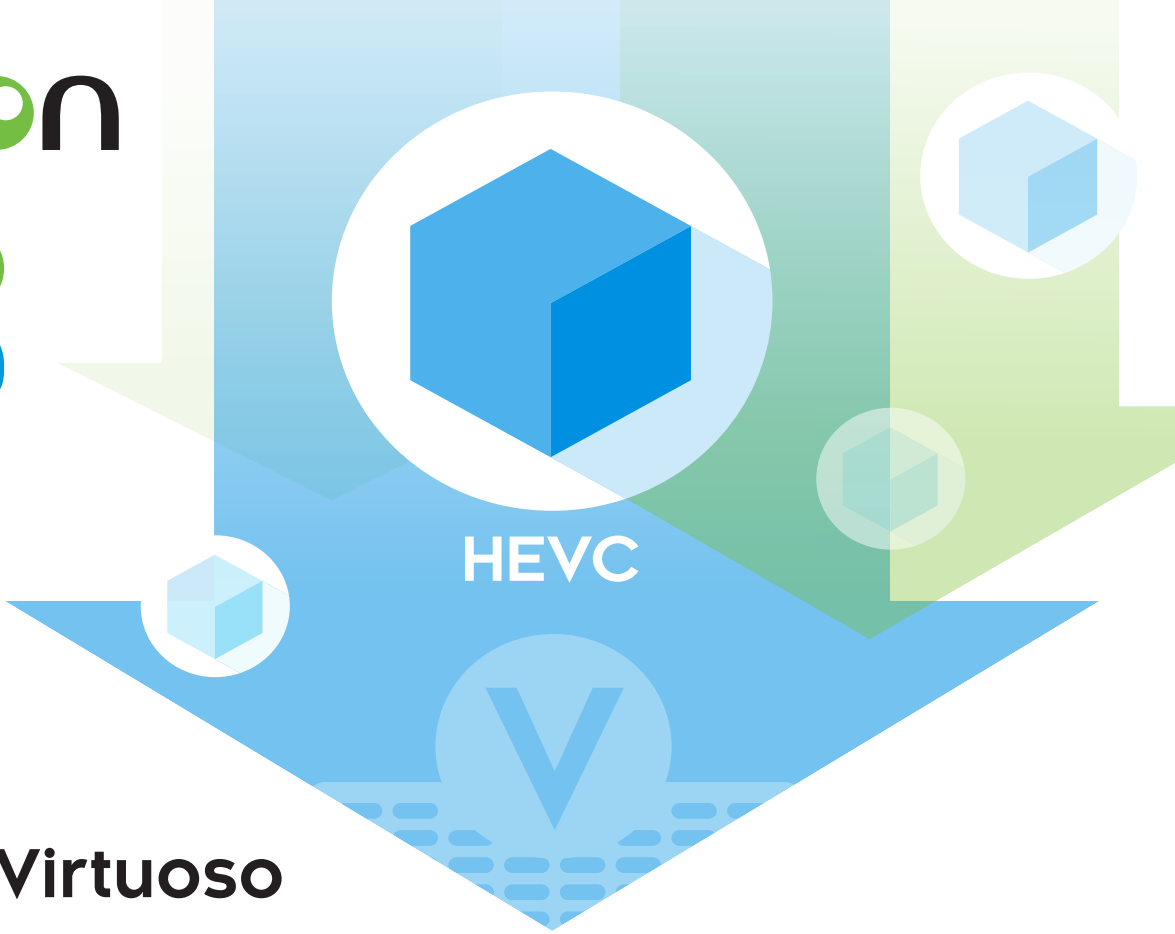
datasheet

Virtuoso Media Function



Nevion Virtuoso

H.265/HEVC

The Nevion Virtuoso H.265/HEVC media function provides low bit rate encoding and decoding with both high picture quality and low end-to-end system latency.

The media function supports 10-bit 4:2:2 and 4:2:0 encoding and decoding for a range of use cases including contribution and ground-to-cloud applications.

Virtuoso can run multiple instances of the H.265/HEVC Media Function on a single platform for high-density applications.

The standards compliant Transport Stream over IP encapsulation ensures perfectly synchronized transport of video, audio and ancillary data, as well as interoperability with 3rd party equipment.

