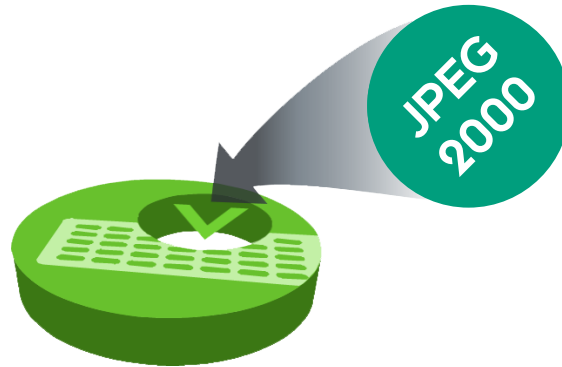




datasheet

Virtuoso
Media Function

nevision



Nevion Virtuoso

JPEG 2000 Encoding and Decoding

Nevion Virtuoso's JPEG 2000 media function saves bandwidth while providing visually lossless compressed video, transparent audio and data, at ultra-low latency.

Nevion Virtuoso can run multiple instances of the JPEG 2000 Media Function on a single platform with built-in network aggregation to 10G Ethernet.

The VSF TR-01 compliant TS over IP encapsulation ensures perfectly synchronized transport of video, audio and ancillary data, as well as interoperability with 3rd party equipment.

The JPEG 2000 Media Function runs on the Virtuoso 10G High Bit Rate Media Accelerator and supports electrical and optical SDI interfaces via video SFPs and breakout cables. Compressed signals are aggregated on built in 10G Ethernet interfaces built-in on the Virtuoso FA or on the Uplink Module of the Virtuoso MI.

A single JPEG 2000 media function supports encoding or decoding of up to 4 HD/3G signals, providing, for example, 16 encoders per 1RU in Virtuoso FA or 28 encoders per 1RU in Virtuoso MI.

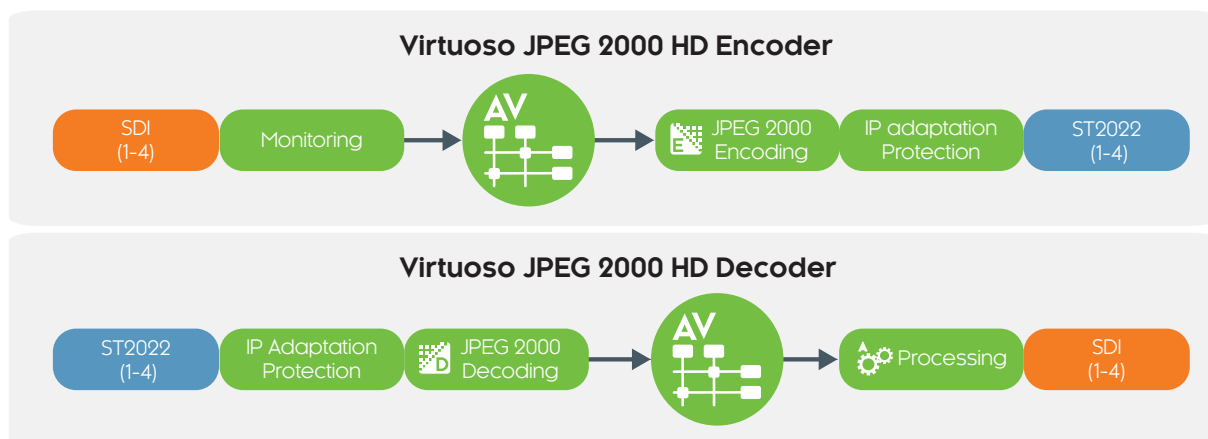
The Nevision Virtuoso JPEG 2000 Media Function, combined with Nevision's advanced protection mechanisms, enables broadcasters to utilize cost-efficient IP links for the real-time transport of professional media with low bandwidth utilization, combined with high quality and availability.

