



ALLEGRO

Digital Video Technology



# Tackling the Challenge of Video Transcoding in the Cloud

IP SOC Day Shanghai

September 12, 2019

[www.allegrodvt.com](http://www.allegrodvt.com)

# Mainstream Codecs



- ❑ The most successful codecs of all time are MPEG2 and H.264 (AVC), both formulated for the broadcast market, irrelevant with streaming. E.g. H.264 still comprises 82% of all video produced by encoding.com
- ❑ H.265 (HEVC) bitstream froze on Jan 25, 2013. The deployment has been hindered by uncertainty of HEVC's royalty policy (MPEG LA for content and HEVC Advance for delivery)
- ❑ AV1, the open source codec from the Alliance for Open Media (AOMedia), was launched in 2018, with improvements of encoding time and decoding efficiency
- ❑ VVC (Versatile Video Coding) is the next generation standards-based codec after HEVC, developed jointly by MPEG and ITU, scheduled to ship by end 2020. At HD and Ultra HD resolutions, VVC may be able to save 30% of bit rate in average over HEVC



## Additional Criteria



	H.264 MPEG-AVC	H.265	AV1	VVC
Licensing	Easy	Complex	Royalty Free	Not Defined
Deployment	2006	2014	2020	2020+
Deployed Devices	>10Billion	>2Billion	NA	NA
Live Deployment Environment	Appliance SW Cloud	Appliance SW Cloud	Cloud	Cloud

Streaming Learning Center: Impressive Early Results for VVC

<https://streaminglearningcenter.com/codecs/impressive-early-results-versatile-video-coding-vvc.html>

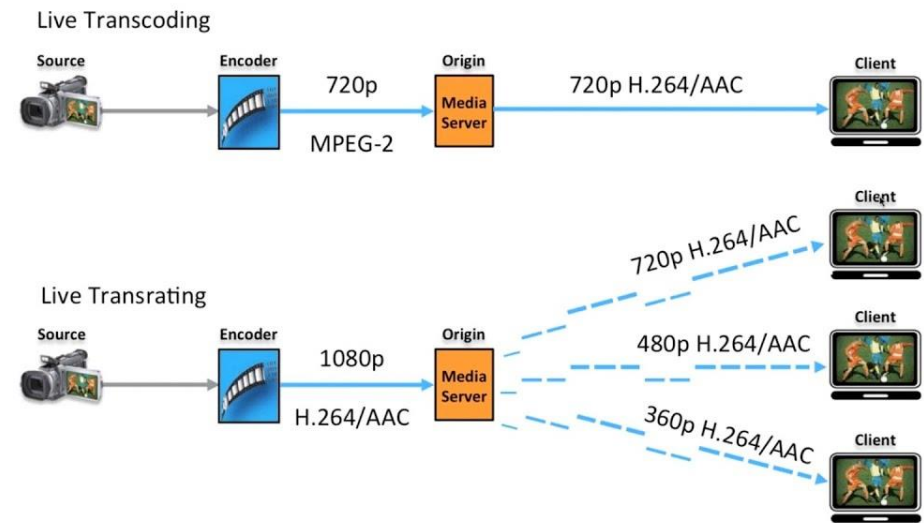
# What is Video Transcoding?



A process of creating multiple versions of the same video, this may cover any combination of the following scenarios

- ❑ Transcoding, at a high level, is taking an already compressed (or encoded) content, decompressing (or decoding) it, and somehow altering it and recompressing it
- ❑ Trans-rating (also known as renditions), refers to changing bitrates. For example, taking a 4K video input stream at 13Mbps and converting it to one or more lower bitrate streams
- ❑ Trans-sizing, refers to resizing the video frame, say from a resolution of 3840x2160 (4K) down to 1920x1080 or 1080x720 etc.

