

VN-Matrix

REAL-TIME STREAMING
OVER IP NETWORKS

HDCP-Compliant, Low Delay,
High Quality AV Streaming

PURE 3[®] CODEC
OPTIMIZED FOR NETWORKS

- ▶ HDCP-compliant streaming
- ▶ Stream at native resolutions up to 1920x1200 and 2048x1080
- ▶ Low latency streaming – encode and decode are 35 ms each
- ▶ Extensive bit rate management
- ▶ High immunity to network errors
- ▶ System designs support record and play back of one or many AV streams



Extron Electronics
INTERFACING, SWITCHING AND CONTROL

Introduction

AV streaming products have evolved to become a practical solution for a growing number of live, interactive and recording applications. Various classes of streaming products have emerged that support different quality, speed, endpoint, and network requirements. VN-Matrix® products support real-time, high performance applications, streaming and recording high resolution images from computers, AV processing equipment, and high definition video sources. Used in one-to-one, one-to-many, and many-to-many applications, VN-Matrix is used to connect AV systems or create AV switching and routing systems over IP networks. VN-Matrix systems enrich endpoint flexibility and scalability, while extending transmission of real-time high resolution AV content around the globe.

VN-Matrix products stream HDCP-compliant HDMI, DVI, or RGB video and 3G-SDI, HD-SDI, and SDI signals with audio at resolutions up to 1920x1200 and 2048x1080 in real-time at very high quality. Extron's PURE3® Codec, a unique wavelet-based compression technology, preserves high resolution AV content used in presentation, monitoring, and collaboration applications. Designed specifically to support mission critical applications, Extron VN-Matrix systems offer a unique combination of high image quality,

low latency, efficient bit rates, and a high immunity to network errors. The rise in digital AV systems brings with it requirements for streaming HDCP-encrypted video. Built to handle these systems, the VN-Matrix 250 series supports real-time transmission of HDCP-compliant HDMI, DVI, or RGB over IP networks.

VN-Matrix products offer a range of compression and bit rate management controls that optimize image quality for diverse network bandwidth requirements. Error concealment ensures reliable video quality, even during poor network quality of service – QoS conditions. Both unicast and multicast applications are supported. VN-Matrix products stream video, graphics, audio, and control signals reliably over a multitude of network topologies. They are an effective solution when traditional AV cable infrastructures and equipment are impractical due to scale, distance, or physical constraints.

The Rise of Streaming Applications

The evolution of networking protocols, hardware, and infrastructure has caused a dramatic rise in the consumption of streamed video. The popularity of streamed content has mirrored the evolution of video playback technology and the increasing accessibility to data and video content available from various computing, production and AV presentation systems.



The Extron PURE3 Codec

The PURE3 codec was developed for use in IP streaming solutions to deliver performance that could not be achieved using other video compression technologies. It maintains very high image quality, low latency, highly efficient bit rates, and is highly immune to network errors. Alternative compression technologies typically sacrifice one or more of the qualities delivered by the PURE3 codec.



VN-Matrix 250 Encoders and Decoders for HDMI, DVI, and RGB Signals	VN-Matrix 325 Codecs for 3G-SDI, HD-SDI, and SDI Signals	VN-Matrix Recorder Simultaneous Record and Playback
HDCP-Compliant Streaming	Original Video Contribution	After Action Review
Distance Collaboration with Visualization Imagery	Production System Collaboration	Training and Simulation
Command and Control	Remote Video Device Control	Event Documentation
Virtual Switching on Networks		Recording of multi-screen presentations

Visually Lossless Image Quality

The PURE3 codec utilizes the discrete wavelet transform - DWT, rather than the more common discrete cosine transform - DCT, to achieve the best results with both moving pictures and computer graphic images. Applying the DWT and full 4:4:4 color quantization ensures that image detail is not lost during the transform process. PURE3 achieves highly efficient, visually lossless coding, ensuring accurate reproduction of any input format or resolution.

Low Latency

The PURE3 codec performs its transform with a single pass through the data, delivering low and consistent latency. The encode and decode process each require 35 ms, for a total system latency of 70 ms.

Highly Efficient Compression

The PURE3 codec uses a highly efficient compression method that exploits the visual perception characteristics of the human eye to optimize compression efficiency. An array of compression controls are available to fine-tune the degree and nature of compression, optimizing for target bit rate and application requirements.

Advanced Error Concealment

Real-world, switched IP networks are prone to unpredictable bit errors, jitter, and out-of-order or dropped data packets. The PURE3 codec incorporates error concealment that ensures robust picture delivery. It maintains stable video imagery under heavy packet loss and errors are rarely noticeable, as typically only a small portion of the image is briefly affected.

VN-Matrix Product Series

The VN-Matrix family of products includes:

- ▶ **VN-Matrix 250 Encoder and Decoder – VNE 250, VND 250** – Streaming of HDCP-compliant HDMI and RGB, two-way audio, Serial RS-232, USB keyboard and mouse
- ▶ **VN-Matrix 325 Codec – VNC 325 3G-SDI** – Streaming of 3G-SDI, HD-SDI, and SDI signals with embedded audio
- ▶ **Enterprise Controller – VNM Enterprise Controller** – Manage, configure and control encoding, decoding, and recording devices
- ▶ **VN-Matrix Single Channel Recorder – VNR 100** – Develop systems that can simultaneously record and play back one or many AV source streams with metadata
- ▶ **VN-Matrix Multi-Stream Decoding Software – VNS 104** – Decode one to four AV sources on a Windows PC platform

VN-Matrix 250 Series

The VN-Matrix 250 Series provides real-time transmission of high resolution HDCP-compliant HDMI, DVI, or RGB video across standard IP networks for use in live streaming, recording, and playback applications. Designed specifically to support mission critical AV applications, the VN-Matrix 250 Series supports streaming of commonly used AV signals, including HDCP-encrypted video. Both stereo analog and HDMI-embedded audio inputs are supported, offering compatibility and flexibility with digital and analog audio formats.

HDCP Compliance

Today's AV systems frequently use a completely digital processing and switching architecture. Use of just one HDCP-encrypted source such as a Blu-ray player, satellite receiver, or PC with HDMI output can necessitate that the entire system be HDCP-compliant. VN-Matrix 250 encoders and decoders solve this problem with their ability to stream HDCP-encrypted content from HDMI sources to HDCP-compliant displays. VN-Matrix 250 encoders also include a 15-pin HD connector that accepts legacy analog video signals.

Extron Advanced High Resolution Video Processing

VN-Matrix 250 encoders and decoders provide advanced video processing for high resolution signals up to 1920x1200 and 2048x1080. They include EDID emulation, Extron EDID Minder®, and Key Minder®, which assure that connected sources and displays power up and operate at optimal resolutions and frequencies, and continuously verify HDCP-compliance, ensuring reliable connections and quick stream switching. VN-Matrix 250 encoders also support user-defined capture and profile storage of custom resolutions and frame rates for legacy analog signals. VN-Matrix 250 decoders maintain the original source resolution or scale to a defined resolution that matches the connected display. A genlock connection allows synchronized decoding of streams across multiple decoders.

