

VN-Matrix 325

SDI, HD-SDI & 3G-SDI
OVER IP CODEC

High Quality, Low Delay
Video Streaming

- ▶ Streams serial digital video with embedded audio
- ▶ Supports 3G-SDI, HD-SDI, and SDI video signals
- ▶ 10-bit 4:2:2 encoding
- ▶ Supports resolutions up to 1080p/60 Hz
- ▶ Low latency streaming - 35 ms encode and 35 ms decode



Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

Introduction

Video and audio signals have traditionally been delivered over coaxial or twisted pair cable. Use of fiber optic cable is popular when transmission distances exceed 100 meters. Use of these cables for audio and video delivery requires careful planning to ensure that once installed, the fixed endpoints and cable infrastructure will fulfill all current and future input and output requirements. Extron VN-Matrix® systems make delivery of audio and video over standard IP networks possible, providing the opportunity to deliver real-time AV content to any endpoint a network reaches, with very low latency and without risk of quality loss throughout the transmission path. Multicast networking capabilities offer scalability for VN-Matrix streaming that is only limited by the size of a network.

VN-Matrix 325

The VN-Matrix 325 codec is a unique streaming solution for delivering high quality SDI, HD-SDI, or 3G-SDI video signals with embedded audio. Common applications include streaming transport of broadcast and production grade cameras, video editing or effects equipment, and high definition conferencing or telepresence cameras. VN-Matrix 325 has very low encode and decode latency, making it valuable to applications where low delay will support natural bi-directional communication, remote device control, or help reduce the time used by a video workflow. This makes it valuable for real-time production, collaboration, communication, and presentation applications. VN-Matrix 325 also provides a variety of bit rate management and compression controls, allowing it to be configured to operate over a range of bandwidths and network conditions. The combination of high quality, low delay, and flexible bit rate management makes the VN-Matrix 325 codec the ideal product for many quality-critical applications.

PURE3 Codec

The Extron PURE3 codec is applied in VN-Matrix 325. It was developed to support unique performance capabilities that were unfulfilled by existing compression standards. The PURE3 codec supports streaming of video and audio across networks with very low latency, visually lossless image quality, 4:2:2 color sampling, and 10-bit color depth, maintaining original source quality. This makes it ideal for low delay, collaborative, or interactive applications with the most demanding quality requirements. PURE3 error concealment provides a high immunity to network errors, preserving quality even under conditions of heavy packet loss, without the typical need for additional delay or bandwidth seen with error correction technologies. PURE3 error concealment can also eliminate the need for expensive high QoS managed network services. The



performance delivered by PURE3 allows VN-Matrix 325 to be operated on a variety of network connections.

True High Definition Quality

The PURE3 codec in the VN-Matrix 325 codec can deliver visually lossless image quality. It is ideal for applications that test and evaluate quality such as remote color grading. It can also be used to contribute real-time content into live video productions.

Embedded Audio

The VN-Matrix 325 supports streaming of embedded audio, transparently passing four channels of lossless, synchronized audio per ancillary – ANC data block. Up to four ANC data blocks can be streamed with video carrying 16 audio channels. Alternatively, two channels of audio can be streamed alone in stereo mode delivering mono, stereo, or 5.1 surround sound in applications requiring use of lower bandwidth. Video can also be streamed without audio.

Synchronized Decoding

The VN-Matrix 325 also supports synchronized decoding of audio and video streams across multiple decoders maintaining genlock and framelock even when network errors are experienced. This capability can be valuable for video delivery from cameras or sensors with more than one signal output, applications using multiple cameras, or very high resolution material comprised of multiple high definition signals.