## Live Transcoding & Transrating



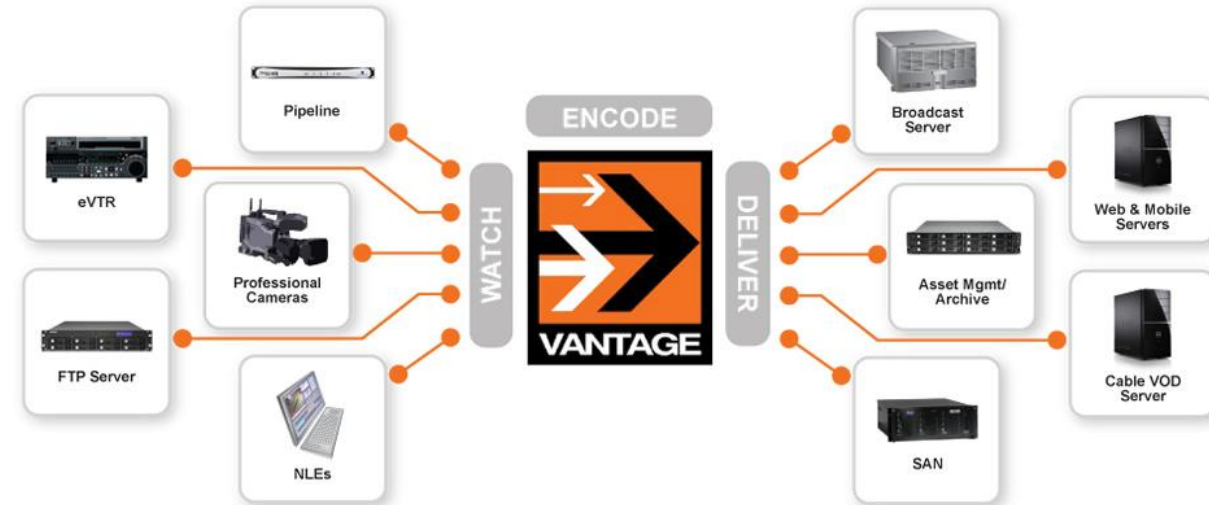
YouTube: Live Streaming Why transcoding is so critical to Quality

# Why Transcoding is Needed?



Transcoding is critical when you want your content to reach more end users and devices!

- ❑ Source files are generated by many kinds of tools and devices, each may have a different purpose, and different “native” output formats (codecs)
- ❑ Transcoding is to convert all uploaded source files, whatever their original codec, into appropriate codecs, for the devices they might be watched on



Telestream: Vantage Transcode Products <http://www.telestream.net/vantage/vantage-transcode.htm>

# Challenges for Transcoding



Maximize QoE is essential for any video broadcasting/transmission!

## ❑ Adaptive bitrates (ABR)

- Bandwidth is always a limiting factor – mobile devices, crowded locations etc.
- Bad experience viewing the video – buffering, lagging, slow startup, or fail to play
- Most common ABR are Apple's HLS and MPEG DASH

## ❑ Matching Delivery Mode Requirements

- Key frames in ABR assets must be aligned to the same timing
- Other constraints such as Widevine DRM

