

Fraunhofer Institute for Integrated
Circuits IIS

Fraunhofer JPEG XS

with Application Support Package (ASP)



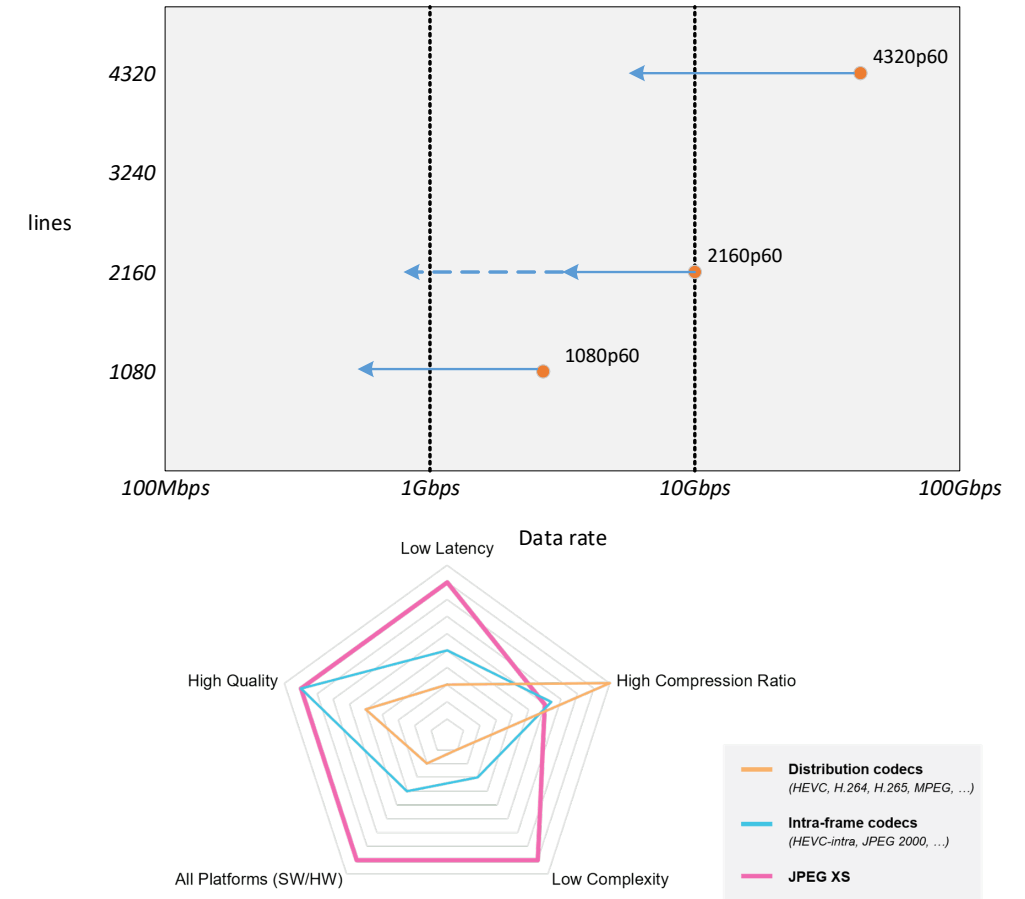
JPEG XS as mezzanine codec

ISO/IEC 21122

- JPEG XS is a standardized image codec for low latency video transmission over IP targeting mezzanine compression

Trend to go from SDI lines to IP networks

- uncompressed video data transmission requires high bandwidth on transmission channel
- mezzanine compression allows use of lower cost equipment and lower bandwidth transmission channels
- Good compromise between quality and complexity by preserving low latency
- Typical compression ratios 2:1 to 16:1



JPEG XS target applications (Highest quality video transmission)



Live production from
camera to
distribution



5G Broadcast
workflows



Pro-AV market



Virtual reality,
gaming, headset
connection



Automotive



Machine vision



Surveillance



Healthcare

Fraunhofer JPEG XS key features

Low-Latency	Low-Complexity	High-Quality	Error Robust	Inter-operability	Wide Parameter	Rate Control	High Parallelizable
Algorithmic 32 lines end2end, in SW 180 lines	x86 2 cores for 4K60, x86 10 cores for 8K60	Visually lossless , Multi-gen robust	Tolerant to bit flip, many resync points	ISO, IEC, IETF, SMPTE, VSF, AMWA	444, 422, 420 CFA RAW, 8-16 bit per component, 2:1 – 16:1	Constant or variable bit rate No frame drops	CPU, GPU, FPGA, ASICS

