

The lightweight low latency image coding standard

Standardized as JPEG XS (ISO/IEC 21122), TICO-XS is an evolution of the popular TICO SMPTE RDD35. The new revolutionary coding standard can be applied in every applications for which a perfect image quality, a microsecond latency, with low power and efficient video bandwidth are crucial.

TICO-XS is the solution for video over IP workflows, live broadcast production, TVs and mobile devices, AR/VR systems, gaming, automotive (ADAS), wireless systems, cloud & software video applications or digital cinema workflows.

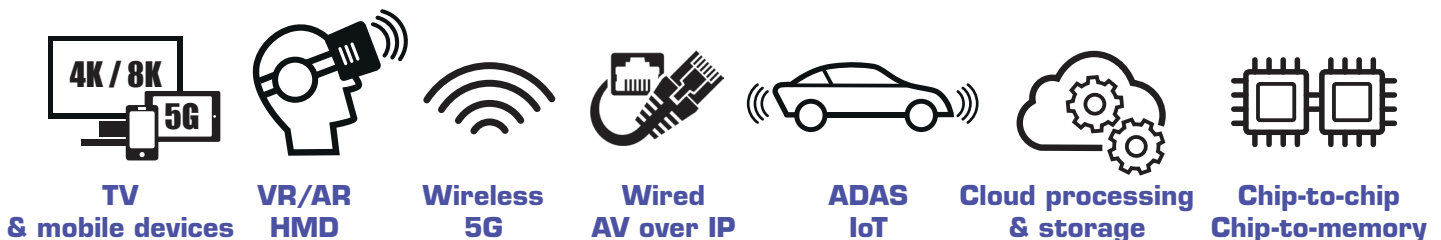
Designed as a solution for (replacing) uncompressed image and video in many devices and applications, it outperforms all popular video codecs offering the world's best lightweight coding capabilities:



- PERFECT IMAGE QUALITY FOR BOTH HUMAN & MACHINE VISION**
 - Extensive bit depth support up to 16bit.
 - No degradation over multiple generations of encoding.
 - Fully transparent to uncompressed quality down to 3bpp (= 10:1 for 444 10bit).
 - Visually lossless up to 1.5bpp on media & natural video content (= 20:1 for 444 10bit).
- BETTER PIXELS WITH COST SAVINGS, BETTER CONNECTIVITY**
 - For storage and connectivity within a device or within a complete workflow or ecosystem.
 - It enables users to perfectly handle much more pixels (HD, 4K, 8K,...), higher bit depth, higher frame rates, at the cost of baseband HD or even lower.
- LOW COMPLEXITY in ASIC, FPGA, CPU, GPU**
 - Cross-platform capable, JPEG-XS offers various levels of parallelism to scale easily. It is the only international coding standard designed with such revolutionary approach.
 - Extremely small in ASIC & FPGA (low logic & low memory).
 - Highly parallelizable for CPU & GPU.
- MICROSECOND LATENCY & LOW POWER**
 - Compared to other popular and high complexity codecs, JPEG-XS offers microsecond-latency thanks to an innovative line-by-line processing. JPEG-XS is also extremely low power. The technology does not need any external memory, it just requires few internal SRAMs to operate.

Where can TICO-XS be implemented?

Wherever you need it as hardware IP-core or software!



- Support more pixels (high resolution, bit depth, frame rates, more streams) using existing systems & infrastructures.
- Reduce internal video bandwidth (and power!) or cost-effectively increase video buffer and storage capacity.
- Reduce the bandwidth for real-time wired or wireless transmission without affecting the latency and quality.
- Build an efficient hardware & software based ecosystem without using expensive and power consuming processing, bandwidth, latency and storage capacity.

Specifications and implementations

IMAGE	Color format	RGB, YCbCr
	Color subsampling	4:0:0, 4:2:2, 4:4:4
	Bit depth	8 / 10 / 12 / 16 bits per component
	Resolution	Any up to 8192 x 4096 pixels
	Frame rates	Any (depending on IP-core or FastTICO Developer SDK configuration)
CODING	Compliance	JPEG XS standard (ISO/IEC 21122-1 – coming profiles) for TICO-XS
	Quality	Full transparency to uncompressed, down to 3bpp (according to ISO flicker test), visually lossless down to 1bpp, depending on type of content Line-based latency CBR (constant bit rate) operation - Adjustable down to 36:1 (1bpp)
	Rate control	
	Latency	
Proxy mode	Embedded downscaler in decoder available (decode 1/4, 1/16 proxies)	

	TICO XS IP-cores	FastTICO-XS Developer SDK	
IMPLEMENTATION	Availability	Q1 2019	Q2 2019
	Evaluation	Ref software & IP-cores	Ref software & FastTICO-XS
	Platform	FPGA: Xilinx & Intel ASIC like TSMC 12, 16, 28, 40 nm	GPU: Nvidia, AMD, Intel CPU: x86 Intel
	Low complexity & fast processing	Small footprint / Low memory (No external DDR) Various configurations	Highly parallelized GPU SDK processing Intel compatible CPU SDK (SSE 4.1 or newer)
	Real-time operation	Latency selectable from 2 lines to 15 lines	< 1 frame

IP-core releases

REFERENCE IP-CORES	VIDEO FORMATS				XILINX	intel	ASIC
	Max resolution	Max FPS	Color sampling	Bit depth			
IPX-TICO-XS-HD-60-444-12 Enc or Dec	1920 x 1080	60	4:2:2	8, 10, 12	✓	✓	✓
			4:4:4				
IPX-TICO-XS-UHD4K-60-444-12 Enc or Dec	4096 x 2160	60	4:2:2	8, 10, 12	✓	✓	✓
			4:4:4				

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