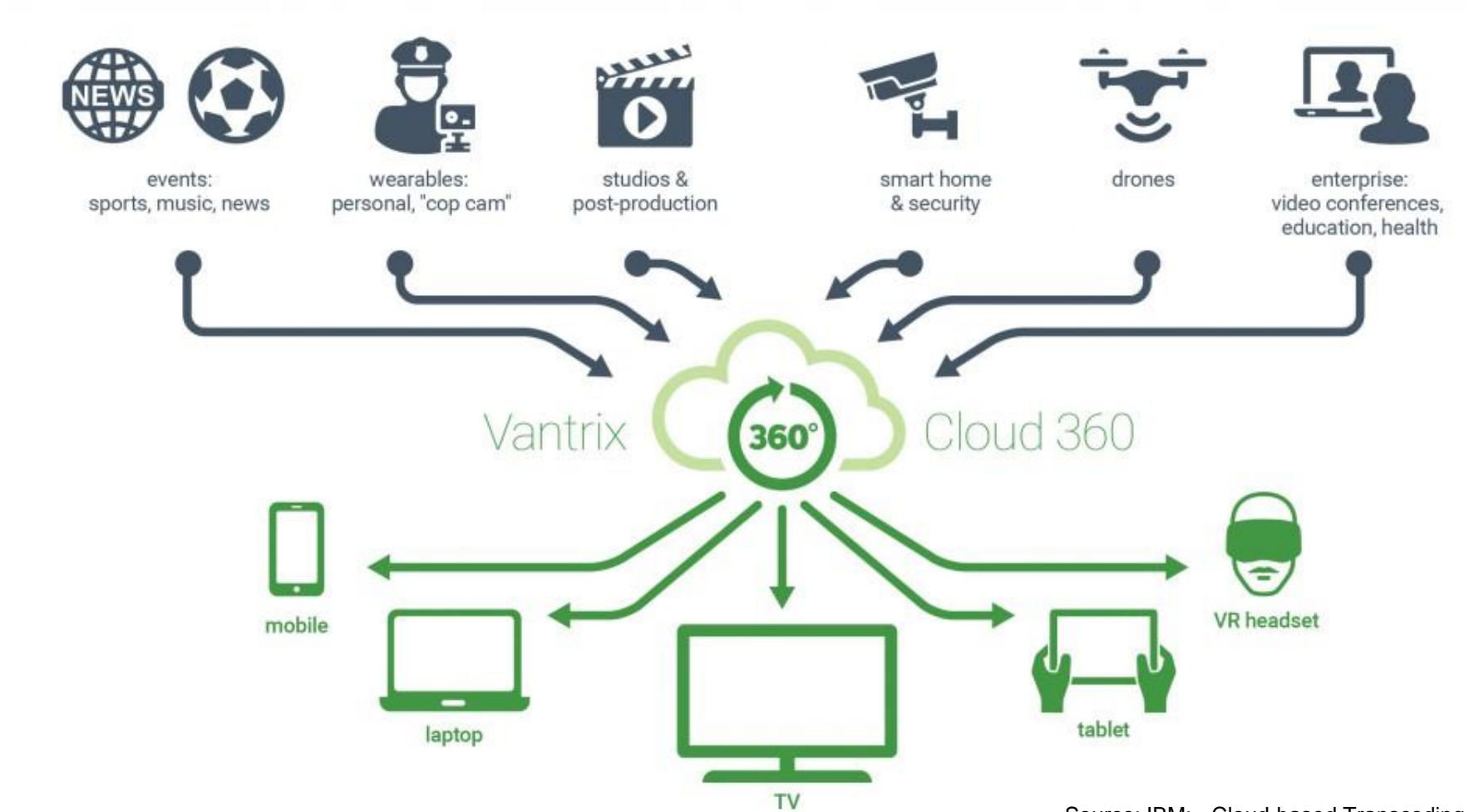
## ❑ Reducing Customer Storage

- Source files are typically much larger than converted files