Applications

VN-Matrix 325 is useful in a number of quality-critical applications:

- ▶ **Live Video Delivery Across a Campus**
- ▶ **Production Collaboration**
- ▶ **Studio to Studio Media Exchange**
- ▶ **Delivery of Contribution or Primary Distribution**
- ▶ **Sports and Live Event Streaming**
- ▶ **Signal Distribution Over Networks**
- ▶ **Video Monitoring**
- ▶ **In-house Signal Distribution and Routing**
- ▶ **Virtual Switching on Networks**
- ▶ **Remote Video Device Control**

Overview

LED indicators provide status feedback for power, network connections, video presence, streaming status, or critical alarms

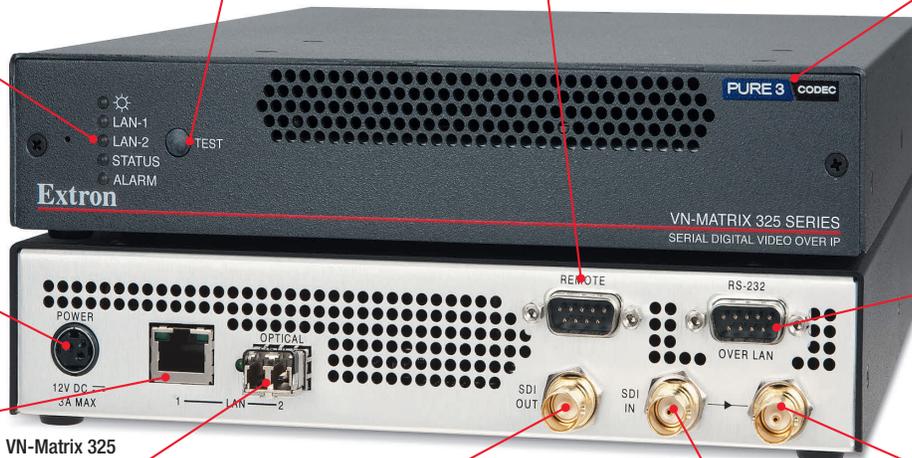
Test button selects HD-SDI or SDI test pattern

Serial RS-232 connection for device configuration

PURE3 codec provides low delay, visually lossless compression, highly efficient bit rates, and high immunity to network errors

External power connection, 12 V, 3 A

Ethernet connection for control and/or streaming



Serial port for cross-LAN device control for unicast applications or alarm relay closures

SFP socket accepts optional Ethernet or optical Ethernet modules for separate control or streaming connections

Multi-rate SDI decoder output or processed encoder loop output, includes input/output text overlay

Multi-rate SDI encoder input or decoder genlock input

Re-clocked multi-rate SDI loop output

Extensive Bit Rate Management

The processing speed, capacity, compression, and bit rate management offered by the PURE3 codec make VN-Matrix 325 flexible for use in a wide range of applications. The demanding quality requirements of production and broadcast applications will be well served using very high bit rates, while presentation, collaboration, and monitoring applications may use moderate to low bit rates. The variety of quality and bit rate controls available in VN-Matrix systems make them capable of fulfilling unique applications that are not served well by encoders designed for specific, mainstream applications.

The VN-Matrix Series

The VN-Matrix 325 is part of a series of encoders, decoders, codecs, recorders, and control devices built to handle a wide range of real-time, high quality, and low delay video streaming applications.

VN-Matrix Series Products



VN-Matrix 225

VN-Matrix Recorder

VN-Matrix 325



VN-Matrix Enterprise Controller



SME 100

H.264 Streaming Media Encoder

Applications that call for standards-based H.264 encoding can use the SME 100 to stream live video or computer video to a variety of decoding platforms. Potential applications include:

AV Systems: For systems monitoring or meeting/lecture overflow delivery

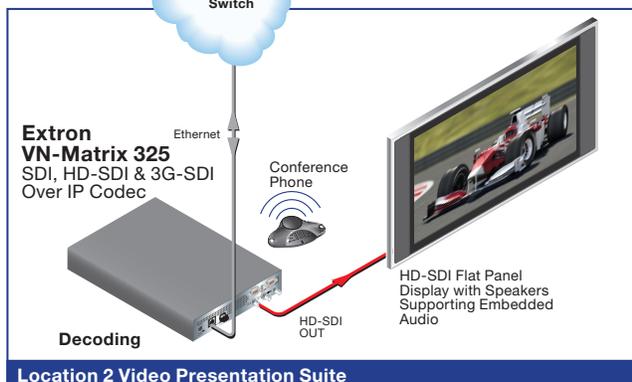
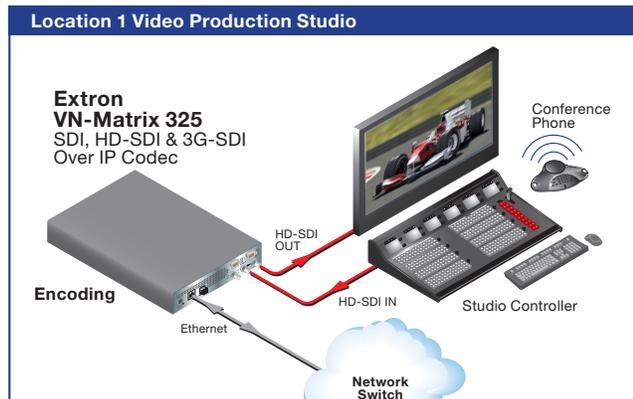
Corporate or Enterprise Broadcast: For corporate, educational, or government facilities

