Nevion Virtuoso

SDI-IP 2022 (TR-04)

Nevion Virtuoso's SDI-IP 2022 Media Function software offers a set of video and audio processing functions for use in live IP production applications.

The SDI-IP 2022 Media Function supports adaptation, synchronization and processing of uncompressed video and audio signals. The software supports any-to-any conversion between baseband SDI and SMPTE ST 2022-6 IP, with flexible audio processing and routing, PTP/SMPTE 2059 frame synchronization and delay management.

Audio processing includes de-embedding of SDI/ST2022-6 and IP audio inputs, flexible internal routing and embedding, as well as per-channel audio gain and delay control.

High availability is ensured with ST2022-7 hitless/seamless IP protection switching, which is supported for all video and audio streams with no impact on audio channel input/output density.

The SDI-IP 2022 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, and IP video/audio via dual 10GE.

A single SDI-IP 2022 instance supports SDI-IP adaptation of up to 4 HD/3G signals in each direction, providing, for example, 16 inputs and 16 outputs HD/3G signals per 1RU in the 4 slot Virtuoso FA appliance, and twice that in the 8 slot Virtuoso MI appliance.

Applications

- IP in the facilities
- IP production infrastructure
- In-house/campus media networks
- Video/Audio processing

Key features

- Multistandard connectivity
    - 3G/HD/SD-SDI optical and electrical via SFPs
    - Uncompressed video/audio over IP/10GE
    - SMPTE 2022-6 and AES 67
    - Any-to-any conversion
- PTP timing and sync (IEEE 1588v2, SMPTE 2059)
- Video/Audio processing
    - Video/audio frame synchronization
    - Break-Before-Make clean switching
    - Audio embedding/de-embedding
    - Audio routing, shuffling, delay and gain
    - Video routing and delay
- Stream protection
    - SMPTE 2022-7 for all RTP media input flows
- Alarm based uncompressed input switching
- Monitoring
    - Thumbnails of input and output video
    - In-depth service monitoring incl. video freeze/black frame and audio silence detection

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Virtuoso SDI-IP 2110 Media Function
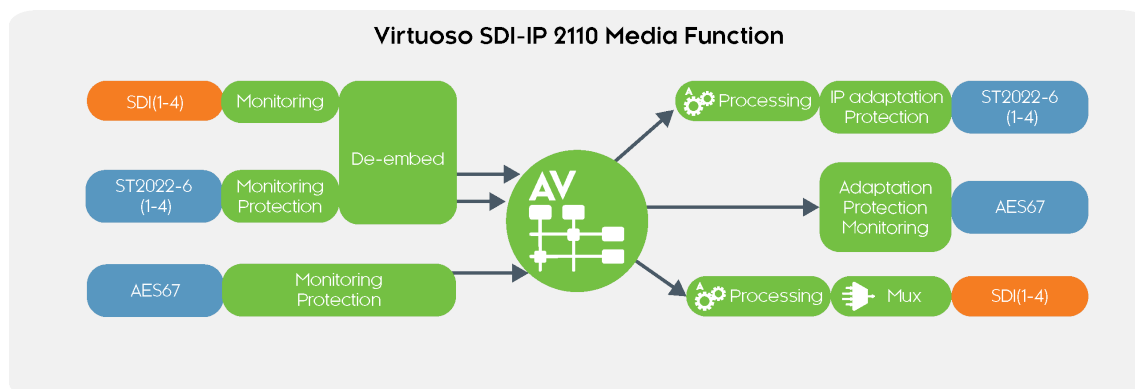
SDI-IP conversion and frame sync

Nevion Virtuoso SDI-IP 2022 inherently acts as a frame synchronizer with legacy SDI and IP video and audio interfaces, supporting any-to-any conversion, audio de-embedding and embedding, video and audio routing/shuffling, delay and gain control. These features make Nevion Virtuoso SDI-IP 2110 ideal for processing audio and video signals in IP-based broadcast facility infrastructure, and for IP remote and at-home production applications.

Flexible interfacing via 10GE/SFP

The SDI-IP 2022 Media Function runs on a 10G HBR accelerator in the Virtuoso FA or MI appliances, and supports dual 10GE and SDI input/output signals via SFP ports, populated with optical/electrical video SFPs or Nevion video breakout cables.

Audio and video processing

Nevion Virtuoso's SDI-IP 2022 Media Function provides de-embedding of audio from SDI and 2022-6 inputs. Audio channels can be routed to any output, embedded in SDI or sent out on IP as AES67.

Audio delay can be adjusted on a channel-by-channel basis, up to 10 seconds. Audio level/gain can also be adjusted on a per-channel basis. The SDI embedder supports automatic re-alignment of Dolby E audio coming from input SDI or SMPTE 2022-6 streams.

PTP and analog sync reference

PTP IEEE 1588v2 / SMPTE 2059 is supported via the 10GE ports on the Virtuoso HBR module, while the Virtuoso FA and MI servers have analog sync input ports and support both PTP time and sync distribution to all modules in the chassis. PTP redundancy is supported with automatic bumpless PTP failover switching. In non-PTP environments, SDI input signals can also be used as a sync reference for outputs.