Applications

- Professional broadcast contribution
- Live sports and event contribution
- Studio-to-studio media exchange
- Managed video services over IP

Key features

- Multi-channel JPEG 2000 encoding and decoding
- Visually lossless VQ and low multi-generation loss
- Transport of SD, HD and 3G-SDI over IP/ GigE
- UHD and 4K with multi-link synchronization
- Interoperability with 3rd party through VSF TR-01
- Very low end-to-end latency 3-4 frames with TR01 and sub-frame with ultra low latency (ULL) mode
- Supports FEC, SIPS / SMPTE 2022-7 and Launch Delay Offset (LDO) IP protection mechanisms
- Integrated frame synchronization on decoder
- User-friendly web GUI for monitoring and control
- Thumbnails for input/output confidence monitoring
- Built-in TS monitoring (ETSI TR 101 290 Priority 1) of encoder output and decoder input, with option for Pri 2 and Pri 3 monitoring including PCR validation
- Software license approach ensures easy and future-proof upgrade path



JPEG 2000 compression technology

Each frame/field is encoded with 4:2:2 10-bit JPEG 2000 Part 1 image compression, typically providing visually lossless video quality using a fraction of the bandwidth required for uncompressed video. Further, JPEG 2000 has excellent properties in terms of being robust against multi-generation encoding/decoding, which provides improved quality headroom in production.

High density and flexibility

The JPEG 2000 Media Function uses the Virtuoso High Bitrate Accelerator. The Media Function has 3 operational modes; encoder, decoder or bi-directional (2 encoder + 2 decoders). In all modes, it can support up to 4 channels per Accelerator, giving a density of 16 codecs in Virtuoso FA (1RU) and 28 codec in Virtuoso MI (1RU). Each channel can be an SD, HD or 3G-SDI signal (up to 1080p 59.94 Hz).

UHD/4K and slow motion feeds

Multi-link synchronization enables transport of Quad-Link UHD/4K signals, slow motion camera feeds and stereoscopic 3D. Synchronization works across all signals in a Virtuoso FA or MI encoding/decoding signal chain.

Transparent audio & ancillary data

The JPEG 2000 Media Function supports transmission of up to 16 channels of embedded audio for SD, HD and 3G-SDI. Handling of embedded audio, whether it's linear PCM or pre-compressed audio, is fully transparent. Similarly, handling of ancillary data such as closed captioning, active format description, time code and other metadata is fully transparent line-by-line.

Standards compliant transport

The software uses VSF TR-01 JPEG 2000 transport, in TS over IP ensuring compatibility with 3rd party.

Ultra low latency

The software supports the new VSF TR-01 JPEG 2000 ultra low latency mode with sub-frame latency end-to-end.

Test image transmission

An encoder can be configured to transmit an internally generated test image or an uploaded image at a configurable, constant bitrate, with configurable text overlays and moving patterns, to allow efficient testing of contribution links prior to a live event.

Robust operation with frame sync

The decoder includes a number of features to ensure a robust operation and graceful degradation in the presence of IP transport impairments; buffering for IP jitter compensation, packet reordering, error correction and highly efficient error concealment, and a built-in frame synchronizer with analog and digital sync inputs. The encoder supports SDI input switching with built-in frame store for clean changeover on loss of input.

Protection and reliability

JPEG 2000 encoding and decoding can be combined with Forward Error Correction (FEC), Seamless IP Protection Switching (SIPS) compliant to SMPTE 2022-7, as well as Launch Delay Offset (LDO).

Seamless IP protection switching

Transmitting the same RTP/IP stream across dual, fully diverse network links enables receivers/decoders to utilize SMPTE 2022-7 Seamless IP Protection Switching (SIPS), which gives error-free transport even in case of severe packet loss or link outages as long as a packet arrives on either of the two network links.