Integration with Content Delivery Networks: Delivering video broadly across the Internet in commercial, government, or consumer applications

Model	Version Description	Part Number
SME 100 HD	H.264 HD Encoder	60-1061-01
SME 100 SD	H.264 SD Encoder	60-1061-02

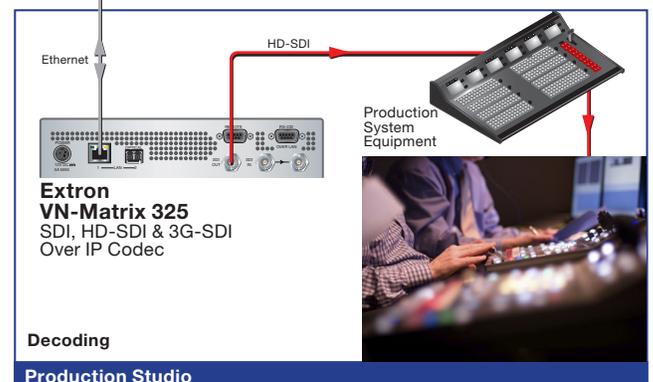
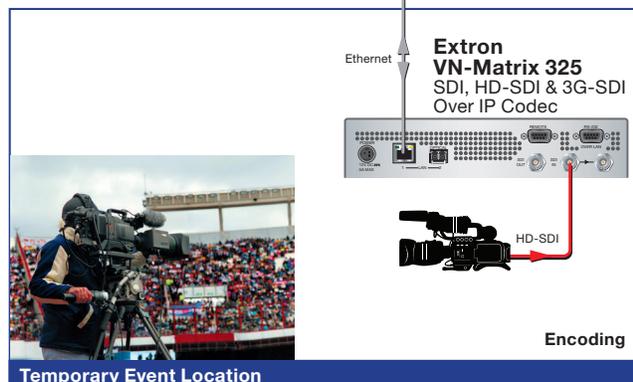
Application 1: Production Collaboration

Organizations offering highly skilled production and animation services often have facilities located great distances from each other. Many times, customers may not be located in the same region where the creative work is prepared. This streaming solution allows account management and customers to review creative work prepared a great distance away. Customers can work collaboratively in real time with creative personnel. This allows productions to be completed much more quickly and efficiently. In this example, collaboration is conducted between New York and Los Angeles. The endpoints could just as easily be New York and London, or Los Angeles and San Francisco.



