datasheet

Virtuoso Media Function

Nevion Virtuoso

TICO UHD/4K Encoding and Decoding

The Virtuoso TICO Media Function provides visually lossless lightweight 4:1 compression for transport of UHD and 4K signals with sub-frame latency.

The Nevion TICO Media Function enables cost-effective transport of 12 Gb/s 4K/UHD video over 10GE IP networks using SMPTE 2022-6/7 or over existing 3G-SDI infrastructure.

The TICO 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 ST2022 IP video/audio via dual 10GE.

Dual hand-off on 10GE and SMPTE 2022-7 is supported for network redundancy, answering the need for high availability.

A single TICO instance supports encoding or decoding of up to 1 UHD signal in each direction with SMPTE 2022-7.

This provides a total of 8 UHD ingress and 8 UHD egress per Virtuoso MI and 6 UHD ingree and 86 UHD egress per Virtuoso RE (both 1RU), Virtuoso FA supports 4 UHD ingress and 4 UHD egress per 1RU.

Compressed signals can be aggregated using a HBR accelerator running the 10G Uplink Media function in the Virtuoso MI.

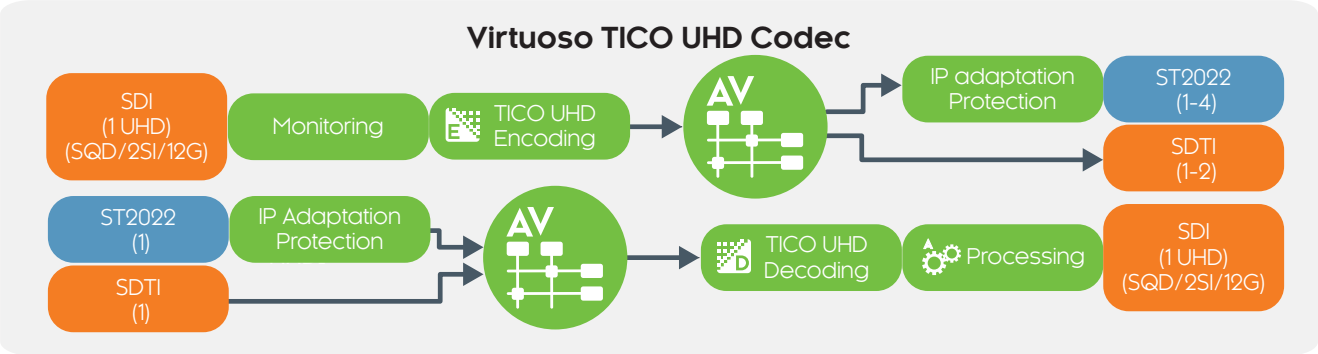
Applications

- Professional broadcast contribution
- Live sports and event contribution
- Studio-to-studio media exchange

Key features

- TICO UHD compression
  - Bi-directional operation
  - High video quality and low multi-generation loss
  - Sub-frame end-to-end latency (with 2SI)
  - Support for HDR; broadcast and film formats
- IP and SDI connectivity
  - Uncompressed UHD/4K video sources using square division/SQD or 2SI with 4 x 3G/HD-SDI, or 12G-SDI
  - Compressed video on 3G/HD-SDI via video SFPs or IP (SMPTE 2022-6)
  - Aggregation to 10G Uplink module in Virtuoso MI
- Stream protection
  - SMPTE 2022-7 IP protection mechanism for link redundancy
- Monitoring
  - Thumbnails of input and output video
  - In-depth service monitoring incl. video freeze/ black frame detection and audio silence detection

TICO UHD Media Function



TICO compression technology

Each frame/field is encoded with 4:2:2 10-bit TICO compression, providing visually lossless video quality at a 4:1 compression ratio using only 25% of the bandwidth required for uncompressed video.

UHD on 3G SDI or SMPTE 2022-6

The TICO Media Function is capable of compressing a 12G/6G UHD/4K signal received as four (4) 3G/HD-SDI (square division/SQD, and 2SI) or single 12G-SDI and compress it to 3G/1.5G allowing broadcasters to reuse their 3G-SDI infrastructure for UHD/4K, up to two(2) copies of each compressed signal can be output on SDI.

The compressed signal can also be sent as a SMPTE 2022-6 stream over IP. Send up to 3 UHD/4K signals on a 10GE link.

High density and flexibility

Running on the Virtuoso HBR 10G accelerator, the TICO media function supports encoding and decoding of 1 UHD channel simultaneously, giving a density of 8 UHD channels of encoding and 8 UHD channels of decoding in Virtuoso MI. 6 UHD channels of encoding and 6 UHD channels of decoding in Virtuoso RE. Virtuoso FA supports 4 UHD channels of encoding and 4 UHD channels of decoding.