Flexible Audio Processing and Streaming

VN-Matrix 250 decoders output either stereo analog or HDMI-embedded audio, providing compatibility with embedded display speakers or existing audio systems. The VN-Matrix 250 encoder includes a loop through connector, simplifying integration with audio source equipment, and audio streams can break away from their associated video source.

Overview – VNE 250 Encoder

VNE 250 ENCODER

USB Configuration Port

Front-accessible USB port provides easy access to basic device configuration from a PC

LCD Control Interface

Front panel controls and LCD display simplify setup and access to device information



VNE 250 Encoder - Front

Streaming Port

100/1000 BaseT Ethernet port provides network transport for streaming data

SFP Socket

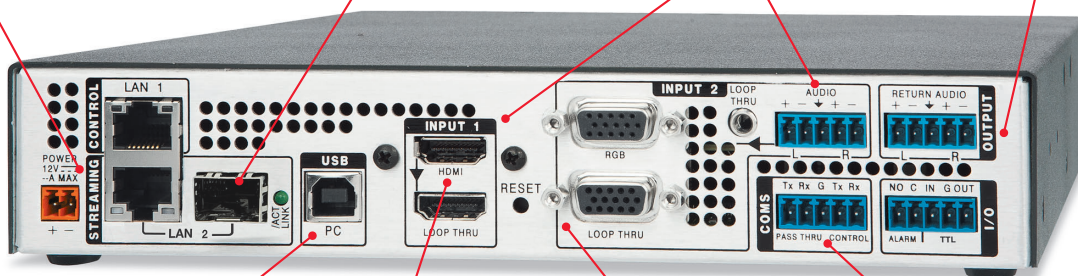
Offered as an alternative to the standard streaming port, a fiber-optic transceiver can be used to provide streaming transport that is inherently secure and immune to outside interference

Analog or Digital Audio Inputs

Stream analog stereo or HDMI-embedded stereo audio with the video input

Return Audio Connection

Enables two-way communication by streaming a return audio signal from decoder to encoder



VNE 250 Encoder - Back

USB Host Connection

Provides remote control of a PC connected to a decoder

HDCP-Compliant

Supports streaming of HDCP-encrypted signals commonly used in AV environments

RGB and HDMI Connections

Supports digital signals and legacy analog video signals

Serial Pass Thru

RS-232 controlled devices can be managed across VN-Matrix 250 encoder-decoder connections

Control and Management Flexibility

VN-Matrix 250 models include front panel LEDs that quickly identify source, network, streaming, and device status. The front panel also features an LCD display, direct access buttons, and rotary controls that support setup and provide access to device settings. VN-Matrix systems include an embedded web interface that provides access and control over all devices in the system. The VN-Matrix Enterprise Controller is used to manage large, dynamic systems, simplifying configuration and system updates. It provides an easy-to-use interface for configuring device, streaming system presets, and recording configurations that can be easily recalled

from external control systems. System alarms and contact closures can be used to alert users of source connection and streaming faults.

Advanced Collaboration Features for Point-to-Point Streaming

VN-Matrix 250 units support two-way audio streaming. Audio connected to the Return Audio input on a VN-Matrix 250 decoder can be streamed back to the encoder, allowing individuals to communicate with each other using a streaming connection. VN-Matrix 250 encoders and decoders include USB connections for transmission of keyboard and mouse data from decoders back

Overview – VNE 250 Decoder

VNE 250 DECODER

Front Panel LEDs

Provide quick visual indication of device, system, and streaming status

Integrated Scaler

Decode at the native source resolution or scale to match the display at selectable resolutions from 640x480 up to 1920x1200 or 2048x1080

Aspect ratio control

The decoder output can provide a full screen output, or preserve the aspect ratio of the original source signal



VNE 250 Decoder - Front

Control Port

Network connection provides access for AV control devices to interface with the VN-Matrix streaming system

Extron LockIt System

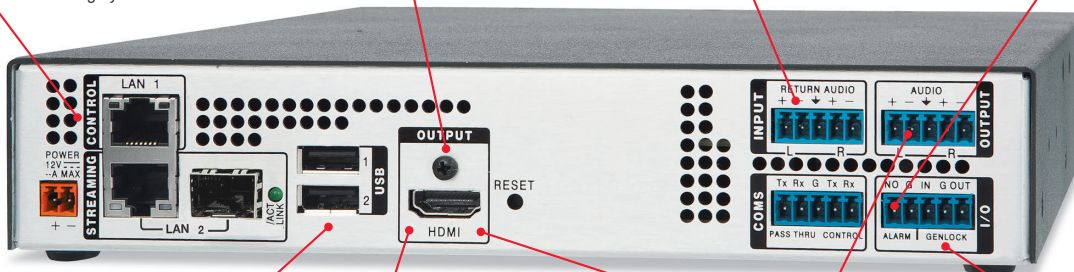
Ensure secure HDMI connections to VN-Matrix 250 units with the Extron LockIt® cable lacing bracket

Return Audio Connection

Supports two-way communication across VN-Matrix 250 connections

Alarm Relay

The alarm relay can notify external systems when a critical streaming or device error occurs



VNE 250 Decoder - Back

USB Connectors

Provides remote control of a PC connected to an encoder

HDCP-Compliant

Decodes HDCP-encrypted digital video streamed from VN-Matrix 250 encoders

Analog and Digital Audio Outputs

Audio is available as HDMI-embedded stereo audio or analog stereo audio

Genlock Connection

VN-Matrix streaming can be genlocked across multiple VN-Matrix 250 decoders

to encoders, supporting remote management of PC applications. RS-232 data can also be transported between VN-Matrix units, supporting remote management of serially controlled devices.

Network and Streaming Flexibility

VN-Matrix 250 units offer two network ports, one for transport of system management and streaming data, and a second that provides access to the system from an external AV control interface. The local control port can access the VN-Matrix embedded web page interface, or allow an external control system to interface with the VN-Matrix Enterprise Controller. An SFP port allows use of fiber-optic transceivers in place of the standard Ethernet streaming

port. Use of an optical Ethernet connection provides transport that is inherently secure and immune to outside interference. VN-Matrix 250 encoders can be configured to operate at low bit rates when streaming on connections with limited bandwidth, such as wide area networks - WANs, or they can be configured to operate at higher bit rates providing superior quality over networks offering abundant bandwidth. Both unicast and multicast applications are both supported and the PURE3 codec's error concealment technology provides high immunity to network errors, making VN-Matrix adaptable to different network conditions.

