferating throughout, giving options for detailed sharing for telemedicine assistance, detailed presentations for training and education, and detailed recordings for patient records as well as oversight and defense. This resolution revolution enables more to be seen through endoscopes, and more to be viewed from head cameras or room monitors.

At the heart of 4K/UHD video sharing, remote streaming and content recording is the latest compression technology. New internationally agreed standards for video compression are introduced roughly every 10 years with each generation offering roughly a 50% reduction in streaming bitrate or storage requirement for similar video quality each time. The most widely used and well established codec is H.264/AVC, first introduced in 2003. The High Efficiency Video Coding (HEVC) codec was introduced in 2013, and trades off 50% better compression ratios with up to a tenfold increase in processing power required. Coupled with a four times increase in resolution, this realistically means hardware acceleration of the video compression is critical to maintaining the low power consumptions expected in medical environments where a single 6W device can replace the 600W computer required for an equivalent software encoder.







4K SDVoE Hybrid Encoder/Recorder

VEGA-1200

- Zero-latency 4K HDR SDVoE video encoder/decoder
- Loop out HDMI output for real-time viewing on additional HDMI display
- Supports real-time HEVC encoding (up to 4Kp60) and SDVoE functionality

4K H.265/H.264 Live Streaming Encoder **VEGA-2002**

- 4Kp60 audio/video capture over built in 4 x 3G -SDI or 1 x 12G(3G)-SDI or HDMI 2.0 inputs
- Real-time 4Kp60 H.264/H.265 8/10-bit encode
- Streaming output via Gigabit Ethernet or USB wireless dongle
- Video Record to USB Storage

Solutions

The additional compression efficiency over AVC allows either a 40-50% reduction in storage costs for those who implement it in recorders, or a chance to substantially increase the video quality or resolution when streaming video over a fixed bandwidth link. Meanwhile developments in coding technology continue and promise even more efficiency, but none of the most recent advances have wide scale support and only HEVC has wide scale support in hardware.

Advantech can help equipment makers to take advantage of the potential benefits of 4K/UHD HEVC based recording and streaming by providing a range of high quality hardware-based HEVC video encoders that can be used to improve storage performance and transmission efficiency whilst retaining a compact, robust form-factor. This paper describes how.

VEGA SDVOE

Encoder



SDVoE 4K Live-Video Capture Card

VEGA-3003

- Zero-latency 4K HDR SDVoE video encoder/decoder
- Loop out HDMI output for real-time viewing on additional . HDMI display
- Supports real-time HEVC encoding (up to 4Kp60) and SDVoE functionality

4Kp60 Dual HDMI & Quad SDI Encoder **VEGA-6301M**

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VEGA SDVoE Decode

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VEGA Management Controller

Management Ethernet Switch

VEGA-1200

- Range of UHD-ready video input formats such as quad 3G-SDI, high speed 12G-SDI, and HDMI 2.0
- HEVC Encoder supports high quality 10bit 4:2:2 modes @ 4Kp60 or 4 x 1080p60
- Easy to use SDKs and remote web based configuration interface

Digital Medical Application

The New Era of 3D Medical Video Imaging

Background

Cutting-edge medical imaging technology has revolutionized the healthcare sector and is used by healthcare professionals to diagnose and treat patients. Furthermore, state-of-the-art 3D medical imaging gives an improved understanding of human anatomy, enables better image resolution for advanced medical analyses and treatments. Therefore, robust medical imaging technology must be comprised of efficient storage configurations, cost-effective video recording and streaming options, and realtime video functionality to advance complex diagnostic and surgical treatment.



System Requirements

The project entailed upgrading the video storage capabilities of a new range of surgery visualization assistants for a leading manufacturer of surgery equipment. The solution required recording and storing high-quality live images as seen by the surgeon during surgical operations. In addition, the importance of the data necessitated the recording and archiving of live images inclusive of a wider patient view and the precise information from the surgical procedure. As such, the final solution had to provide an effective means to store high-quality video for historical records and mitigate the impact on long-term requirements.

System Description

The smart solution entails the customization of Advantech's VEGA-6301M, a low-power video processing platform and compact video appliance with real-time High Efficiency Video Coding (HEVC) 4Kp60. It allows users to capture and adapt live video at up to 4K/UHD resolution from Serial Digital Interface (SDI) or High Definition Multimedia Interface (HDMI) feeds and then encode for streaming to content delivery or distribution networks by using the latest hardware HEVC compression technology.

In addition, two separate HDMI or three separate SDI inputs capture video recordings from the surgeon's 3D interface incorporating a relatively wider patient view. The video recordings are then scaled and assembled into a single 4K composite image using a Field-Programmable Gate Array (FPGA) based processing technique. For efficiency, the video is then compressed for recording alongside time-stamped metadata corresponding to the surgeon's operational procedure. The videos are recorded locally on a high capacity Solid-State Drive (SSD) with the ability to bulk offload to a hospital storage option via a 10Gb Ethernet port.



4Kp60 Dual HDMI & Quad SDI Encoder

VEGA-6301M

- Compact Video Appliance with real-time HEVC 4Kp60 encoding capabilities
- 1U high & half rack mountable / standalone design allows easy user mounting different combinations of appliance in a small space
- UHD-ready Video over IP connections in addition to standard video connectivity
- HEVC Encoder supports high quality 10bit 4:2:2 modes @ 4Kp60 or 4 x 1080p60

Endoscopic Surgery Image Encoding, Storage, and Streaming

Background

Endoscopic surgery is a mature and minimally invasive surgery used widely in today's smart hospitals with clinical applications being expanded and intensified. Both doctors and patients can benefit from the endoscopic surgery.

