User Guide

Streaming AV Products

VN-Matrix® 225 Series

VNC 225 DVI, VNE 225 DVI, and VND 225 DVI

DVI and RGB Video over IP Encoders and Decoders

Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

68-2119-01 Rev. C
02 14

Safety Instructions

Safety Instructions • English

WARNING: This symbol, ⚠, when used on the product, is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

ATTENTION: This symbol, ⚠, when used on the product, is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

For information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the Extron Safety and Regulatory Compliance Guide, part number 68-290-01, on the Extron website, **www.extron.com**.

Instructions de sécurité • Français

AVERTISSEMENT: Ce pictogramme, ⚠, lorsqu'il est utilisé sur le produit, signale à l'utilisateur la présence à l'intérieur du boîtier du produit d'une tension électrique dangereuse susceptible de provoquer un choc électrique.

ATTENTION: Ce pictogramme, ⚠, lorsqu'il est utilisé sur le produit, signale à l'utilisateur des instructions d'utilisation ou de maintenance importantes qui se trouvent dans la documentation fournie avec le matériel.

Pour en savoir plus sur les règles de sécurité, la conformité à la réglementation, la compatibilité EMI/EMF, l'accessibilité, et autres sujets connexes, lisez les informations de sécurité et de conformité Extron, réf. 68-290-01, sur le site Extron, **www.extron.com**.

Sicherheitsanweisungen • Deutsch

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Instrucciones de seguridad • Español

ADVERTENCIA: Este símbolo, ⚠, cuando se utiliza en el producto, avisa al usuario de la presencia de voltaje peligroso sin aislar dentro del producto, lo que puede representar un riesgo de descarga eléctrica.

ATENCIÓN: Este símbolo, ⚠, cuando se utiliza en el producto, avisa al usuario de la presencia de importantes instrucciones de uso y mantenimiento recogidas en la documentación proporcionada con el equipo.

Para obtener información sobre directrices de seguridad, cumplimiento de normativas, compatibilidad electromagnética, accesibilidad y temas relacionados, consulte la Guía de cumplimiento de normativas y seguridad de Extron, referencia 68-290-01, en el sitio Web de Extron, **www.extron.com**.

Инструкция по технике безопасности • Русский

ПРЕДУПРЕЖДЕНИЕ: Данный символ, ⚠, если указан на продукте, предупреждает пользователя о наличии неизолированного опасного напряжения внутри корпуса продукта, которое может привести к поражению электрическим током.

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Chinese Simplified（简体中文）

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注 意：⚠ 产品上的这个标志意在提示用户设备随附的用户手册中有重要的操作和维护(维修) 说明。

关于我们产品的安全指南、遵循的规范、EMI/EMF 的兼容性、无障碍使用的特性等相关内容，敬请访问 Extron 网站 **www.extron.com**，参见 Extron 安全规范指南，产品编号 68-290-01。

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警告: ⚠ 若產品上使用此符號，是為了提醒使用者，產品機殼內存在著可能會導致觸電之風險的未絕緣危險電壓。

注意 ⚠ 若產品上使用此符號，是為了提醒使用者，設備隨附的用戶手冊中有重要的操作和維護（維修）說明。

有關安全性指導方針、法規遵守、EMI/EMF 相容性、存取範圍和相關主題的詳細資訊，請瀏覽 Extron 網站：**www.extron.com**，然後參閱《Extron 安全性與法規遵守手冊》，準則編號 68-290-01。

Japanese

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注意: この記号 ⚠ が製品上に表示されている場合は、本機の取扱説明書に記載されている重要な操作と保守(整備)の指示についてユーザーの注意を喚起するものです。

安全上のご注意、法令遵守、EMI/EMF適合性、その他の関連項目については、エクストロンのウェブサイト **www.extron.com** より『Extron Safety and Regulatory Compliance Guide』(P/N 68-290-01) をご覧ください。

Korean

경고: 이 기호 ⚠, 가 제품에 사용될 경우, 제품의 인클로저 내에 있는 접지되지 않은 위험한 전류로 인해 사용자가 감전될 위험이 있음을 경고합니다.

주의: 이 기호 ⚠, 가 제품에 사용될 경우, 장비와 함께 제공된 책자에 나와 있는 주요 운영 및 유지보수(정비) 지침을 경고합니다.

안전 가이드라인, 규제 준수, EMI/EMF 호환성, 접근성, 그리고 관련 항목에 대한 자세한 내용은 Extron 웹 사이트(**www.extron.com**)의 Extron 안전 및 규제 준수 안내서, 68-290-01 조항을 참조하십시오.

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. The Class A limits provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause interference; the user must correct the interference at his own expense.

NOTE: For more information on safety guidelines, regulatory compliances, EMI/EMF compatibility, accessibility, and related topics, see the ***Extron Safety and Regulatory Compliance Guide*** on the Extron website.

Specifications Availability

Product specifications are available on the Extron website, **www.extron.com**.

Conventions Used in this Guide

In this user guide, the following are used:

ATTENTION: Attention indicates a potential hazard to equipment or data.

NOTE: A note draws attention to important information.

TIP: A tip provides a suggestion to make working with the application easier.

WARNING: A warning warns of things or actions that might cause injury, death, or other severe consequences.

Commands are written in the fonts shown here:

```
^AR Merge Scene,,Op1 scene 1,1 ^B 51 ^W^C
[Ø1] R ØØØ4 ØØ3ØØ ØØ4ØØ ØØ8ØØ ØØ6ØØ [Ø2] 35 [17] [Ø3]
Esc X1 * X17 * X20 * X23 * X21 CE←
```

NOTE: For commands and examples of computer or device responses mentioned in this guide, the character "Ø" is used for the number zero and "O" represents the capital letter "o."

Computer responses and **directory paths** that do not have variables are written in the font shown here:

```
Reply from 2Ø8.132.18Ø.48: bytes=32 times=2ms TTL=32
C:\Program Files\Extron
```

Variables are written in slanted form as shown here:

```
ping xxx.xxx.xxx.xxx –t
SOH R Data STX Command ETB ETX
```

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

From the **File** menu, select **New**.

Click the **OK** button.

Contents

Introduction

This section introduces the VN-Matrix 225 Series, consisting of the VNC 225 (codec), VNE 225 (encoder), and VND 225 (decoder). The topics covered in this section are:

NOTE: This document describes the VNC 225 DVI-I (codec) device only, although both the VNE 225 and VND 225 may be referenced. Encoder features may apply to the VNE 225. Decoder features may apply to the VND 225.

Overview of the VN-Matrix 225 Series

The VN-Matrix 225 devices distribute RGB video and graphics from a source computer or similar graphical device across an IP network to one or more viewing stations.

An RGB signal is captured or acquired by a VNC 225 or VNE 225 unit and encoded into a Transmission Control Protocol (TCP) or Real-Time Protocol (RTP) data stream for transport across a local area or wide area network. Elsewhere on the network another VNC 225 or a VND 225 unit can decode the stream back into an analog RGB or digital (DVI) signal suitable for display on a wide range of display devices.

In addition to an RGB signal, the VNC 225 can provide cross-network transport of:

- Digital audio (S/PDIF)
- Serial data (RS-232)

NOTE: Digital audio may accompany video, graphics, or both sources. The VN-Matrix 225 Series cannot distribute an audio-only signal.

RS-232 serial data can be distributed between VNC 225 units unidirectionally as part of the source stream (data channel) or bidirectionally independent of any source streams (pass-through).

Firmware Version

This user guide is based on **v3.8** firmware. You can check for newer firmware releases and user guide updates by visiting the Extron website at **www.extron.com/download**.

TIP: To check which version of firmware is currently installed, see **Upgrading Device Firmware** on page 82.

Product Range

There are three VN-Matrix 225 products. These units are compatible with each other, but there are some feature limitations and differences between the models.

VNC 225 DVI-I — Codec

This unit:

- May be configured as either an encoder or a decoder.
- Supports the full use of remote keyboard and mouse.
- Has Remote and RS-232 ports enabled.

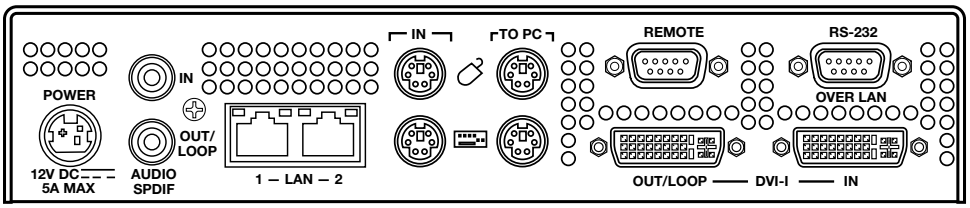


Figure 1. VNC 225 DVI-I Codec — Back Panel

VNE 225 DVI-I — Encoder Only

The VNE 225 is an encoder-only device and is compatible with the other products in the VN-Matrix family. It does not support:

- Mouse and keyboard operation
- RS-232 client/server operation

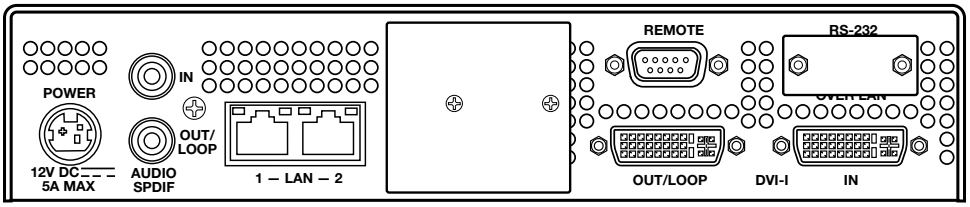


Figure 2. VNE 225 DVI-I Encoder — Back Panel

VND 225 DVI-I — Decoder Only

The VND 225 is a decoder only and is compatible with other VN-Matrix products, including the VNM Enterprise Controller and the VNC 225 when configured as a controller. The VND 225 does not support:

- Mouse and keyboard operation
- RS-232 client/server operation
- DVI-I In port

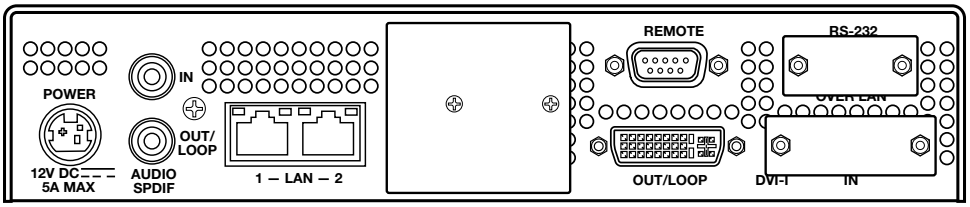


Figure 3. VND 225 DVI-I Decoder — Back Panel

Functional Overview

Device Name	Part Number	Standard Features	Optional Features by License
VNC 225 DVI	**60-1118-02**	Codec, video, audio, keyboard and mouse, output scaling, RS-232	Whiteboard and data support
VNE 225 DVI	**60-1119-02**	Encoder, video, audio	None
VND 225 DVI	**60-1120-02**	Decoder, video, audio, output scaling	None

The VNC 225 can be configured to operate in one of two modes:

- As an **encoder** to encode a source signal and stream it across a network
- As a **decoder** to decode and display a VNC 225 data stream from a network

Any VNC 225 matrix system contains at least two devices, one configured as an encoder and the other as a decoder. Multiple encoders and decoders may coexist on the same network.

Encoder Source Compatibility

As an encoder, the VNC 225 is compatible with digital (DVI) and analog (RGB) graphics sources up to WUXGA (1920x1200 at 60 Hz, 24-bit color) resolution (see **Technical Data** for a list of standard supported sources).

The VNC 225 incorporates advanced image acquisition circuitry, which can automatically detect a wide range of source types without the need for any additional setup.

For special or non-standard source formats, user-customizable source modes can be created using the web interface (see **Advanced Source Setup** on page 53 for further details).

NOTE: The VNC 225 provides analog-to-digital or digital-to-analog conversion via its monitor connections. Therefore, it is possible to use a digital monitor with an analog source and vice versa.

Decoder Display Capability

As a decoder, the VNC 225 is compatible with both digital (DVI) and analog (RGB) graphics sources up to WUXGA (1920x1200 at 60 Hz, 24-bit color) resolution.

NOTES:

- By default, sources are displayed at their native resolution and format.
- The decoded image may also be scaled by the decoder to match the native resolution of the local display.

Control Capability

Source control

The VNC 225 provides loop-through connections for the keyboard and mouse of the source computer. Local keyboard and mouse control of the source computer is fully maintained while connected to the VNC 225. In addition, keyboard and mouse functions can be remotely controlled from the viewing station.

System setup and configuration

Low level communications setup of the VNC 225 is achieved using a serial data link connected to the Remote port. High level configuration is achieved via the network using the integrated web management system.

Integrated web management system

The VNC 225 incorporates an integrated web management system (web interface). This allows any VNC 225 unit on a network to be configured via a PC or laptop (on the same network), using a standard web browser (for example, Microsoft® Internet Explorer® or Mozilla® Firefox®).

- One VNC 225 unit on the network must be designated as a controller. This unit acts as a server for the web interface and also holds a database of all VNC 225 devices on the network.
- Any VNC 225 unit, whether it is configured as an encoder or decoder, can be used as a controller.
- The web interface includes a full online help system.

Remote control

RS-232 serial data can be routed between selected VNC 225 units to provide remote control of a source.

Network Requirements

VNC 225 uses highly efficient compression algorithms to minimize the amount of required data transported across the network.

It is, however, crucial to the effective operation of the VNC 225 that sufficient data throughput can be achieved, especially where multiple sources are being encoded.

The efficiency of a network is directly affected by the speed and configuration of each element within its infrastructure, that is, switchers and routers. The VNC 225 achieves optimal transmission results over a dedicated 1 Gbps network (gigabit Ethernet). For more general information on networks and network performance, see **Network Components and Performance** on page 95.

Example of a System Application

The diagram below shows an example of a system application with seven VNC 225 units. Four are configured as encoders (sources) and three as decoders (displays). Each device is connected to the network.

Configuration of each device, including which source signal is displayed on which display, can be achieved by any PC or laptop on the same network using the VNC 225 integrated web management system. Potentially any display can broadcast any source signal.

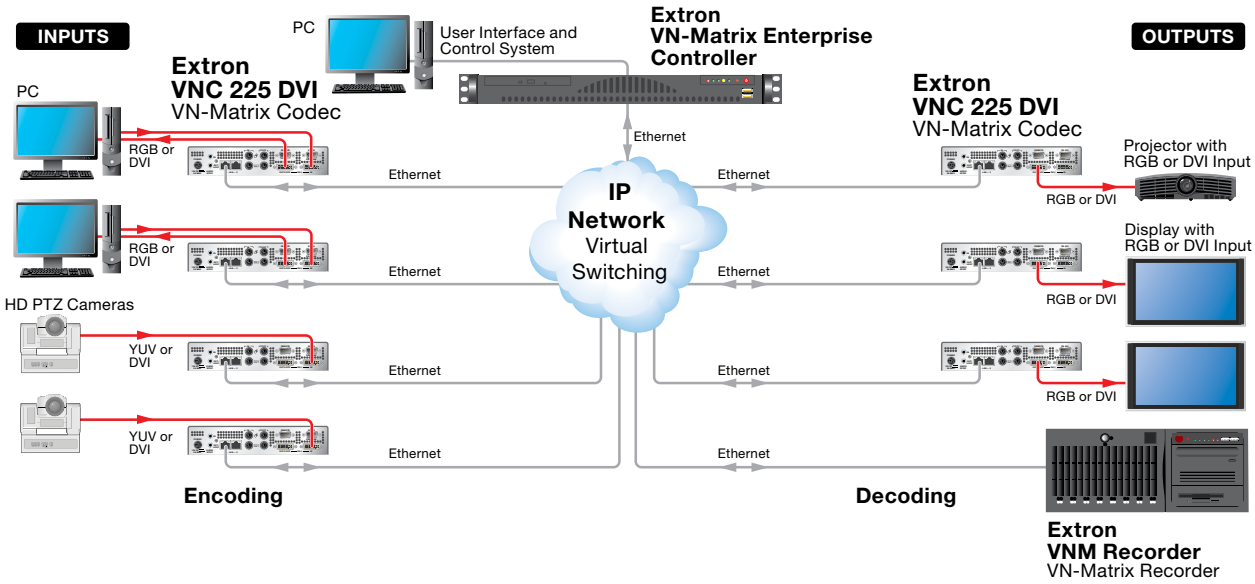


Figure 4. Using the VN-Matrix 225 Matrix to Integrate a Web Management System

Data Transport Methods

Source data from a VNC 225 or a VNE 225 encoder can be distributed to multiple displays and decoders (one-to-many) or to a single display or decoder (point-to-point).

Video data is transported from the source (encoder) to the display (decoder) using one of three methods:

- **Multicast RTP**
- **Unicast RTP**
- **Unicast TCP**

A description of each method with its advantages and disadvantages is provided on the next two pages.

Multicast RTP

This method uses a real-time variation of User Datagram Protocol (UDP), called Real-time Transport Protocol (RTP). Multicast RTP allows a source signal to be displayed on any number of displays.