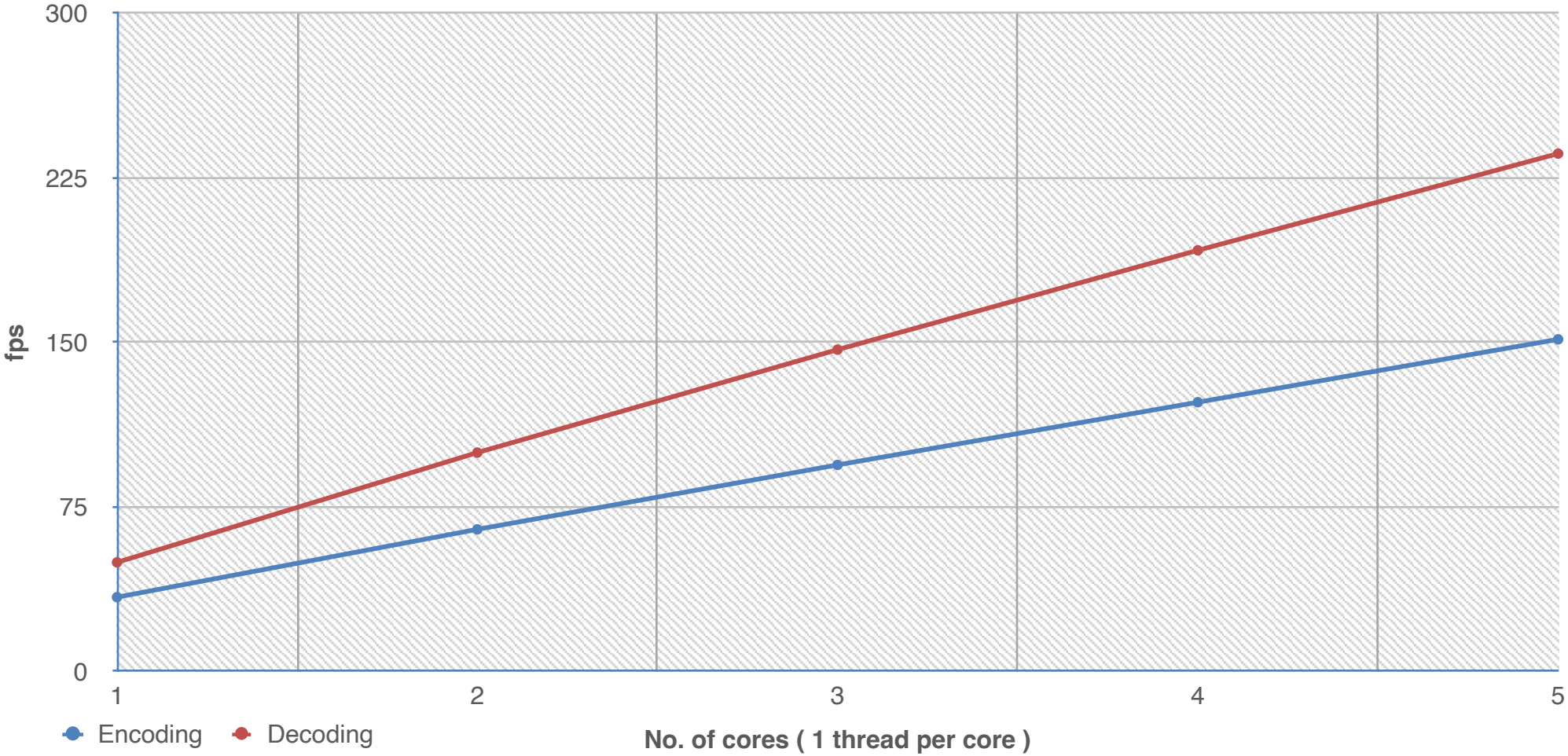
+

Fraunhofer Application Support Package

Application example code for JPEG XS SDK integration	MXF container format support	Forward Error Correction ST2022-5 VSF TR09	Speed optimizations for CFA RAW transform	File format support: JXS, MXF , MP4	Transport: Stream support RTP, MPEG TS
--	---------------------------------------	---	--	---	---

JPEG XS 1.Edition Performance Data SDK 6.0

UHD-1 (4K) 4:2:2, Speed (FPS) over Number of Threads (AMD Ryzen 9 7950X @ 4.5 GHz)



JPEG XS Editions

UHD-1 (4K) 4:2:2, Speed (FPS) over Number of Threads (AMD Ryzen 9 7950X)

Edition 1

- Focus on natural images in 444 (RGB and YUV) and 422 (YUV) format
- Use of wavelet transform for spatial-frequency transform

Edition 2

- Focus on CFA Bayer Compression
- Pre-emphasis and black level control

Edition 3

- Focus on Screen and Mixed Content
- Introduction of frame buffer for prediction from last frame and columnwise refresh