The primary function of the endoscope is to display images taken by an optical sensor through monitors or computers. In the medical field, image storage and transmission functions are also required. Advantech has cooperated with a leading medical instrument provider in China to develop a high-quality, all-in-one endoscope for filming, encoding, storage, and transmission. Endoscopes are sometimes used for streaming or recording surgical operations, and they are sometimes used for remote doctor consultations or educational training, being invaluable for expanding the scope and development of cutting-edge smart medical technology.



The Solution

Advantech's endoscopic surgery image coding, storage and streaming solution includes four parts

- The endoscope camera function transmits images to the encoding module.
- Advantech partner's control board and light source board, which is used to control the endoscope while managing the encoding module through SP
- Advantech VEGA encoding module collects high-definition SDI signals for high quality encoding
- The encoded data can be stored on USB flash drive, streamed via LAN port, or real-time displayed on screen though the HDMI interface

The solution provides great advantages of convenience for endoscopic surgery and ensures that vital high quality images are recorded and stored securely

Why Advantech

- Offers a hardware interface location adjustment function with complete CGI commands
- Customized software for saving resources and accelerating your time to market
- Compact Size, Competitive Price & Low Power Consumption

Broadcasting Application

Advantech and France TV Collaboration Demonstrates Effectiveness of 8K Over 5G Technology

Background

8K and 5G will likely play a significant role in the future of broadcasting. Likewise, the possibilities of immersive 8K experiences go beyond higher pixel counts. When combined with high frame rates and dynamic range, 8K produces hyper-realistic video that boosts viewer engagement. The challenge is the processing power required to compress live 8K, and the bandwidth required to carry this pristine content. 5G provides one of the solutions to this challenge with greater bandwidths and improved download speeds that reach up to 10 gigabits per second (Gbit/s). As a bandwidth intensive technology, the use of 5G will enable more 8K services to be established.

System Requirements

Advantech provided live 8Kp60 HEVC encoding equipment to a France TV experiment conducted at the 2019 French Open. This experiment demonstrated a point-to-point link with a system that captured, encoded, and streamed data from a Sharp 8K camera. This compressed video data was streamed across a locally established 5G network to a software decoder/player in a remote viewing room. Produced by our partner Spin Digital, this decoder/player enabled viewing on home entertainment systems using Sharp 8K TVs.





8Kp60 HEVC Video Encoder

VEGA-8300E

- Compact 8Kp60 HEVC Encoder Appliance with comprehensive control
- Video and audio acquisition via 4 x SDI-12G inputs with up to 22.2ch embedded audio
- Real time HEVC 10-bit 4:2:2 encoding with 2SI and slice-mode support up to 300Mbps

8Kp60 HEVC Video Decoder VEGA-8300D

- 8Kp60 HEVC 85Mbps real-time decoder platform
- 4:2:0 chroma & 10-bit color
- 4 x DP ports outputs with 22.2-ch audio support
- Live input via HLS or RTP streaming protocols across IP

System Description

This project leveraged Advantech's VEGA-8300E encoder platform. This platform pairs the latest generation, award winning 8Kp60 10bit 4:2:2 capable encoding technology with 4 x SDI-12G capture interfaces, remote web-based configuration, and local HLS/RTP encapsulation and streaming outputs. The system is supplied ready to use.

The decoder/player employed during the event was a "Home Theatre" PC running the Spin Player 8K application. This proved tricky to configure in the field so Advantech also now provide a VEGA-8300D 8K decoder appliance validated for use with the encoder. This appliance leverages the Spin Digital 8K live HEVC decoder in a robust package optimized for field/event use. Variants of the VEGA-8300D include one with 4 x SDI-12G outputs supporting 4:2:2 profiles for contribution links and one with 4 x HDMI 2.0 (with support for future HDMI 2.1) for direct interfacing with large screens or video walls.

8K/UHD2 provides the foundation for immersive experiences in a broad range of scenarios — including live OTT broadcasting, 360 VR, and medical applications. The extra resolution can convey intricate detail and enables users to zoom in on individual elements without compromising image clarity. With HEVC encoding, superior live picture detail is delivered using bandwidths uniquely suitable to 5G networks (100Mbit/s ~ 200Mbit/s).



Advantech's Comprehensive Video Solutions

8Kp60 HEVC Contribution Grade Decoder

VEGA-8301D

- Zero-latency 4K HDR SDVoE video encoder/decoder
- Loop out HDMI output for real-time viewing on additional HDMI display
- Supports real-time HEVC encoding (up to 4Kp60) and SDVoE functionality

8Kp60 Real-time HEVC Encoder Card

VEGA-3304

- Range of UHD-ready video input formats such as quad 3G-SDI, high speed 12G-SDI, and HDMI 2.0
- HEVC Encoder supports high quality 10bit 4:2:2 modes @ 4Kp60 or 4 x 1080p60
- Easy to use SDKs and remote web based configuration interface

Broadcasting Application

8K Virtual Reality Live Streaming

Background

Virtual Reality has the potential to fully transform viewers' experience but real mass adoption is subject to providing life-like quality content which poses many infrastructure challenges. From broadcasting and social media to enterprise and online gaming, many industries can benefit from immersive VR experiences.