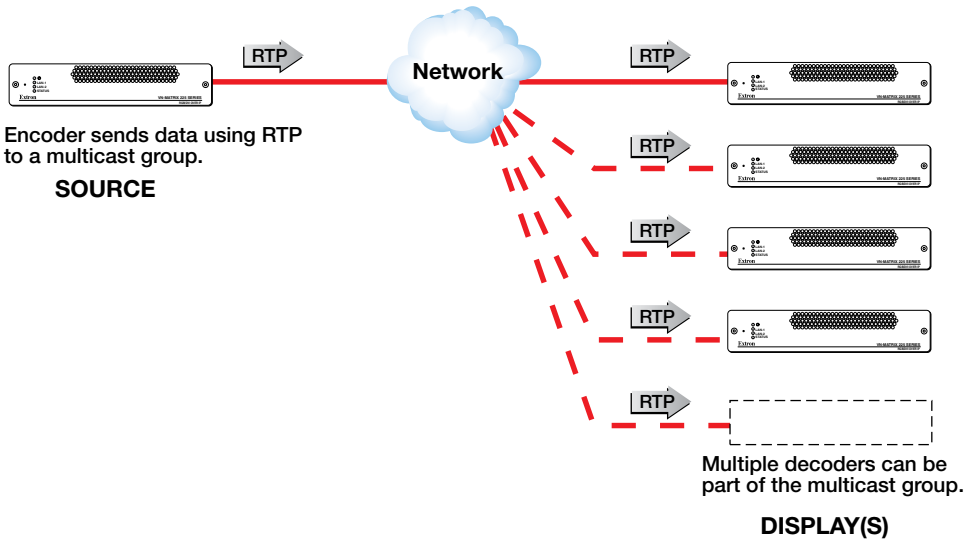


Figure 5. Multicast RTP

The source encoder uses RTP to send data to a multicast group. The source encoder does not need to know the IP address of any decoders using that source.

RTP provides very low latency, which is important for video transport. Unlike other protocols, RTP packets include a time stamp. Therefore, if packets are received in the wrong order they can easily be sorted into the correct order for display, or discarded if the time stamp is out of date.

However, because RTP is a connectionless protocol, data delivery is not guaranteed. Where data packets are lost (for example, due to excessive network traffic) the VNC 225 carefully manages the data stream to minimize any image disruption.

Unicast RTP

Like multicast RTP, this method uses a real-time variation of UDP protocol, called Unicast RTP. This method can be used where the network infrastructure does not support multicast traffic. Unicast RTP should be used as a point-to-point configuration (that is, single source to single display) but can be used for up to four displays.

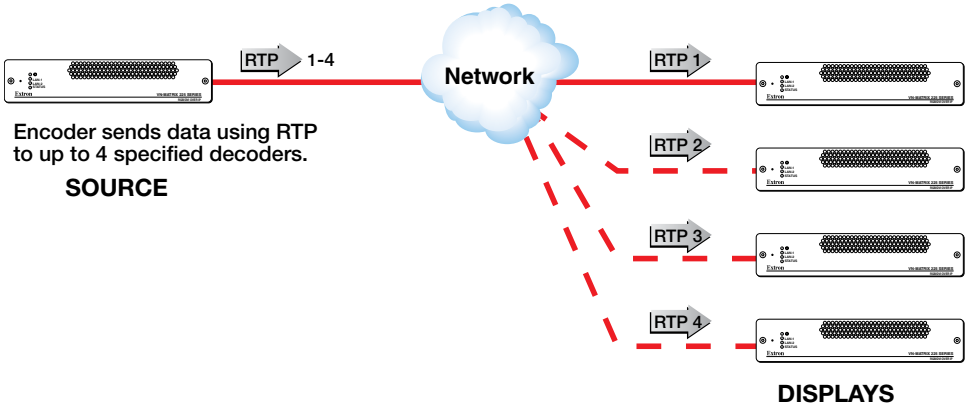


Figure 6. Unicast RTP

RTP provides very low latency, which is important for video transmission. Unlike other protocols, RTP packets include a time stamp. Therefore, if packets are received in the wrong order they can easily be sorted into the correct order for display, or discarded if the time stamp is out-of-date.

However, because RTP is a connectionless protocol, data delivery is not guaranteed. Where data packets are lost (for example, due to excessive network traffic) the VNC 225 carefully manages the data stream to minimize any image disruption.

Unicast TCP

This method transmits data using standard TCP and should only be used for single point-to-point transfer of data.

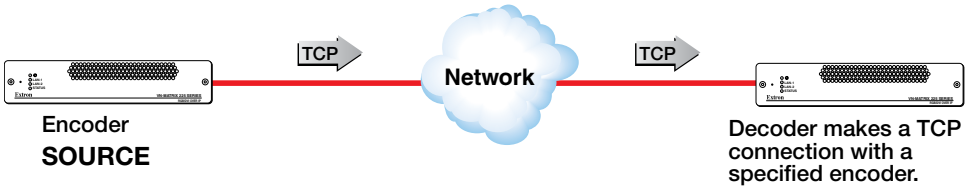


Figure 7. Unicast TCP

TCP is a connection-based protocol and, therefore, data is guaranteed to be delivered. However, in the event of excessive network traffic, delivery may be delayed and will impact real-time performance.

NOTE: Multiple decoder connections are theoretically possible using this method but NOT recommended. Each additional connection will create extra loading on the encoder CPU which will ultimately result in poor display performance. In addition, multiple TCP streams carrying the same source data is an inefficient use of network bandwidth.

Front Panel Features

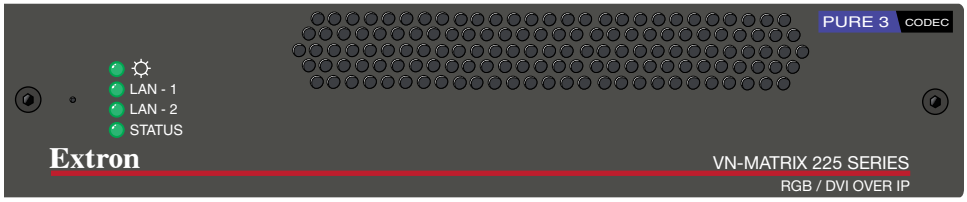


Figure 8. VN-Matrix 225 Front Panel

Indicators

The following LED indicators are on the front panel of the VNC 225:

Name	Color	Indication		
☼ (Power)	Green	• **Fully Lit** — The unit is receiving power from the 12 V supply input • **Flashing** — An over-temperature condition, a power overload, or a power underload has occured. Cycle the power off and then on to reset.		
LAN-1	Orange	Indicates the status of network port 1: • **Fully Lit** or **Flashing Intermittently** — Control or source data is being transmitted or received by the port. • **Unlit** — No data or network connection is detected.		
LAN-2	Orange	Indicates the status of network port 2: • **Fully Lit** or **Flashing Intermittently** — Control or source data is being transmitted or received by the port. • **Unlit** — No data or network connection is detected.		
Status	Green	Indicates the source status of the VNC 225		
		Condition	**Encoder (Source)**	**Decoder (display)**
		Unlit	No source input is detected.	No source is being received.
		Flashing	Source signal is being streamed.	Source is being received.
		Fully Lit	Source is present but not being streamed (the unit is currently disabled, in standby mode, or no decoder is subscribed to the encoder).	Not applicable.

NOTE: During the VNC 225 boot up period (typically 20-30 seconds) the Network and Status indicators may light or flash intermittently.

Reset Button

The VNC 225 has a recessed reset button on the front panel. This button can be used to reboot the operating system, for example, during a firmware update.

To activate this button, insert the blade of a very small screwdriver (or similar tool), a pointed stylus, or a straightened paper clip into the hole on the front panel to the left of the LED indicators and press the button.

Rear Panel Features

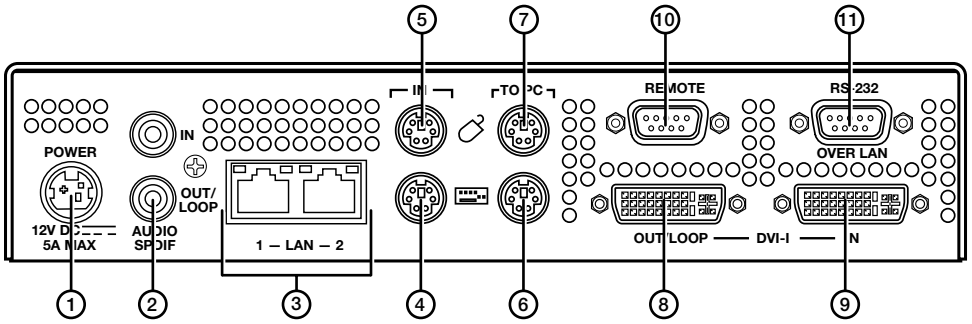


Figure 9. VN-Matrix 225 Rear Panel

Full details of the following connector types, pin-outs, and specifications can be found in the **Technical Data** section on page 103.

① **DC power connector** — The VNC 225 requires a 12 VDC regulated power supply via this connector. A suitable power supply unit (PSU) is provided.

> **ATTENTION:** Unless otherwise stated, the power supply unit is not suitable for use in air handling spaces or in wall cavities.

② **Audio S/PDIF connectors** — Two female RCA connectors for input or output/loop-through of digital audio signals through S/PDIF coaxial cables.

> **NOTE:** Loop-through means that the input is passed through and output unprocessed. This feature applies only to an encoder or a codec configured as an encoder. It does not apply to a decoder.

③ **LAN network connectors (1 and 2)** — Two female RJ-45 connectors are used to connect the VN-Matrix 225 to an Ethernet network. Port 1 is used for data streaming and device configuration (using the web interface). Port 2 is reserved for future use and special applications.

④ **Keyboard connector** — Connect the keyboard to the PS/2 port.

⑤ **Mouse connector** — Connect the mouse to the PS/2 port.

⑥ **PC keyboard connector** — Connect the VN-Matrix 225 PS/2 keyboard port to the PS/2 keyboard port of the PC.

⑦ **PC mouse connector** — Connect the VN-Matrix 225 PS/2 mouse port to the PS/2 mouse port of the PC.

⑧ **DVI-I out/loop connector** — Connect the computer monitor to the female DVI-I output/loop-through port.

> **NOTE:** Loop-through means that the input is passed through and output unprocessed. This feature applies only to an encoder or a codec configured as an encoder. It does not apply to a decoder.

⑨ **DVI-I input connector** — Connect the DVI-I output port of the computer to the female DVI-I input port.

⑩ **Remote serial connector** — This male 9-pin communications port is used to configure the VN-Matrix 225.

⑪ **RS-232 serial connector (over LAN)** — This male 9-pin port is used to transmit and receive data across a network.

Installation and Setup Procedures

This section describes the following:

Choosing a Suitable Location for Mounting

The VNC 225 is designed to be used either as a free-standing unit or mounted in a 19-inch rack using optional mounting kits.

ATTENTION:

- Whichever installation method you choose, there are environmental requirements, detailed in **Environmental Requirements**, that must be observed in order to ensure safe and reliable operation.
- For rack-mounted applications, the criteria detailed in **UL Rack Mounting Guidelines** on page 113 also must be observed.

Environmental Requirements

ATTENTION: The criteria in this section must be observed for all installations of the VNC 225, whether free-standing or rack-mounted.

Orientation

The VNC 225 is designed to be used free-standing on a stable, horizontal surface. It can, however, be used in any orientation subject to the necessary ventilation requirements.

Temperature

- **Do not** install or operate the VNC 225 in an area where the ambient temperature exceeds 35 °C (95 °F) or falls below 5 °C (35 °F).
- The VNC 225 and its associated power supply (PSU) produce heat, which may affect the ambient temperature.
- After the VNC 225 has been in use for a period of time, the external casing may become slightly warm to the touch. Ensure that any adjacent surfaces will not be affected by the heat.

Ventilation

Do not obstruct the ventilation openings during use. The VNC 225 has an integral forced-air cooling system. A fan draws air in through the ventilation openings in the front panel and expels the heated air through the openings in the back panel. The fan speed is controlled automatically by an internal temperature sensor. The fan may, therefore, appear to run faster as the unit warms up or if the ambient temperature is increased.

A self-resetting thermal cutoff shuts down the VNC 225 if the temperature exceeds design limits.

Humidity and Water

Do not install or operate the VNC 225 in an area:

- In which the ambient relative humidity exceeds 85%
- That is prone to condensation
- Near water or in a location that may be prone to water

Mounting the Units

ATTENTION: Installation and service must be performed by authorized personnel only.

Detailed mounting instructions can be found under **Mounting the VN-Matrix 225** on page 113. The 1U high, half-rack width VNC 225 codecs can be placed on a tabletop, without additional kits or mounted on a rack shelf or mounted under a desk, using the optional applicable mounting kit.

WARNINGS:

- This equipment must be grounded.
- To avoid the possible risk of electric shock or product damage due to condensation, always allow the PSU to adapt to the ambient temperature and humidity for at least 30 minutes before switching it on. This is particularly important when moving the unit from a cold location to a warm location.

Power Connection via the PSU

Always ensure that the power supply is the correct voltage and frequency for all equipment within the rack and that it has a good ground (earth) connection.

Where a power strip is used, always ensure that the current rating of both the power strip and the supply is sufficient for all equipment within the rack.

The VNC 225 must be powered from a 12 VDC regulated supply. A suitable power supply unit (PSU) is provided. The following power connection details relate to the PSU.

ATTENTION:

- Never connect the VNC 225 directly to the power source.
- To ensure CE compliance always use the provided PSU.
- If a backup or replacement PSU is required, always use an Extron approved PSU.

Supply Requirements for the PSU

ATTENTION: Always observe the following instructions to ensure safe and reliable operation of the PSU.

- Always ensure that the supply voltage is single phase only and is within the permitted range: 100 – 240 VAC (0.45 A max.) 50 – 60 Hz.
- Never connect the PSU to a DC supply.
- Do not allow the power outlet to be overloaded. This is particularly important to check when powering several items of equipment from a single power outlet (that is, within rack-mounted installations).

Power Cord for the PSU

The PSU is equipped with a 3-pin male connector that requires a power cord fitted with a corresponding female 3-pin IEC connector.

The type of power cord that is supplied is appropriate for use in your country:

WARNING: Possibility of electric shock: Do not allow anything to rest on the power cord.

Wiring Details

The wires of both power cords (supplied with each VNC 225) are color-coded as shown in the table below. Be sure to connect your plug in accordance with the following guidelines:

Connect the wire colored...	to the terminal identified as...
Brown	"L" or "Live" or "Line" (or colored red or brown)
Blue	"N" or "Neutral" (or colored blue or black)
Green and yellow	"E" or "G" or "Earth" or "Ground"(or colored green or green and yellow)

WARNING: Possibility of electric shock: If you are unsure of the connections, or if the markings on your plug do not match those given above, consult a qualified electrician.

NOTE: The PSU is double insulated and does not require a ground connection. However, the ground cable of the lead must be connected in the plug.

Power-up Procedure

You must always ensure that the VNC 225 is powered on at the same time as the source computer or slightly before.

Powering the VNC 225 after the source computer may result in the source computer not correctly detecting the mouse, keyboard, monitor, or all three.

Attaching a power plug

If you are attaching a plug to an unterminated power cord (or replacing an existing plug), you must fit a plug that is:

- Rated for use with mains voltage
- Equipped with a grounding pin or connection
- In compliance with any applicable national or local electrical regulations
- Fitted with a correctly rated fuse (applicable to UK-style plugs only (see **Setup and Connection Procedure** on page 14).

WARNING: Possibility of electric shock: Never attempt to fit or use a plug without a ground connection.

External Power Supply Protection

ATTENTION: The power cord supplied with this product is rated at 10 A, maximum, and must be protected from overload by an external fuse or circuit breaker.

Fused plugs (UK style)

If the power cord is fitted with a UK style BS1363 3-pin plug (one with provision for an internal fuse), then it must be fitted with a BS1362 ASTA approved 1 inch cartridge fuse.

This fuse must be rated at a **maximum of 10 A/250 V**. Since the current draw of the PSU is less than 1 A, a fuse of a lower rating **not less than 3 A/250 V** may be used.

WARNING: Possibility of electric shock: Never attempt to fit a fuse or circuit breaker of a higher maximum rating than shown above.

Unfused Hard-wired Plugs

If the power cord is fitted with an unfused plug or it is hard-wired into a power strip, then the power cord must be protected by an external fuse or circuit breaker of a rating shown in the table below.

Supply Voltage	110 V Nominal	230 V Nominal
Maximum fuse rating	10 A	10 A
Minimum fuse rating	3 A	3 A

WARNING: Possibility of electric shock: Never attempt to fit a fuse or circuit breaker of a higher maximum rating than shown above.

Setup and Connection Procedure

Setting up and connecting a VNC 225 system is best undertaken in three steps.

- **Step 1: Network Communications Setup**

  Configure the network settings for each device using a PC or laptop and serial data link, ensuring that one device is configured as a controller (see Network Communications Setup, below).

- **Step 2: Connect Devices**

  Connect each device to the network and connect its associated source or display equipment (see **Connecting Devices** on page 18).

- **Step 3: System Configuration**

  Use a PC or laptop connected to the VN-Matrix network to access the web interface (served by the controller) to configure each device to be an encoder (source) or decoder (display) (see **System Configuration** on page 21).

ATTENTION: Do not proceed with connecting or configuring the VNC 225 for an existing network until you are certain you know what you are doing. Incorrect connection or configuration may cause disruption to other network users.

Network Communications Setup

Establishing a serial communication link

1. Using a null modem serial cable, connect the serial port of a PC or laptop to the Remote serial port on the VNC 225 to be configured.