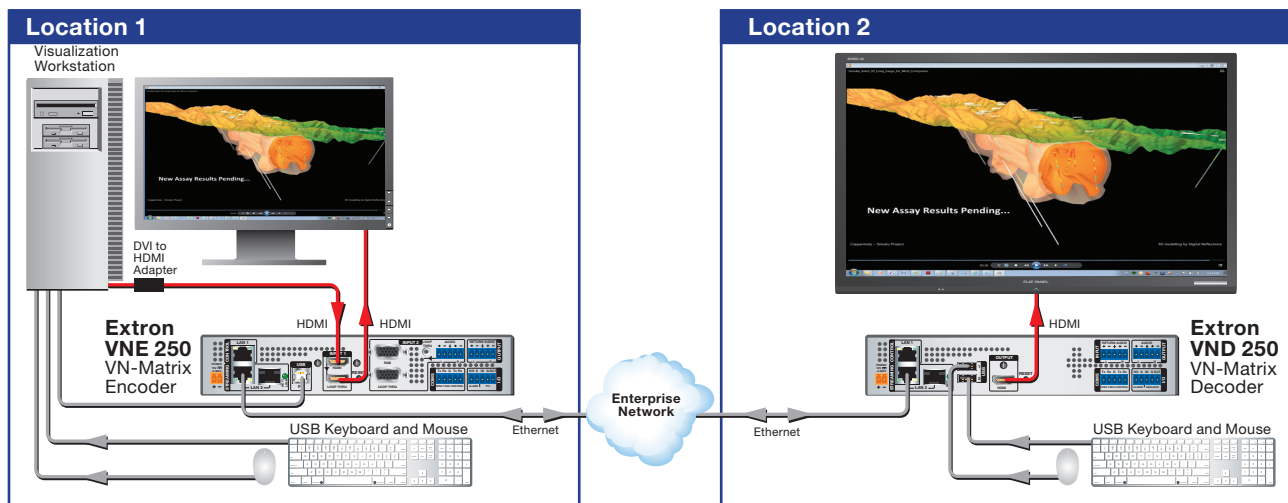
Applications

POINT TO POINT STREAMING

VN-Matrix supports point-point applications that require bi-directional communication and collaboration between distant locations. Streaming of keyboard and mouse data and return audio channels enhance collaboration in these applications.

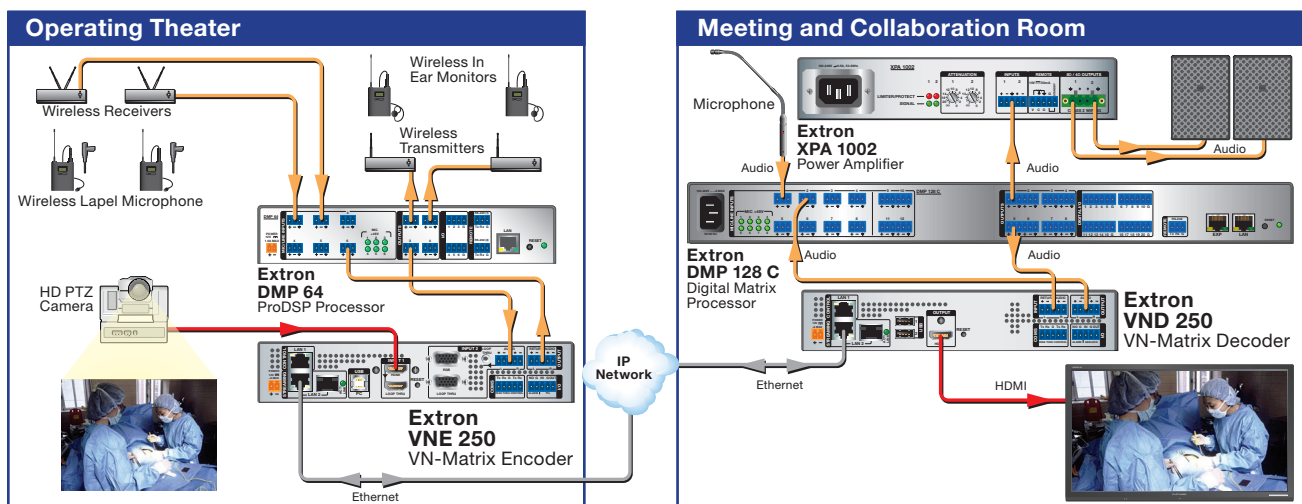
Remote Keyboard and Mouse Control Using USB Connections

VN-Matrix 250 devices include USB connections that can transport keyboard and mouse data between encoders and decoders. This allows a keyboard and mouse connected to a VN-Matrix 250 decoder to remotely manage a PC connected to a VN-Matrix 250 encoder. Low delay streaming and a local pointer generated by the decoder helps to support a natural, interactive, real-time experience when remotely managing a source across a streaming connection. This feature is useful for distance collaboration with high-resolution computer visualization imagery, or remote management of video editing equipment.



Bi-Directional Audio Streaming

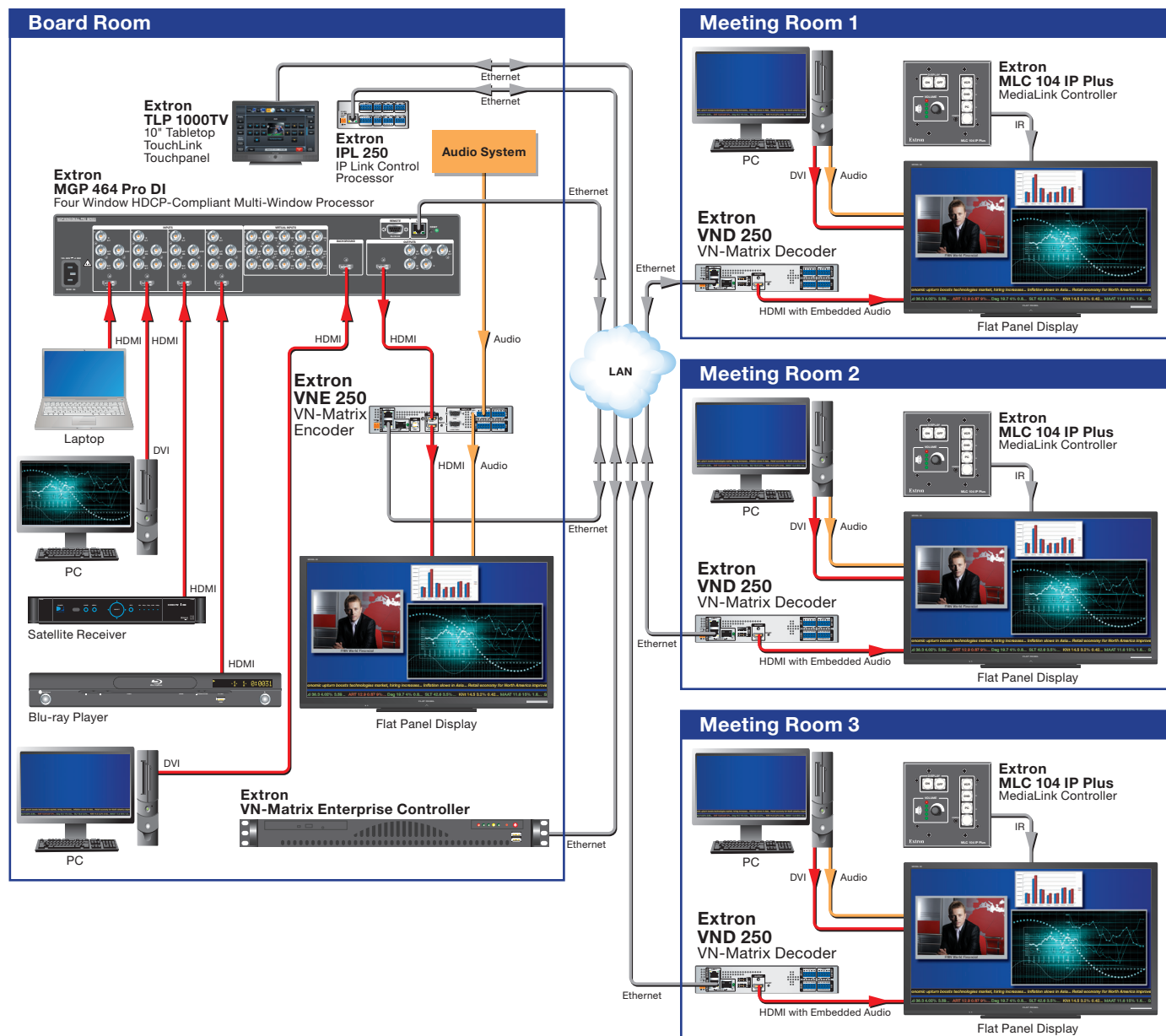
VN-Matrix 250 units support two-way audio streaming. Audio connected to the Return Audio connection on a VN-Matrix 250 decoder is streamed back to the encoder, allowing individuals at each end to hear one another speak. Extron digital signal processing products process audio at each end based on input, mixing, and acoustical echo cancellation requirements. Two-way audio streaming by VN-Matrix 250 models streamlines system designs for high-level conferencing and collaboration applications using high definition video from cameras or multi-window processors.