System Requirements

To produce live 8K VR content, HEVC encoding of several ultra-high definition streams will be required in order to keep bandwidth under control while providing a good quality visual experience. However, live event production has a series of constraints in terms of space, weight and power. To tackle this, hardware acceleration can be leveraged in order to build compact live 8K VR encoders that streamlines VR content production and can be hidden from the 360 degree view.

The VEGA-3304 is a PCI Express accelerator that supports 8K acquisition, real-time HEVC encoding and can be plugged into standard server GPU slots to create powerful and efficient live VR encoders. Enjoying a reduced bandwidth, the encoded streams can be sent to the cloud to be stitched and delivered. The proposed cloud architecture is shown in the image below and greatly simplifies 8K VR live streaming workflows enabling hyper immersive solutions without jeopardizing quality.

Content producers just need to setup the camera and compact live encoding systems onsite. Live feed from the 4K cameras mounted on a 360 degree rig are acquired and encoded by the VEGA-3304 to be streamed to the cloud. Storage and real-time stitching are handled on the cloud and provided as a service which minimizes onsite deployment complexity and optimizes operations when producing immersive VR live events such as sports and concerts.

Key Challenges

- Hyper immersive and smoother user experience
- Acquisition support
- Low power and compact
- Cost efficient and flexible



8Kp60 Real-time HEVC Encoder Card

VEGA-3304

- 1-ch 8Kp60, 4-ch 4Kp60 or 16-ch 1080p60 real-time HEVC encoding
- Main or Main 10 HEVC profiles with 8 or 10 bit depth and 4:2:0 or 4:2:2 chroma subsampling
- Video acquisition over built-in 16-ch 3G-SDI inputs
- Linux and Windows SDK including simple-to-use API and example code for FFmpeg and GStreamer multimedia frameworks
- Double width, 3/4 length PCI Express Gen3 x16, compatible with server GPU slots

Accelerating Smooth 4K Live Streaming Solution for Remote Production (REMI)

Background

To provide a better service and improved experience for their sport fans, many broadcasters are looking to update their on-site production and streaming facilities. Others are turning to a new paradigm, that of Remote Production, a trend sure to be accelerated by the rollout of 5G mobile networks. A recent study by the European Broadcasting Union found that an overwhelming majority of broadcasters will adopt 5G and that Remote Production was identified as the main use case.

Naturally the focus is on event coverage, and often this is based in Outside Broadcast trucks. Advantech can help equipment makers and more adventurous system integrators to be successful by providing a range of commercial off the shelf encoding and streaming equipment that addresses these needs, offering high quality performance in a compact and low power way.



Key Challenges

- Live Contribution: Reliably encode & stream 4K at a solid 60fps using 4:2:2 chroma subsampling
- Good Compression: Maximize quality for the limited available uplink bitrate using HEVC
- Limited Space: Racks are normally only 600mm deep and compact size is required
- Minimize Power: Always limited in mobile applications, both to source power to operate and to remove heat during operation
- Low Latency: As low as possible within other constraints



4K HEVC Broadcast Video Encoding Card

- VEGA-3311
- 1-ch 4Kp60 or 4-ch 1080p60 real-time 4:2:2 10-bit HEVC, AVC encode
- AIMS roadmap support including SMPTE 2110 & VSF TR-03/-04 w/ AES67 audio & SMPTE 2059 sync
- 4K video capture over built-in, 4-ch SDI-3G or 1-ch SDI-12G and 2x 10GbE
- Simple-to-use API & example code for FFmpeg & GStreamer multimedia frameworks



1U High Density Video Server for Accelerated Video Processing **VEGA-7020**

- Short depth 1RU x 19" server platform
- Intel Xeon Workstation-Class Processor with embedded graphics functionality and Intel Quick Sync Video support
- Four PCI Express card slots for I/O and accelerators/ Four Gigabit ethernet network ports
- Front panel LCD display, keypad, and confidence monitor