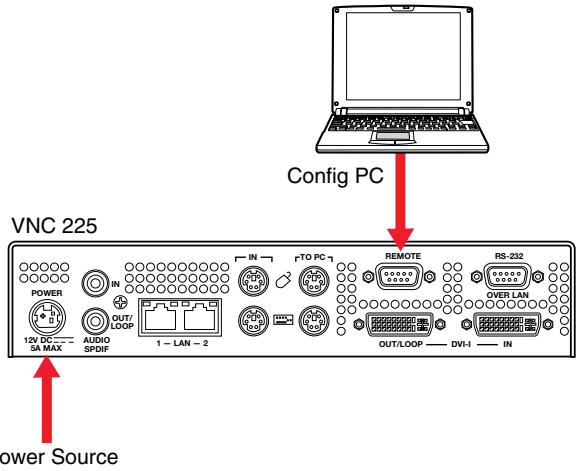


Figure 10. Establishing a Serial Communication Link

2. On the PC or laptop, open a terminal emulation program such as Extron DataViewer with the following settings:

   - Baud rate: 115200
   - Data bits: 8
   - Parity: None
   - Stop bits: 1
   - Flow control: None

NOTE: DataViewer is available on the Extron website (**www.extron.com**), free of charge.

Accessing the setup menus

1. Connect power to the VNC 225 or, if already connected, cycle the power off then on.
2. The VNC 225 starts sending setup and diagnostic data, which appears in the terminal emulation window. After a few seconds, this data concludes with a display similar to the following:

```
VN-Matrix® Maintenance Console: ver3.1c
```

NOTE: The version number can change depending on the latest version available.

```
(none) login: ThorPci Init
registering plx interrupt routine = D17F89FC, -78Ø166896
Hello kernel
thor_init_module: pre-ioremap
thor_init_module: post-ioremap
Hello kernel, this is MK registering
registering plx interrupt routine = D296BD3Ø, Ø
```

3. Press the <Enter> key. The VNC 225 responds with the following login prompt:

```
VN-Matrix® Maintenance Console: ver3.1c
192.168.Ø.1 login:
```

NOTES:

- The version number can change depending on the version available.
- The login prompt is preceded by the current IP address of the unit.

4. Type `config`, then press <Enter>.
5. When prompted for a password, type `config` then press the <Enter> key. The following menu displays:

Network Port 1		Network Port 2	
Ø. Speed/duplex:	auto_1Ø_1ØØ_1ØØØ	1Ø. Speed/duplex:	auto_1Ø_1ØØ_1ØØØ
1. Boot method:	static [dhcp]	11. Boot method:	static [dhcp]
2. Address:	192.168.Ø.1	12. Address:	192.168.1.1
3. Netmask:	255.255.255.Ø	13. Netmask:	255.255.255.Ø
4. Gateway:	192.168.Ø.1	14. Gateway:	
5. Broadcast:		15. Broadcast:	
6. MTU:	15ØØ	16. MTU:	15ØØ
7. Controller IP:	192.168.Ø.18	17. IP forwarding:	Ø
8. Controller port:	5432	18. Web server port:	8Ø
9. Exit			

NOTE: The IP address details shown above are for illustration only and do not represent values that will work in a particular application.

The **table** on the next page, describes the menu options in greater detail.

6. Change the settings as required by typing the option number followed by the <Enter> key. Then type the new value and press the <Enter> key.

Example: To change the Network Port 1 IP address to 172.28.232.16:

Type **2** and press <Enter>, then type `172.28.232.16` and press <Enter>.

NOTE: Do not include any leading zeros when entering IP addresses.

For example, enter 192.168.0.18 and not 192.168.000.018.

Network Port-Specific Options		
Option	**Function**	**Comment**
Ø and 1Ø	Set network port link speed.	Select this option to set the network link speed. After you select either Ø or 1Ø, a new menu is displayed with five options, numbered 1 through 5. Enter the number that corresponds to the desired mode.
1 and 11	Set static or DHCP.	Entering 1 or 11 toggles this option. When DHCP is selected, options 2 through 5 and 12 through 15 are not accessible. **NOTE:** It is necessary to assign a known IP address for the controller. This address must be entered manually into each VNC 225 unit. Therefore, it is not always practical to use DHCP. It is recommended to use a static IP address scheme.
2 and 12	Set the local address of the network port.	Network port 1 is assigned to the RJ-45 connector. Network port 2 is assigned to the RJ-45 connector. Standard Ethernet IP addressing rules apply. Do not use any leading zeros in the IP address; for example, 172.28.12.1ØØ is valid; 172.ØØ28.Ø12.1ØØ is not valid.
3 and 13	Set the appropriate subnet mask for the network.	Standard Ethernet subnet rules apply. Do not use leading zeros in the subnet mask.
4 and 14	Set the IP address of the default gateway.	Required for VNC 225 systems that include multiple subnets. The default gateway must be on the same subnet as the port to which it is assigned. **NOTE:** Setting the gateway address allows for bit rate statistics to be displayed in the streams panel of the encoder bandwidth page. Only one default route is supported. After a value is set for either option, the other option is no longer available. To clear a gateway address, select the option (4 or 14) and press <Enter> with no value set. Standard Ethernet IP addressing rules apply. Do not use leading zeros in the IP address.
5 and 15	Set the broadcast address.	Not required.
6 and 16	Set the value of the maximum transmission unit (MTU), for example, the number of bytes (payload) in a frame.	This value affects the performance of the system. A large value can cause packets to be fragmented (split) while a small value may not make efficient use of the network capacity. For Ethernet this value is normally set to 15ØØ. In certain circumstances this value may need to be changed to better match the network currently in use (see **Data Packets and Frames** on page 95).

Unit Specific Options		
Option	**Function**	**Comment**
7	Set the IP address of the controller.	Only one VNC 225 may be configured as a controller. The controller IP address must be set to the IP address (options 2 and 12) of either network port on the unit designated as the controller. This is the port over which control data is sent.
17	IP forwarding	By default, this parameter is set to 0. For normal operation, there is no need to modify this setting. Setting a value of 1 enables IP forwarding between the two network ports on the device. This function is not required for normal operation of the device.
8	Set the number of the port used for communications with the system controller.	By default this is set to 5432, and this may be changed if required. Note that all VNC 225 units must have the same port number assigned.
18	Set the port number that is used for communication with the web server.	By default this is set to 80, and this may be changed if required. Note that the web browser in use must use the same port number. **NOTE:** Option 18 is visible only on the controller.
9	Reboot and activate settings.	Reboot the VNC 225 to activate any changes. **NOTE:** Typing reboot at the DataViewer cursor also resets the unit.

NOTES:

- For advice on choosing IP addresses, see **Using the Ping Utility to Test Communications** on page 94.
- For normal applications only network port 1 settings need to be configured.
- Options 1 and 11 are toggle actions. For example, to switch between static and DCHP modes, type 1 and press <Enter>. The currently selected mode is the option listed first. When DHCP mode is selected, options 2, 3, 4, and 5 (or 12, 13, 14, and 15) are not displayed.
- Only one VNC 225 can be configured as a controller (see below). The controller IP (option 7) must be set to the IP address of the unit designated as the controller.

Configuring a VNC 225 as a controller

1. Ensure that the boot method for network port 1 is set to static (option 1).
2. Set the IP address (option 2) and controller IP (option 7) to the same value.

Implementing the new settings

1. After you have completed making any changes, type 9 and press <Enter> to exit the menu. The VNC 225 reboots automatically to implement the new settings.
2. If the unit does not reboot for any reason or if you want to perform a manual reboot, type reboot at the command prompt and press <Enter>, or cycle the power off and on to reboot the unit and implement the new settings.

   The VNC 225 is now ready for connection to the network.

Connecting Devices

Supplied cables

A set of cables is supplied with the VNC 225 to accommodate a variety of standard connection requirements. The VNC 225 is compatible with both digital (DVI) and analog signals. The unit is provided with the additional cables you may require.

Cable Description	Source (encoder)		Display (decoder)	
	Digital	Analog	Digital	Analog
Mouse and keyboard cable (PS/2 to PS/2) (2 off)	✔	✔		
Digital monitor cable (DVI-D to DVI-D)	✔		✔	
Analog monitor cable (15-pin HD to DVI A)		✔		✔
DVI A to 15-pin HD adapter		✔		✔
For connection diagrams, see the sections as indicated by the circled reference numbers: ① See **Connecting a digital source**. ② See **Connecting an analog source**. ③ See **Connecting a digital display**. ④ See **Connecting an analog display**.	①	②	③	④

NOTES:

- Disconnecting and reconnecting PS/2 cables to a computer that is already switched on may cause loss of mouse and keyboard control or cause the computer to freeze. It is recommended, therefore, that the connections are made while the computer is powered down (see **Power-up Procedure** on page 12.
- If you use a monitor cable or adapter other than that provided with the VNC 225 (configured as an encoder), you must ensure that all pins are properly interconnected, otherwise the computer graphics card or monitor may not operate correctly.

Network connection

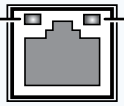
ATTENTION: Do not proceed with connecting the VNC 225 to an existing network until it is correctly configured using the procedure in **Network Communications Setup** on page 14. Incorrect connection or configuration may cause disruption to other network users.

Typically, the VNC 225 connects to a convenient network point on an existing in-house network. Use a standard CAT 7 patch cable for this purpose. A patch cable is not supplied with the VNC 225, but it is available in a variety of lengths.

If a convenient network connection point is not available, it will be necessary to have one installed. Consult your IT or network administrator for advice. Alternatively, the VNC 225 and source computer can share a connection by using a network switch. Hubs are not suitable for use with the VNC 225 because they restrict bandwidth.

NOTE: For normal VNC 225 operation, use network port 1 only.

TIP: With the VNC 225 powered and connected to a network, the Network Status Indicator (above the network RJ-45 connector) should be lit, as follows:



Network Status Indicator
Unlit = no network connection
Lit/flashing = network detected

Data Tx/Rx Indicator
Unlit = no data
Lit/flashing = data

Connecting a digital source

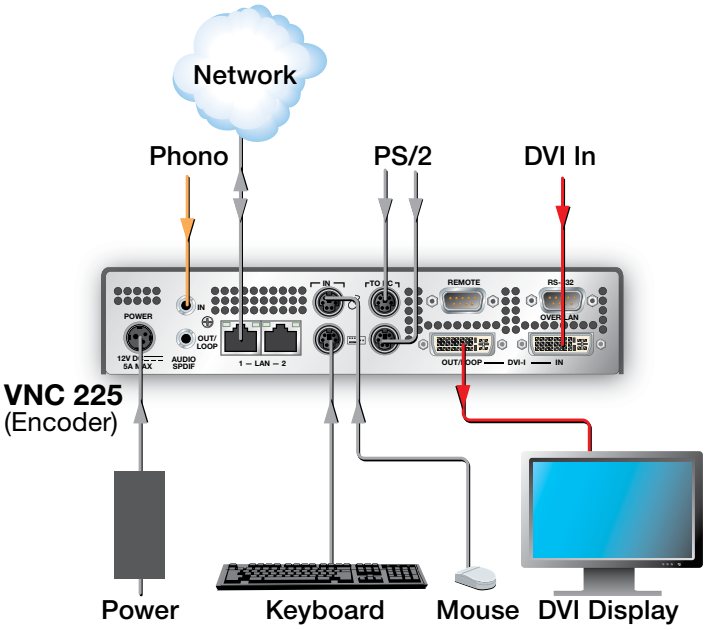


Figure 11. Connecting a Digital Source

Connecting an analog source

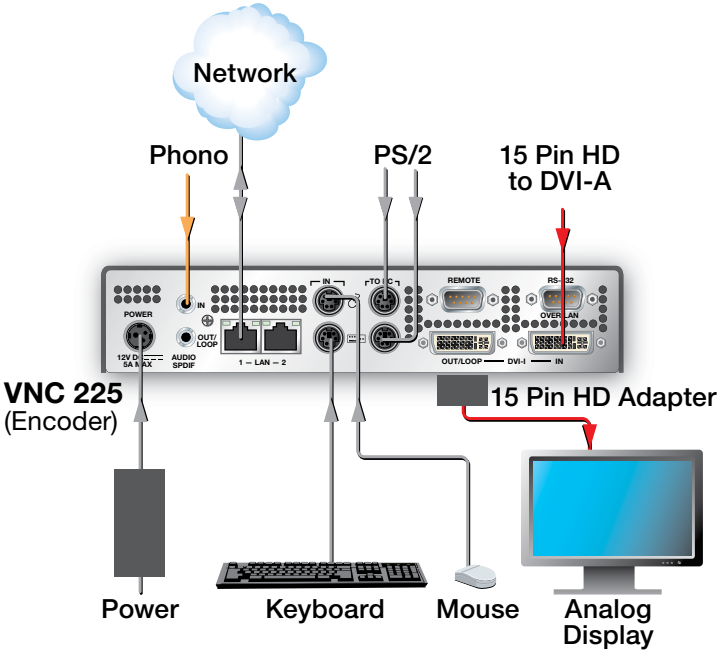


Figure 12. Connecting an Analog Source

Connecting a digital display

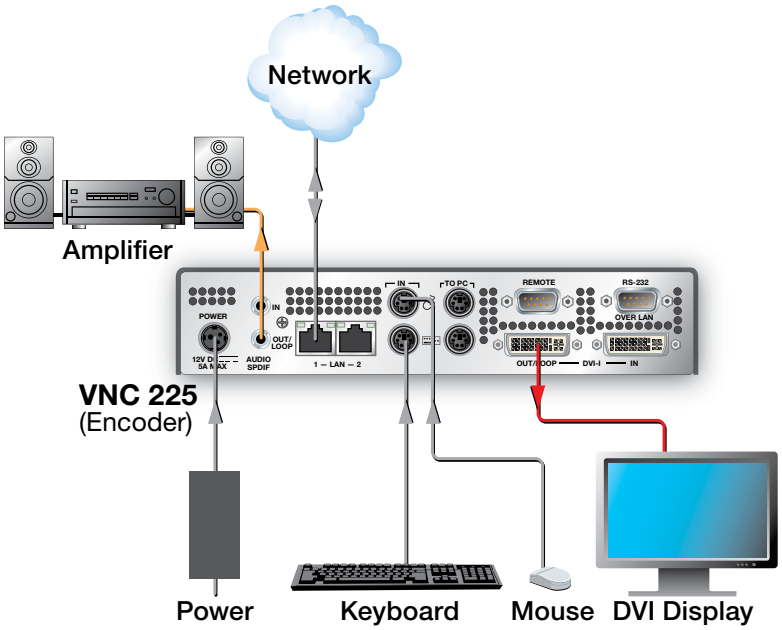


Figure 13. Connecting a Digital Display

NOTE: The VNC 225 provides both an analog and a digital output signal regardless of the original source format.

Connecting an analog display

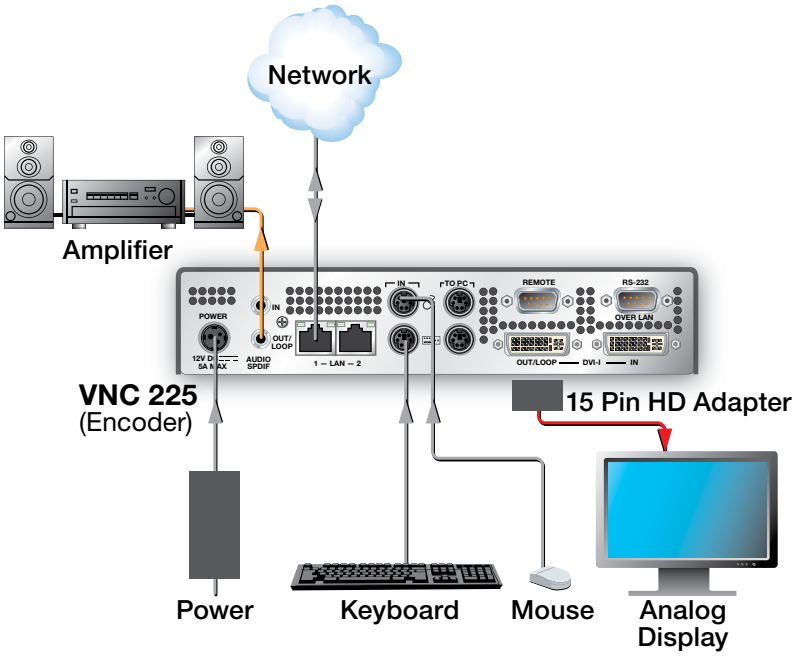


Figure 14. Connecting an Analog Display

NOTE: The VNC 225 provides both an analog and digital output signal regardless of the original source format.

System Configuration

This section provides step-by-step instructions for using the web interface and is aimed at new users of the VNC 225 system. Advanced users may wish to see **Technical Data** on page 103. This section describes the following:

- **VNC 225 Web Interface**
- **Configuring a VNC 225 as an Encoder (Source)**
- **Configuring a VNC 225 as a Decoder (Display)**
- **Troubleshooting**

VNC 225 Web Interface

After all VNC 225 devices have been correctly set up for and connected to a network, any further system configuration is done via the VNC 225 web interface. This contains a number of pages that provide access to various system parameters.

The web interface is stored and accessed via the VNC 225 device that was designated as the controller during the network setup procedure (see **Setup and Connection Procedure** on page 14). It can be viewed by any up-to-date web browser running on a PC or a laptop that is connected to the same network as the VNC 225 devices.

Suitable browsers include, but are not limited to:

- Microsoft Internet Explorer (v6 and above)
- Mozilla Firefox (v1.3 and above)

NOTE: The browser must be configured to accept cookies and be JavaScript™ enabled. For further help on configuring your browser (see **Browser Configuration** on page 99).