Applications

HDCP-COMPLIANT STREAMING

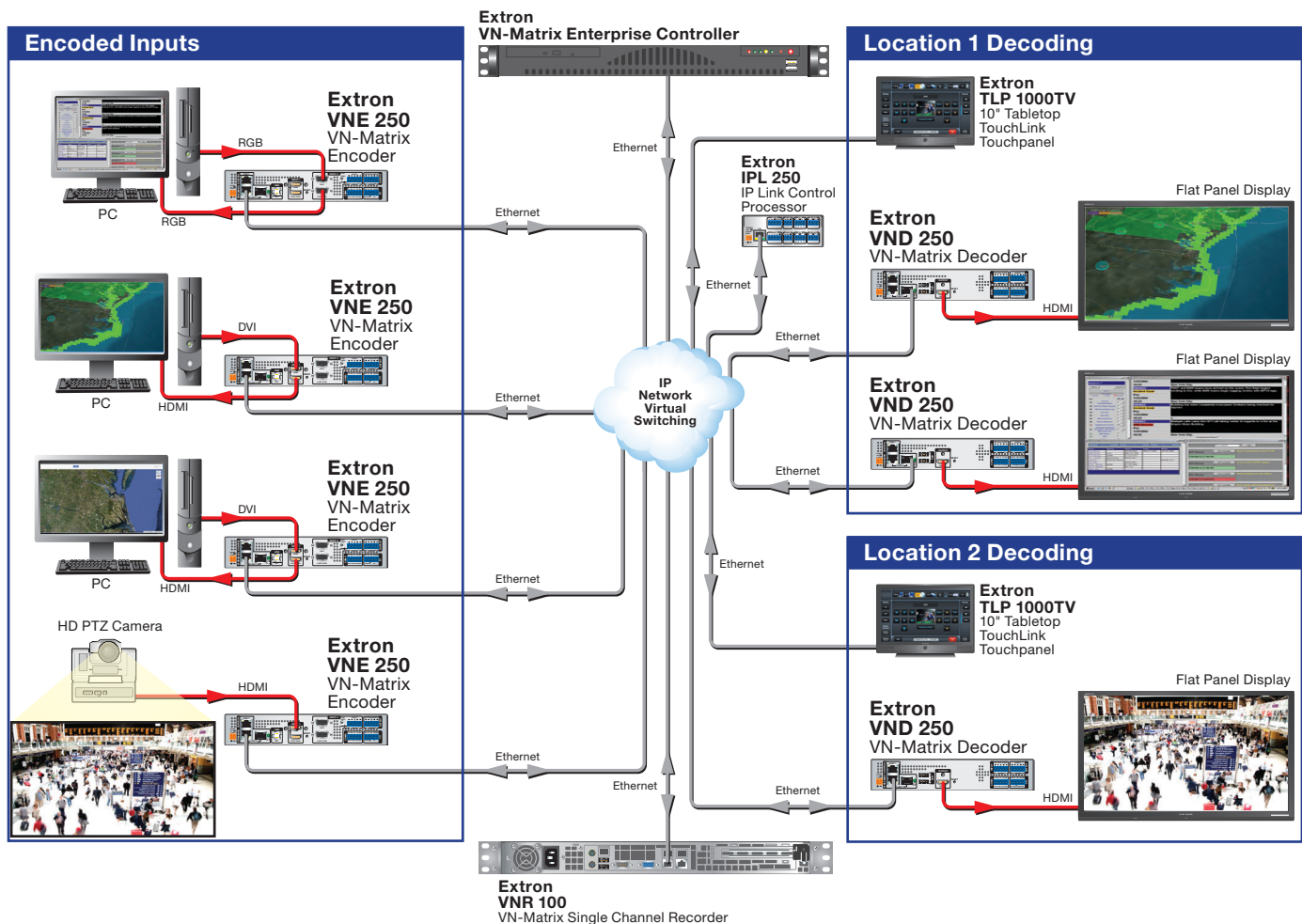
Today, many AV systems use completely digital processing and switching architectures. Use of just one HDCP-encrypted source such as a Blu-ray player, satellite receiver, or a PC with an HDMI output can force a requirement for full HDCP-compliance. This system includes an Extron MGP 464 Pro Multi-Window Processor, which combines common AV source signals, including a Blu-ray player, on a single display in a board room. A VN-Matrix 250 encoder streams audio and HDCP-encrypted video from the MGP 464 Pro to VN-Matrix 250 decoders in meeting rooms with HDCP-compliant displays. An Extron TLP 1000 TV in the boardroom selects multiple display configurations from the MGP 464 Pro and recalls streaming preset configurations from the VN-Matrix Enterprise Controller, which determines which meeting rooms can view the presentation.



Applications

VIRTUAL SWITCHING SYSTEMS

VN-Matrix virtual switching systems turn IP networks into a real-time AV distribution systems, routing sources from encoders to decoders. Used on LANs or WANs, they can distribute AV content to flexible locations over great distances. VN-Matrix 250 encoders accept RGB analog, DVI, or HDMI signals from video or computer-video sources at resolutions from 640x480 to 1920x1200, or 2048x1080p and stream them to VN-Matrix 250 decoders. HDMI embedded audio and analog audio formats are supported, and audio streams can breakaway from their associated video stream. Video sources that are not HDCP-encrypted can be recorded and played back from VNR 100 recorder units and all encoder and decoder configurations, recording, and real-time streaming connections are managed by VN-Matrix Enterprise Controller. Networked control systems such as the Extron TLP 1000 TV and IPL 250 Control processor provide a control interface that can be used to recall programmed preset configurations and make streaming connections that are managed by the VN-Matrix Enterprise Controller.