			*Venil I	Wand I	· 53 %	Tannal
	Model		VEGA-1000	VEGA-1100	VEGA-1101	VEGA-1200
Life Cycle			5 Years	5 Years	5 Years	5 Years
Platform			Appliance	AVP2000T	Appliance	AVP2000T
	Channels (Max.)		1	1	1	1
Video Inputs and Outputs	Video formats	Resolution	480i/480p/720p/1080i/ 1080p/4K2K	480i/480p/720p/1080i/ 1080p/4K2K	VGA: 640x480 (4:3) SXGA: 1280x1024 (5:4) 1080p/i: 1920x1080 (16:9) SVGA: 800x600 (4:3) WXGA: 1366x768 (16:9) QXGA: 2048x1536 (4:3) XGA: 1024x768 (4:3) SXGA+: 1440x1080 (4:3) Ultra HD: 3840x2160 (16:9) HDTV: 1280x720 (16:9) UXGA: 1600x1200 (4:3) -/ 4K: 4096x2160 (17:9)	480i/480p/720p/1080i/ 1080p/4K2K
		Frame rate	up to 4K60	up to 4K60	up to 4K60	up to 4K60
	Chroma Sampling I	Format	4:4:4	4:4:4	4:4:4	4:4:4
	Bit Depth		8bit/10bit/12bit	8bit/10bit/12bit	24 bit, 30 bit, 36 bit, 48 bit	8bit/10bit/12bit
	Input Interface		HDMI 2.0	HDMI 2.0	HDMI 2.0 (Optional: 3G-SDI, DP)	HDMI 2.0 / DP/ 12G-SDI/S-Video/VGA
	Output Interface		HDMI 2.0	HDMI 2.0	HDMI 2.0	HDMI 2.0
	Video Decoding	Standard	AVX	SDVoE	SDVoE	SDVoE/HEVC/AVC
		Bit Depth	8bit/10bit/12bit	8bit/10bit/12bit	8bit/10bit/12bit	8bit/10bit/12bit
Video Codina		Chroma Subsampling	4:4:4/4:2:2/4:2:0	4:4:4/4:2:2/4:2:0	4:4:4/4:2:2/4:2:0	4:4:4/4:2:2/4:2:0
video oounig		Standard	AVX	SDVoE	SDVoE	SDVoE
		Bit Depth	8bit/10bit/12bit	8bit/10bit/12bit	8bit/10bit/12bit	8bit/10bit/12bit
		Chroma Subsampling	4:4:4/4:2:2/4:2:0	4:4:4/4:2:2/4:2:0	4:4:4/4:2:2/4:2:0	4:4:4/4:2:2/4:2:0
VoIP	VoIP Connectivity		1 x 10Gb (SFP+ cages)/ 1x10Gb Copper/1Gb Copper	1 x 10Gb (SFP+ cages)/ 1x10Gb Copper/1Gb Copper	1 x 10Gb (SFP+ cages)/1 x 1Gb Copper	1 x 10Gb (SFP+ cages)/1 x 1Gb Copper
	Standard Supporte	d	AVX	SDVoE	SDVoE	SDVoE/NDI/SRT
	Channels (Max.)		8	8	8	8
Audio	Formats		Stereo Multi-channel linear PCM up to 8 channels (7:1)	Stereo Multi-channel linear PCM up to 8 channels (7:1)	Stereo Multi-channel linear PCM up to 8 channels (7:1)	Stereo Multi-channel linear PCM up to 8 channels (7:1)
	Audio Connectors		1 x ln / 1 x Out	1 x ln / 1 x Out	1 x In (Encoder) 1 x Out (Decoder)	1 x ln / 1 x Out
	Operation System		Linux	Linux	Linux	Linux
	Streaming Protocol		AVX	SDVoE	SDVoE	SDVoE/NDI/SRT
	Management & Control Interface		Local or remote Control GUI interface	Local or remote Control GUI interface	Local or remote Control GUI interface	Local or remote Control GUI interface
	Development Kits		Semtech AVX	Semtech BlueRiver	-	Semtech BlueRiver
Feature	Local Video Output		HDMI 2.0	HDMI 2.0	HDMI 2.0 (Decoder)	HDMI 2.0
	Network Interface		10Gb SFP+ Fiber/ 10Gb Copper/ 1Gb Copper	10Gb SFP+ Fiber/ 10Gb Copper/ 1Gb Copper	10Gb SFP+ Fiber/ 1Gb Copper	10Gb SFP+ Fiber/ 1Gb Copper
	USB Port		3 x USB 1.0 typeA HID	3 x USB 1.0 typeA HID	1 x USB 2.0 TypeB (Encoder) 2 x USB 2.0 TypeA (Decoder)	1 x USB 2.0 TypeA 1 x USB 1.0 TypeA HID
	Power Input		12V DC	12V DC	12V DC	12V DC
Power	Power Consumptio	n	12.5 Watt [max]	12.5 Watt [max]	16 Watt [max] (Encoder) 12 Watt [max] (Decoder)	25 Watt [max]
Mechanical	Dimensions		172 x 162 x 30mm	172 x 162 x 30mm	166mm x 228mm x 43mm (Encoder) 163mm x 175mm x 43mm (Decoder)	266 x 210 x 47.5mm