Accessing the Web Interface

1. Enter the IP address of the controller device into the address bar of the web browser, for example, http://192.168.0.18 and browse to that address. The following web page displays in the web browser:

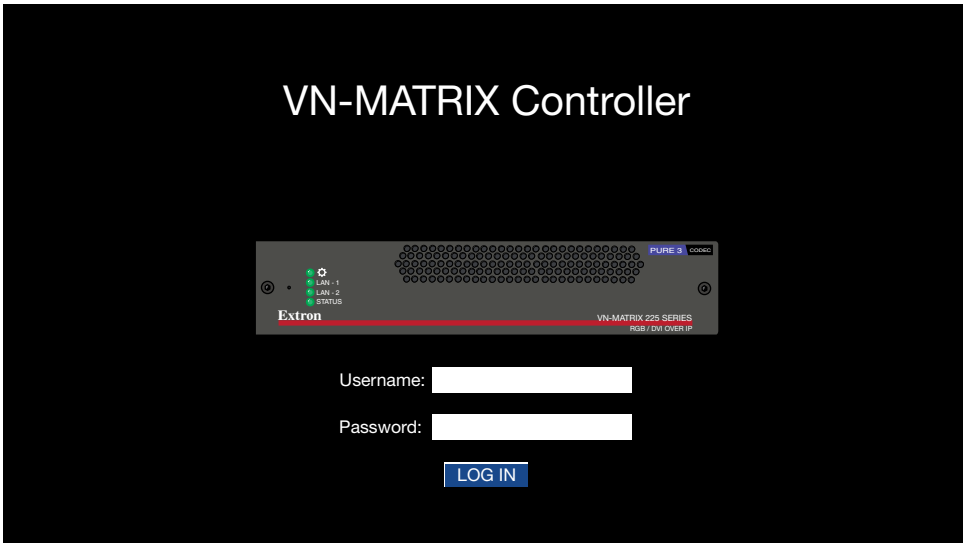


Figure 15. VN-MATRIX Controller Log-in Screen

2. Enter the appropriate user name and password.

   The VNC 225 has two user accounts or security levels:

   - **admin** — Allows full read and write access to all setup parameters.
   - **public** — Allows read-only access to setup parameters.

   NOTES:

   - As shipped from the factory, the password for both accounts is the same as the user name (the password is "admin" for the administrator account and "public" for the public account).
   - The user name and password are case sensitive.
   - For initial setup, use the admin user name.

   Initially, the password for both accounts is the same as the user name (that is, the account name). It is recommended that these passwords be changed after logging in (see **Changing User Login Passwords** on page 79).

3. Click the **Log In** button. If the login details are correct the Device List page displays (see the next section).

Device List Page

This page lists all VNC 225 devices detected on the network.

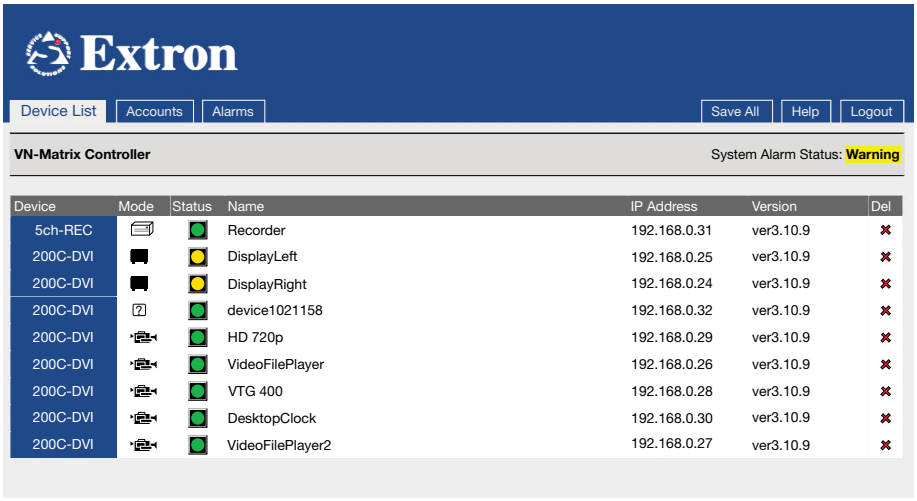


Figure 16. Device List Page

NOTE: If devices are added after this page displays, they do not automatically appear on this list. You need to refresh the list by clicking the Device List tab or by refreshing the browser.

After a VNC 225 device has been detected and listed on the Device List page, an entry displays even if the device is subsequently disconnected. All valid devices are listed by device name and current IP address. Missing devices are easily identified by the lack of an IP address and are not currently available. For example, the device may be disconnected from the network or powered down.

Icons used on the Device List Page

The current configuration status of each device is also identified by an icon:

Icon	Description	Icon	Description
5ch-REC	A 5 Channel VN Matrix recorder		Unconfigured device
200C-DVI	A 2xx series codec (Note that 200 and 225 series devices have the same icon)		Configured as an encoder (source)
200E-DVI	A 2xx series encoder		Configured as a decoder (display)
200D-DVI	A 2xx series decoder		Configured as a PC system such as a recorder or playback device

In a new system, all VNC 225 devices are typically in an unconfigured state. The remainder of this section guides you through the process of configuring each VNC 225 as either an encoder (source) or decoder (display).

Online help

Online help is available for each page in the web interface by clicking the **Help** tab.

Interface timeout and logging out

If the web interface is left unattended or is not used for 30 minutes, it logs out. You can start using the interface again by reentering your login details.

Log out of the web interface

Click the Logout tab on any page or close the web browser.

Save All tab

On the Device List page only there is a Save All tab.

Clicking the Save All tab saves all current settings (including those that have been updated) for all VNC 225 units.

Configuring a VNC 225 as an Encoder (Source)

The following procedure assumes that a valid source is connected to the VNC 225. For details on how to connect a source, see **Setup and Connection Procedure** on page 14.

NOTE: This procedure provides a basic level of configuration that will be adequate for most systems. For additional options, see **Advanced Setup Procedures** on page 53).

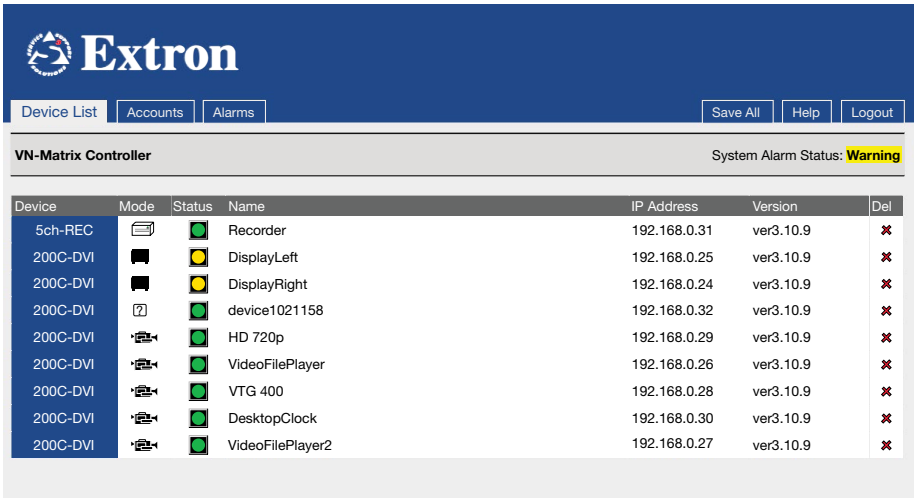


Figure 17. Configuring a VNC 225 as an Encoder

1. On the Device List page, click the device that you want to configure. The Device page displays.

2. If the device has not been configured (device type is none), click the create source button (see Device Setup Mode on the Help tab).

TIP: You can change the default device name to be more relevant to the source input (for example, Camera1) (see 2a in the illustration below).

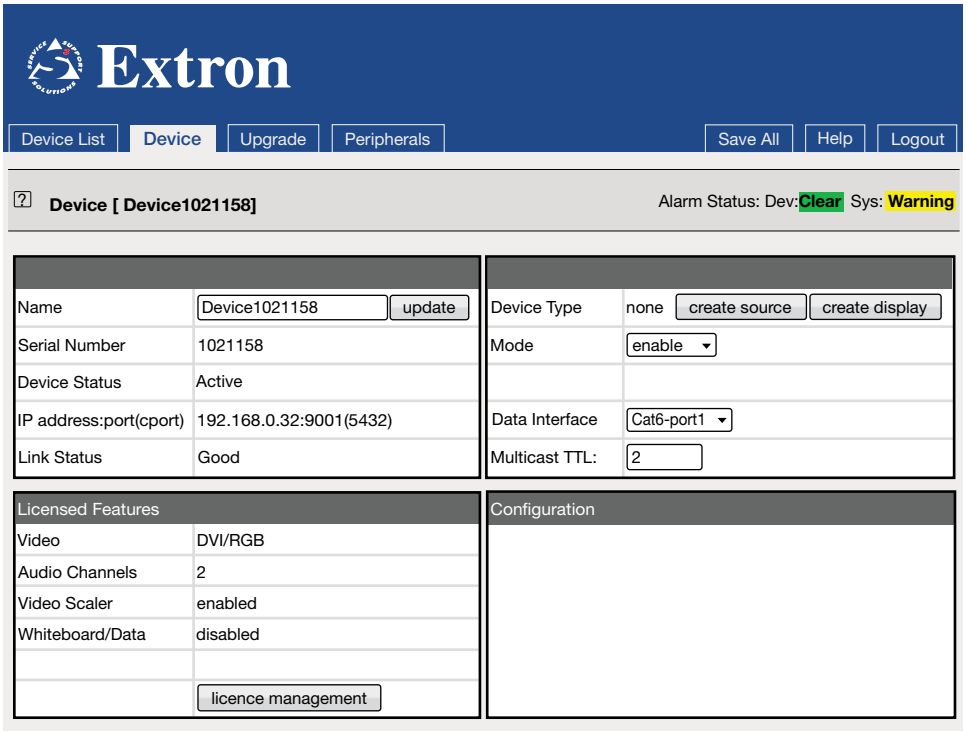


Figure 18. Device — Create a Source Button

3. Check that the **Mode** field is set to **enable** (see Device Setup Mode on the **Help** tab).

TIP: To help identify this device during setup or troubleshooting, select the **Identify** check box to display the device name on the local monitor (select the **Help** tab on the Device page for more information).

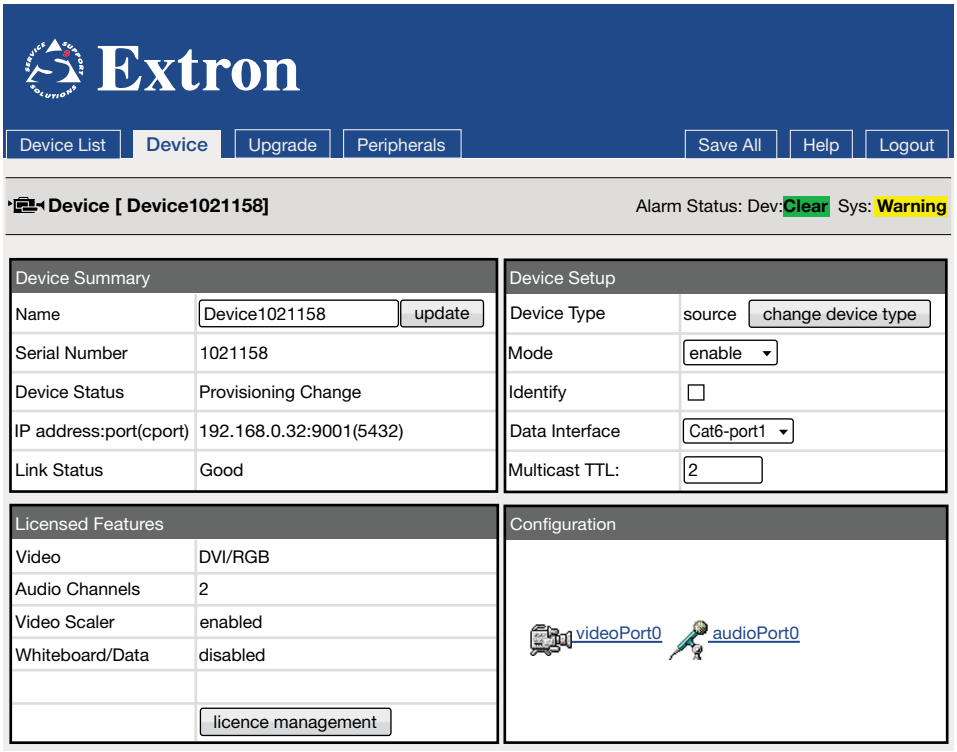


Figure 19. Device Mode

4. Click the **Save All** tab.
5. Click the **videoPortØ** icon. The Configure page displays.

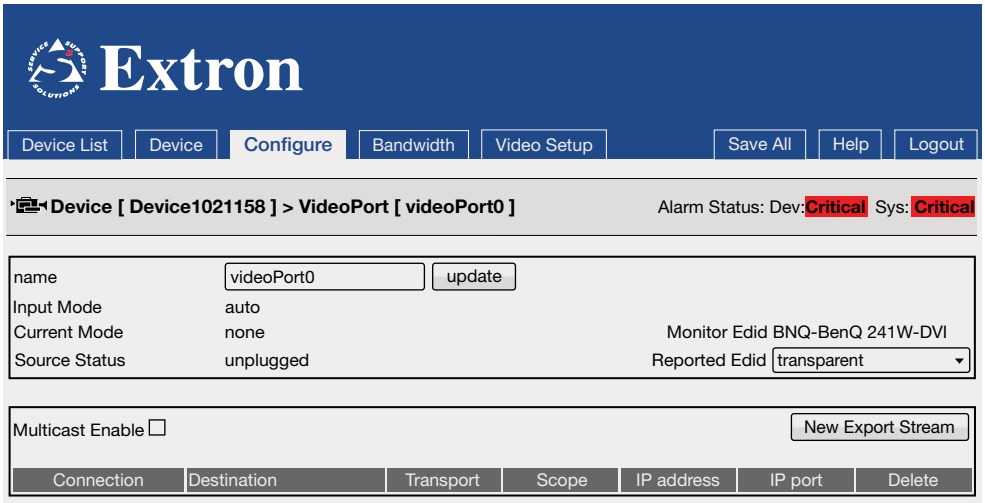


Figure 20. Configure Page

6. Check that the input mode is set to **auto**. If not, see **Input mode**, on page 28.
7. Check that the Current Mode shows the format of the connected source. If it does not, see **Input mode** on page 28.

8. Select the **Multicast Enable** box if RTP multicast source streaming is required. Otherwise ensure this box is deselected in order to enable RTP unicast. A dialogue displays asking for a multicast address. This should be obtained from your network administrator.

   TIP: If your source or local monitor uses Extended Display Identification Data (EDID), you may need to look at these settings (see **EDID options** on page 29 and 8a in figure 20).

9. Does the VNC 225 need to stream audio?

No...	Yes...
Encoder setup is complete. Click the **Save All** tab. If a local monitor is connected it should now be displaying the source. If it is not, see **Source Troubleshooting**, on page 38.	See Additional Setup for Audio, below.

10. Repeat this procedure (from step 1) for each encoder in the system. To configure the VNC 225 device as a decoder (display), see **Configuring a VNC 225 as a Decoder (Display)** on page 31.

Additional Setup for Audio

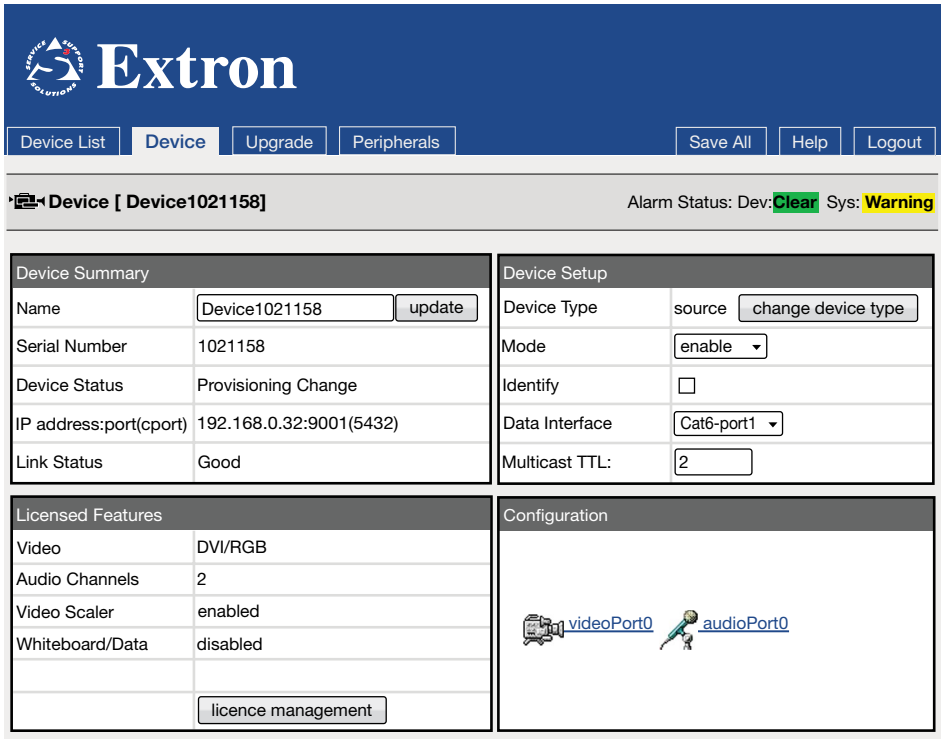


Figure 21. Device Page — Audio

1. Click the **Device** tab to return to the Device page.
2. Click the **audioPortØ** icon. The Configure page displays.

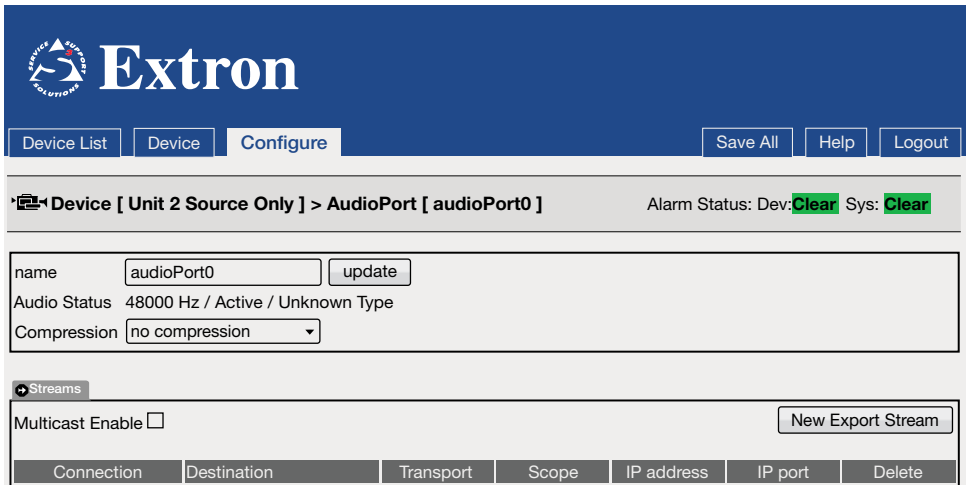


Figure 22. Configure Page — Audio

3. Check that the Audio Status shows a valid audio source type. If it does not, see **Audio Status** on page 30.
4. Ensure that Compression is set to **`no compression`** (see **Audio Compression** on page 70).
5. Select the **`Multicast Enable`** box if RTP multicast source streaming is required. Otherwise ensure this box is deselected in order to enable RTP unicast. This must be the same as the videoPort setting.
6. Click the **`Save All`** tab. Encoder setup is now complete.