Applications

LIVE HD-SDI VIDEO TRANSPORT USING VN-MATRIX 325

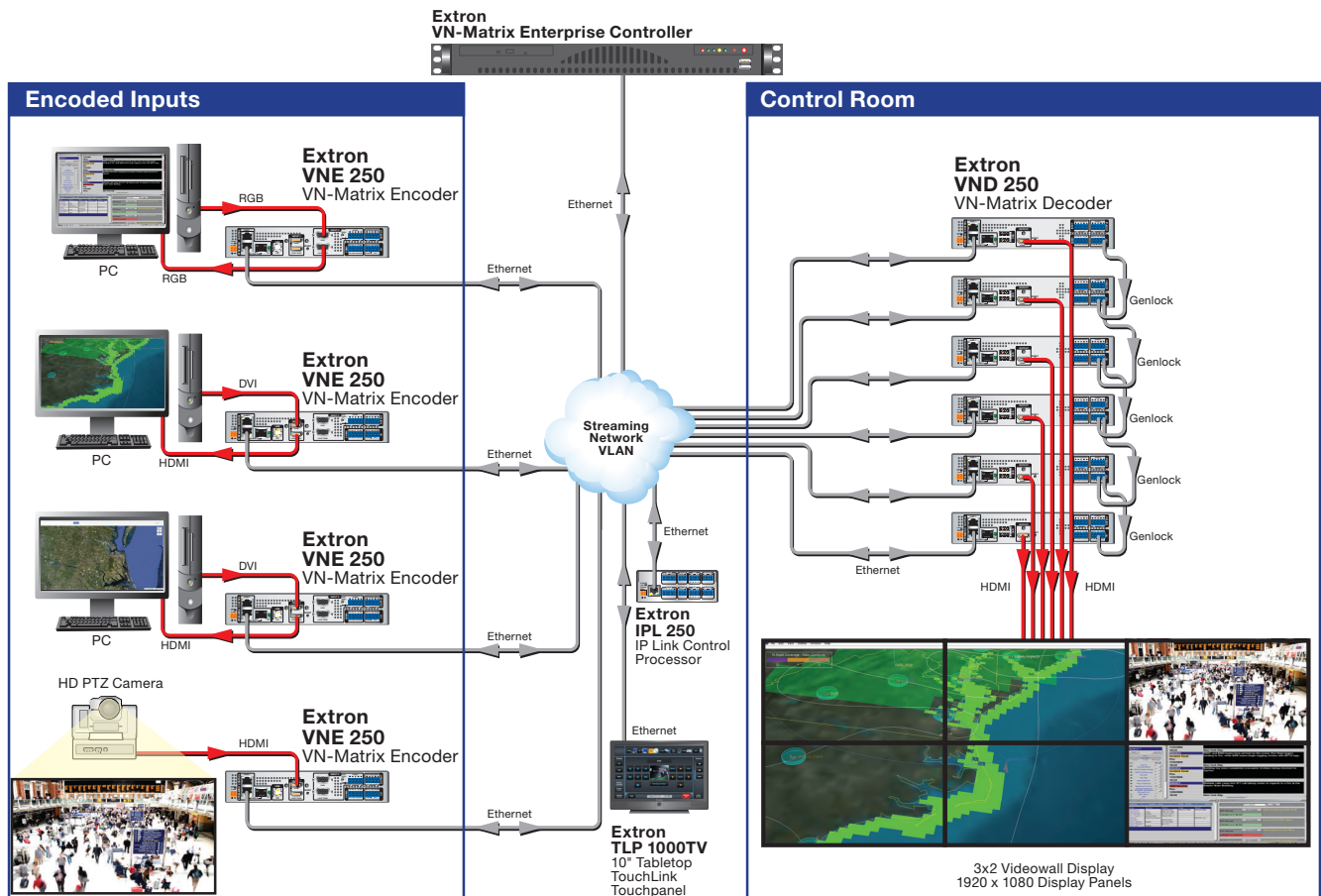
An enterprise network within a corporate or higher education campus can provide the infrastructure to deliver video to a production studio when dedicated coax or fiber connections are impractical to install or stage temporarily. Audio and video can be transported great distances across a large campus or even farther using VN-Matrix 325. In this application, a VN-Matrix 325 codec is permanently installed in a production studio to connect production or recording equipment to real time camera feeds located at various points across the campus. VN-Matrix 325 codecs configured to encode can be placed at permanent sites regularly used for public press conferences or interviews and other VN-Matrix 325 codecs can be deployed temporarily in locations to deliver live event video, such as a college football game, promotion, or other activities. Where required, VLANs can be configured on the enterprise network to segment the video bandwidth from data and voice traffic.



Applications

VIRTUAL SWITCHING SYSTEMS – VIDEOWALL MAGNIFICATIONS

VN-Matrix virtual switching systems frequently manage large numbers of AV sources, and videowalls are ideal for presenting them at large, magnified sizes or on individual screens. VN-Matrix 250 decoders can produce a videowall system without use of an external processor, scaling their output to match the native resolution of a connected display. VNE 250 decoders can scale and magnify source streams and PURE3® stream synchronizing technology along with the genlock connection on VN-Matrix 250 decoders ensures that the video outputs remain stable and synchronized as various video sources are presented. VN-Matrix Enterprise Controller is the central control point for managing VN-Matrix systems. Presets for streaming connections saved on the VN-Matrix Enterprise Controller can be programmed to be easily recalled by users from an AV control system.



VN-Matrix Series

VN-Matrix 250 Series

HDCP-Compliant HDMI and RGB Video Over IP Encoders and Decoders



The VN-Matrix® 250 Series provides real-time transmission of high resolution HDCP-compliant HDMI, DVI, or RGB video across standard IP networks for use in real-time streaming, recording, and playback applications. The VN-Matrix 250 Series accept HDMI and RGB signals at resolutions up to 1920x1200 and 2048x1080, streams video and audio over a standard IP network, and decodes content at the original or a scaled resolution. Designed specifically to support mission critical AV applications, the VN-Matrix 250 Series supports streaming of commonly used AV signals, including HDCP-encrypted video. Both stereo analog and HDMI-embedded audio are supported, providing compatibility with embedded display speakers or existing audio systems. VN-Matrix is ideal for applications with the most demanding quality requirements, such as command and control, simulation, medical, and distance collaboration with complex computer visualizations.