Model		VEGA-2002-12GS	VEGA-2002-3GS	VEGA-2002-4x3GS	VEGA-2002R-4x3GS	
Life Cycle		5 Years	5 Years	5 Years	5 Years	
Platform			Ambarella H2+ Xilinx Kintex-7 FPGA	Ambarella H2+ Xilinx Kintex-7 FPGA	Ambarella H2+ Xilinx Kintex-7 FPGA	Ambarella H2+ Xilinx Kintex-7 FPGA
	Channels (Max.)		2	2	4	4
Video Inputs and Outputs	Video formats	Resolution	HDMI 2.0 Interface 3840x2160: 60p/59.94p/ 50p/30p / 29.97p/25p 1920x1080: 60p/ 59.94p/50p/30p/ 29.97p/25p/24p 1920x1080: 60i/59.94i/50i 1280x720: 60p/59.94p/50p BNC (12G-SDI) Interface 3840x2160: 60P/59.94p/50p/30p/ 29.97p 1920x1080: 60p/ 59.94p/50p/30p/ 29.97p/25p 1280x720: 60p/ 59.94p/50p/30p/ 29.97p/25p	HDMI 2.0 Interface 3840x2160: 60p/59.94p/ 50p/30p / 29.97p/25p 1920x1080: 60p/ 59.94p/50p/30p/ 29.97p/25p/24p 1920x1080: 60i/ 59.94i/50i 1280x720: 60p/ 59.94p/50p BNC (3GS-SDI) Interface 1920x1080: 60p/ 59.94p/50p/30p/ 29.97p/25p 1920x1080: 60i/59.94i/50i 1280x720: 60p/ 59.94p/50p/30p/ 29.97p/25p	BNC (3GS-SDI) Interface 3840x2160: 60P/ 59.94p/50p/30p/ 29.97p 1920x1080: 60p/ 59.94p/50p/30p/ 29.97p/25p 1920x1080: 60i/59.94i/50i 1280x720: 60p/ 59.94p/50p/30p/ 29.97p/25p (Note: 3840x2160 support by 4 x 3GSDI Quad Link)	BNC (3GS-SDI) Interface 3840x2160: 60P/ 59.94p/50p/30p/ 29.97p 1920x1080: 60p/ 59.94p/50p/30p/ 29.97p/25p 1920x1080: 60i/59.94i/50i 1280x720: 60p/ 59.94p/50p/30p/ 29.97p/25p (Note: 3840x2160 support by 4 x 3GSDI Quad Link)
		Frame rate	up to 4K60	up to 4Kp60	up to 4Kp60	up to 4Kp60
	Chroma Sampling Format		4:2:2	4:2:2	4:2:2	4:2:2
	ыс рерш				JIQUI VIQ8	JIQ01 /JIQ8
	Input Interface		1 x HDMI 2.0	1 x HDMI 2.0	4 x 3G-SDI	4 x 3G-SDI
	Output Interface		HDMI 2.0	HDMI 2.0	HDMI 2.0	HDMI 2.0
Video Codina	Video Decodina	Video Encoding	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)
video ocanig	video Decounig	Bit Depth	8, 10 bit(only HEVC)	8, 10 bit(only HEVC)	8, 10 bit(only HEVC)	8, 10 bit(only HEVC)
Audio	Formats		4:2:0 Line-In: stereo 12G(3G)-SDI: 2 stereo HDMI: 2 stereo	4:2:0 Line-In: stereo 3G-SDI: 4 stereo HDMI: 4 stereo	4:2:0 Line-In: stereo 3G-SDI: 2 stereo (Only supports the SDI port next to the line in)	4:2:0 Line-In: stereo 3G-SDI: 2 stereo (Only supports the SDI port next to the line in)
	Sampling Frequenct		HDMI/SDI: 44.1/48Khz Line in: 32/44.1/48Khz	HDMI/SDI: 44.1/48Khz Line in: 32/44.1/48Khz	HDMI/SDI: 44.1/48Khz Line in: 32/44.1/48Khz	HDMI/SDI: 44.1/48Khz Line in: 32/44.1/48Khz
	Sampling Bit Depth	1	16bit	16bit	16bit	16bit
	Audio Connectors		1 x ln	1 x ln	1 x ln	1 x ln
	Operation System		Linux	Linux	Linux	Linux
	Streaming Protocol		RTSP/RTP/RTMP/HLS/ TS over IP/SRT/NDI HX2(option)	RTSP/RTP/RTMP/HLS/ TS over IP/SRT/NDI HX2(option)	RTSP/RTP/RTMP/HLS/ TS over IP/SRT/NDI HX2(option)	RTSP/RTP/RTMP/HLS/ TS over IP/SRT/NDI HX2(option)
Feature	Management & Co	ntrol Interface	Remote from Web GUI interface	Remote from Web GUI interface	Remote from Web GUI interface	Remote from Web GUI interface
	Local Video Output		HDMI 2.0	HDMI 2.0	HDMI 2.0	HDMI 2.0
	Network Interface		RJ45	RJ45	RJ45	RJ45
	USB Port		2 x USB 1.0 typeA	2 x USB 1.0 typeA	2 x USB 1.0 typeA	2 x USB 1.0 typeA
Dowor	Power Input		12V DC	12V DC	12V DC	12V DC
1 OWEI	Power Consumptio	n	17.8 Watt [max]	17.8 Watt [max]	17.8 Watt [max]	17.8 Watt [max]
Mechanical	echanical Dimensions		130x48x93mm	130x48x93mm	130x48x93mm	122x43x92 mm