Repeat this procedure for each encoder in the system. To configure a VNC 225 device as a decoder display device, see **Configuring a VNC 225 as a Decoder (Display)** on page 31.

Additional Information for Encoder Setup

Input mode

The default and recommended input mode for a VNC 225 encoder is auto. This mode provides full detection of the applied source and automatic configuration of input parameters. It has the additional advantage that if a different source is connected at any time, the VNC 225 automatically reconfigures the input for the new source.

Auto mode detects most standard video and graphics source formats. However, the VNC 225 may not autodetect correctly if the source input:

- Is a non-standard format.
- Is an RGsB (sync on green) or YPrPb source type.
- Has a poor quality signal.
- Has Macrovision® copy protection.

In these cases, to achieve reliable operation, some fine-tuning may be necessary. A predefined or custom input mode can also be applied. For further information, see **Advanced Source Setup** on page 53.

EDID options

Many modern computers and monitors are capable of detecting the Extended Display Identification Data (EDID) of a connected display, allowing the computer graphics card to be aware of the resolution and refresh rate of the display. The VNC 225, when configured as an encoder, provides options for monitoring and reporting the EDID.

To access the EDID options:

1. On the Device List page, select a VNE 225 model.
2. On the Device page, click **`videoPortn`** in the Configuration section to display the Configure page.

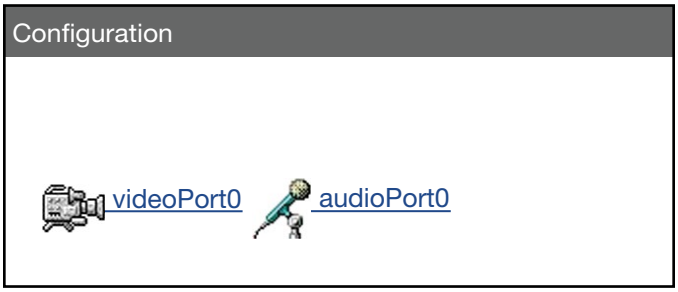


Figure 23. VideoPort0 Button in the Configuration Section of the Device Page

3. On the Configure page, view EDID information in the following fields:

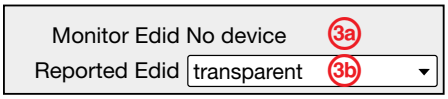


Figure 24. EDID Information Fields

(3a) The **`Monitor EDID`** field shows the local monitor display type. If no local monitor is connected or the monitor does not support EDID, this shows **`No Device`**.

(3b) The **`Reported EDID`** field shows the EDID that the VNC 225 reports to the source device. Transparent mode reports the current or last connected monitor type.

Alternatively, choose one of the listed display types.

Identify mode

As an aid to setting up a VNC 225 encoder in a large or complex system, use the **`Identify`** function (found in the Device Setup portion of the Device page) to display the device name on the local monitor (if connected).

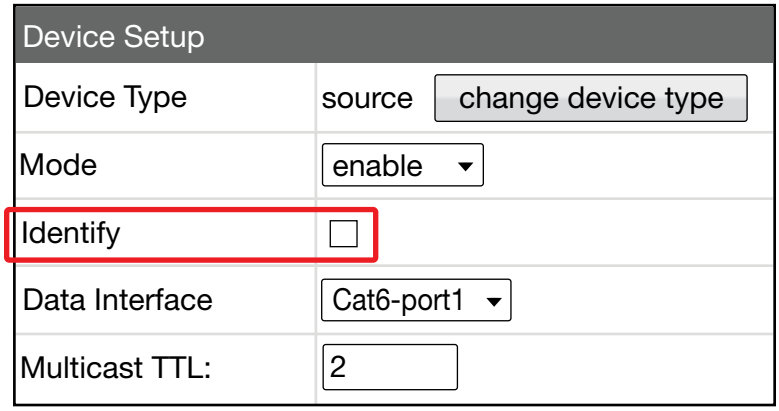


Figure 25. Selecting Identify Mode

Select the **Identify** check box, then click the **update** button. The device name is shown on the local display (see the example in figure 26, below).

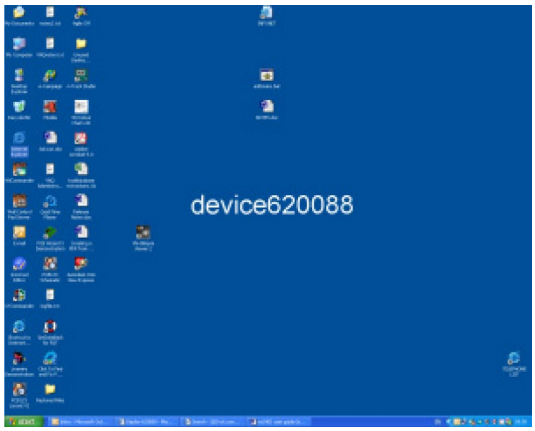


Figure 26. Device Name

NOTES:

- The name displays only if a valid source is connected and has been correctly detected by the VNC 225.
- The name displays only on the local display output. It does not appear as part of the streamed signal.

Device mode

A VNC 225 encoder can be configured in four modes:

- **Enable** Allows the source to be streamed.
- **Disable** Prevents a source from being streamed.
- **Standby** Prevents a source from being streamed.
- **Test** Displays a splash screen with the text “test mode.” Normal streaming is suspended.

For normal operation, **enable** must be selected.

Audio status

Where a valid digital audio signal is connected to the Digital Audio In connector, the type of signal appears in the **Audio Status** field on the Configure (audioPort) page.

The VNC 225 supports the auto-detection of 44100 Hz and 48000 Hz digital audio sources.

Advanced setup options

The encoder setup procedure on the preceding pages achieves a basic level of operation adequate for most normal applications.

The following advanced setup options are available:

Fine-tuning of input parameters	See **Fine-tuning a Source (Manual Overrides)** on page 56.
Creation of custom input modes	See **Creating a custom input mode**. on page 59.
Changing video compression	See **Managing Compression and Bandwidth Settings** on page 62.
Managing bandwidth usage	See **Bandwidth Management Settings** on page 69.
Changing audio compression	See **Audio Compression** on page 70.

Configuring the VNC 225 as a Decoder (Display)

The following procedure assumes that at least one VNC 225 encoder has been configured and is ready to stream a source (see **Configuring a VNC 225 as an Encoder (Source)**) on page 24.It also assumes that a suitable display device is connected to the VNC 225.

NOTE: This procedure provides a basic level of configuration that is adequate for most systems. For more options, see **Additional Information for Decoder Setup** on page 35.

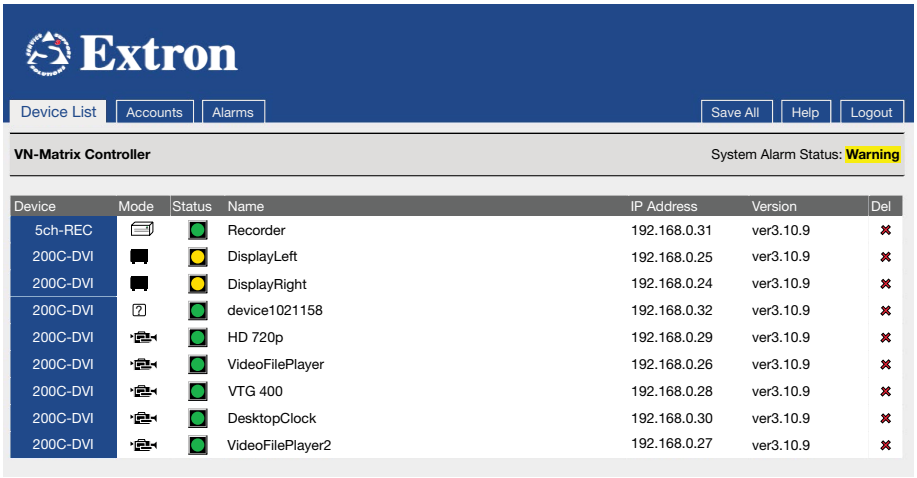


Figure 27. Configuring a VNC 225 as a Decoder

1. On the Device List page, click the device that you want to configure, as shown in the image above. The Device page displays.

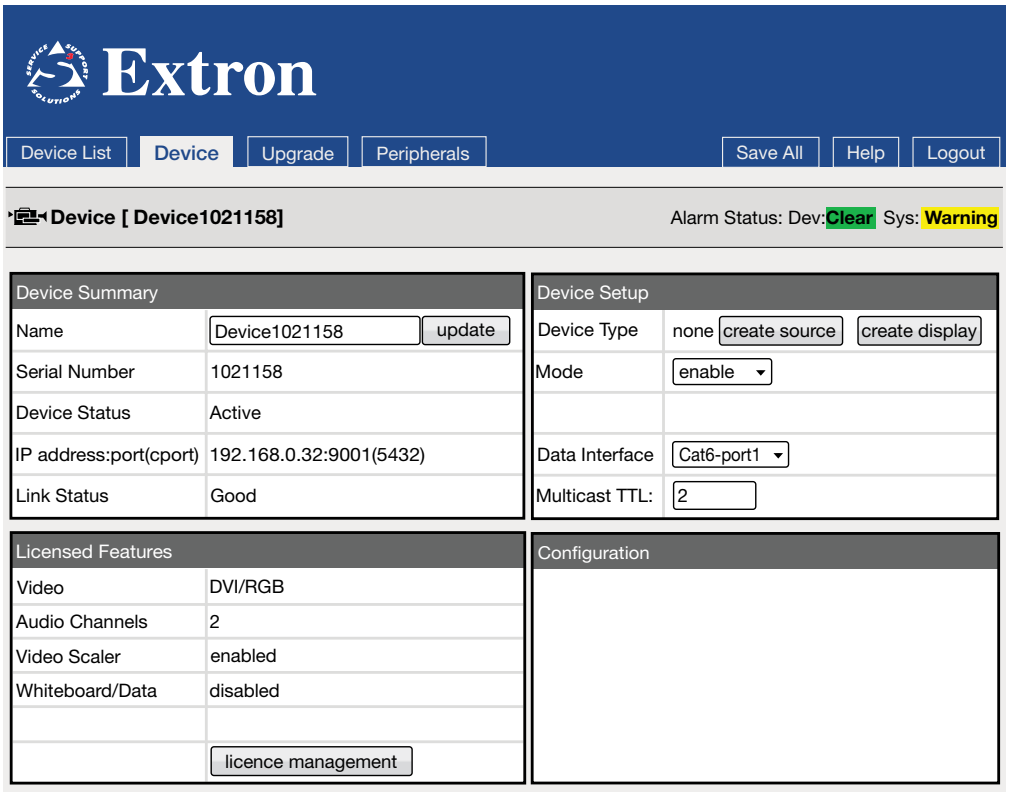


Figure 28. Device Page for Decoder Setup

2. Check that the **Mode** field is set to enable as shown above. Click the create **display** button (2a in figure 28, above). See the **Help** tab for details.

TIP: You can change the default device name to be more relevant to the source input; for example, Device1021158 (figure 28, 2b).

NOTE: Device names can use letters and numbers as well as the underscore and hyphen characters, but must not include spaces.

3. For more information see Device Setup on the decoder Display page **Help** tab (figure 29, ③).

TIP: To help identify this device during setup or troubleshooting, check the Identify box (figure 29, ③a) to display the device name on the local monitor (where connected).

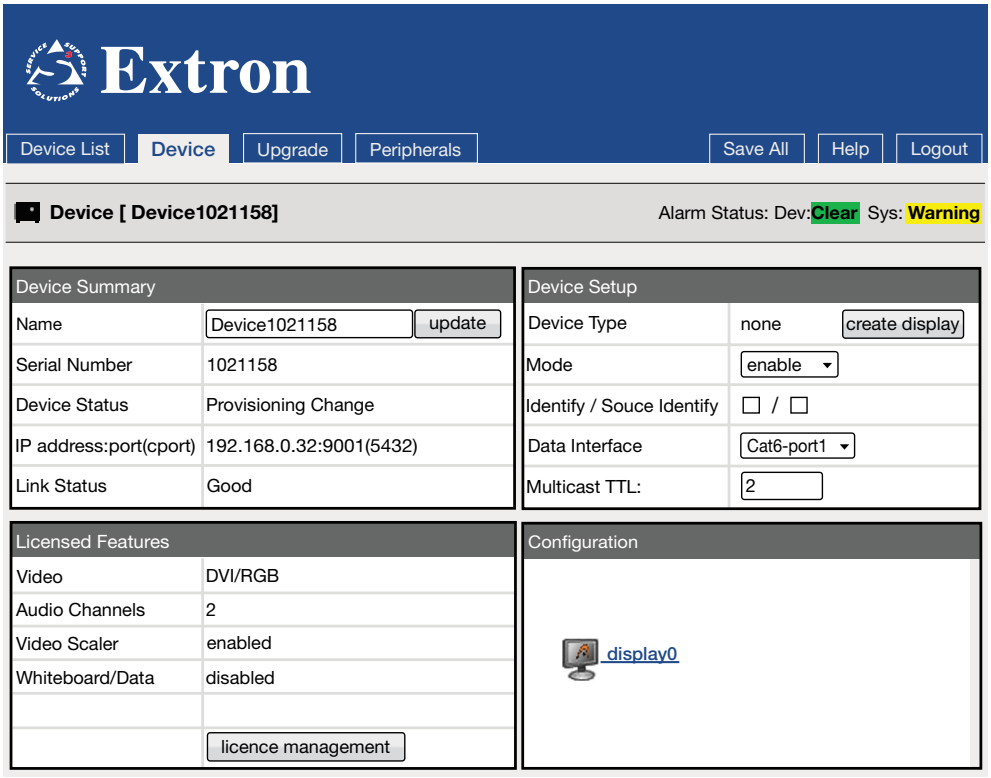


Figure 29. Device Page Setup

4. Click the **Save All** tab, (figure 29, ④).

5. Click the **display0** icon (figure 29, ⑤). The Display page opens.

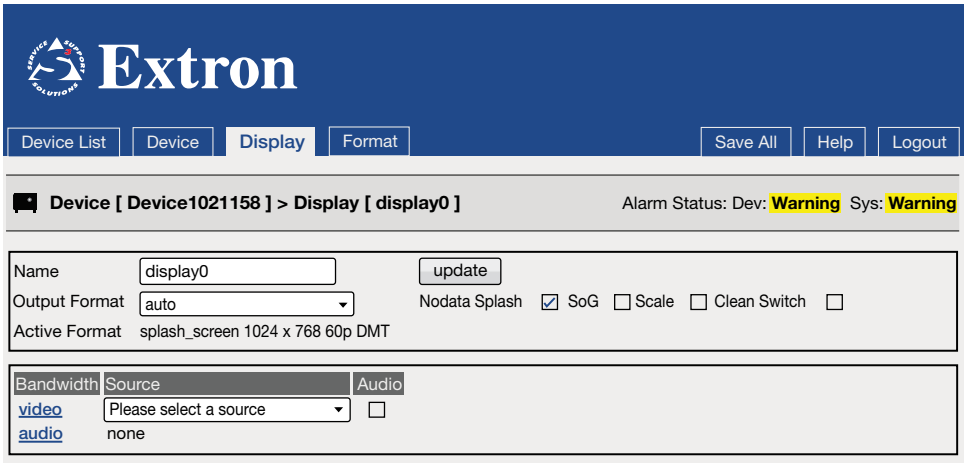


Figure 30. Display Page — Decoder

6. Check that the Output Format is set to auto as shown in the illustration on the previous page. This forces the output format to be the same as the chosen source.

TIP: The **Nodata Splash** option determines how the display output behaves if no source is selected or if the source stops streaming for some reason (figure 30, ⑥a). See Nodata Splash on the Help page accessed from the decoder Display page for more information.

7. If the source type is RGsB (sync on green), ensure that the SoG check box is selected, as shown below. Otherwise, it should be left deselected as shown in figure 30. This forces the output format to be the same as the chosen source.