Features

- Streams HDMI, DVI, or RGB video and stereo analog or HDMI-embedded audio
- HDCP-compliant streaming
- Stream at native resolutions up to 1920x1200 and 2048x1080
- Low latency streaming – encode and decode are 35 ms each
- Extensive bit rate management
- High immunity to network errors
- PURE3® Codec
- 100/1000 BaseT Ethernet streaming port for transport of streaming data
- Optional SFP port available as alternate streaming port for use with fiber-optic transceivers
- 10/100 BaseT Ethernet port available for AV control devices to interface with the VN-Matrix system
- Two-way audio streaming
- Analog stereo or HDMI-embedded stereo audio
- Audio breakaway streaming
- EDID Emulation
- Key Minder® continuously verifies HDCP compliance
- HDCP Visual Confirmation provides a green screen when encrypted content is sent to a non-compliant display
- Auto-Image™ setup
- Remote USB keyboard and mouse control
- Remote RS-232 control across VN-Matrix connections
- Serial RS-232 data streaming
- Unicast or multicast streaming



VNE 250 Encoder

Encoder for HDCP-Compliant HDMI and RGB Video Over IP

Unique Features

- Encoder-only model
- Supports resolutions up to 1920x1200 and 2048x1080
- User-definable analog video source capture
- Accepts HDMI-embedded stereo audio and analog stereo audio
- EDID Minder® automatically manages EDID communication between connected devices
- USB host connection for keyboard and mouse data



VND 250 Decoder

Decoder for HDCP-Compliant HDMI and RGB Video Over IP

Unique Features

- Decoder-only model
- Decode at native resolution or scale to display
- Analog stereo audio or HDMI-embedded stereo audio output
- Genlock connection for synchronized decoding
- USB keyboard and mouse interface
- Videowall magnification scaling
- Aspect ratio control

Model	Version Description	Part Number	Model	Version Description	Part Number
VNE 250	Encoder for HDMI, RGB, Audio, USB K&M	60-1274-01	VND 250	Decoder for HDMI, Audio, USB K&M	60-1275-01

VN-Matrix Series



PURE 3[®] CODEC
OPTIMIZED FOR NETWORKS

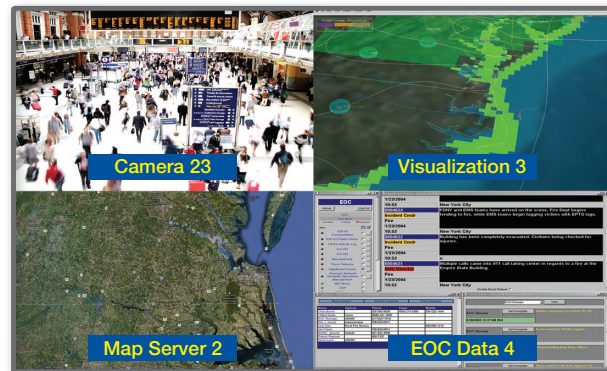
VN-Matrix 325 Codec

3G-SDI, HD-SDI & SDI Over IP Codec

The VN-Matrix[®] 325 streams 3G-SDI, HD-SDI, or SDI video and embedded audio over IP networks to meet the emerging need for low delay, production quality transport of SD and HD video over enterprise networks. The VN-Matrix 325 codec uses Extron's PURE3[®] codec which exceeds many of the performance characteristics of standards-based compression formats, delivering visually lossless quality with low latency, and a high immunity to network errors. The VNC 325 codec is switchable between encode and decode functionality and video decoding can be genlocked to an external SDI reference. The VNC 325 is ideal for quality-critical applications such as live video delivery across a campus, production collaboration, studio-to-studio media exchange, and original video source contribution.

Features

- Streams serial digital video with embedded audio
- Supports 3G-SDI, HD-SDI, or SDI signals
- Streaming data rates from 6 Mbps to 150 Mbps
- 10-bit YCrCb 4:2:2 encoding
- Supports resolutions up to 1080p/60
- Low latency streaming – 35 ms encode and 35 ms decode
- Codec switchable between encode and decode operation
- Decoding can be genlocked to an external SDI reference signal
- SFP port available for use with fiber optic Ethernet transceivers
- Compatible and interoperable with VN-Matrix 300 models
- Stream embedded audio as a stereo pair or as ancillary data in groups of four channels



VNS 104

Multi-Stream Decoding Software for VN-Matrix 250, 225, or 200 Series

VNS 104 Multi-Stream Decoding Software decodes one or four video streams and one stereo audio stream from VN-Matrix 250, 225, or 200 series real-time encoders and VN-Matrix Recorder playback channels. It operates on a Windows PC and is managed from a VN-Matrix Enterprise Controller. The VNS 104 is used in monitoring, remote presentation viewing, distance collaboration, and data visualization, in a variety of environments including command and control, after action review, training and simulation, medical and geological visualization.

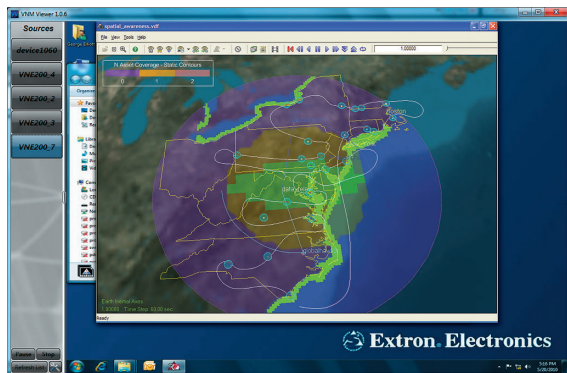
Features

- Decodes and displays one or four VN Matrix PURE3[®] video streams on a single display from a Windows PC platform
- Select VNS 104 display modes from an external control system through VN-Matrix Enterprise Controller
- Monitor four VN-Matrix streams from one display as a cost effective alternative to multiple hardware decoders and displays
- Scaling and aspect ratio control
- Audio source selection, mute, and level control
- Text overlay messaging
- Software license supports installation on one endpoint
- For use on LANs or private networks support multicast traffic

Model	Version Description	Part Number
VNC 325 3G-SDI	Codec for 3G-SDI	60-1249-01

Model	Version Description	Part Number
VNS 104	Four Stream Decoding Software License	29-108-01

VN-Matrix Series



VNM Software Decoder

Software Decoder for VN-Matrix 250, 225, or 200 Series

The VNM Software Decoder application lets users view live PURE3® streams on a PC. The streams can originate from VN Matrix 250, 225, or 200 encoders as well as any active playback streams from VN-Matrix recorder models. The VNM Software Decoder application includes a plugin that operates with Windows Media Player® to decode PURE3 streams. VNM Software Decoder identifies and lists available VN Matrix encoders and any VN-Matrix recorder playback streams in source buttons, which can be selected for viewing in the application window.

Features

- Operates in conjunction with Microsoft® Windows Media Player
- Software decoder application provides basic source selection
- Decodes streams from VN-Matrix 250, 225, or 200 Series products
- Compatible with Microsoft® Windows
- Installs quickly and simply on any standard PC
- Install decoder on as many endpoints as desired
- Number of live stream decodes is licensed by system
- For use on LANs or private networks supporting multicast traffic



VNR 100

VNR 100

VN-Matrix Single Channel Recorder

The VNR 100 digitally records and plays back high-definition computer graphics, video, audio, and data streamed in VN-Matrix® systems. It can record and play back at the same time, increasing duty cycles for expensive source equipment and presentation systems by utilizing both recording and playback features simultaneously. The time-slip feature allows a live event to be recorded while a previous event is played back, and the chase-play feature allows a recording in progress to be streamed with a time-shifted delay. VN-Matrix systems can be configured with multiple VNR 100 units to record and play back synchronized multi-source AV presentations or content presented on multi-screen display systems. The VNR 100 is ideally suited for AV streaming and recording applications with the most demanding quality and performance requirements.

