



Nevion Virtuoso

UDC for UHD/HD

Nevion Virtuoso's Up/Down/Cross Media Function offers a variety of high-quality format conversions for HD and UHD with native SMPTE 2110 interfacing on 25 GigE.

The Up/Down/Cross (UDC) media function runs on an HBR25 accelerator card in Virtuoso MI/RE and supports two independent video converters.

Each converter can perform de-interlacing, scaling, colour conversion and processing, legalization, frame synchronization and delay.

Any-to-any conversion is supported for HD 720p, 1080i, 1080p and UHD 2160p video formats.

Colour conversion including HDR/SDR conversion is supported via 33-cube 3D-LUT conversion. Users can upload a set of custom LUT files and quickly change between them via user interface or API.

For HLG HDR workflow conversions, a selection of the Sony SR-Live and BBC LUTs, intended for live production, are pre-bundled in the UDC media function software.

The versatility, performance and low latency of the UDC media function makes it ideal for live broadcast and media production applications.

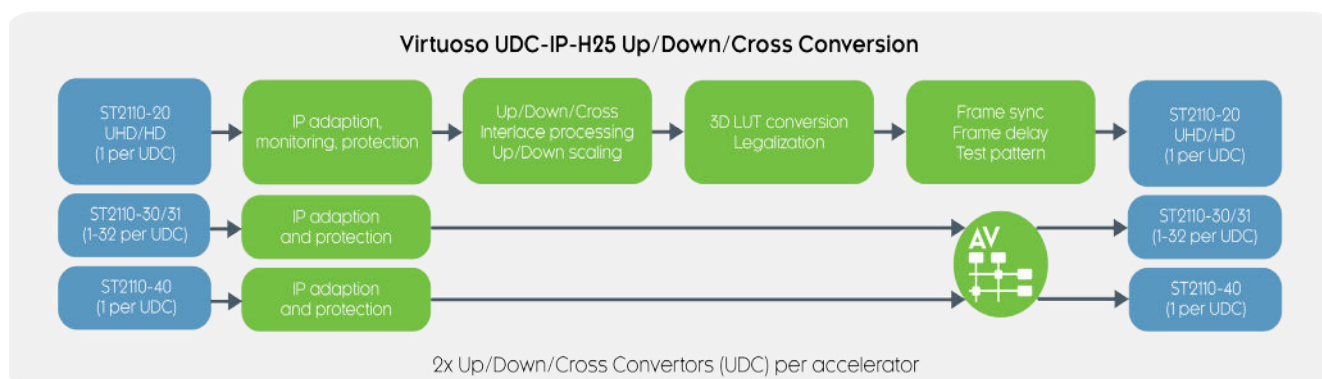
A single Virtuoso MI supports up to 16 UHD/HD Up/Down/Cross video conversion processes. Virtuoso RE supports 12 conversions. Both offer a high density (in 1RU) and power efficient solution for video processing.

Applications

- Live production
- Media processing

Key features

- Video format conversion for HD and UHD
 - UHD to HD down-conversion
 - HD to UHD up-conversion
 - HD to HD conversion
- 3D-LUT colour conversion
 - HDR/SDR conversion
 - Pre-bundled BBC and Sony SR-Live 3D-LUTs
 - Support for user-defined custom LUTs
- Native IP connectivity
 - Native SMPTE 2110 video/audio interfacing
 - ST 2022-7 hitless switching on dual IP/25GigE
- Video processing
 - High quality de-interlacing and interlacing
 - High quality resolution scaling
 - Built-in frame synchronizer with PTP support
 - Video sample legalization on output
- Monitoring and control
 - Thumbnails of input and output video
 - Advanced video monitoring option
 - HTML5 user interface for configuration
 - NMOS IS-04/05 and REST API for control



High quality format conversion

The Nevion Virtuoso Up/Down/Cross media function provides dual channel high-quality format conversion for UHD and HD signals.