The HEVC Media Function runs on the Virtuoso High Bit Rate Media Accelerator and supports electrical and optical SDI interfaces via video SFPs and Nevion breakout cables. Compressed signals are aggregated on the Ethernet interfaces of the Virtuoso MI/RE Uplink Module.

A single HEVC media function supports encoding or decoding of up to 4 HD/3G or 1 UHD signal, providing, for example, 28 encoders per 1RU in Virtuoso MI or 20 encoders per 1RU in Virtuoso RE.

The HEVC Media Function, combined with Nevion's advanced protection mechanisms, enables 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
- Managed video services over IP
- Ground-to-Cloud ingress applications

Key features

- Multi-channel HEVC encoding and decoding
- Configurable Encoder or Decoder modes
- Best in class video quality with 4:2:2/4:2:0 10-bit H.265/HEVC compression up to 100 Mbit/s per channel
- Transport of HD and 3G-SDI over IP
- 16-channel audio pass-through with full audio routing matrix built-in
- MPEG-2 Transport Stream encapsulation transport over IP for inter-op with third parties products
- Low Latency mode end-to-end 200ms. ULL mode roadmapped.
- 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.*(using Uplink module).

Virtuoso H.265/HEVC Media Function

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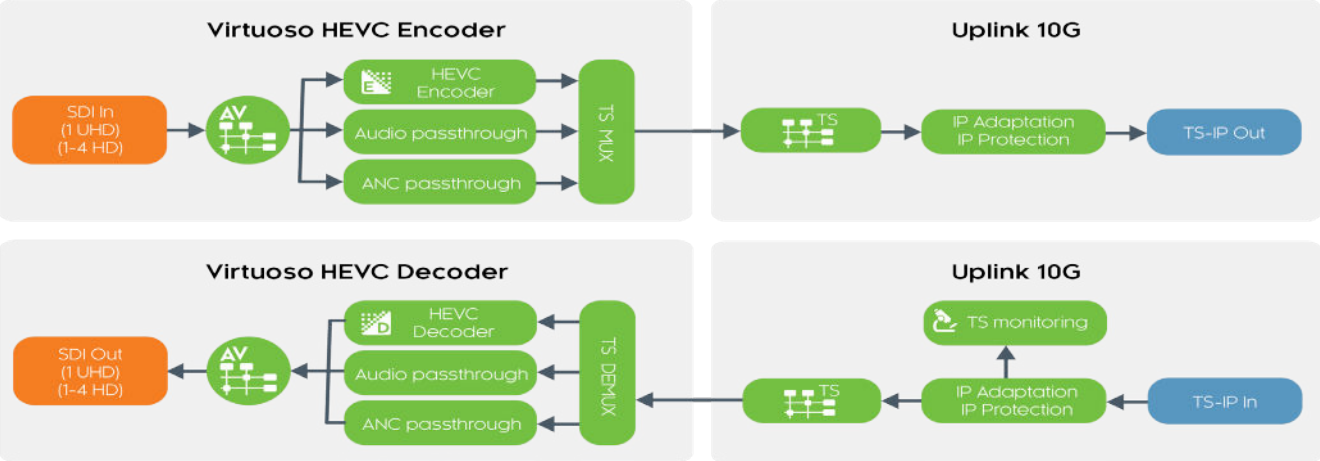

H.265/HEVC compression technology

Video is encoded using H.265/HEVC with native 10-bit resolution and 4:2:2/4:2:0 chroma sampling and 80 Mbit/s video elementary stream achieving high quality using a fraction of the bandwidth required for uncompressed video.

Typical bandwidth usage for HD video ranges from 6 Mbit/s to 80 Mbit/s depending on content and quality requirements and expectations.

High density and flexibility

The HEVC media function uses the Virtuoso LBR Low Bitrate Accelerator. The media function has 2 operational modes; encoder or decoder. In both modes, it can support up to 4 channels of HD or 1 UHD channel per accelerator. Each accelerator can be individually configured in Encoder or decoder mode.

This gives a density of 28 channels (HD or 3G-SDI) in Virtuoso MI and 20 channels in Virtuoso RE (both 1RU). For UHD, 7 channels in MI and 5 channels in RE. Each accelerator can be individually configured in HD or UHD mode.