## ❑ Custom Requirements

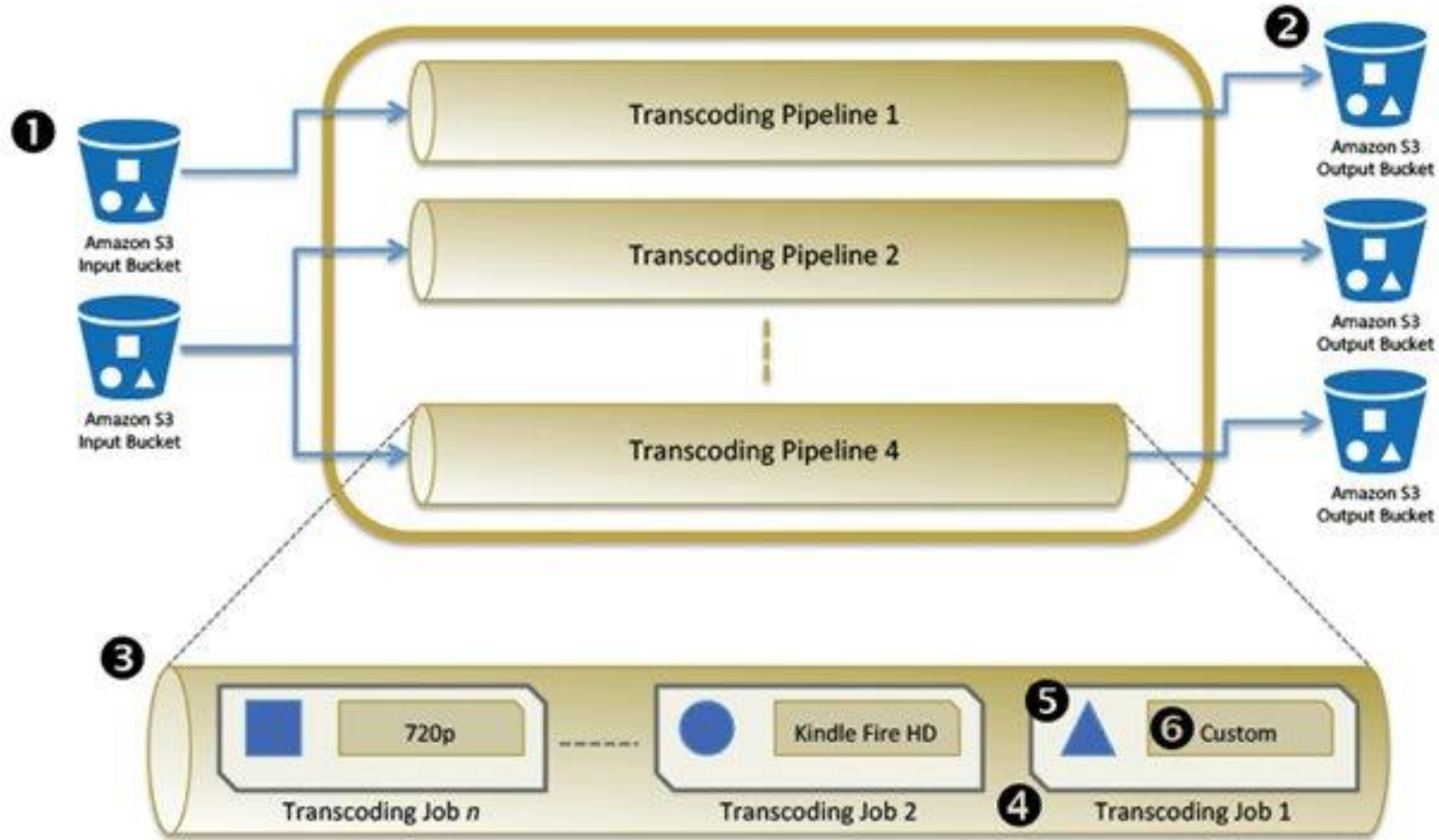
- Special formats
- Multi-lingual audio
- Clipping/trimming

