

## The lightweight low latency image coding standard

Standardized as JPEG XS (ISO/IEC 21122), 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.

TicoXS is the intoPIX JPEG XS solution for AV over IP, 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 low-latency 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 down 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 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 FPGA (low logic & low memory).
- Highly parallelizable for CPU & GPU.

### • MICROSECOND LATENCY & LOW POWER

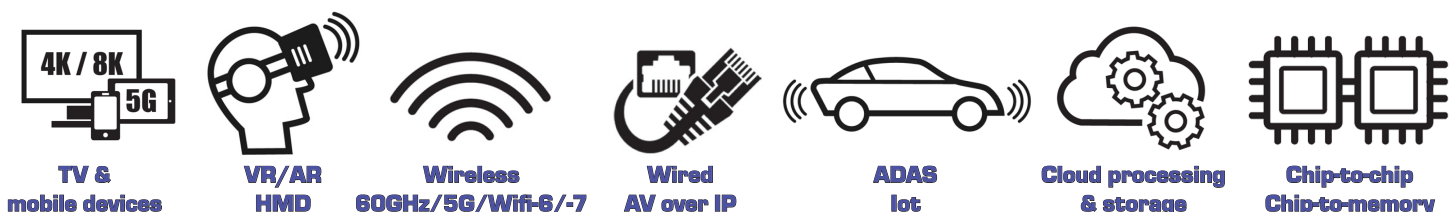
- Compared to other popular and high complexity codecs, JPEG XS offers microsecond-latency thanks to an innovative line-by-line processing. JPEG XS is also extremely low power. The technology does not need any external memory, it just requires few internal SRAMs to operate.

### • OPTIONAL FLAWLESS IMAGING PROFILE

- Quality beyond the operating range of JPEG XS, 20:1 for KVMs, desktop and AVoIP. Discover our new TicoXS FIP.

## Where can TicoXS 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 your internal video bandwidth (and power!) or cost-effectively increase your video buffer and storage capacity.
- Reduce your bandwidth for realtime 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

TicoXS ENCODER & DECODER IP cores & SDKs		
IMAGE/VIDEO	<b>Color format</b>	RGB, YCbCr, Monochrome
	<b>Color subsampling</b>	4:4:4, 4:2:2, 4:2:0, 4:0:0 (Monochrome)
	<b>Bit depth</b>	8 / 10 / 12 / 14 / 16 bits per component
	<b>Resolution</b>	Any up to 10240 x 4320 pixels (Even more on request)
	<b>Frame rates</b>	Any (depending on IP-core or FastTicoXS Developer SDK configuration)
CODING	<b>Compliance</b>	JPEG XS standard (ISO/IEC 21122-1 - High/Main / MLS12 profiles) for TicoXS + additional options (such as TDC profile - see TicoXS FIP Codec)
	<b>Quality</b>	Full transparency to uncompressed, down to 3bpp (according to ISO flicker test), Visually lossless down to 1bpp, depending on type of content
	<b>Rate control</b>	Line-based latency
	<b>Latency</b>	CBR (constant bit rate) operation - Adjustable down to 36:1 (1bpp)
	<b>Proxy mode</b>	Optional secondary proxy stream generation (1K resolution) in the encoder Embedded downscaler in decoder available (decode 1/4, 1/16 proxies)

			TicoXS IP cores	FastTicoXS SDK
IMPLEMENTATION	<b>Platform</b>		Intel FPGA Cyclone V, Arria V, Stratix V, Cyclone 10, Arria 10, Stratix 10, Agilex	CPU: x86-64 GPU: OpenCL OS: Windows, Linux, macOS
	<b>Low complexity &amp; fast processing</b>		Small footprint / Low memory (No external DDR) Various configurations	Highly parallelized GPU SDK processing Intel compatible CPU SDK (SSE 4.1 or newer)
	<b>Real-time operation</b>		Latency selectable from 2 lines to 15 lines	Latency selectable from 30 lines to 1 frame/field
	<b>Add-on</b>		IPX-SDI-MAP-TX/-RX : XS over SDI IPX-RTP-TX/RX : XS over RTP/2110-22 IPX-MPEG2-TS : XS over TS IPX-AES: AES128 Encryption	FFmpeg patch Nvidia Rivermax integration intoPIX Titanium Streaming SDK

## IP core typical configurations

VIDEO FORMATS				
REFERENCE IP CORES	Max resolution	Max FPS	Color sampling	Bit depth
<b>IPX-TICO-XS-HD-60-444-12</b> Enc or Dec	1920 x 1080	60	4:2:2 4:4:4	8, 10, 12
<b>IPX-TICO-XS-UHD4K-60-444-12</b> Enc or Dec	4096 x 2160	60	4:2:2 4:4:4	8, 10, 12
<b>IPX-TICO-XS-UHD8K-60-444-12</b> Enc or Dec	7680 x 4320	60	4:2:2 4:4:4	8, 10, 12

### CONTACT INTOPIX FOR YOUR CUSTOM IP CORE & SDK CONFIGURATION

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