Transparent audio & ancillary data

The HEVC media function supports transmission of up to 16 channels of embedded audio for 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.

High quality and low latency

The HEVC media function and Nevion's Low Bitrate accelerator combines the very latest coding technology to achieve the best in class HEVC solution for picture quality and low latency.

Standards compliant transport

The software uses MPEG-2 compliant transport, in TS over IP ensuring compatibility with 3rd party devices.

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

HEVC 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.

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Virtuoso H.265/HEVC Media Function

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Video formats

HD-SDI	SMPTE ST 292/ST 296 1280 x 720p: 50/59.94/60
3G-SDI	SMPTE 424 (Level A) 1920 x 1080p: 50/59.94

Additional format support tbc

SDI interfaces

SDI interfaces	Inputs and outputs per accelerator: 3G/HD-SDI - Up to 4 inputs or 4 outputs 12G/3G/HD-SDI Video SFP with options for: - Dual channel SDI RX (input) - Dual channel SDI TX (output) - Single channel SDI RX + SDI TX (bidirectional) - Optical and electrical variants 3G/HD-SDI video breakout with options for: - Dual channel SDI RX + SDI TX - Dual channel SDI RX with passive loop out

Video compression

Video compression	HEVC (ISO/IEC 23008-2 and ITU-T recommendation H.265)
Video sampling	YCbCr, 4:2:2,10 bit per component YCbCr, 4:2:0,10 bit per component
Colour formats	ITU-R BT.709 (HDTV) ITU-R BT.2020-2 (UHDTV) ITU-R BT.2100 HDR (HLG / PQ)
Video bitrate	Variable 8-100Mbps Picture quality guarantee (lower limit) 12Mbps: Recommened operating point HD: 25-35Mbps
Number of channels	Up to 4 HD encoding (or decoding) per Accelerator

Audio and ancillary data formats

Embedded audio	8 AES3 stereo channel pairs 20 or 24-bit, transparent for linear PCM and non-PCM audio
Audio compression	To be confirmed.
Ancillary data	Fully transparent for ST 20238 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..

Video/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. SDI input via LBR accelerator.
Test image	Color bar, custom color or image. Configurable text overlay and moving box
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/Output TS	SPTS up to 100 Mbps
Program information	Encoder output: PAT, PMT
AES3 audio	SMPTE 302 pass-through (48 kHz, 20 or 24-bit) One audio channel pair per PID

Monitoring

TS monitoring	ETSI TR 101 290 Priority 1:alarms ETSI TR 101 290 Priority 2/3 alarms (Licensed option).
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	TS over RTP/UDP/IP. Virtuoso MI/RE: HBR module running UPLINK-10G media function 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.
Extended FEC	Support for extended matrix size L*D < 960, max L+D 244, e.g. 240 x 4)
Link redundancy	Hitless/seamless switching for all RTP flows compliant to SMPTE ST 2022-7:2019 Up to 450 ms differential path delay in MI/RE
LDO	Launch delay offset for single path temporal diversity using SMPTE ST 2022-7)..

Media Server Appliance support

Please refer to Nevion Virtuoso Platform datasheet for details.

Virtuoso MI	Supported in version 2.0 or higher
Virtuoso RE	Supported in version 2.0 or higher

Accelerator requirement

Accelerator	LBR media accelerator (LBR)
Description	Multi-channel low bitrate Media Accelerator (HW module). 4x SFP+ ports that accommodate a combination of 10/25GE SFP+ and video SFPs.
Product codes	VIRTUOSO-HW-LBR-SFP4 (25910)
SFP configuration	Port 1: Video SFP for SDI input (E4) Port 2: Video SFP for SDI input (E4) Port 3: Video SFP for SDI output (D4) Port 4: Video SFP for SDI output (D4)
Video SFP support	Non-MSA 270 Mb/s to 12 Gb/s HD-SDI, 3G-SDI, 12G-SDI Optical and electrical variants
Power consumption	Maximum 45W

Software media functions

HEVC-HD-E4	HEVC HD/UHD Encoder (up to 4 channels)
HEVC-HD-D4	HEVC HD/UHD Decoder (up to 4 channels)
Product code	VIR-SW-HEVC-HD4-UHD1 (25911)

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