# Cloud Transcoding – IBM Vantrix 360



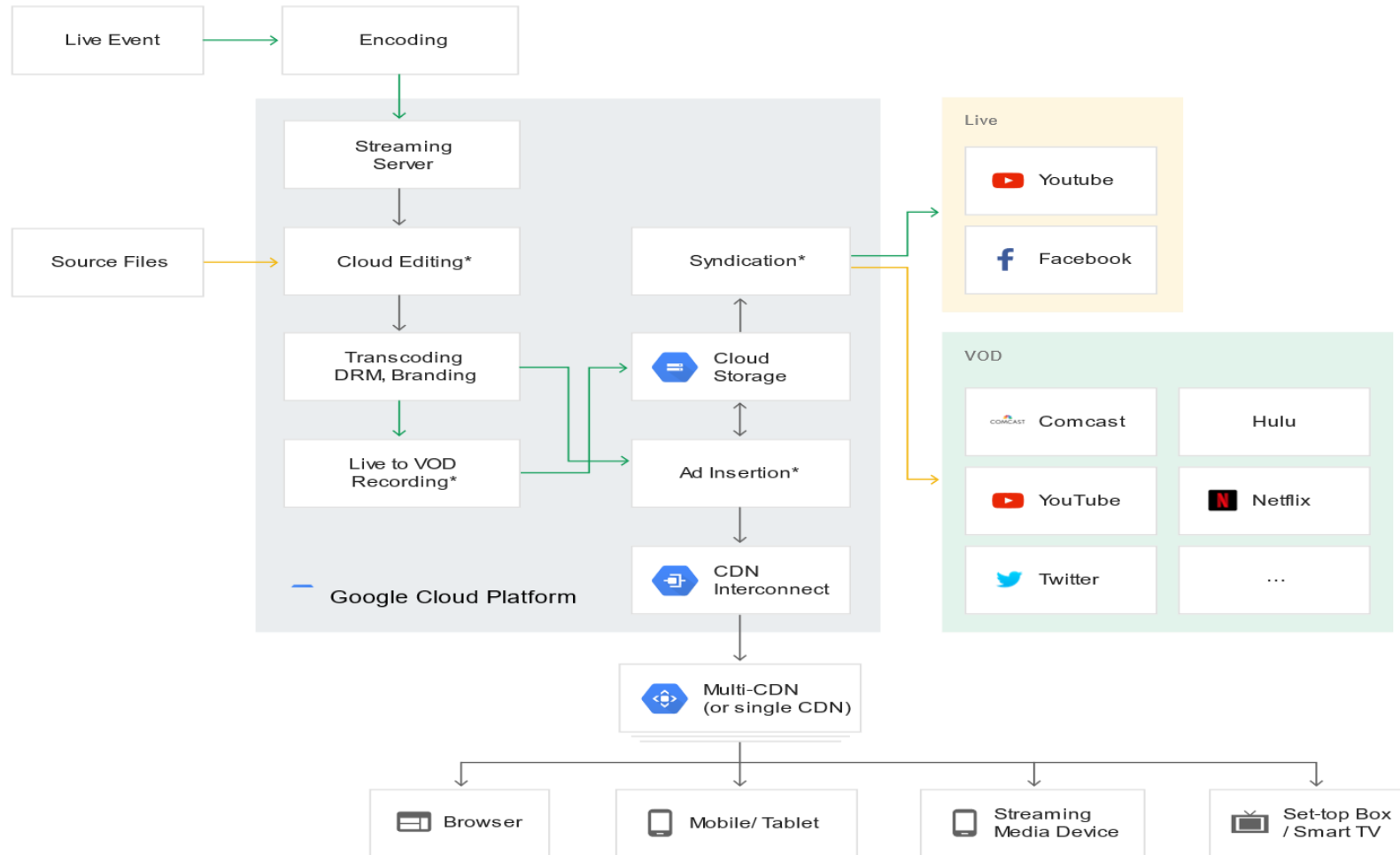
Source: IBM: - Cloud-based Transcoding System Delivers Low Latency Video  
March 31, 2017

# Cloud Transcoding – Amazon Elastic



Source: Amazon's Elastic Transcoder converts audio files now, too (updated)

# Cloud Transcoding – Google



\* Optional    → Live    → VOD    → Live/VOD to key

Source: <https://cloud.google.com/solutions/media-entertainment/architecture/transcoding>



# AV1 in Development



- ❑ Browser playback – with the support from Chrome, Firefox, Opera, AV1 now plays in 35.28% of all browsers, according to Can I use
- ❑ Microsoft released the beta AV1 Video Extension in Nov. 2018, which enables AV1 playback on Win10 devices
- ❑ Hardware support of AV1 encode/decode is scheduled to be available in mid 2020
- ❑ Facebook, Netflix, and YouTube have all released AV1-encoded video for public consumption
- ❑ Intel/Netflix released its real time 4K60P 10-bit encoding before NAB 2019

**Modernizing software for visual cloud**  
Intel & Netflix Release Scalable Video Technology –AV1 (SVT-AV1 ) into open source