Features

- Simultaneously record and play back VN-Matrix AV streams
- Time-shift capabilities support time-slip or chase-play applications
- Transport controls include: play, pause, and variable speed playback at 2x 4x 8x speeds in forward or reverse as well as single frame advance in forward or reverse
- System scalability – create multi-channel recording systems using multiple VNR 100 units
- System synchronization – synchronize playback across multiple VNR 100 units
- Replacement media drive and operating system drive available
- Compatible with VN-Matrix encoder, decoder, codec, and software decoder products

Model	Version Description	Part Number	Model	Version Description	Part Number
VNM Software Decoder	Single Stream Decoding Software License	29-098-01	VNR 100	VN-Matrix Single Channel Recorder	60-1291-01
			VNR 100 OS	VNR 100 OS Drive 80 GB in Caddy	70-1002-01
			VNR 100 MD	VNR 100 Media Drive 1 TB in Caddy	70-1003-01

VN-Matrix Series



VNM Enterprise Controller

VN-Matrix Enterprise Controller

The VNM Enterprise Controller is a dedicated controller for VN-Matrix® systems. The VNM Enterprise Controller simplifies management of large VN-Matrix deployments, providing the ability to configure and dynamically control one or many VN-Matrix devices from a single user interface.

Every VN-Matrix device in a system can be accessed and configured using a simple, embedded web interface. The standard embedded web interface is useful for configuring smaller systems limited to a few units or systems that will be left in a fixed operational state. VNM Enterprise Controller provides the greater processing capacity required to efficiently manage, configure, and dynamically control large VN-Matrix systems. VNM Enterprise Controller allows streaming and recording system presets to be created that can be quickly recalled from an AV control system. Each preset captures all VN-Matrix device settings and defines specific streaming connection and recording actions. Recall of various streaming and recording presets greatly simplifies management and control of VN-Matrix systems.

The VNM Enterprise Controller's embedded web interface also allows users to quickly organize and sort all devices in a system based on different properties such as: unit status or type, operating mode, source, controller, or firmware version. VN-Matrix devices can be selected in groups, and common configuration properties can be applied to all devices. Firmware can also be uploaded to all devices or a group of devices in one action. Multiple VNM Enterprise Controllers can be applied in VN-Matrix systems, providing control over the entire system or independent clusters of VN-Matrix devices.

Two VNM Enterprise Controller units can be configured to operate together as a redundant system for mission-critical applications. One unit is configured as a primary unit, and the other as a secondary unit. System data is continuously synchronized between the redundant pair. The secondary unit continually monitors the primary unit's system health and seamlessly takes control if required. Control is automatically returned to the primary unit if required, maintaining transparent communications and control over the VN-Matrix system.

The VN-Matrix Enterprise Controller is required when:

- More than 10 VN-Matrix units are configured into a system
- The system includes VN-Matrix recording devices or VNS 104 Multi-Stream Decoding Software
- Preset streaming and recording configurations must be prepared and recalled
- A system of VN-Matrix units will be dynamically controlled in a virtual switching solution that is managed from an AV control system
- Clusters of VN-Matrix units must be managed independently and as one large system
- Redundant control is required for the system

Features

- Create and recall system streaming and recording preset configurations
- Monitor, configure, and manage all VN-Matrix and VN-Matrix Recorder units as a system
- High level interface provides single point of control for external control systems
- Manage multiple VN-Matrix systems in combined or independent clusters
- Provide redundant control for mission-critical applications
- Standard model employs hard disk storage
- Model with flash storage is available for applications requiring the reliability of a completely solid state system, and temporary removal of sensitive system data

Model	Version Description	Part Number
VNM Enterprise Controller	VN-Matrix Enterprise Controller	60-1133-01
VNM Enterprise Controller CFC	VNM Enterprise Controller with CF Drive	60-1133-02

Specifications

VIDEO INPUT AND LOOP-THROUGH — ANALOG

Number/type	1 RGBHV, RGsB input 1 RGBHV, RGsB loop-through, actively buffered RGB analog video
Connectors	2 female 15-pin HD
Horizontal frequency	15 kHz to 100 kHz
Vertical frequency	50 Hz to 85 Hz
Resolution range	VESA: 640x480p to 2048x1080p @ 60 Hz SMPTE: 480p/720p/1080i/1080p @ 23.98, 24, 25 29.98, 30 50, 59.94, and 60 Hz

VIDEO INPUT AND LOOP-THROUGH — DIGITAL

Number/signal type	1 HDMI/DVI (Single link, HDCP compliant) 1 HDMI/DVI (HDCP compliant) loop through, actively buffered RGB or YCrCb digital video
Connectors	Female HDMI, Type A
Resolution range	VESA: 640x480p to 2048x1080p @ 60 Hz SMPTE: 480p/720p/1080i/1080p @ 23.98, 24, 25 29.98, 30 50, 59.94, and 60 Hz
Standards	HDMI, DVI 1.0, HDCP, EDID v2.0

VIDEO PROCESSING

Digital sampling	24 bits, 8 bits per color, 165 MHz
Analog sampling	24 bits, 8 bits per color, 165 MHz
Colors	16.78 million
Compression	Pure3® CODEC
Latency	35 ms (70 ms encode/decode) nominal
Bit rate	1 Mbps to 270 Mbps, adjustable
Bit rate control	Selectable (None, Manual frame drop, Peak flow rate, Peak bit rate, or Peak bit rate with real-time adaptive frame dropping)

PROGRAM AUDIO — Analog input with loop-through

Number/signal type	1 analog stereo, line level, balanced/unbalanced input 1 analog stereo, line level, unbalanced loop-through
Connectors	(1) 5-pole, 3.5 mm captive screw connector for analog input (1) 3.5 mm mini stereo jack (tip, ring, sleeve) for analog loop-through
Sampling rate	16 bit, 48 kHz

PROGRAM AUDIO — HDMI input with loop-through

Number/signal type	1 digital stereo, de-embedded from HDMI (2-channel, PCM only)
Connectors	2 female HDMI type A (shared with digital video input)
Sampling rate	24 bit, 32, 44.1, and 48 kHz

RETURN AUDIO OUTPUT

Number/signal type	1 analog stereo, line level, balanced/unbalanced output
Connectors	(1) 5-pole, 3.5 mm captive screw connector

CONTROL/REMOTE/SYSTEM

Serial control	
Type	1 bidirectional RS-232: used for low-level configuration
Connector	3 poles of a 5-pole 3.5 mm captive screw connector (shared with pass-through port)

