HTJ2K is not JPEG XS

High Throughput JPEG 2000 **(HTJ2K)** for Entertainment Imaging

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Introducing **HTJ2K**

- **Joint ISO/ITU standard** published in August 2019
- Available at https://www.itu.int/rec/T-REC-T.814/en
- **Enhances JPEG 2000 Part 1**
  - Replaces the slow block coder with a fast block coder
  - Keeps everything else from JPEG 2000 Part 1
  - Royalty-free intent like JPEG 2000
- **HTJ2K is not JPEG-XS**

HTJ2K is **fast**

CPU decoding on 2018 MacBook Pro laptop (6-core)

SDR 4K 24p 4:4:4 10bit content

	400 Mbps	800 Mbps	Lossless (3500 Mbps)
J2K Part1	24 fps	11 fps	2 fps
HTJ2K	**111 fps**	**91 fps**	**70 fps**
Speed-up	**5x**	**9x**	**30x**

CPU encoding has similar results

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HTJ2K is **fast**

GPU encoding & decoding on Nvidia GTX1080

HDR 4K 24p 4:4:4 12bit content

	200 Mbps	800 Mbps	Lossless (4000 Mbps)
Decoding	**560 fps**	**440 fps**	**402 fps**
Encoding	**455 fps**	**447 fps**	**435 fps**

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HTJ2K is **flexible**

- **HTJ2K supports any image data structure**
  - Any resolution – SD, HD, 4K, 8K, 16K, 50K, up to 4 billion × 4 billion
  - Any sampling structure - 4:4:4, 4:2:2, 4:2:0, 4:4:4:4, 4:2:2:4, RAW, etc.
  - Any number of color components or sample precision (bit depth)
  - Floating point pixels – e.g. ACES EXR files (16-bit half-float)
  - Any color space, HDR, SDR, PQ, HLG, BT.709, ACES, XYZ, custom, etc.
- **HTJ2K supports lossy or lossless compression**
- **HTJ2K supports resolution scalability and spatial random access**

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Transport of **HTJ2K**

Same codestream structure as J2K Part 1 (transparent at the transport level)

Today	
JPH	File format for single frames with signaling for modern images (HDR, RAW…). This is part of the HTJ2K standard.
MXF	SMPTE ST 422:2019 (https://ieeexplore.ieee.org/document/8984770) Open source implementation (https://github.com/sandflow/jid)
Soon	
VSF TR-01, SMPTE ST 2110-22…	

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HTJ2K implementations **today**

Commercial	
Kakadu	C++ SDK and demonstration executables https://kakadusoftware.com
Open source	
MatHTJ2K	Matlab (https://bitbucket.org/osamu620/mathtj2k) Developed by Osamu Watanabe of Takushoku University, Japan
OpenJPH	C++ and JavaScript (https://github.com/aous72/OpenJPH)
Reference software	ISO/IEC 15444-5 (under ballot) Written by Shigetaka Ogawa from ICT Link, Japan

Upcoming HTJ2K developments

GPU	Work in progress by Kakadu R&D, Australia
FPGA	Work in progress by ICT Link (Japan) and Kakadu R&D (Australia)

HTJ2K has a lot of potential uses

Cameras

Production

Monitoring

ATL

NY

LA

Facilities

Live Streaming Provider

OTT Licensee

IMF Program Archive

Storage Archive

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HTJ2K is **not JPEG-XS**

Feature	HTJ2K	JPEG-XS
Low Latency	YES	YES
Lossy and lossless coding	YES	YES
Fast encoding/decoding on different platforms	YES	YES
Open source	YES	TBD
MXF wrapping	YES	TBD
Royalty-free Intent	YES	NO

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Thank you

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