- Highly Efficient implementation of AV1
- Open source
- Makes AV1 commercially viable
- Committed to innovation of future codecs

**first time ever - real time av1 encoding of 4k content on CPU-only**

- Performance
- Half bitrate of x264 (AVC) @ same quality
- Ease adoption: GitHub, Gstreamer & FFmpeg

Best Video Quality ← Mode 0 → Mode 1 → Mode 2 → Mode 3 → Mode 4 → Mode 5 → Mode 6 → Mode 7 → Mode 8 → Mode 9 → Mode 10 → Mode 11 → Mode 12 → Highest Speed

VOD Broadcast Premium OTT Live streaming Gaming Real-time CPU-only 4kp60/10-bit

Optimizations for Modes 0-8 available in open source NOW | Open source optimizations available through 2019

DRIVING INDUSTRY INNOVATION OF CODECS TO UNLEASH LEADING EDGE USER EXPERIENCES AT A GLOBAL SCALE

FOR MORE INFORMATION VISIT: <https://01.org/svt>

Source: HEVC, AV1, VVC: How to Make Sense of 2019's World of Codecs  
Jan Ozer, Aug 16, 2019

# E210 – Allegro’s Transcoding Solution for AVC/HEVC/AV1/VP9/MJPEG



- ❑ Announced in April 2019
- ❑ Best-in class video encoding quality
- ❑ Low latency encoder (hardware option)
- ❑ Small IP size
- ❑ Low memory bandwidth
- ❑ Low power consumption
- ❑ Fast and easy SoC integration
- ❑ Flexibility, thanks to user configurable control software
- ❑ 10+ years of experience in high quality H.264/H.265 IPs for SoC

# E210 Configuration



	AL-E210 Encoder
Codec	AVC/HEVC/MP9/AV1/JPEG
Bit depth	8/10-bit
Chroma sub-sampling	4:2:0
Max Resolution	4K 3840x2160p
Hardware Acceleration	Yes
Number of cores	Scalable
Status	Available



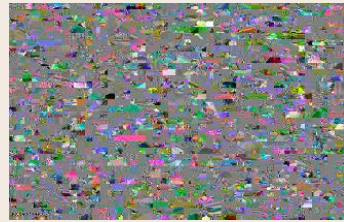
- ✓ Founded in 2003 成立于2013年
- ✓ Based in Grenoble, France 总部位于法国Grenoble
- ✓ Strong and recognized expertise in video compression standards 视频压缩标准领域中的专业佼佼者
- ✓ World class customer base 客户分布在全球
- ✓ Market leader in video compliance streams et video IPs 视频兼容性测试码流的市场领导者

# Allegro DVT Product Lines



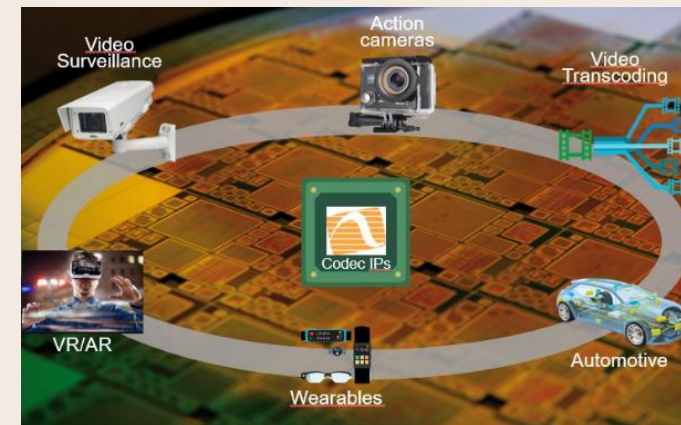
## CS “Compliance Streams” 兼容性码流

- Industry de-facto standard video compliance streams 业界标准的兼容性测试码流库



## Video IPs 视频IPs

- Leading semiconductor video compression and decompression IPs 领先的视频压缩/解压缩IPs





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