JPEG XS related standards

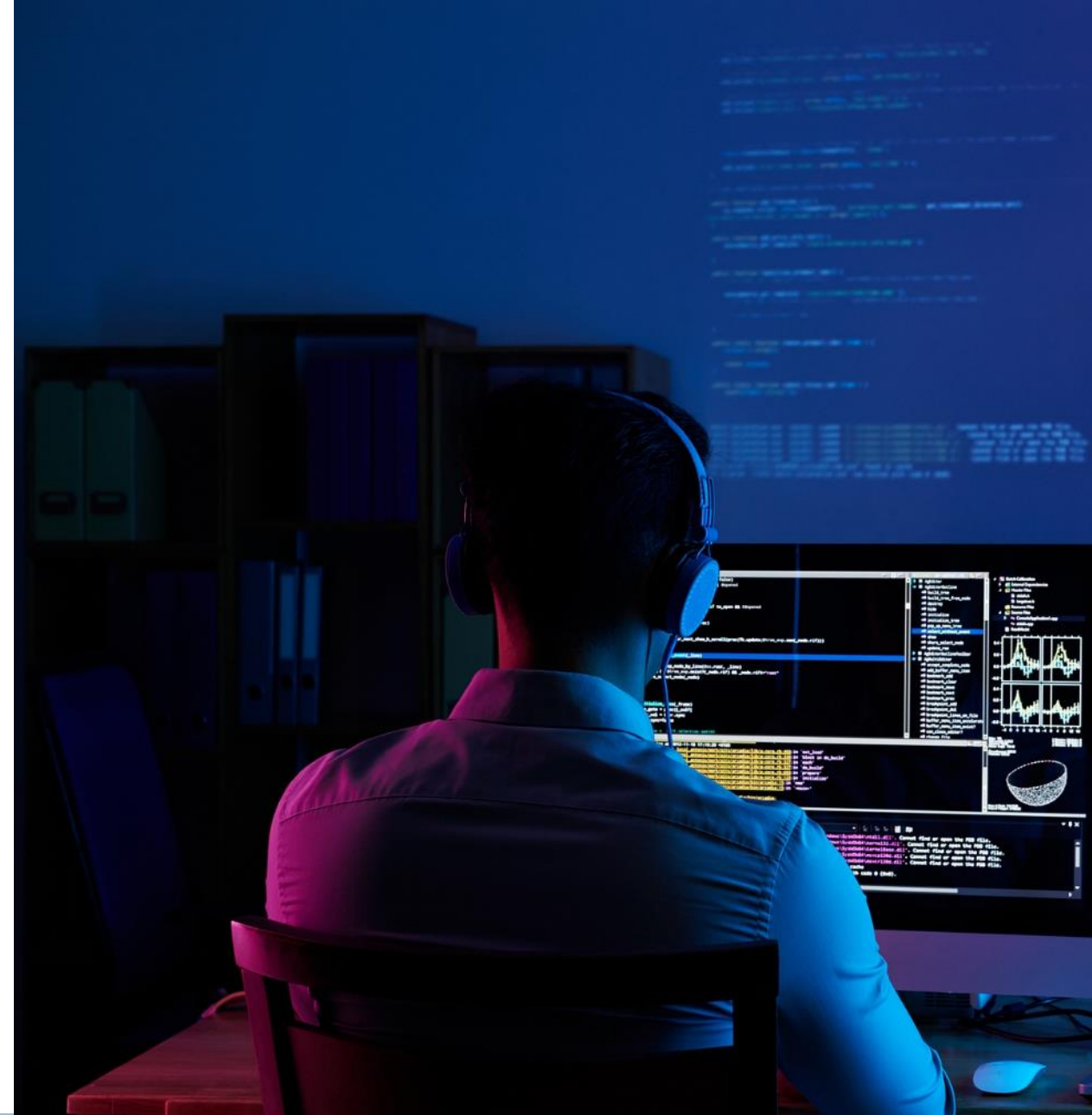
ISO – SMPTE – IETF und co.

- ISO/IEC 21122-1/2/3 Third edition in progress (Improved screen content coding)
- IETF RFC9134 (RTP for JPEG XS) published
- Fulfills SMPTE 2110-22 key requirements for compressed video transport
- VSF TR-08 (Transport of JPEG XS Video in ST 2110-22) published
- ISO/IEC 13818-1 MPEG TS in Systems
- VSF TR-07 (Transport of JPEG XS Video in MPEG-2 TS over IP)
- ISO/IEC 21122-3 standardizes storage of JPEG XS for MP4 and HEIF files
- ST2124 (JPEG XS in MXF) published
- ITU-R BT.2246-8



JPEG XS solutions by Fraunhofer SDKs

- SDKs for x86 (Intel, AMD), ARM (Raspi, Jetson, Mx)
- SDK for GPU (Nvidia)
- SDK for Holoscan for Media (Nvidia)
- Adobe Premiere Plugin
- DaVinci Resolve Plugin
- Reference applications (Recorder, ultra low latency transmission, 8k server system)



JPEG XS patent pool

Patent pool established 1st Feb. 2022

- **Vectis** as patent pool administrator
- **Fraunhofer** and **IntoPix** as licensors
- Allows licensing of **devices**, **software** and **services**

Benefits

- Facilitating equal access to licenses for all potential licensees
- Speeding up access to technology
- Reduction of transaction costs for both licensees and licensors
- Possible clearing of blocking positions
- Avoidance of costly infringement litigation
- Guaranteed non-discriminatory and equal access to all potential licensees



Contact

Prof. Dr. Siegfried Foessel
Division AME
Phone +49 9131 776-5140
Fax +49 9131 776-5197
siegfried.foessel@iis.fraunhofer.de