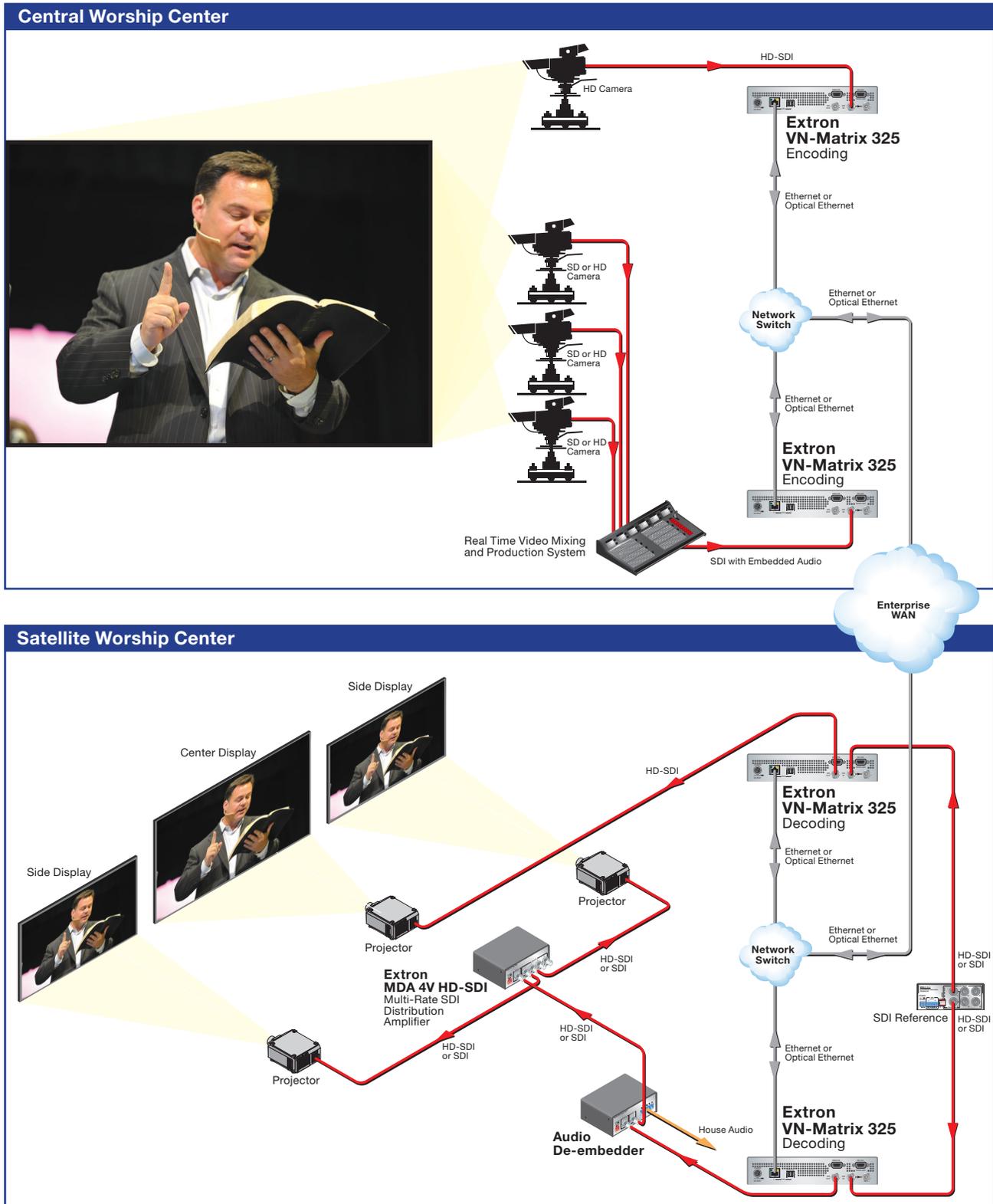
Application 2: Live Campus Video Delivery

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 not available and 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.