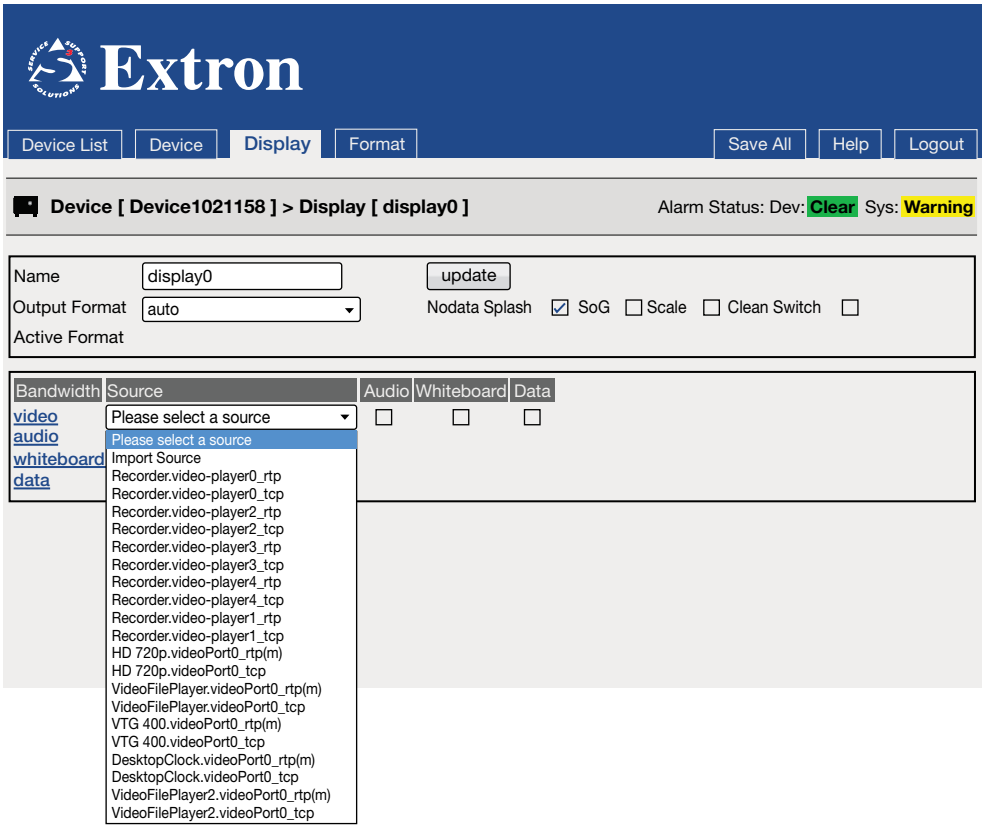


Figure 31. Selecting a Source Stream

8. Select one of the available source streams as shown on the previous page.

   Each source is listed by the device name, video port name, and suffixed by the connection type.

   - _rtp is an RTP unicast connection
   - _rtp(m) is an RTP multicast connection
   - _tcp is a TCP unicast connection

9. If the chosen source has an audio channel, select the **`audio enable`** check box. Otherwise, leave the box unchecked as shown in the previous diagram.

10. Click the **`Update`** button and the **`Save All`** tab as shown above. The chosen source should now appear on the output display. If it does not, see **Display Troubleshooting** on page 38.

Additional Information for Decoder Setup

Identify mode

As an aid to setting up a VNC 225 decoder in a large or complex system, use the **`Identify`** function to display the device name on the display output.

NOTE: Source Identify displays the name of the source stream that is being decoded. The text appears to the right of the Identify text.

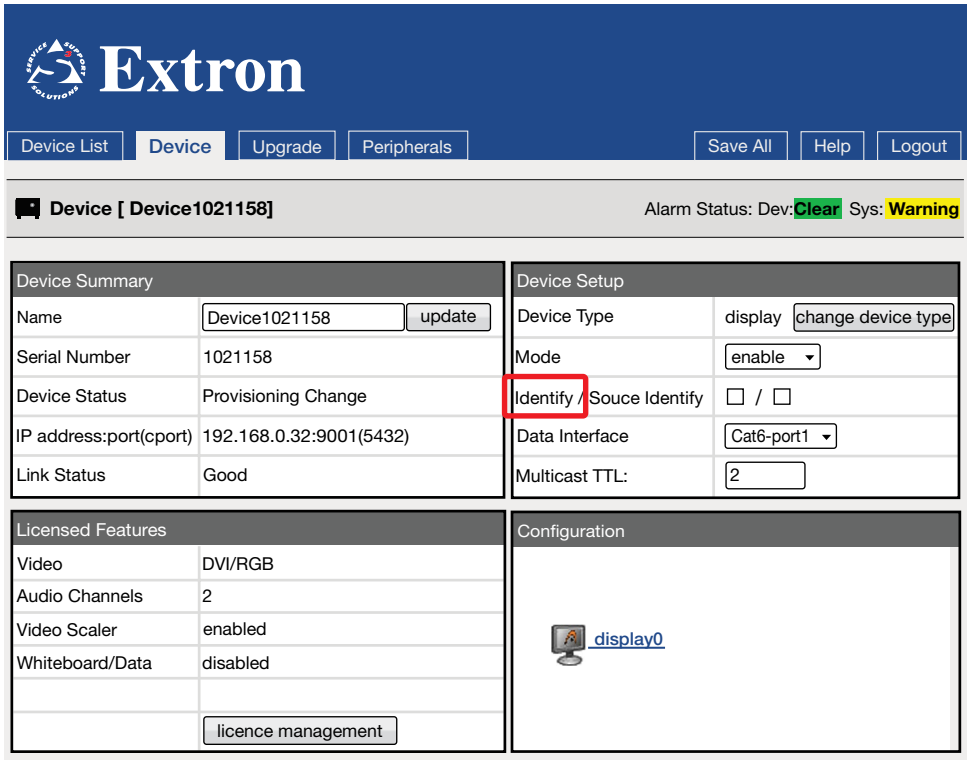


Figure 32. Identify Function

1. Select the **`Identify`** check box as shown above.
2. Click the **`Update`** button. The device name appears on the display, as shown in **figure 33** on the next page.

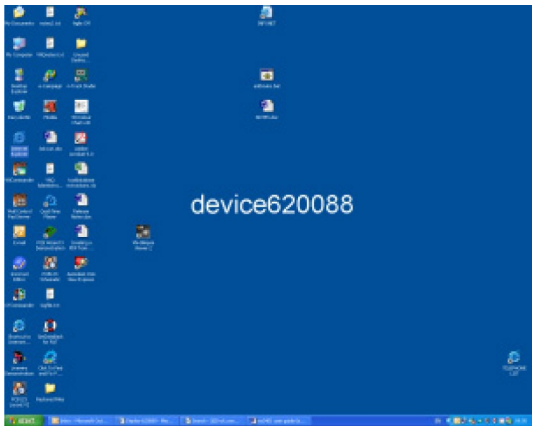


Figure 33. Device Name

NOTES:

- The device name displays only if a valid source is currently selected and being displayed.
- The device name displays only on the selected output device. It does not appear as part of the streamed source on other displays.

Nodata splash mode

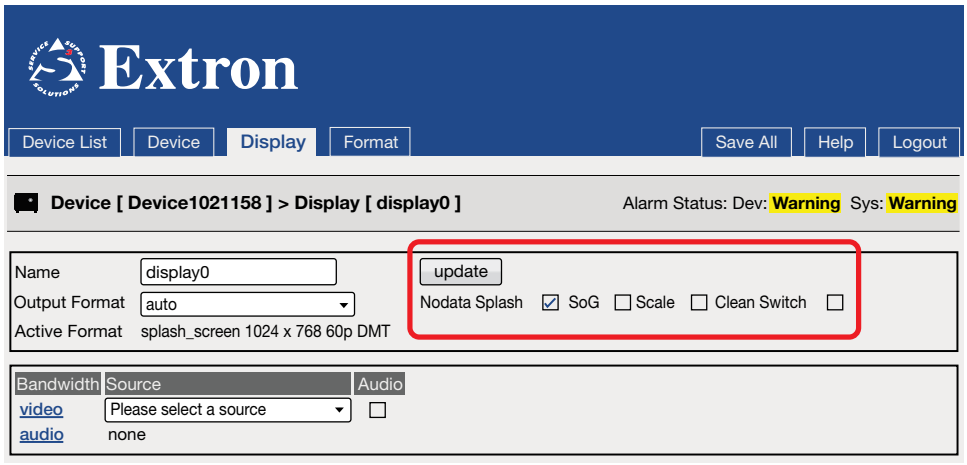


Figure 34. Nodata Splash Mode

If a VNC 225 decoder is not displaying a source (for example, if no source is selected, has become disconnected, or is in the wrong format), it offers two different display options. The required option is selected using the Nodata Splash check box:

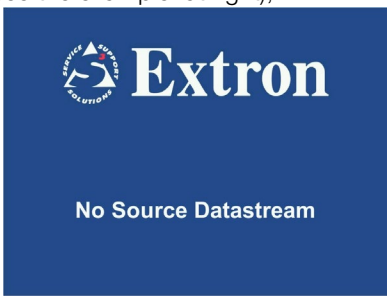
- If the check box is selected, displays a splash screen (see the example at right),

  or

- If the check box is not selected, displays the last frame of valid source data (black if no data is available).



Scaling

In normal operation the decoder output format is set to auto and the output resolution is the same as the encoded source resolution.

For applications where it is necessary to set the output of the decoder to match the resolution of the locally connected display, the scale option can be enabled and the required output resolution can then be selected from the **`Output Format`** drop-down list, as shown below. Selecting **`monitor`** from the drop down will match the output resolution of the decoder to the recommended setting of the connected display.

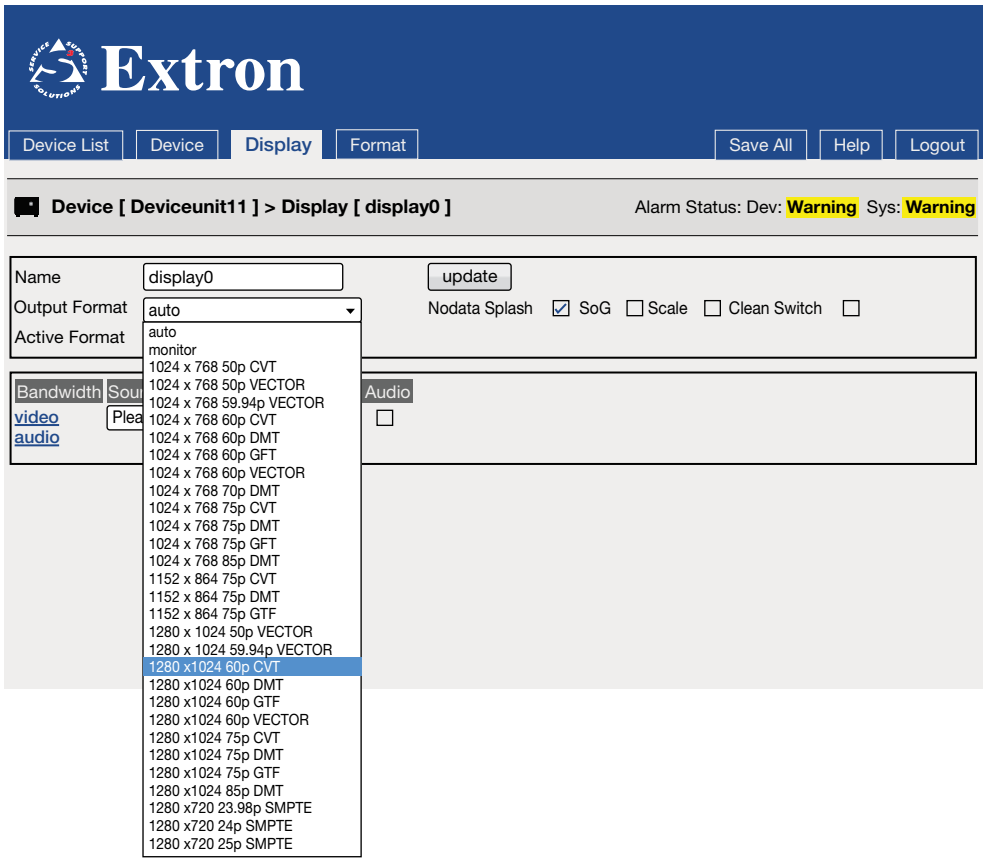


Figure 35. Decoder Output Format

Clean switching

Clean switching provides a method by which streams can be decoded and displayed without disruption to the image that is displayed on the local decoder display. Clean switching is supported in the VNM Enterprise Controller that manages all aspects of the system configuration.

Device mode

A VNC 225 decoder can be configured in four modes:

- **Enable** Allows the selected source to be displayed.
- **Disable** Prevents a source from being displayed (display is blank).
- **Standby** Prevents a source from being displayed (display shows a “no data” splash screen).
- **Test** Displays a splash screen with the text “test mode.”

For normal operation, **`enable`** must be selected.

Advanced setup options

The decoder setup procedure on the preceding pages achieves a basic level of operation that will be adequate for most normal applications.

The following advanced setup options are possible.

- **Setting Optimum Playback Delay**
- **Bandwidth Management**
- **Creating a custom output mode**

Troubleshooting

If you have followed the procedures on the preceding pages, you should by now have set up at least one VNC 225 encoder and one VNC 225 decoder, and be able to display the source (encoder) signal on the display (decoder). If not, this section will help diagnose most problems you may encounter.

Display Troubleshooting

Most problems in a VNC 225 system manifest themselves as a type of disruption of the target display. Use the flowchart on the next page as a starting point to trace common problems, either with the decoder (display) or elsewhere in the system (see **figure 36** on the next page).

Source Troubleshooting

When diagnosing problems with an encoder or source, it is highly recommended that a local monitor be connected to the VNC 225. If a monitor is not already connected as part of the system, connect one temporarily (see **figure 37**, on page 40).