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	Model		VEGA-3003	VEGA-3304	VEGA-3311	VEGA-3321
Life Cycle			5 Years	5 Years	5 Years	5 Years
Platform		Xilinx UltraScale+	Xilinx Virtex UltraScale+ Socionext M31	Xilinx UltraScale Socionext M30	Xilinx Virtex UltraScale+ Socionext M30	
	Channels (Max.)		2 (up to 4Kp60)	1 (up to 8Kp60) or 4 (up to 4Kp60)	1 (up to 4Kp60)/ 4 (up to 1080p60)	1 (up to 4Kp60)/ 4 (up to 1080p60)
	Video formate	Resolution	3840x2160/ 1920x1080/ 1280x720/720x480	7680x 4320 or 3840x2160/ 1920x1080/ 1280x720/720x480	3840x2160/ 1920x1080/ 1280x720/720x480	3840x2160/ 1920x1080/ 1280x720/720x480
Video Inputs		Frame rate	60p/59.94p/50p/30p/ 29.97p/25p/24p/ 59.94i/50i	60p/59.94p/50p/30p/ 29.97p/25p/24p	60p/59.94p/50p/30p/ 29.97p/25p/24p/ 59.94i/50i	60p/59.94p/50p/30p/ 29.97p/25p/24p/ 59.94i/50i
and outputs	Chroma Sampling I	Format	4:4:4/4:2:2/4:2:0	4:2:2/4:2:0	4:2:2/4:2:0	4:2:2/4:2:0
	Bit Depth		8bit/10bit	8bit/10bit	8bit/10bit	8bit/10bit
	Input Interface		2 x HDMI 2.0 or 1 x HDMI 2.0 + 1 x SDVoE	16 x SDI-3G	4x SDI-3G or 1x SDI-12G 2x 10GbE (VEGA-3311-I)	4x SDI-3G or 1x SDI-12G 2x 25GbE (VEGA-3321-I)
	Output Interface		PCle Gen 3 x8	PCle Gen3 x16	PCle Gen3 x8	PCle Gen3 x8
	Video Encoding		-	H.265(HEVC)	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)
	Bit Depth		-	8bit/10bit	8bit/10bit	8bit/10bit
	Chroma Subsampling		-	4:2:2 / 4:2:0	4:2:2 / 4:2:0	4:2:2 / 4:2:0
Video Coding	Video Decoding	Standard	-	-	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)
		Bit Depth	-	-	8bit/10bit	8bit/10bit
		Chroma Subsampling	-	-	4:2:2 / 4:2:0	4:2:2 / 4:2:0
	Connectivity		-	-	2x 10GbE (SFP+ cages)	2x 25GbE (SFP+ cages)
VoIP	Standard Supported		-	-	SMPTE 2110 w/ AES67 audio & SMPTE 2059 sync	SMPTE 2110 w/ AES67 audio & SMPTE 2059 sync
	Channels (Max.)		8-ch / 16-ch	-	8-ch / 16-ch	8-ch / 16-ch
Audio	Sampling Frequenct		48KHz / 96KHz	-	48KHz / 96KHz	48KHz / 96KHz
	Sampling Bit Depth	1	16 bit	-	16 bit	16 bit
	Operation System		Windows/ Linux	Linux	Windows/ Linux	Windows/ Linux
Feature	Development Kits		FFmpeg, Microsoft DirectShow	FFmpeg	FFmpeg, Microsoft DirectShow	FFmpeg, Microsoft DirectShow
Power	Power Consumptio	n	<15W	<70W	<35W	<50W
Aechanical Dimensions		PCI Express Half Length Full Height 167.65 x 111.15 mm	PCI Express 3/4 length Full Heigh 234 x 111.15 x 41.19 mm	PCI Express Half Length Full Height 167.65 x 111.15 mm	PCI Express Half Length Full Height 167.65 x 111.15 mm	





Model		VEGA-6301	VEGA-6301M		
Life Cycle		2 Years	5 Years		
Platform		Appliance	Appliance		
	Channels (Max.)		1 (up to 4Kp60)/ 4 (up to 1080p60)	1 (up to 4Kp60)/ 4 (up to 1080p60)	
	Video formata	Resolution	3840x2160/1920x1080/ 1280x720	3840x2160/1920x1080/ 1280x720	
Video Inputs	video iormats	Frame rate	60p/59.94p/50p/ 30p/29.97p/25p	60p/59.94p/50p/ 30p/29.97p/25p	
and Outputs	Chroma Sampling Format		4:2:2/4:2:0	4:2:2/4:2:0	
	Bit Depth		8bit/10bit	8bit/10bit	
	Input Interface		1x SDI-12G or 1x HDMI2.0 or 4x SDI-3G	1x SDI-12G or 2x HDMI2.0 or 4x SDI-3G	
		Video Encoding	H.265(HEVC)	H.265(HEVC)	
Video Coding	Video Encoding	Bit Depth	8bit/10bit	8bit/10bit	
		Chroma Subsampling	4:2:2 / 4:2:0	4:2:2 / 4:2:0	
V-ID	Connectivity		2x 10GbE (SFP+ cages)	-	
VOIP	Standard Supported		ST 2022-5/6/7, ST 2059	-	
	Channels (Max.)		16	16	
	Formats		PCM	PCM	
Audio	Sampling Frequenct		48KHz / 96KHz	32~192KHz	
	Sampling Bit Depth	1	16 bit	24 bit	
	Audio Connectors		Embedded from HDMI or SDI	Embedded from HDMI or SDI	
	Operation System		Linux	Linux	
Streaming Protocol			RTP/MPEG/JDP/IP	RTP/MPEG/JDP/IP	
Feature	Management & Control Interface		Local or remote Control GUI interface	Local or remote Control GUI interface	
	Development Kits		FFmpeg, Microsoft DirectShow	FFmpeg, Microsoft DirectShow	
	System Processor		i7-6820EQ, i5-6440EQ, i3-6100E	i7-7820EQ, i5-7440EQ, i3-7100E	
	System Memory		8GB Standard, up to 16GB on request	8GB Standard, up to 16GB on request	
Module/ Card/	Storage		32GB mSATA	128GB M.2 SSD	
System/ Characteristic	Local Video Output		1 x HDMI 2.0	1 x HDMI 2.0	
	Network Interface		2 x GigE port	2 x GigE port	
	USB Port		2 x USB3.0 port	2 x USB3.0 port	
	Power Input		DC12V	DC12V	
Power	Power Consumption	n	75W based on Intel® Core™ i3 SOM	75W based on Intel® Core™ i3 SOM	
Mechanical	cal Dimensions		Dimensions 214 x 289.7 x 42.8 mm		269 x 289.8 x 42.8 mm