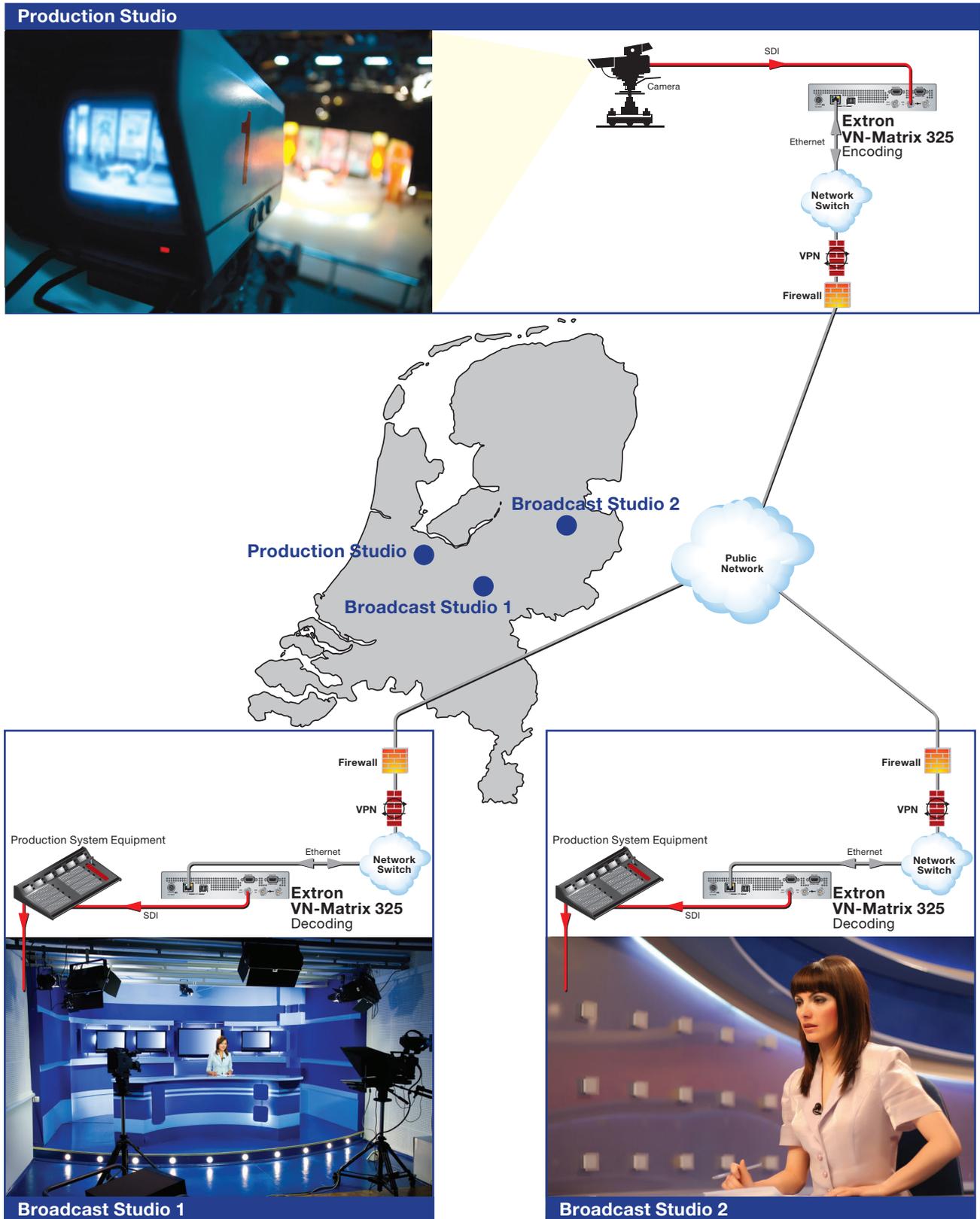
Application 3: House of Worship

Contemporary worship centers deploy large format projection systems, large scale audio systems, and real time video production equipment to enhance the worship experience. As congregations grow, streaming technology is called on to connect the experience, particularly the reach of the charismatic teaching pastor to large projection displays in satellite worship centers. VN-Matrix 325 codecs extend sermons from central to satellite worship centers delivering high video quality over private network connections.



Application 4: Studio to Studio

Video contributed to live sports, news, or event broadcasts has historically required dedicated point-to-point fiber, satellite, or microwave connections. A more cost effective connection can make more of those applications economically feasible. This project delivers Live Traffic Analysis from an outsourced studio to different television broadcasters. VN-Matrix 325 delivers visually lossless video between broadcast studios, supporting production of high quality live or pre-recorded programs.