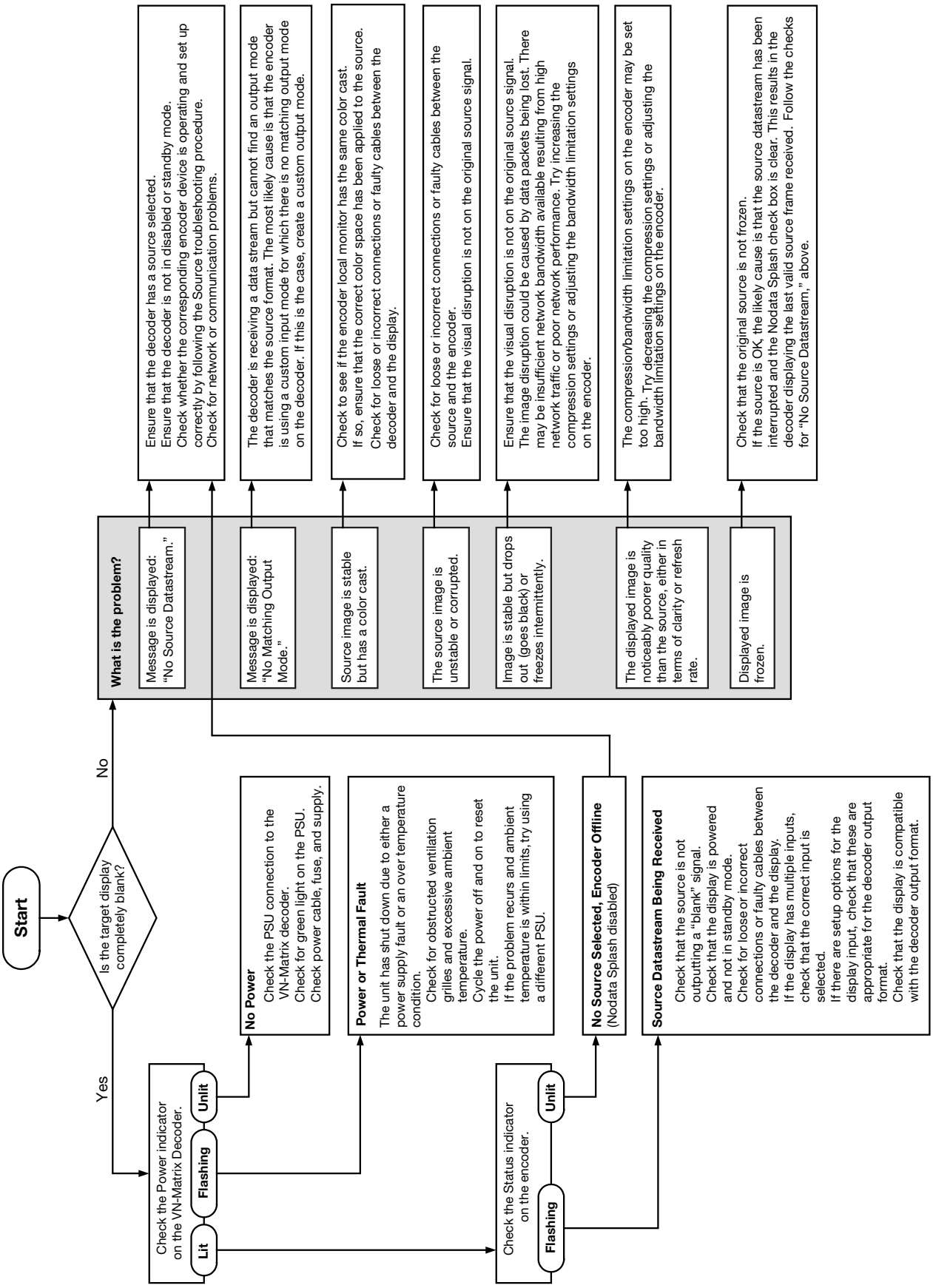


Figure 36. Troubleshooting the Displayed Image

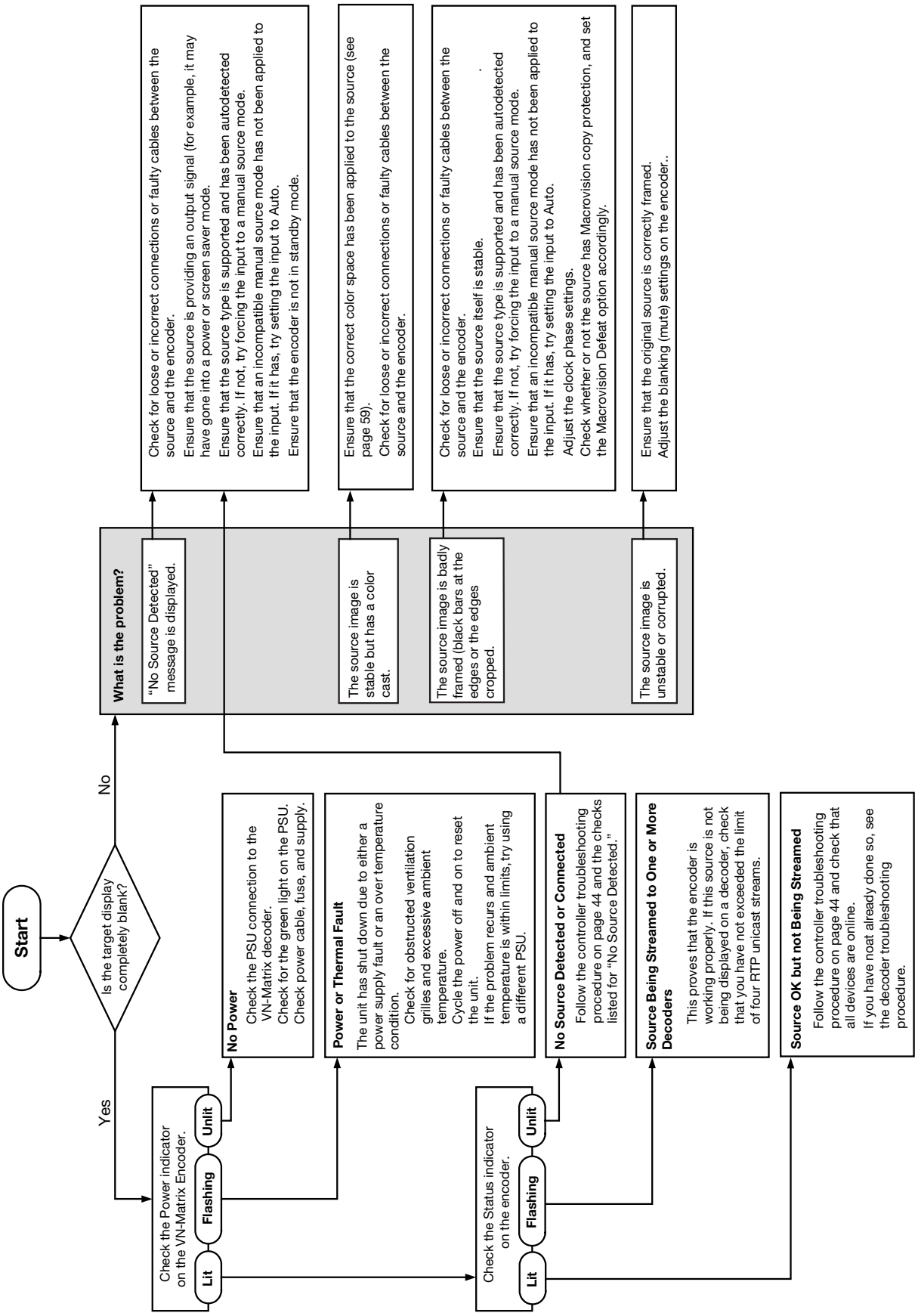


Figure 37. Troubleshooting the A/V Source

System Troubleshooting

Follow this troubleshooting procedure to ensure that all VNC 225 devices in your system are online and correctly configured as either encoders or decoders.

- Log into the VNC 225 web Interface (see **VNC 225 Web Interface** on page 21).
- Navigate to the Device List page.

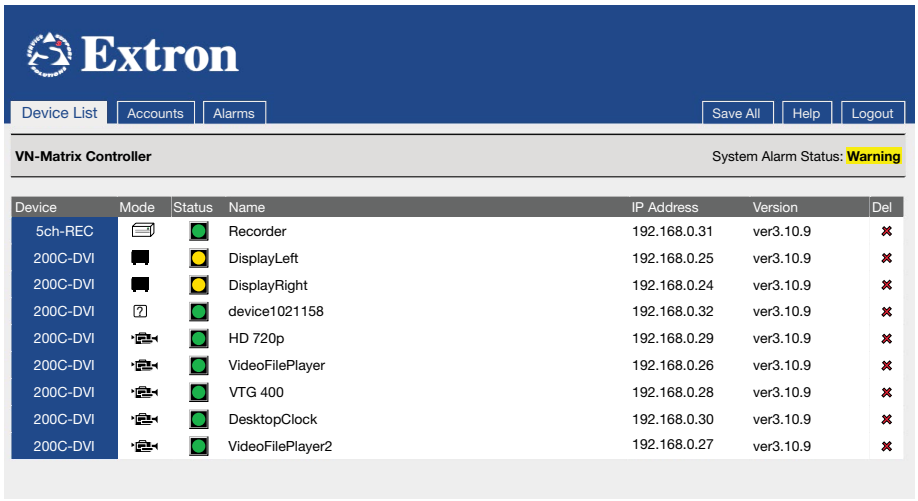


Figure 38. System Troubleshooting Procedure on Device List Page

Item	Test
Is each device configured as: • a recorder? • an encoder? • a decoder?	Unconfigured devices are marked with a ? • For recorder information see the VNM Recorder User Guide. • To configure as an encoder, see **Configuring a VNC 225 as an Encoder (Source)** on page 24. • To configure as a decoder, see **Configuring a VNC 225 as a Decoder (Display)** on page 31.
Is an IP address shown with each device?	If there is no IP address shown, then this indicates that the device is offline. • Ensure that the device in question is powered. • Ensure that all network cables are connected. • Ensure that the device is correctly configured for network operation.

Controller Troubleshooting

Follow this troubleshooting flowchart if you cannot establish contact with the VNC 225 controller device using the web browser on a control PC.

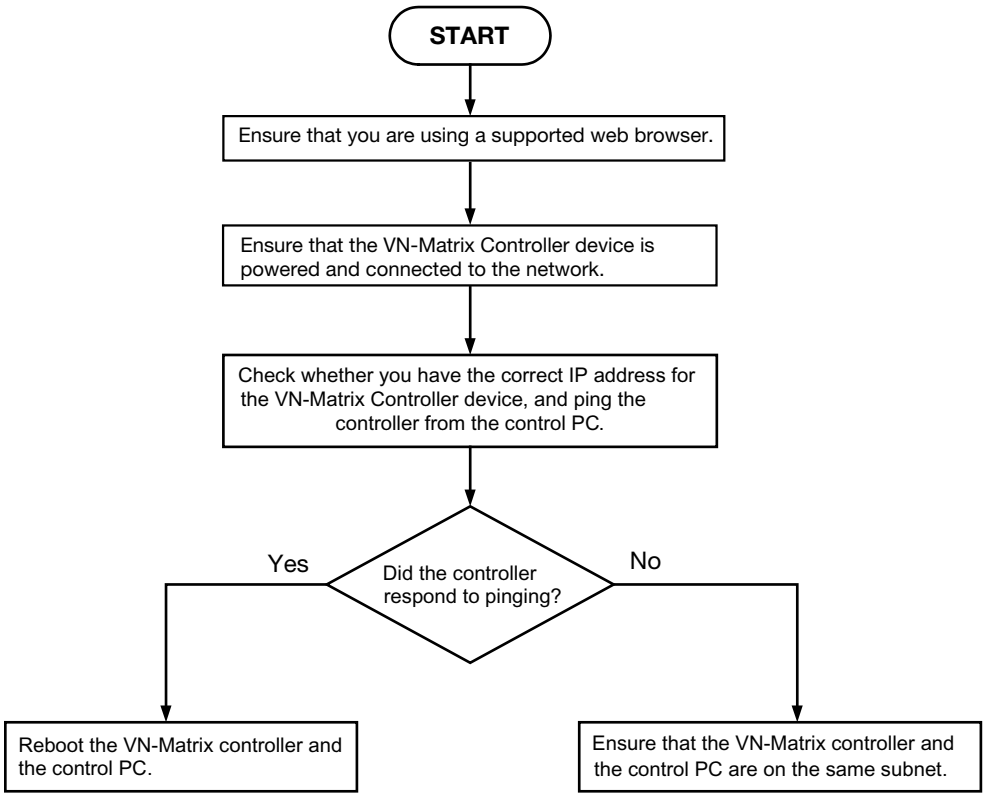


Figure 39. Controller Troubleshooting

Serial Transport and Control Methods

This section describes the following:

- **Overview — Serial Control**
- **Setting Up a Serial Pass-through Group**
- **Serial and Telnet Commands**
- **Data Stream Mode**

Overview — Serial Control

You can establish external serial (RS-232) communications among any VNC 225 units on the same network. Serial traffic can be:

- Unidirectional as part of a source stream (encoder to decoder)
- Data stream mode (licensed option)
- Bi-directional and independent of any source stream
- Pass-through mode

In addition, serial commands can be sent via any VNC 225 device to the controller, allowing dynamic control of system parameters (remote control mode).

Pass-through Mode

In this mode, data received by a device (input) is transmitted using TCP/IP over the network and then converted back to serial data by a device (output). Data flow is fully bidirectional and not dependent on whether the VN-Matrix 225 is configured as an encoder or decoder.

One device within a pass-through group is designated as a server. One or more devices are then connected as clients (in pass-through mode):

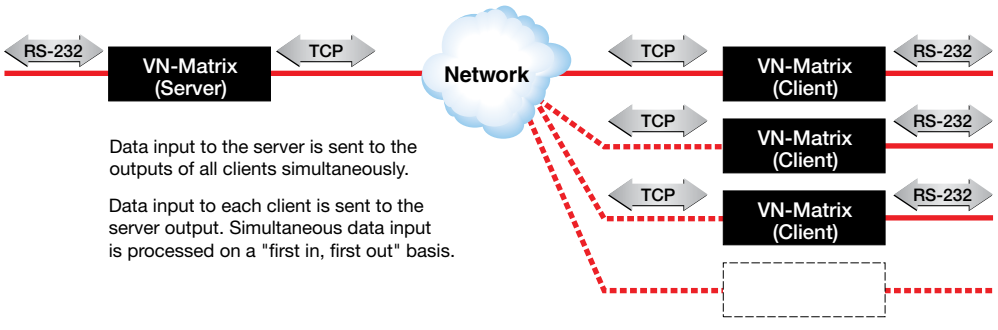


Figure 40. Example of Pass-Through Mode

Serial ports on each VN-Matrix 225 need not share a common baud rate. However, where a large amount of data is sent from a high speed to a low speed data link, some form of handshaking or flow control may be required to prevent buffer overflow on the output device. Standard flow control methods are fully supported.

Any number of serial pass-through groups may exist on the same network. To set up a serial pass-through group, see Setting Up a Serial Pass-through Group, below.

Setting Up a Serial Pass-through Group

1. Decide which VN-Matrix 225 unit will be the server in the pass-through group and which unit or units will be the clients, and connect your serial devices to the VN-Matrix 225 RS-232 ports accordingly. Remember that communication can take place only between server and clients, not among clients.
2. Log in to the web interface (see **VNC 225 Web Interface** on page 21).
3. On the Device List page, click the name of the device that you want to configure as the server. The Device page opens.
4. On the Device page, select the **Peripherals** tab to display the Peripheral Configuration page.

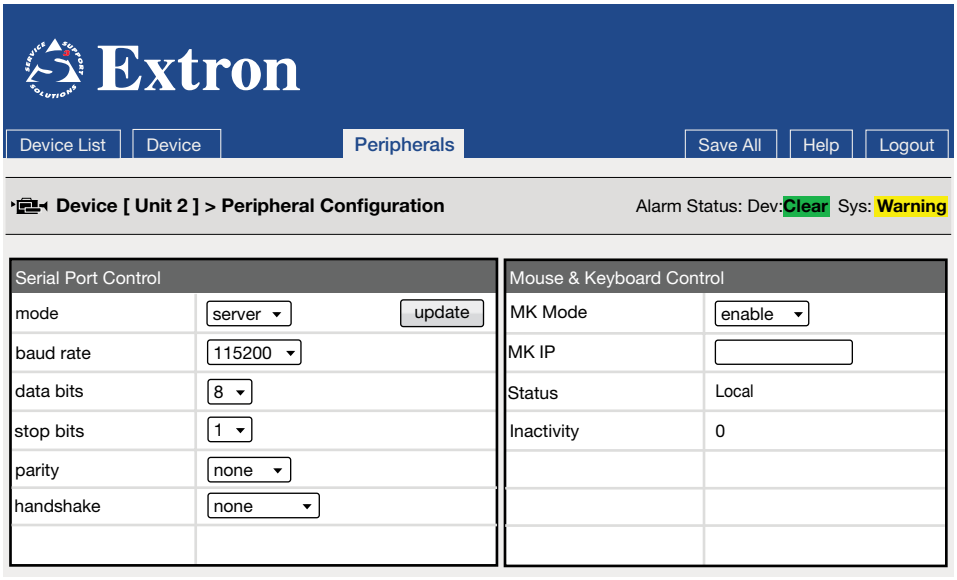


Figure 41. Peripheral Configuration Page

5. From the **Mode** drop-down menu, select ***Server***.
6. Change the other settings as required, then select the **Save All** tab.
7. Select the **Device List** tab to return to the Device List page.
8. Click the name of the device that you want to configure as a client, then select the **Peripherals** tab.

   The Serial Port Control options are shown in **figure 42** on the next page.

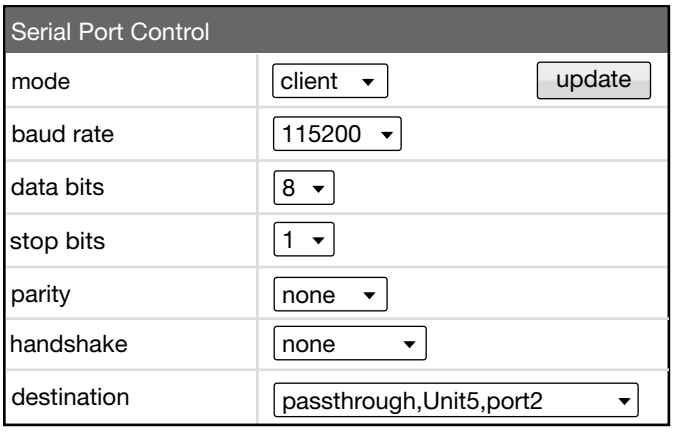


Figure 42. **Peripheral Serial Port Control Window**

9. From the **Mode** drop-down menu, select **Client** (note that this reveals the destination box).
10. From the **Destination** drop-down menu, select **passthrough** for the appropriate server.
11. Change the other settings as required, then select the **Save All** tab.

Serial and Telnet Commands

Commands can be used to provide basic remote control of a VN-Matrix 225 system as follows:

- Commands can be issued either as part of a serial remote control configuration or by using a Telnet application via the network.
- For both serial and Telnet control, you must first initiate a control session by sending a valid user name and password.
- All commands must be terminated with a new line (LF) character (a carriage return is not required). In programs such as Telnet, this is done by pressing the <Enter> key.

Control Session Commands

`user <user name>`
Initiates a user login. To be able to change system settings you must log in using the "admin" user account.
Example: `user, admin`

`pass <password>`
Specifies the password for the user account. By default this is admin but may have been changed using the web interface (see **Changing User Login Passwords** on page 79).
Example: `pass, admin`

`exit`
Terminates the current remote control session.

Device Commands

`mode` *`deviceid, state`*
Changes the operating mode of the specified device. ***deviceid*** is the serial number of the device or the user-defined device name. ***state*** is the required mode and can be set to: • `enable` – for normal operation • `disable` – to stop encoder source streaming or stop display output on a decoder • `standby` – to stop encoder source streaming or display the splash screen on a decoder
Example: `mode 16 enable`

`channel` *`deviceid, window, sourceid.videoport.protocol`*
Changes the source being displayed in a window of the specified decoder device. ***deviceid*** is the serial number of the device or the user-defined device name. ***window*** is the window object number. Set to **1** for video. ***sourceid.videoport.protocol*** is the source to be displayed, where: • ***sourceid*** is the serial number of the source device. • ***videoport*** is the video input number, usually set to **Ø**. • ***protocol*** specifies either RTP or TCP, set to **Ø** for RTP or **1** for TCP. **NOTE:** Periods (.) are required between the ***sourceid***, ***videoport***, and ***protocol*** values.
Example: `channel 17 1 16.Ø.Ø`

`optimization` *`deviceid, videoport, mode`*
Changes the compression transform for the specified encoder device. ***deviceid*** is the serial number of the device or the user-defined device name. ***videoport*** is the video input number, usually set to **Ø**. ***mode*** is the source transform to be used and can be set to: • `video` – for low resolution video sources • `graphics` – for higher resolution graphics sources
Example: `optimization 16 Ø video`

`bandwidth` *`deviceid, videoport, bandwidth`*
Changes the target bandwidth value for the specified encoder device. ***deviceid*** is the serial number of the device or the user-defined device name. ***videoport*** is the video input number, usually set to **Ø**. ***bandwidth*** is the bandwidth value in megabits per second.
Example: `bandwidth 16 Ø 5`

Response Messages

All commands (except for `user` and `exit`) generate an `OK` response message if the command is successfully executed.

Unrecognized commands or invalid command parameters generate an error message in the format `fail:` followed by a brief description of the error. For example, `fail: unknown command`.

Data Stream Mode

NOTE: Data stream mode is not supplied as a standard feature on VNC 225 codec devices. Contact your Extron representative for details.

