intoPIX has developed break-through video transport FPGA IP-cores and solutions for customers that bridge the worlds of Professional Video production and Ethernet/IP Networks.

Today, intoPIX is extending its video transport expertise to address complex issues in delivery of video data in HD, 4K or 8K through IP networks in Broadcast, Pro-AV and Digital Cinema workflows with minimum latency, maximum reliability, quality and interoperability.

**Video over Ethernet/IP Reference Design:**
- SMPTE2022-1/2 with JPEG2000 (Xilinx Series 7)
- SMPTE2022-5/6 (Xilinx Series 7) Uncompressed or with TICO lightweight compression - Coming Soon!
- AVB Bridge - SDI to 10GbE (Xilinx Zynq) - Coming Soon!

**Transport IP-cores:**
- AVB Video Bridge 10 GbE Endpoint (SDI support)
- AVB Audio Bridge 1 GbE Endpoint
- MPEG-2 TS - for codestream encapsulation (SMPTE2022, AVB, …)
- UDP Receiver - for DCP transmission

**Compression & Security IP-cores:**
- JPEG 2000 compression
- TICO lightweight compression
- AES real-time encryption

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**Visually Lossless path for HD/4K/8K**

**TRANSMITTER**

- SDI (HD/3G/12G)
- 10 GbE
- HDMI 2.0
- DP 1.2
- USB, PCIe, …

**NETWORK**

- Visually Lossless path for HD/4K/8K
  - JPEG 2000 Enc + MPEG-2 TS + SMPTE2022-1/2
  - JPEG 2000 Enc + MPEG-2 TS + AVB
  - TICO lightweight Enc + SMPTE2022-5/6
  - TICO lightweight Enc + AVB

**RECEIVER**

- Uncompressed path for HD
  - SMPTE2022 5/6
  - AVB

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**Uncompressed path for HD**

- SMPTE2022 5/6
- AVB

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**RX FPGA**

- SDI (HD/3G/12G)
- 10 GbE
- HDMI 2.0
- DP 1.2
- USB, PCIe, …
Transport IP-cores

**IPX-AVB10G-Video: 10G AVB Video Endpoint IP-core (Preliminary)**
The IPX-AVB10G-Video is designed for 10 GbE and brings a complete Ethernet AVB protocol support to move current SDI-based production workflows to a smart and scalable Ethernet network infrastructure.

- AVB (Audio Video Bridge) Standards support: IEEE802.1as, IEEE802.1Qav, IEEE802.1Qat, IEEE 1722.1 Discovery and Control , IEEE P1722 transport protocol
- SDI Profile support to manage up to 4 video inputs/outputs (4 x SD/HD, 2 x 3G)
- Up to 64 audio channels
- Option to lock to a network reference

**IPX-MPEG2-TS: MPEG-2 Transport Stream Encapsulation for SMPTE2022**
The IPX-MPEG2-TS IP-core used with intoPIX JPEG 2000 compression brings full interoperability with VSF recommendations to carry SDI over SMPTE2022-1/2 using JPEG 2000 Broadcast profile in MPEG-2 TS over IP. The core support audio, video codestream and ancillary data. It can also be used with TICO lightweight compression.

**IPX-UDP: UDP Protocol Manager for DCP file transfer**
The IPX-UDP receives UDP packets (including video/audio assets) on a gigabit Ethernet link and is particularly conceived for real-time data/video reception of Digital Cinema Package.
**SMPTE 2022 Video over IP Reference Design**

The complete SMPTE2022 FPGA reference design combines both intoPIX JPEG 2000 compression and MPEG-2 TS cores with Xilinx SMPTE2022-1/2 IP-core to carry 3G-SDI over 1 GbE IP Network on a Xilinx Kintex-7 FPGA. Leveraging Xilinx SMPTE2022-5/6 IP-cores, it can also carry uncompressed HD/3G-SDI.

This reference design brings future 4K upgrade capability over 1 GbE and 10 GbE network infrastructure. intoPIX’s new TICO lightweight visually lossless compression technology, with a pixel line-based latency, can be used as a smart way to map 4K video over SMPTE2022-5/6 10G infrastructure. intoPIX JPEG 2000 4K cores can be directly integrated to carry 4K over SMPTE2022-1/2 1G network.

**SMPTE2022-1/2:**
In collaboration with Xilinx, intoPIX can deliver ready-to-use SMPTE 2022 reference design that have successfully participated in the J2K VSF Interop Event during Vidtrans 2014.

Fully compliant with the VSF (Video Services Forum) Technical Recommendation, "Transport of JPEG 2000 Broadcast profile video in MPEG-2 TS over IP", intoPIX JPEG 2000 and MPEG-2 TS cores, guarantee a faster time to market to new adopters. The design has been successfully connected with the equipment of major players of the broadcast market. It answers broadcasters’ needs for a cost-effective and reliable solution to enable them to migrate toward IP networks for video transport such as contribution links.

**SMPTE2022-5/6:**
Leveraging the power of SMPTE2022-5/6, intoPIX can embed the TICO lightweight compression to carry more HD streams, higher resolution (4K/8K) or higher frame rates (60p,120p) without any impact on latency.

**Key features:**
- intoPIX HD & 4K JPEG 2000 and TS encapsulation IP-cores
- Xilinx SMPTE2022 IP-cores for encapsulation over IP
- Ultra Low Latency option (down to 10 ms end-to-end)
- Reference application and IP-cores available from intoPIX and Xilinx

**Future version:**
- SMPTE2022-5/6 integrating TICO lightweight compression to carry 4K60p over 10 GbE.

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**Diagram:**

- **IPX-DDR3 Multiport Controller**
- **JPEG 2000 Encoder(S)**
- **JPEG 2000 Decoder(S)**
- **MPEG-2 TS**
- **TICO Encoder(S)**
- **TICO Decoder(S)**
- **FEC**
- **SMPTE 2022 1/2**
- **SMPTE 2022 5/6**
- **1 Gbps Ethernet**
- **10 Gbps Ethernet**

**Take IMAGING to the NEXT LEVEL**
**AVB Video over 10G Ethernet Reference Design**

intoPIX in collaboration with Xilinx, will deliver a reference design that will enable to see the 10 Gbps AVB standard working in full capacity.

The 10 Gbps AVB reference design will be using intoPIX new IPX-AVB10G-video IP-cores supporting multiple SD/HD/3G-SDI bridged to 10 Gbps Ethernet, and reversely, to reliably transport video from an SDI video source from the Talker (transmitter) to the Listener (receiver) over an Ethernet connection. The switching capability of AVB is fully accessible with this design.

Using the Omnitek OZ745 board, intoPIX 10 Gbps AVB reference design will enable a faster time to market and cost-effective development to deliver your own AVB solutions to your customers.

**Evaluation**

Contact us today for an evaluation and see how intoPIX can accelerate your product development success: sales@intopix.com

**About intoPIX**

intoPIX is a leading supplier of image compression technology to audio-visual equipment manufacturers. We are passionate about offering people a higher quality image experience and have developed IP-cores for FPGA/ASIC and software solutions that enable leading-edge image and video compression (JPEG 2000, TICO), security and hardware enforcement. More information on our company, customers and products can be found on www.intopix.com.