

# VC-2 HQ Video Codec

Lightweight Video Compression IP core



Low Complexity  
ASIC and FPGA



Ultra-Low  
Latency



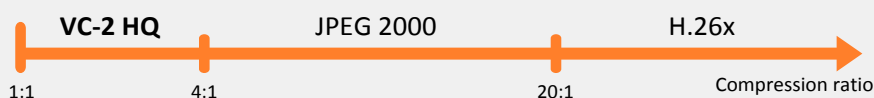
SMPTE ST 2042  
Patent free



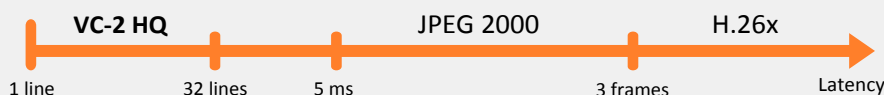
Visually or  
Math Lossless

The VC-2 HQ codec is defined in the SMPTE ST 2042 standard. The high quality profile and low delay syntax of VC-2 is used to achieve low compression ratio, typically up to 4 times visually lossless. The algorithm is lightweight and works without external memory allowing cost-effective implementation. The VC-2 High Quality codec has ultra-low latency due to its line-based processing.

### Best trade-off between quality and complexity



### End-to-end Latency: encoding + decoding



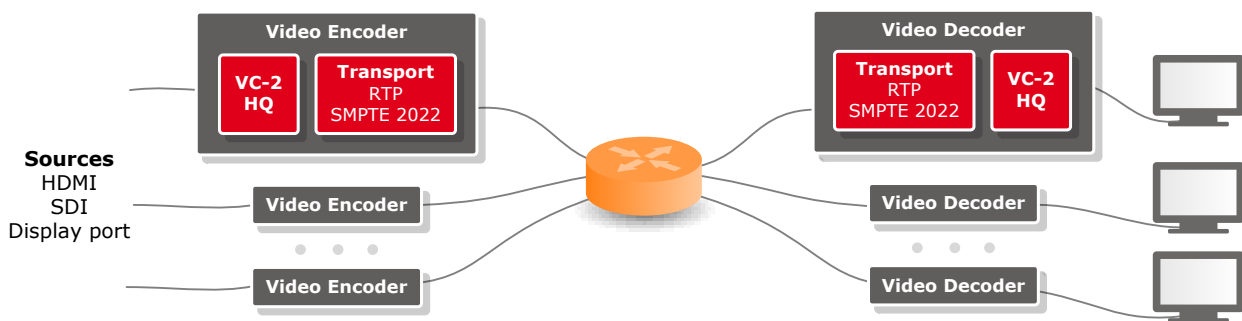
# VC-2 HQ Video Codec applications

Product sheet

## Video Transport over IP networks

### Visually lossless and low latency video networking on 1G and 10G Ethernet

VC-2 HQ can be used to efficiently transport video streams over an IP network. Several channels of high resolution/frame rate can be encoded and transmitted over the same IP network. Infrastructure based on 1 Gbps or 10 Gbps can be used depending on the bandwidth of the video streams to transport. The constant bitrate compressed stream can be mapped to RTP packets according to the IETF RFC. VC-2 HQ can be used for compression and RTP transport according to VSF TR-03.

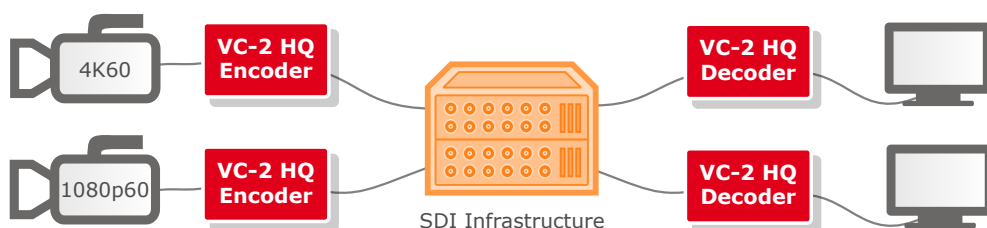


- Ultra-low latency
- High quality and visually lossless
- Low-cost encoder/decoder
- Standardized RTP mapping
- HD channels over 1G
- UHD channels over 10G