The signal conversion capabilities include option for de-interlacing for converting 1080i interlaced formats to HD/UHD progressive formats at 50/59.94 Hz, followed by high-quality scaling to go between HD 720p, 1080p and UHD 2160p resolution.

3D LUT colour conversion

The media function supports 3D LUT conversion for the ultimate flexibility in colour space and HDR/SDR conversion for live production, on-set preview/monitoring, and broadcast distribution.

The processing is based on high quality 33-cube 3D-LUT conversion with tetrahedral interpolation.

The solution offers a high level of customization as up to 24 user-defined LUTs can be uploaded, pre-stored and easily switched between.

For HLG HDR workflow conversions, a selection of the Sony SR-Live and BBC LUTs, intended for live production, comes pre-bundled in the media function software.

Flexible interfacing via IP/25GE

The UDC media function is available for the HBR25 accelerator card in the Virtuoso MI appliance and supports native SMPTE 2110 via dual 25GE ports.

PTP timing and sync

Precision Timing Protocol (PTP) provides accurate synchronization for IP video and audio, using IEEE 1588v2 profiles or SMPTE 2059-2. Locking to PTP/TAI ensures fully synchronous operation across any network and any distance. PTP redundancy is supported with bumpless PTP failover switching.

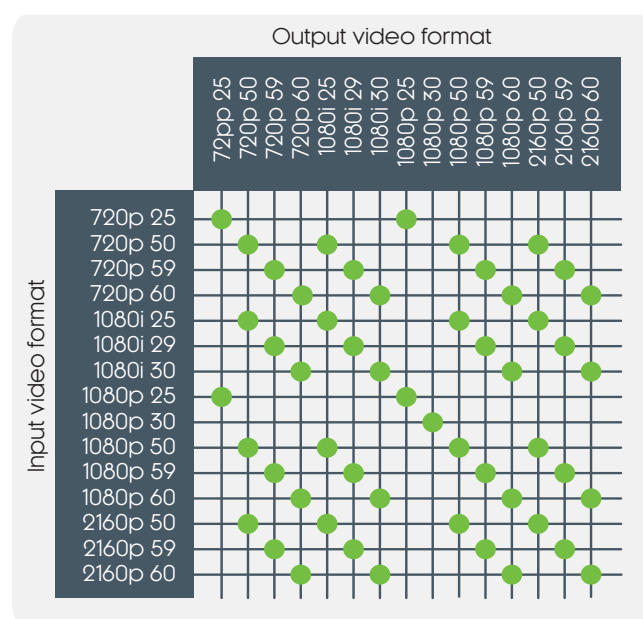
RTP-based A/V sync

In a native ST 2110 network, uncompressed audio and video is available on the network as ST2110 elementary streams, so that audio and video can be processed independently. In order to facilitate downstream synchronization, the UDC software will process the ST 2110-20 video input RTP timestamps and publish a new video source on the network, in the desired format and resolution, inheriting the RTP timestamps of the source.

This allows other devices in the network to choose between different video resolutions and color formats, while still using RTP timestamps for automatically synchronizing audio and video.

Built-in video frame sync

The UDC media function includes built-in video frame synchronization with media alignment to PTP/ST 2059, or legacy BB/TLS analog sync in Virtuoso MI. Video delay up to 10 video frames is supported.



Video formats

IP media interface	SMPTE ST 2110-20 Video SMPTE ST 2110-21 (NL sender, W receiver) SMPTE ST 2110-30/31 audio (Level B) SMPTE ST 2110-40 ANC
HD-SDI	SMPTE ST 292/ST 296/ST 274 1280 x 720p: 25/50/59.94/60 Hz 1920 x 1080i: 25/29.97/30 Hz 1920 x 1080p: 25/29.97/30 Hz
3G-SDI	SMPTE ST 424 (Level A)/ST 274 1920 x 1080p: 50/59.94/60 Hz
12G-SDI	SMPTE ST 2082-1/10 (Mode 1), SMPTE ST 2036-1 3840 x 2160p: 50/59.94/60 Hz