Transparent audio & ancillary data

The TICO Media Function supports transmission of embedded audio (16 channels for HD and 32 channels for 3G-SDI). The handling of embedded audio, whether it's linear PCM or pre-compressed audio, is fully transparent. Similarly, the handling of ancillary data such as closed captioning, active format description, time code and other metadata is fully transparent line-by-line.

Low latency

The software supports very low end-to-end latency of 1 frame for SQD conversion and sub-frame latency for encoding/decoding..

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.

Bi-directional capability

The TICO Media Function uses the Virtuoso High Bitrate Accelerator to encode and decode simultaneously one (1) UHD/4K signal per Media Accelerator.

Network redundancy with ST2022-7

Transmitting the same RTP/IP stream across dual, fully diverse network links enables receivers/decoders to utilize SMPTE ST 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. Support for ST 2022-7 requires the protection license.

TICO UHD Media Function

Video formats

HD-SDI	SMPTE ST 292/ST 274 1920x1080P: 23.98/24/25/29.97/30 2048 x 1080P: 23.98/24/25
3G-SDI	SMPTE ST 425-1: 2017 (Level A and Level B input)/ST 425-5:2015/ST 274/ST 428 1920 x 1080p: 50/59.94/60 Hz 2048 x 1080p: 47.95/48/50/59.94/60
12G-SDI	Transmit or receive UHD or 4K signal using 4 (four) HD or 3G-SDI signals (2 sample interleave and square division) or 12G-SDI SMPTE ST 2082-1/10 (Mode 1), SMPTE ST 2036-1 3840 x 2160p: 23.98/24/25/29.97/30/50/59.94/60 Hz 4096 x 2160p: 23.98/24/25/47.95/48/50/59.94/60

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 - Dual channel SDI RX with passive loop out All video interfaces support HD/3G-SDI

Video compression

Video compression	SMPTE RDD 35 TICO profile 2 (decoder compliant with profile 1 and profile 2)
Compression ratio	4:1 (fixed)
Latency	1 frame (SQD), sub-frame encoding/decoding
Video sampling	YCbCr, 4:2:2,10 bit per component
Colour space	ITU-R Rec BT.709 ITU-R Rec BT.2020 (4:2:2 10 bit) ITU-R Rec BT.2100 (4:2:2 10-bit for PQ, HLG)
HDR Support	HLG, PQ and S-LOG3
Number of channels	1 channels of encoding and 1 channel of decoding per Accelerator, each UHD format
Video encapsulation	SDI (SMPTE ST 425-1:2017 Level A) SMPTE 2022-6 SDI payload over RTP/UDP/IP

Audio and ancillary data

Audio and ancillary data taken from the first 3G-SDI input and transported transparently for all SMPTE ST 291-1:2011 ANC data

For cross-conversion between 2SI and SQD, SMPTE ST 352 Video Payload ID codes is regenerated for output 3G-SDI signals

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. PTP via Uplink module in MI/RE SDI input via HBR 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

Video and audio over IP transport

SDI over IP	SMPTE 2022-6 SDI payload over RTP/UDP/IP
Network redundancy	Hitless/seamless switching for all RTP flows compliant to SMPTE ST 2022-7:2019
NMOS support	NMOS IS-04 Discovery and Registration NMOS IS-05 Connection Management
Network interface	2x 10GE

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 FA/MI
Media alignment point	SMPTE 2059-1 (phase offset configurable)

Monitoring

Thumbnails of SDI video input and output

Content monitoring	Thumbnails of SDI video input and output Audio level bars.
Advanced monitor	Template based monitoring for video/audio. SDI Video black and freeze frame detection. Audio silence and peak level detection. (Licensed option)

Media Server Appliance support

Please refer to Nevion Virtuoso Platform datasheet for details.

Virtuoso MI	Supported in version 1.4 or higher
Virtuoso RE	Supported in version 1.0.8 or higher
Virtuoso FA	Supported in version 2.6 or higher

Accelerator requirement

Accelerator	HBR 10G 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.
Product codes	VIRTUOSO-HW-HBR-SFP4 (24204)
SFP configuration	Port 1: SDI / Video SFP Port 2: SDI / Video SFP Port 3: 10GE (10GBase-R) Port 4: 10GE (10GBase-R)
Video SFP support	Non-MSA 1.5 Gb/s to 12 Gb/s HD-SDI, 3G-SDI: max 2 in + 2 out 12G-SDI: max 1 in + 1 out Optical and electrical variants
Sync input format	PTP on 10GE (IEEE 1588v2:2008, SMPTE ST2059)
Power consumption	Maximum 45W

Software media functions

TICO-UHD-E1D1	TICO bidirectional UHD Encoder and decoder.
TICO-UHD-E2	TICO UHD Encoder (2 channels)
TICO-UHD-E2-H25	TICO UHD Encoder (2 channels). IP ST 2110 inputs. Dual 25GE interfaces.
TICO-UHD-D2-H25	TICO UHD Decoder (2 channels). IP ST 2110 outputs. Dual 25GE interfaces.

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