Video formats

SD-SDI	SMPTE ST 259-C 625i25, 525i29.97
HD-SDI	SMPTE ST 292/ST 296/ST 274/ST 2048 1280 x 720p: 50/59.94/60 1920 x 1080i: 25/29.97/30 1920 x 1080p: 25
3G-SDI	SMPTE 424 (Level A)/ST 274/ST 2048 1920 x 1080p: 50/59.94/60
UHD and 4K	Transmit or receive 1 UHD or 4K 2160p signal using 4 synchronized HD or 3G-SDI signals (square division)

Video compression

Video compression	JPEG 2000 Part 1 Broadcast Profile (ISO/IEC 15444-1 and VSF TR-01 profiles for HD/3G)
Video sampling	YCbCr, 4:2:2, 10 bit per component
Color space	ITU-R Rec BT.709
Number of channels	Up to 4 channels of encoding (or decoding) per Accelerator. Each channel is independently configurable for SD, HD or 3G.

Audio and ancillary data

Embedded audio	8 AES3 stereo channel pairs / 4 AES groups (user selectable), 20 or 24-bit, transparent for linear PCM and non-PCM audio
Ancillary data	Fully transparent for ancillary data, including but not limited to Time code (SMPTE 12M), Closed captioning (SMPTE 334-1), Active format description (AFD, SMPTE 2016-3) and OP-47.
Audio/video sync	+/- 2 ms

Video and audio processing

Frame sync	Integrated frame store on SDI input/SDI output with option to lock to reference sync.
Sync input format	Analog video sync via FA or MI base unit. PTP on 10GE via HBR uplink in MI SDI input via HBR accelerator.
Test image	Color bar, custom color or image. Configurable text overlay and moving box
Audio processing	Audio mono shuffling. Audio delay up to 10 seconds per channel. Audio gain / level control per channel. Option for automatic Dolby E re-alignment. Processing available on decoder SDI output.
Input signal loss	Freeze frame, option to fallback to test image

MPEG-2 Transport Stream

DVB-ASI	ETSI EN 50083-9, Annex B, 188 bytes/pkt
TS over IP	SMPTE 2022-2 RTP/UDP/IP (CBR)
Input TS bitrate	Encoder: 20 Mbps to 400 Mbps (SPTS/MPTS)
Output TS bitrate	Encoder: 20 Mbps to 400 Mbps (SPTS)
Program information	Encoder output: PAT, PMT
JPEG 2000 video	VSF TR-01:2013 full-frame encoding mode VSF TR-01:2018 ultra low latency mode Up to 200 Mbps for HD Up to 350 Mbps for 3G
AES3 audio	SMPTE 302 pass-through (48 kHz, 20 or 24-bit) One audio channel pair per PID
Ancillary data	SMPTE 2038 pass-through up to 1 Mbps

Monitoring

TS monitoring	ETSI TR 101 290 Priority 1 alarms in Virtuoso FA. ETSI TR 101 290 Priority 2/3 alarms in Virtuoso FA (Licensed option).
Content monitoring	Video thumbnail picture. Audio level bars.
Advanced monitor	Template based monitoring for video/audio. Video black and freeze frame detection. Audio silence and peak level detection. (Licensed option)
Alarm log	Persistent alarm log with 100,000 entries.

IP transport and protection

TS/IP encapsulation	VSF TR-01 TS over RTP/UDP/IP. Virtuoso MI: HBR module running UPLINK-10G media function is used for TS/IP input/output. Virtuoso FA: main board is used for TS/IP input/output.
Protocols	RTP, UDP, IP, ICMP, ARP, IGMPv2/v3, Diffserv/TOS, 802.1Q (VLAN tag), 802.1P (VLAN priority).
Jitter / PDV	Buffering for IP jitter/PDV compensation Up to 50 ms receiver buffer.
FEC	Forward Error Correction compliant to SMPTE ST 2022-1/2 (Virtuoso FA)
Extended FEC	Support for extended matrix size L*D < 960, max L+D 244, e.g. 240 x 4)
SMPTE ST 2022-7	Hitless/seamless protection switching compliant to SMPTE ST 2022-7. Up to 200 ms differential path delay in FA. Up to 450 ms differential path delay in MI.
LDO	Launch delay offset for single path temporal diversity using SMPTE ST 2022-7 (Virtuoso FA).