High density and flexibility

The SDI-IP 2022 Media Function running on a Virtuoso HBR accelerator supports up to 8 video input and 8 video outputs (4 SDI and 4 IP video) and up to 64 IP audio streams (AES67). Internally, there are 8 video frame synchronisers and fully flexible audio router. For SDI-IP conversion applications, this means SDI-IP 2022 supports 4 input + 4 output channels per module, giving a density of 16 input + 16 output conversions in Virtuoso FA (1RU), and 32 input + 32 output conversions in Virtuoso MI (1RU).

Reliability and IP protection

The software includes multiple features to ensure a robust operation and graceful degradation in the case of IP transport impairments, including robust IP buffering, re-ordering and ST2022-7 transport protection. The software also supports alarm-based input switching between different SDI inputs.

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. This functionality is supported in the SDI-IP 2022 Media Function for all RTP media streams, without impacting the density of e.g. IP audio inputs.

Test image transmission

The SDI-IP 2022 Media Function can transmit an internally generated or custom test image with configurable text overlays and moving patterns, to allow efficient testing of links prior to a live production.

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Nevion Virtuoso SDI-IP 2022 Media Function

Video formats

SD-SDI	SMPTE ST 259-C 625i25, 525i29.97
HD-SDI	SMPTE ST 292/ST 296/ST 274 1280 x 720p: 50/59.94/60 1920 x 1080i: 25/29.97/30 1920 x 1080PsF: 25/29.97/30 1920 x 1080p25
3G-SDI	SMPTE 424 (Level A)/ST 274 1920 x 1080p: 50/59.94/60

Audio and ancillary data formats

Embedded audio	16 channels (8 stereo pairs) Linear PCM 24 bit audio (48kHz) AES3 non-PCM audio 32-bit pass-through
Ancillary data	Fully transparent

Video and audio over IP transport

Video over IP	SMPTE 2022-6 SDI payload over RTP/UDP/IP Up to 4 IP video inputs and outputs Transmit and receive via dual 10GE SMPTE ST 2022-7 supported for all flows.
Audio over IP	AES67 (1 to 8 audio channels per stream) Up to 64 IP audio inputs and output streams Transmit and receive via dual 10GE SMPTE ST 2022-7 supported for all streams.
Network redundancy	Seamless IP protection Switching (SIPS) compliant to SMPTE ST 2022-7.
Signal switching	Break-before-make clean swithing

Audio processing

De-embedding audio channels from SDI and IP audio.
Embedding audio channels to SDI and ST2022-6
Fully flexible internal audio routing and shuffling
Audio delay adjustment - up to 10 seconds per channel
Audio level/gain control - per mono channel

Timing and synchronization

Sync input format	PTP (IEEE 1588v2:2008) Analog BB/TLS via Virtuoso appliance
PTP profile support	PTP default and media profile SMPTE 2059-2 PTP profile
Media timing	SMPTE ST 2059-1, SMPTE ST 2110-10, AES67 Link Offset configuration supported

Monitoring

Thumbnails of video input and output
In-depth service monitoring incl Video freeze/black, Audio silence

Media Server Appliance support

Please refer to Nevion Virtuoso Platform datasheet for details.	
Virtuoso FA	Supported in version 2.8 or higher
Virtuoso MI	Supported in version 1.0 or higher

Accelerator requirement

Accelerator	HBR Media Accelerator
Description	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 adaptation/compression/processing/monitoring Media Functions.
Product codes	VIRTUOSO-HW-HBR-SFP4 (24204)
Connectors	Four (4) SFP+ supporting 10GE, Video/MADI SFPs and breakout cables
Ethernet network	10GE (10GBase-R)
Video SFP support	Non-MSA 270 Mb/s to 12 Gb/s SD-SDI, HD-SDI, 3G-SDI, 12G-SDI, MADI, ASI Optical and electrical variants See Media Function datasheets for details
Sync input format	PTP on 10GE (IEEE 1588v2:2008, SMPTE 2059)
Power consumption	Maximum 45W

SDI interfaces

SDI interfaces	Video SFP with options for: - Dual channel SDI RX (input) - Dual channel SDI TX (output) - Single channel SDI RX + SDI TX (bidirectional) Video breakout with options for: - Dual channel SDI RX + SDI TX (bidirectional) - Dual channel SDI RX with passive loop out All video interfaces support SD/HD/3G-SDI

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-UNC-HD[1,4,8] VIR-MI-SW-UNC-HD[1,4,8]	License option enabling IP adaptation, frame sync and audio embedding/de-embedding of uncompressed video signals, including flexible audio routing/shuffling and delay handling. Up to [1,4,8] Video channels on IP (inputs + outputs) and a total of [16,64,128] mono Audio channels per module. Includes SMPTE2022-6 /AES67 and SMPTE 2110 interfaces. Max 4 SDI inputs/outputs per module.
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-UNC-HD-PROT[1,4] VIR-MI-SW-UNC-HD-PROT[1,4]	License option enabling receiving SMPTE 2022-7 Seamless IP Protection Switching (SIPS) for RTP/IP transport over dual diverse network links for up to [1,4] Video channels on IP and [1,64] audio channels on IP.
VIR-FA-SW-UNC-HD-WBUF1 VIR-MI-SW-UNC-HD-WBUF1	License enabling a wide buffer for IP reception of one (1) HD uncompressed Video over IP service. Enables up to 150 miliseconds of buffering for ST2022-7 path delay compensation, ideal for WAN applications. Applicable for ST2022-6 and ST2110 Video IP inputs.

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