## High Resolution video over SDI cabling

### Transport 3G-SDI video signals over HD-SDI with the SMPTE 2047 standard

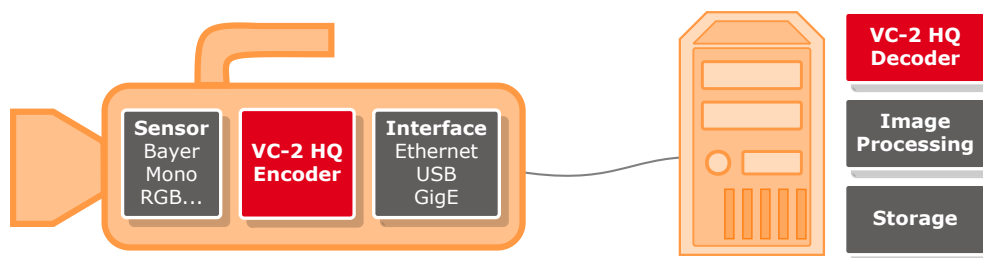
The SMPTE 2047 standard defines how to transport 3G-SDI content over a less expensive HD-SDI cable. Similar can be done with high resolution UHD/4K content over a single 3G-SDI cable. This enables reuse of the current SDI infrastructure for future 4K content. The VC-2 HQ codec is resilient to multiple encoding and decoding of the same content without degrading the video which is essential during broadcast production. The SDI signal containing the VC-2 stream can be mapped to SMPTE 2022-6.



## Camera sensor encoding with VC-2 HQ

### Encoding of high frame rate and high resolution images

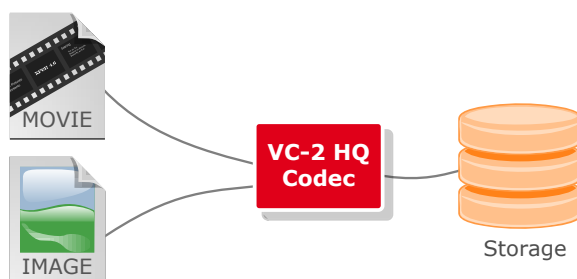
Industrial and military camera can have very different sensors (resolution, color, frame rate), but higher quality always brings more data to read out from the camera. The VC-2 HQ can lower the bandwidth of the video content and its storage space. A software decoder can be used to process and visualize the content on a server or workstation.



## Image and video storage with VC-2 HQ

### Optimize data bandwidth and storage with lightweight compression

Storage of video and images requires high bandwidth to the storage medium, and also a lot of space. The VC-2 HQ codec will reduce the bandwidth on the interface and avoid bottleneck while maintaining top quality. It can be used for temporary buffering such as DDR memory, or permanent storage such as disks in data centers.



- Any storage (DDR, Disk,...)
- Save bandwidth and space
- Visually lossless up to 4 times
- Mathematically lossless for archiving

## Open source software libraries

### VC-2 HQ real-time software encoding/decoding and transport

- [VC2HQDecode](#): real-time software decoder library for VC-2 High Quality
- [VC2HQEncode](#): real-time software encoder library for VC-2 High Quality
- [gstRTPvc2](#): GStreamer RTP Mapping plugin for VC-2
- [FFmpeg](#): FFmpeg 3.0 with integrated VC-2 codec.

## Technical features

The VC-2 High Quality codec is compliant with SMPTE ST 2042-1:2017:

- High Quality profile, Low Delay syntax
- Available for ASIC and FPGA

Special features:

- 2-pixel interleaved video interface for UHD
- Resolution scalability
- Partial decoding of an area of the image

The core supports the following video parameters and encoding modes

- Unrestricted resolution including SD, HD, 2K, 4K, UHD, UHD-8K
- 4:4:4, 4:2:2 and 4:2:0 color subsampling
- Interlaced and progressive formats
- From 8 up to 16 bits per pixel component (HDR Ready)
- Haar0 and Haar1 Discrete Wavelet Transform (DWT) with depth of 1, 2 and 3
- Asymmetric LeGall Discrete Wavelet Transform (DWT)
- Constant bit-rate encoding (CBR) with adjustable compression ratio
- Lossless and constant quality/variable bit-rate encoding (VBR)
- Capped VBR encoding with maximum slice size

## Viper: OEM board for 4K HDMI transport over IP network



The Viper boards from Silex Insight are fully integrated boards that enable the development of ultra-low latency audio/video over IP products. The video stream is compressed with VC-2 HQ and enables up to 4K HDMI over a single 1G Ethernet cable.

## Other video compression IP cores

- JPEG2000 encoder and decoder for many types of applications in broadcast, digital cinema, surveillance,...
- JPEG encoder and decoder for color/monochrome still or video images.
- MPEG-2 decoder for high performance multichannel systems.

**For more information, please contact us.**

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