Serial control pass-through ports

Type	1 bidirectional RS-232: used for pass-through of external RS-232 data
Connector	3 poles of a 3.5 mm captive screw connector (shared with control port)
Baud rate and protocol	User configurable, up to 115200 baud
Standard / Protocol	Transparent pass-through, bidirectional

USB — front panel

Connector	1 female mini USB B: used for low level configuration
Standard / Protocol	USB 2.0 480 Mbps SIS™ (configuration subset only)

USB — rear panel

Connector	1 female type B
Standard / Protocol	USB 2.0 480 Mbps, Keyboard and Mouse only

Alarm relay control

Type	1 Normally open, SPST
Connector	2 poles of 5-pole 3.5 mm captive screw connector (shared with TTL port)

System control

System Controller	Extron VNM Enterprise Controller Extron VN-Matrix® Web Server
Standard / Protocol	Extron HLI command protocol

Program control

	Microsoft Internet Explorer®, Apple® Safari®, Mozilla® Firefox®, Google® Chrome™* (*Certain browser dependencies may apply)
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NETWORK — STREAMING

Ethernet data rate	LAN 2: 100/1000 Mbps auto sensing
Connectors	LAN 2: SFP or RJ45 (RJ45 is disabled when SFP is populated)
Protocols	Streaming: RTP, RTCP Transport: TCP, UDP, Multicast-UDP All supported: IGMP (v2), IP, UDP, DHCP, HTTP, RTP, RTCP, SNMP (v3), Telnet, VLAN

NETWORK — CONTROL

Ethernet data rate	LAN 1: 10/100 Mbps auto sensing
Connector	LAN 1: Shielded RJ45
Protocols	Transport: TCP, UDP All supported: IP, UDP, DHCP, HTTP, Telnet, VLAN

GENERAL

Power supply	External Input: 100-240 VAC, 50-60 Hz Output: 12 VDC, 2.5 A, 30 watts
Power consumption	
Device and power supply	24.9 watts
Thermal dissipation	
Device and power supply	82.7 BTU/hr
Enclosure	1.66" H x 8.75" W x 9.96" D (1U high, half rack wide) (4.2 cm H x 22.2 cm W x 25.3 cm D) (Depth excludes connectors and knob.)
Product weight	2.4 lb (1.1 kg)
Regulatory compliance	
Safety	CE, c-UL, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
Warranty	3 years parts and labor

Model	Version Description	Part number
VNE 250	Encoder for HDMI, RGB, Audio, USB K&M	60-1274-01

Specifications

VIDEO OUTPUT – DIGITAL

Number/type	1 HDMI/DVI (Single link, HDCP compliant) RGB or YCrCb digital video
Connectors	1 female HDMI, type A
Resolution range	VESA: 640x480p to 2048x1080p @ 60 Hz SMPTE: 480p/720p/1080i/1080p @ 23.98, 24, 25 29.98, 30 50, 59.94, and 60 Hz
Standards	HDMI, DVI 1.0, HDCP, EDID v2.0

VIDEO PROCESSING

Digital sampling	24 bits, 8 bits per color, 165 MHz
Colors	16.78 million
Compression	Pure3® CODEC
Latency	35 ms (70 ms encode/decode) nominal
Bit rate	1 Mbps to 270 Mbps, adjustable
Bit rate control	Selectable (None, Manual frame drop, Peak flow rate, Peak bit rate, or Peak bit rate with real-time adaptive frame dropping)

PROGRAM AUDIO – ANALOG OUTPUT

Number/signal type	1 analog stereo, line level, balanced/unbalanced output
Connectors	(1) 5-pole, 3.5 mm captive screw connector for analog input
Frequency response	20 Hz to 20 kHz
Sampling rate	16 bit, 48 kHz

PROGRAM AUDIO – HDMI OUTPUT

Number/signal type	1 digital stereo, de-embedded from HDMI (2-channel, PCM only)
Connectors	2 female HDMI type A (shared with digital video input)
Sampling rate	24 bit, 32, 44.1, and 48 kHz

RETURN AUDIO INPUT

Number/signal type	1 analog stereo, balanced/unbalanced output
Connectors	(1) 5-pole, 3.5 mm captive screw connector for analog input
Sampling rate	16 bit, 24 kHz

CONTROL/REMOTE/SYSTEM

Serial control	
Type	1 bidirectional RS-232: used for low-level configuration
Connector	3 poles of a 5-pole 3.5 mm captive screw connector (shared with pass-through port)
Serial control pass-through ports	
Type	1 bidirectional RS-232: used for pass-through of external RS-232 data
Connector	3 poles of a 5-pole 3.5 mm captive screw connector (shared with control port)
Standard / Protocol	Transparent pass-through, bidirectional
USB — front panel	
Connector	1 female mini USB B: used for low level configuration
Standard / Protocol	USB 2.0 480 Mbps SIS™ (configuration subset only)
USB — rear panel	

Connector	1 female type B
Standard / Protocol	USB 2.0 480 Mbps, Keyboard and Mouse only
Alarm relay control	
Type	1 Normally open, SPST
Connector	2 poles of 5-pole 3.5 mm captive screw connector (shared with Genlock port)
Genlock connector	
Number/type	Locally generated master / loop in and loop out 1 + 1
Connector	3 poles of 5-pole 3.5 mm captive screw connector (shared with Alarm port)
System control	
System Controller	Extron VNM Enterprise Controller Extron VN-Matrix® Web Server
Standard / Protocol	Extron HLI command protocol
Program control	Microsoft Internet Explorer*, Apple® Safari®, Mozilla® Firefox®, Google® Chrome™* (*Certain browser dependencies may apply)

NETWORK – STREAMING

Ethernet data rate	LAN 2: 100/1000 Mbps auto sensing
Connectors	LAN 2: SFP or RJ45 (RJ45 is disabled when SFP is populated)
Protocols	Streaming: RTP, RTCP Transport: TCP, UDP, Multicast-UDP All supported: IGMP (v2), IP, UDP, DHCP, HTTP, RTP, RTCP, SNMP (v3), Telnet, VLAN

NETWORK – CONTROL

Ethernet data rate	LAN 1: 10/100 Mbps auto sensing
Connector	LAN 1: Shielded RJ45
Protocols	Transport: TCP, UDP All supported: IP, UDP, DHCP, HTTP, Telnet, VLAN

GENERAL

Power supply	External Input: 100-240 VAC, 50-60 Hz Output: 12 VDC, 3.0 A, 36 watts
Power consumption	
Device and power supply	18.5 watts
Thermal dissipation	
Device and power supply	62.1 BTU/hr
Enclosure	1.75" H* x 8.75" W x 9.96" D (1U high, half rack wide) (4.4 cm H* x 22.2 cm W x 25.3 cm D) *Height with feet is 2.1" (5.3 cm). (Depth excludes connectors and knob.)
Product weight	2.4 lb (1.1 kg)
Regulatory compliance	
Safety	CE, c-UL, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
Warranty	3 years parts and labor

Model	Version Description	Part number
VND 250	Decoder for HDMI, Audio, USB K&M	60-1275-01

For complete specifications, please go to www.extron.com
Specifications are subject to change without notice.

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