Specifications

VIDEO	
Signal type	SDI, HD-SDI, 3G-SDI digital video
Data rates	270 Mbps, 1.485 Gbps, 2.970 Gbps.
Operation standards	SMPTE 259M, SMPTE 296M, SMPTE 424M
Auto data rate lock	Yes
VIDEO INPUT AND LOOP THROUGH – ENCODER	
Number/signal type	1 digital component video with loop through 10 bit, 4:2:2, with auto-detection
Connectors	3 female BNC: 1 for input, 2 for loop through (1 with messaging overlay option)
Data rates	1.5 Gbps to 3.0 Gbps
Vertical frequency	23.97 Hz to 60 Hz, depending on signal format
Resolution range	525i, 625i, 720p, 1080i, 1080p, 1080psf
VIDEO PROCESSING – CODEC	
Compression	PURE3® Codec
Frame rate delay	35 ms (70 ms encoding/decoding end-to-end)
Bit rate	6 Mbps to 250 Mbps
Bit and frame rate control	Selectable
Frame rate	Up to 60 fps @ 1080p
VIDEO OUTPUT – DECODER	
Number/signal type	1 digital component video 10 bit, 4:2:2, with auto-detection
NOTE: Output signal format follows the input format at the encoder.	
Vertical frequency	23.97 Hz to 60 Hz, depending on signal format
SYNC – GENLOCK – DECODER	
External sync (genlock)	0.8 Vp-p (digital component video)
Genlock connector	1 female BNC
Output impedance	75 ohms
Vertical frequency	23.97 Hz to 60 Hz, depending on signal format
AUDIO INPUT AND OUTPUT	
Number/signal type	4 groups of 4 channels, embedded with video signal
Connectors	1 female BNC (shared with video input and output)
NOTE: Output mode (transparent pass-through or stereo) is user selectable.	
AUDIO PROCESSING	
Transparent pass-through mode (selectable)	
Format	Embedded audio (ANC) data is transported as received.
Sampling rates and bit depth	48 kHz (synchronous) 20 or 24 bit digital audio
Standards	SMPTE 299M, SMPTE 272M-A
Transmitted payload	SDI: 8 Mbps per group of 4 audio channels HD-SDI and 3G-SDI: 16 Mbps per group of 4 audio channels
Stereo mode (selectable)	
Format	PCM: a single stereo pair is transported. AC3/Dolby Digital: 5.1 channels are transported.
Sampling rates and bit depth	48 kHz 20 or 24 bit digital audio
Standards	SMPTE 299M, SMPTE 272M-A
Transmitted payload	2.43 Mbps

CONTROL – HOST PORTS – CODECS, DECODERS		
Serial host control port	(1) RS-232, male 9-pin D connector (labeled "Remote") for VNC 325 configuration	
Ethernet control port	1 female RJ-45 1 female SPF IP module	
Ethernet data rate	10/100/1000Base-T, half/full duplex with autodetect	
Ethernet protocol	ICMP (ping), IP, TCP, RTP, RTCP, UDP, DHCP, HTTP, SMTP, Telnet	
System control	VN-Matrix Enterprise Controller VN-Matrix web server	
Program control	Extron Command Line Interface (CLI) Microsoft® Internet Explorer® and other web browsers, Telnet	
CONTROL – Serial Port (RS-232 Pass-Through Over LAN)		
Serial control port	(1) RS-232, male 9-pin D connector (labeled "RS-232 over LAN") for third party device control across a network	
NETWORK TRANSPORT		
Ethernet data rate	10/100/1000Base-T, half/full duplex with autodetect	
Ethernet protocol	Streaming Transport All supported	
	RTP, RTCP TCP, UDP (unicast or multicast) ICMP (ping), IP, TCP, RTP, RTCP, UDP, DHCP, HTTP, SNMP V3, Telnet	
GENERAL		
Power supply	External Input: 100-240 VAC, 50-60 Hz Output: 12 VDC, 3 A max.	
Power consumption	30 watts nominal, 60 watts max., 12 VDC	
Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing Operating: +41 to +95 °F (5 to +35 °C) / 10% to 85%, noncondensing	
Cooling	Fan, vents front to back	
Enclosure	1.7" H" x 8.75" W x 12.2" D (1U high, half rack wide) (4.3 cm H" x 22.2 cm W x 30.9 cm D) *Height with feet is 2.1" (5.3 cm). (Depth includes connectors.)	
Product weight	2.8 lbs (1.3 kg) each	
Regulatory compliance	Safety EMV/EMC Environmental	
	CE, c-UL, UL CE, C-tick, FCC Class A, ICES, VCCI Complies with the appropriate requirements of RoHS, WEEE	
Warranty	3 years parts and labor	
NOTE: All nominal levels are at ±10%.		
Model	Version Description	Part number
VNC 325 3G-SDI	Codec for 3G-SDI	60-1249-01

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

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UNITED STATES

+800.633.9876
Inside USA/Canada
+1.714.491.1500

EUROPE

+800.3987.6673
Inside Europe
+31.33.453.4040

ASIA

+800.7339.8766
Inside Asia
+65.6383.4400

MIDDLE EAST

+971.4.2991800