	Model	VEGA-7020	VEGA-7110
Life Cycle		5 Years	5 Years
Platform		Intel Comet Lake W-1270E	Intel Tiger Lake-U
Input Interface		Gen 3 x 4/8/16	Gen 3 x 4/8/16
Output Interface		Gen 3 x 4/8/16	Gen 3 x 4/8/16
	System Memory	Up to 64 GB (2 channels)	Up to 64 GB (2 channels)
	Storage	2 x NVME M.2 SSD 2 x 2.5"" SSD	2 x NVME M.2 SSD 2 x 2.5"" SSD
Module/ Card/ System/ Characteristic	Local Video Output	1 x HDMI 2.0 or 1 x VGA	2 x HDMI 2.0
	Network Interface	4 x GigE port	2 x GigE port
	USB Port	4 x USB 3.0	2 x USB 3.0 + 2 x USB 2.0
Power	Power Input	AC 110~240V	AC 110~240V
FUWEI	Power Consumption	80W based on Comet Lake W-1270E	50W based on i7-1185G7E
Mechanical	Dimensions	44.4 x 438 x 560 mm	44.4 x 438 x 560 mm

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Model		VEGA-8300E	VEGA-8300D	VEGA-8301D	
Platform		Appliance	Appliance	Appliance	
	Channels (Max.)		1 (up to 8Kp60)	-	-
		Resolution	7680 x 4320	7680 x 4320	7680 x 4320
Video Inputs	Video formats	Frame rate	60p, 59.94p, 50p, 30p, 29.97p, 25p, 24p	60p / 59.94p /50p / 30p / 29.97p / 25p / 24p	60p / 59.94p /50p / 30p / 29.97p / 25p / 24p
and Outputs	Chroma Sampling	Format	4:2:2, 4:2:0	-	-
	Bit Depth		8-bit, 10 bit	-	-
	Input Interface		4 x 12G-SDI,	4 x DP ports	4 x 12G-SDI
		Standard	HEVC (H.265)	-	-
	Video Encoding	Bit Depth	8-bit, 10 bit	-	-
Video Ordina		Chroma Subsampling	4:2:2, 4:2:0	-	-
video Coding		Standard	-	HEVC (H.265)	HEVC (H.265)
	Video Decoding	Bit Depth	-	8-bit, 10 bit	10 bit
		Chroma Subsampling	-	4:2:0	4:2:2, 4:2:0
	Channels (Max.)		Up to 22.2 audio stereo channels	22.2	22.2
	Formats		Input:AAC, AAC-LC Output: PCM	Input:AAC, AAC-LC Output: PCM	Input:AAC, AAC-LC Output: PCM
Audio	Sampling Frequenct		48KHz	48KHz	48KHz
	Audio Connectors		SDI Audio	SDI Audio	SDI Audio
Operation System		Linux	Windows	Windows	
Feature	Streaming Protocol		FFmpeg supported protocol (RTMP/HLS/RTP/TS over TCP,UDP)	HLS or RTP	HLS or RTP
	Management & Control Interface		Local and Remote Web GUI interface	Local and Remote Web GUI interface	Local and Remote Web GUI interface
	System Memory		16GB	16GB	Up to 48 GB (2 channels)
Module/ Card/	Storage		2 (SSD/ HDD 2.5" 1TB 7KRPM SATA3)	2 (SSD/ HDD 2.5" 1TB 7KRPM SATA3)	2 x NVME M.2 SSD 2 x 2.5" SSD
System/ Characteristic	Local Video Output		1xDP1.4, 1xHDMI1.4	1xDP1.4, 1xHDMI1.4	4 x 12G-SDI,
	Network Interface		3	3	2 x RJ-45, 2x SFP+
	USB Port		2	2	2
	Power Input		AC input 100-240V	AC input 100-240V	AC input 100-240V
Power	Power Consumptio	n	350W	350W	700W
Mechanical	Dimensions		370mm x 350mm x 70mm	370mm x 350mm x 70mm	438.00 x 506.20 x 44.20 mm