Software media functions

J2K-HD-E4	JPEG 2000 HD Encoder (4 channels)
J2K-HD-D4	JPEG 2000 HD Decoder (4 channels)
J2K-HD-E2D2	JPEG 2000 HD Bidirectional Encoder (2 channels) and Decoder (2 channels).

Accelerator requirement

Accelerator	HBR Media Accelerator
Description	Multi-channel high bitrate Media Accelerator (HW module). 4x SFP+ ports that accommodate a combination of video SFPs. Additional licenses required for use with adaptation/compression/processing/monitoring Media Functions.
Product codes	VIRTUOSO-HW-HBR-SFP4 (24204)
SFP configuration	Port 1: Video SFP for SDI input (E4 and E2D2) Port 2: Video SFP for SDI input (E4) Port 3: Video SFP for SDI output (D4) Port 4: Video SFP for SDI output (D4 and E2D2)
Video SFP support	Non-MSA 270 Mb/s to 3 Gb/s SD-SDI, HD-SDI, 3G-SDI Optical and electrical variants
Power consumption	Maximum 45W

Ordering Options

VIRTUOSO-HW-HBR-SFP4	Multi-channel high bitrate Media Accelerator (HW module). 4x SFP+ ports that can accommodate a combination of 10GE SFP+ and video SFPs. Additional licenses required for use with media adaptation/compression/processing/monitoring functions.
VIR-FA-SW-J2K-HD[1,4] VIR-MI-SW-J2K-HD[1,4]	License option enabling one [1,4] JPEG 2000 HD/SD encoder/decoder service. Supports SD/HD/3G-SDI interfaces and television production formats. Requires an HBR accelerator module (maximum 4 encoders, 4 decoders or 2 encoders + 2 decoders per module). Licensed per service.
VIR-FA-SW-TS-PROT[1,8] VIR-MI-SW-TS-PROT[1,8]	License option enabling IP protection features for one [1,8] TS input or output service, including SMPTE 2022-7 Seamless IP Protection Switching (SIPS) for RTP/IP transport over dual diverse network links (license only needed on receiver), Launch Delay Offset (LDO) (license needed in both sender and receiver) and SMPTE 2022-1 Forward Error Correction (FEC) for TS over IP (license needed in both sender and receiver). Note that protection for TS over IP input + output requires 2x TS-PROT licenses.
VIR-FA-SW-TS-ADVMON[1,8]	License option enabling advanced TS monitoring according to ETSI TR 101 290 Priority 2 alarms (e.g. PCR accuracy/overall jitter) and Pri 3 DVB-SI and ATSC A/78. Note that Priority 1 alarms is included with the TS related media functions. Licensed per service.
VIR-FA-SW-UNC-HD-MON[1,4,8] VIR-MI-SW-UNC-HD-MON[1,4,8]	License option enabling advanced monitoring features for SD/HD uncompressed video/audio, including black/ freeze frame and audio silence detection. Licensed per [1,4,8] video services and [16,64,128] audio channels.
VIR-FA-SW-MLS4 VIR-MI-SW-MLS4	License option enabling synchronization of up to four (4) J2K or H.264/AVC decoders. Enables multi-link 3G/HD-SDI transport for UHD/4K/8K (JPEG2000) applications, stereoscopic 3D, or super-slow motion. License required on decoder side. Signals to be synchronize need to be generated from the same Virtuoso Server. Licensed per set of 4 channels, so syncing 8 channels requires a quantity of 2 licenses.



Nevion near you!

Nevion has a presence in all the major regions, and an extensive network of partners to reach customers anywhere in the world.

Visit our website for your nearest sales contact

neviON.com

Copyright © NeviON, 2020, all rights reserved.

No part of this documentation may be reproduced in any form or by any means or be used to make any derivative work (including translation, transformation or adaptation) without explicit written consent of NeviON.

Nevion reserves the right to make changes without notice to equipment specification or design. The information provided in this document is for guidance purposes only and shall not form part of any contract.