Video conversion and processing

Input/output video	YCbCr, 4:2:2, 10 bit per component
Interlace processing	De-interlacing: 1080i to 1080p Interlacing: 1080p to 1080i
Down-scaling	2160p to 1080p/720p 1080p to 720p
Up-scaling	1080p to 2160p 720p to 1080p/2160p
Colour conversion	3D-LUT conversion (33 cube LUT) Requires 3D-LUT license
Pre-bundled LUTs	Sony SR-Live LUTs BBC HLG Format Conversion LUTs v1.7 - Primary Live Production: complete set - Secondary: BT2020 & S-Log3 to HLG - Only for use with Virtuoso UDC function - Requires 3D-LUT license
User-defined LUTs	Yes, up to 24 additional available slots
Colour formats	ITU-R BT.709 (HDTV) ITU-R BT.2020-2 (UHDTV) ITU-R BT.2100 HDR (HLG / PQ)
Legalisation	Yes
Frame sync	Yes
Sync reference	PTP (IEEE 1588v2) via 25GE network interface Analog BB/TLS via Virtuoso appliance
Processing latency	1-2 frames
Video delay	Yes, up to 10 frames additional delay
Test patterns	75% and 100% Bars, SMPTE RP 219, SMPTE EG 1 EIA RS-189-A, EBU TECH-3373 colour bar for HDR/HLG Flat-field with configurable color Custom test image (BMP/JPG/PNG) Configurable text overlay Moving bar/box

Audio processing

Fully flexible internal audio routing and shuffling
Audio delay adjustment - up to 10 seconds per channel
Audio level/gain control - per mono channel.

Video and audio over IP transport

Video over IP	SMPTE ST 2110-20 video in RTP/UDP/IP SMPTE ST 2110-21 (NL sender, W receiver)
Audio over IP	SMPTE ST 2110-30 PCM audio (Level B) SMPTE ST 2110-31 AES3 over IP (Level B) Up to 32 IP audio input and 32 IP audio output flows per UDC 1-16 audio channels per stream
Ancillary over IP	SMPTE ST 2110-40 Ancillary Data over IP 1 IP input and 1 IP output flows (one flow/ video) per UDC
NMOS support	NMOS IS-04 Discovery and Registration NMOS IS-05 Connection Management NMOS IS-08 Audio Channel Mapping
Network interface	2x 25GE

Protection

Link redundancy	Hitless/seamless switching for all RTP flows compliant to SMPTE ST 2022-7:2019 ST 2110-20: class A. ST 2110-30/31: class C
Clean switching	Break-before-make switching (1-2 frames additional latency) Make-before-break switching

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
PTP redundancy	Internal PTP failover in Virtuoso MI/RE
Media timing	SMPTE ST 2059-1, SMPTE ST 2110-10 SDI video timing based on SMPTE ST 2059-1
RTP timestamp	Pass-through mode (transparent), or generated based on PTP/ST 2110

Monitoring

Thumbnails of video input and output
Video freeze and black frame detection (licensed)
Audio template monitoring (presence, peak and silence)
RESTful API and SNMP for all status and configuration parameters

Media Server Appliance support

Please refer to Nevion Virtuoso Platform datasheet for details.	
Virtuoso MI	Supported in version 1.6 or higher.
Virtuoso RE	Supported in version 1.2 or higher

Accelerator requirement

Accelerator	HBR 25G Media Accelerator
Description	Multi-channel high bitrate Media Accelerator (HW module). 2x25G SFP ports. Additional licenses required for use with media adaptation/compression/ processing/ monitoring functions.
Product codes	VIRTUOSO-HW-HBR25-SFP3 (24645)
SFP configuration	Port 1: Video SFP (not used) Port 2: 25GE (25GBase-LR/SR) Port 3: 25GE (25GBase-LR/SR)
Power consumption	Maximum 45W



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