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Model			VEGA-3310	VEGA-3314	VEGA-3318	VEGA-3500
Life Cycle			5 Years	5 Years	5 Years	5 Years
Platform			Socionext M30	Socionext M30	Socionext M30	Intel Xe Graphic
Video Inputs and Outputs	Channels (Max.)		2 (Up to 4Kp60) / 8 (Up to 1080p60)	4 (Up to 4Kp60) / 16 (Up to 1080p60)	8 (Up to 4Kp60) / 32 (Up to 1080p60)	4 (Up to 4Kp60) / 16 (Up to 1080p60)
	Video formats	Resolution	3840x2160/ 1920x1080/ 1280x720/720x480	3840x2160 /1920x1080/ 1280x720/720x480	3840x2160/ 1920x1080/ 1280x720/720x480	3840x2160/ 1920x1080/ 1280x720/720x480
	Frame rate		60p/59.94p/50p/30p/ 29.97p/25p/24p/ 59.94i/ 50i	60p/59.94p/50p/30p/ 29.97p/25p/24p/ 59.94i/ 50i	60p/59.94p/50p/30p/ 29.97p/25p/24p/ 59.94i/ 50i	60p/59.94p/50p/30p/ 29.97p/25p/24p/ 59.94i/ 50i
	Chroma Sampling Format		4:2:2/4:2:0	4:2:2/4:2:0	4:2:2/4:2:0	4:2:2/4:2:0
	Bit Depth		8bit/10bit	8bit/10bit	8bit/10bit	8bit/10bit
	Input Interface		PCle Gen3 x8	PCle Gen3 x16	PCle Gen3 x16	PCle Gen3 x16
	Output Interface		PCle Gen3 x8	PCle Gen3 x16	PCle Gen3 x16	PCle Gen3 x16
Video Coding	Video Encoding	Standard	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)/VP9
		Bit Depth	8bit/10bit	8bit/10bit	8bit/10bit	8bit/10bit
		Chroma Subsampling	4:2:2 / 4:2:0	4:2:2 / 4:2:0	4:2:2 / 4:2:0	*4:4:4/4:2:2 / 4:2:0
	Video Decoding	Standard	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)/VP9/AV1
		Bit Depth	8bit/10bit	8bit/10bit	8bit/10bit	8bit/10bit
	Chroma Subsampling		4:2:2 / 4:2:0	4:2:2 / 4:2:0	4:2:2 / 4:2:0	4:2:2 / 4:2:0
Feature	Operation System		Windows/ Linux	Windows/ Linux	Windows/ Linux	Linux
	Development Kits		FFmpeg, Microsoft DirectShow	FFmpeg, Microsoft DirectShow	FFmpeg, Microsoft DirectShow	FFmpge
Power	Power Consumption		<35W	<35W	<65W	<75W
Mechanical	Dimensions		PCI Express Half Length Full Height 167.65 x 111.15 mm	PCI Express 10.5" Length Full Height, double-deck / 266.7 x 111.15 mm	PCI Express 10.5" Length Full Height, double-deck / 266.7 x 111.15 mm	PCI Express 10.5" Length Full Height, double-deck / 266.7 x 111.15 mm
I/O or PCIe Interface			PCle Gen 3 x8	PCle Gen 3 x16	PCle Gen 3 x16	PCle Gen 4 x16









Model			VEGA-4000	VEGA-4002	VEGA-540	VEGA-550
Life Cycle			5 Years	5 Years	5 Years	5 Years
Platform			Xilinx Virtex® UltraScale+ XCVU9P FPGA	2 x Xilinx Virtex® UltraScale+ XCVU9P FPGA	Xilinx Zynq® UltraScale+ ZU7EV MPSoC FPGA	4 x Xilinx Zynq® UltraScale+ ZU7EV MPSoC FPGA
DDR			4-ch of 4GB DDR4- 2400 64b w/ECC	4-ch of 4GB DDR4- 2400 64b w/ECC per FPGA device	4GB/64bit DDR4 2400 (PS side) and 4GB/64bit DDR4-2666 (PL side)	8GB/64bit DDR4 2400 (PS side) and 8GB/64bit DDR4-2666 (PL side) per ZU7EV
Video Inputs and Outputs	Channels (Max.)		Depend on the Integrated IP	Depend on the Integrated IP	Integrated video codec unit(VCU) up to 4-ch 4Kp60	Integrated video codec unit(VCU) up to 4-ch 4Kp60 per ZU7EV
	Chroma Sampling Format		-	-	4:2:2	4:2:2
	Bit Depth		-	-	10 bit	10 bit
	Input Interface		PCle Gen3 x16	PCle Gen3 x16	PCle Gen3 x16	PCle Gen3 x16
	Output Interface		PCle Gen3 x16	PCle Gen3 x16	PCle Gen3 x16	PCle Gen3 x16
Video Coding	Video Encoding	Standard	Depend on the Integrated IP	Depend on the Integrated IP	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)
	Video Decoding	Standard	-	-	H.265(HEVC)/ H.264 (AVC)	H.265(HEVC)/ H.264 (AVC)
Feature	Operation System		-	-	Linux	Linux
	Development Kits		Reference Design Available	Reference Design Available	Xilinx SDK, RPC SDK, FFmpeg, DNNDK	Xilinx SDK, RPC SDK, FFmpeg, DNNDK
Power	Power Consumption		<75W	<225W	<40W	<150W
Mechanical	Dimensions		Low Profile form-factor	Full height, 10.5" length form-factor	Low Profile form-factor	Full height, 10.5" length form-factor
Programmable Functionality	System Logic Cells (K)		2, 586 per FPGA device	2, 586 per FPGA device	504 per FPGA device	504 per FPGA device
	CLB Flip-Flops (K)		2, 364 per FPGA device	2, 364 per FPGA device	461 per FPGA device	461 per FPGA device
	CLB LUTs (K)		1, 182 per FPGA device	1, 182 per FPGA device	230 per FPGA device	230 per FPGA device
	DSP Slices		6, 840 per FPGA device	6, 840 per FPGA device	1, 728 per FPGA device	1, 728 per FPGA device
	Memory		N/A	N/A	Total Block RAM / URAM(Mb) : 11.0 / 27.0	Total Block RAM / URAM(Mb) : 11.0 / 27.0
I/O or PCIe Interface			PCle Gen 3 x16	PCle Gen 3 x16	PCle Gen 3 x16, 1x USB3.0, 1x mini Display Port	PCle Gen 3 x16, 1 xRJ45 GbE port to FPGA0, 1x USB3.0 to each FPGA



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