In this mode, data received by an encoder is transported to the decoder, along with video and audio, as part of the source stream. Data transport in this mode is unidirectional and is capable of being recorded (and played back) by the VNM Recorder.

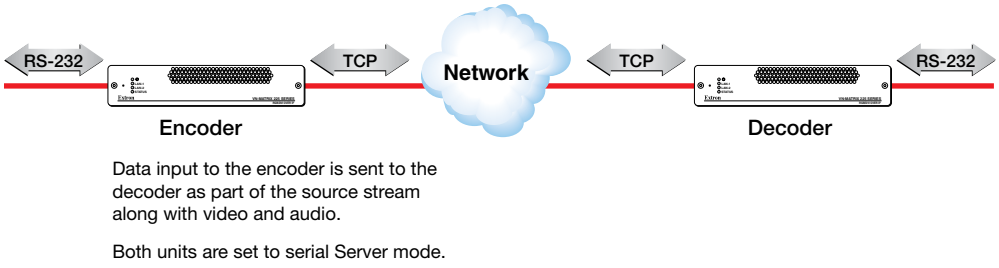


Figure 43. Example of Data Stream Mode

Serial ports on each VN-Matrix 225 need not share a common baud rate. However, where a large amount of data is sent from a high speed to a low speed data link, some form of handshaking or flow control may be required to prevent buffer overflow on the output device. Standard flow control methods are fully supported.

NOTE: No data is transported until the decoder connects to the encoder stream.

To set up a serial data stream, see Setting Up a Serial Data Stream below.

Setting Up a Serial Data Stream

1. Log in to the web interface (see **System Configuration** on page 21).
2. From the Device List page click on the required encoder device.
3. From the Device page click the Peripherals tab to display the following:

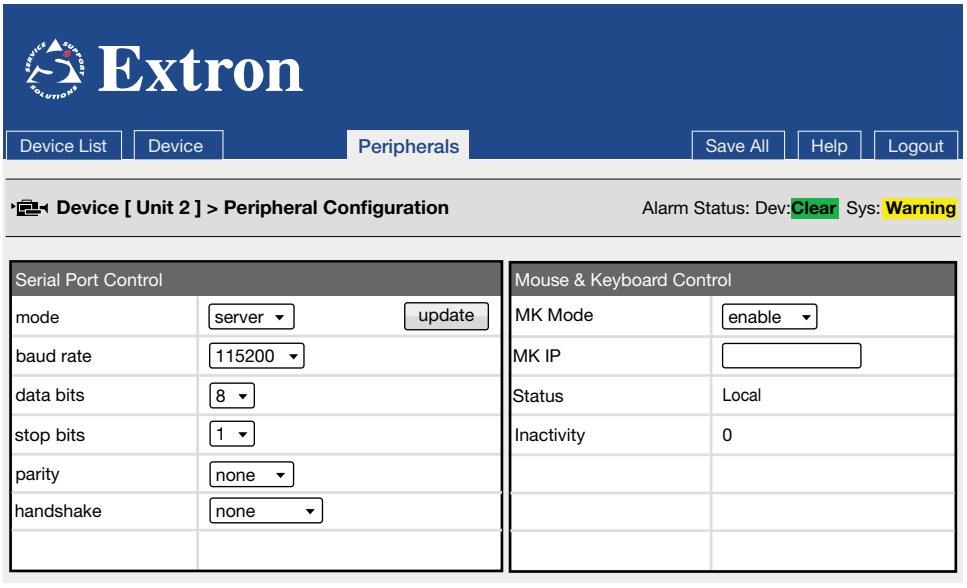


Figure 44. Peripherals Page

4. Using the **mode** drop-down menu select the server option.
5. Change the other settings as required, then click the **Save All** tab.
6. Return to the Device List page and follow steps 2 through 5 for the decoder device.

NOTES:

- No data is transported until the decoder connects to the encoder stream.
- The **Peripherals** tab is **not** present in the VNE 225 and VND 225 device types.

Remote Keyboard and Mouse Operation

This section describes remote keyboard and mouse operation. The following topics are covered:

Overview — Remote Keyboard and Mouse

When a PC source is being viewed by a VNC 225 decoder, remote keyboard and mouse control of the source PC can be achieved via the decoder unit.

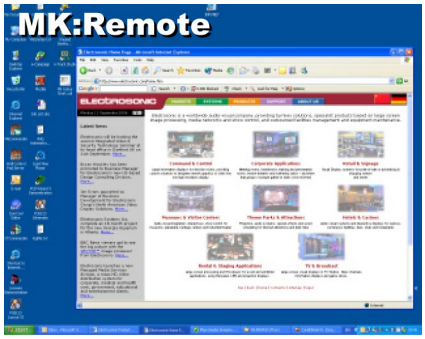
For remote keyboard and mouse functionality to be possible:

- The keyboard and mouse ports of the source PC must be fully connected to the VNC 225 encoder (see **Connecting Devices** on page 18).
- A keyboard and mouse must be connected to the VNC 225 decoder (see **Connecting Devices** on page 18).
- The decoder must currently be viewing the PC source.
- The remote control session must be initiated via the keyboard connected to the decoder.

Initiating a Remote Control Session Using Hot Keys

Using the keyboard attached to the VNC 225 decoder, press the <Scroll Lock> key twice, followed by the <F1> key. The remote control session starts.

The **source monitor** briefly shows `MK:Remote` in the top left corner.



The **display monitor** briefly shows `MK:Forward` in the top left corner.

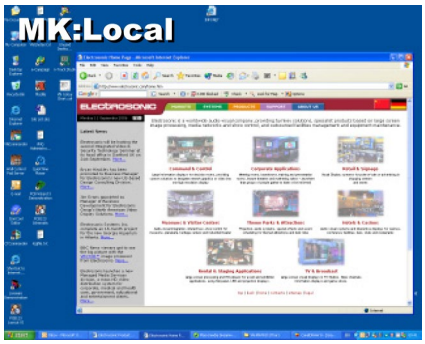
Figure 45. **Starting a Remote Control Session**

NOTE: Local keyboard and mouse control of the source is disabled (see **Mouse and Keyboard Control**, on the next page, to regain local control).

Terminating a Remote Control Session Using Hot Keys

Using the keyboard attached to the VNC 225 decoder or encoder, press the <Scroll Lock> key twice, followed by the <F2> key. The remote control session ends.

Both the **source monitor** and **display monitor** briefly show `MK:Local` in the top left corner as shown here:



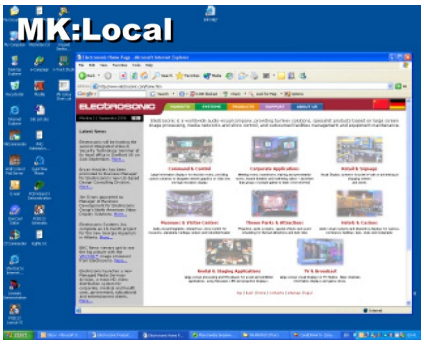


Figure 46. **Closing a Remote Control Session**

Mouse and Keyboard Control

1. Log in to the web interface (see **System Configuration** on page 21).
2. On the Device List page click on the required encoder device. The Device page appears.
3. On the Device page click the **Peripherals** tab to display the following:

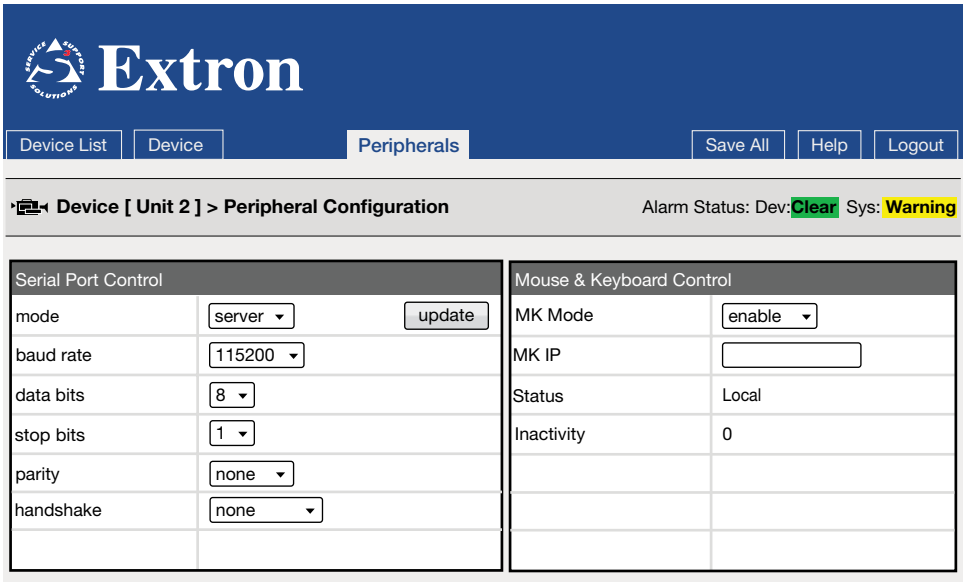


Figure 47. **Peripherals Page**

4. Set the desired options in the Mouse & Keyboard Control area as needed using the information in **Configuring for Mouse and Keyboard Control**, below, as a guide.
5. Click **Save All**.

Configuring for Mouse and Keyboard Control

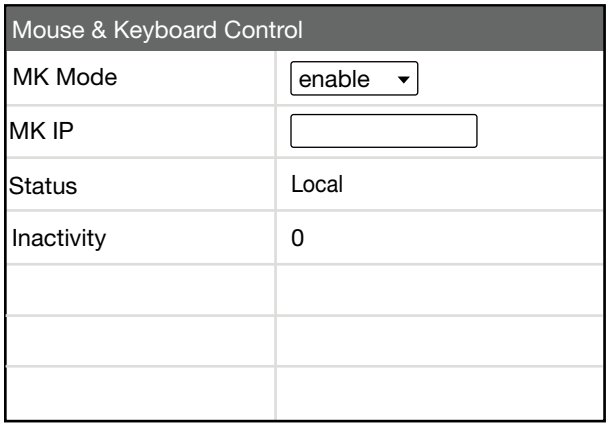


Figure 48. **Mouse & Keyboard Control Area of the Peripherals Tab**

Configure the mouse and keyboard control using the options provided on the **Peripherals** tab. These settings modify the way in which the hot keys (covered on the preceding pages) operate, as described in the tables below.

Source (Encoder, VNC 225 Only)		
Item	**Option**	**Description**
MK mode, menu	**Enable**	Allows a remote mouse and keyboard connection from a decoder. This is the default option.
	Disable	Blocks remote mouse and keyboard connection from a decoder, effectively disabling the hot key feature.
MK IP, field	Not used	Not used on the encoder end of the connection.

Display (Decoder, VNC 225)		
Item	**Option**	**Description**
MK mode, menu	**Enable**	Blocks remote mouse and keyboard connection to an encoder, effectively disabling the hot key feature.
	Keyboard	Normal mouse and keyboard operation Permits the hot key feature. This is the default state of this control.
	Keyboard & Keep Alive	The mouse and keyboard connection is reestablished if it fails, providing that you configure the target encoder by selecting **Enable** from the **MK Mode** menu. Works in conjunction with the hot key feature.
	Force	The mouse and keyboard connection is permanent, independent of the hot key pressed on the local keyboard (if present). The connection is made to the currently selected source (stream), providing that the stream is **not** multicast or imported from another control domain.
MK IP, field	*IP Address*	Enter the IP address of the target encoder device. This feature is used only when the target encoder is configured for multicast or when the source stream is imported from another control domain.

Advanced Setup Procedures

This section provides procedures for advanced setup of all VN-Matrix 225 series models. The following topics are covered:

- **Encoder Setup**
- **Advanced Source Setup**
- **Managing Compression and Bandwidth Settings**
- **Decoder Setup**
- **Controller Configuration**
- **Changing a Device License**
- **Upgrading Device Firmware**

Encoder Setup

To set up a VNC 225 or a VNE 225 encoder, see the following sections:

- **Fine-tuning of input parameters:** See **Fine-Tuning a Source (Manual Overrides)** on page 56.
- **Creation of custom input modes:** See **Creating a custom input mode** on page 59.
- **Changing video compression:** See **Bandwidth Management** on page 63).
- **Managing bandwidth usage:** See **Bandwidth Management** on page 63).
- **Changing audio compression:** See **Audio Compression** on page 70).

Advanced Source Setup

For most applications, it is recommended that the source input of a VNC 225 and VNE 225 be set to auto mode. This enables the device to detect the electrical and timing characteristics of the input signal and determine the exact source type. It then invokes the appropriate input parameters for optimum processing of that source signal.

This also has the advantage of changing the input setup automatically without any user intervention if the input source changes to another source type (for example, if the input is derived from a source switcher).

While the auto mode works with most standard video and graphics standards, there are circumstances (particularly with analog sources) in which additional fine-tuning may be required. For example, when the source:

- Is an RGsB (sync on green) or YPrPb source type.
- Has Macrovision copy protection.
- Does not have a completely standard signal format.

In extreme circumstances, it may even be necessary to create a custom input mode. For example, when a source:

- Is completely non-standard
- Has a poor quality signal

NOTE: The advanced source setup procedures described here are only required for analog sources. For digital (DVI) sources, the input mode should always be set to auto.

Video Setup Page

All advanced source setup is performed via the Video Setup page. To access the Video Setup page, follow the numbered steps in **figure 49** on the next page. Click the **`Video Setup`** tab on the Configure (videoPort) page for the relevant VNC 225 encoder.

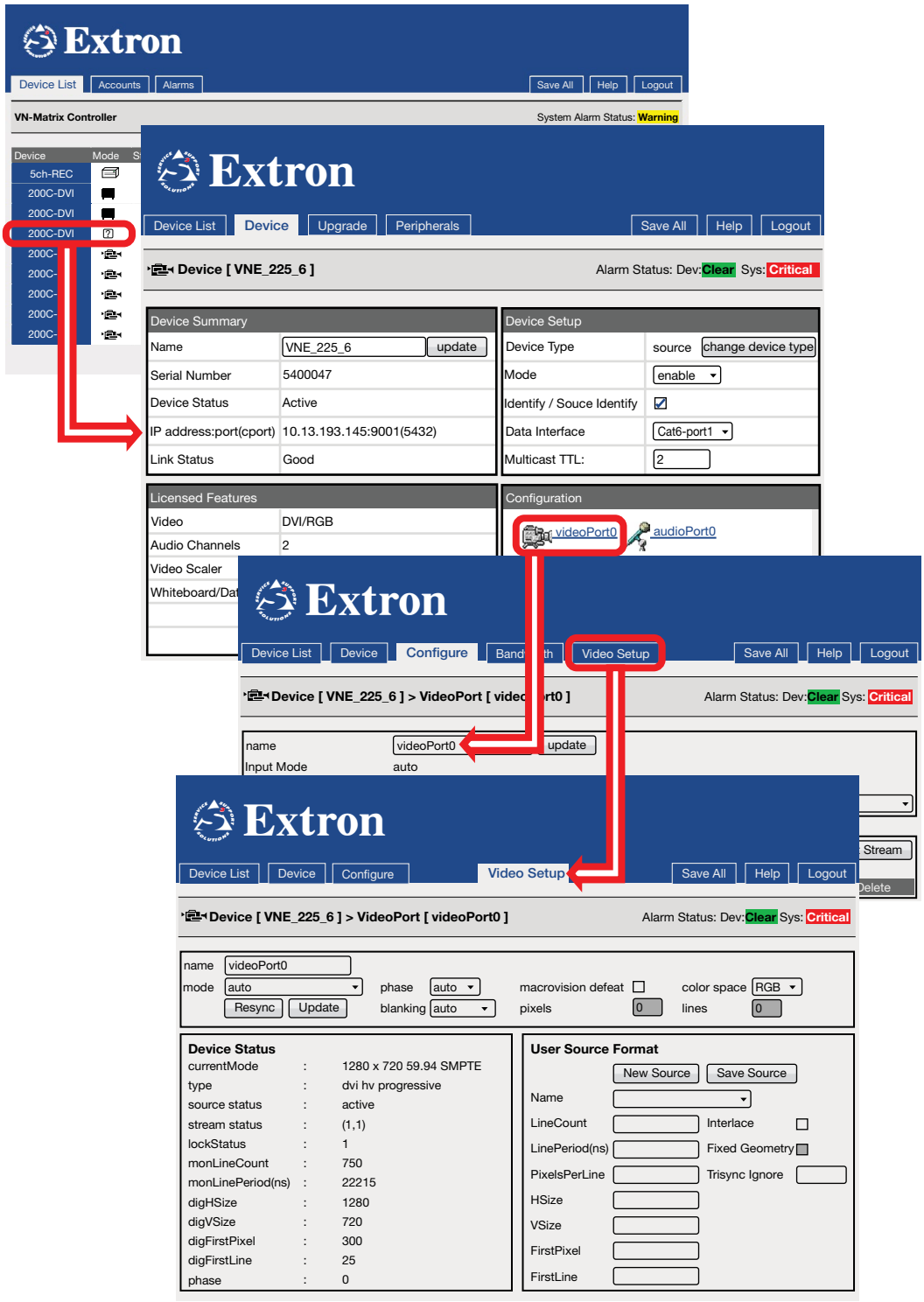


Figure 49. Video Setup

For most source types it is recommended that you select auto from the **mode** drop-down menu, allowing full auto-detection of the source. To apply a fixed input mode, select the required mode from the **mode** drop-down list and click **Update** or the **Save All** tab.

NOTE: Selecting a fixed input mode disables the auto-detect function.

Fine-tuning a Source (Manual Overrides)

The following adjustments are classed as manual overrides. These adjustments are not saved as part of the current source mode and after they are applied, remain in force until they are changed.

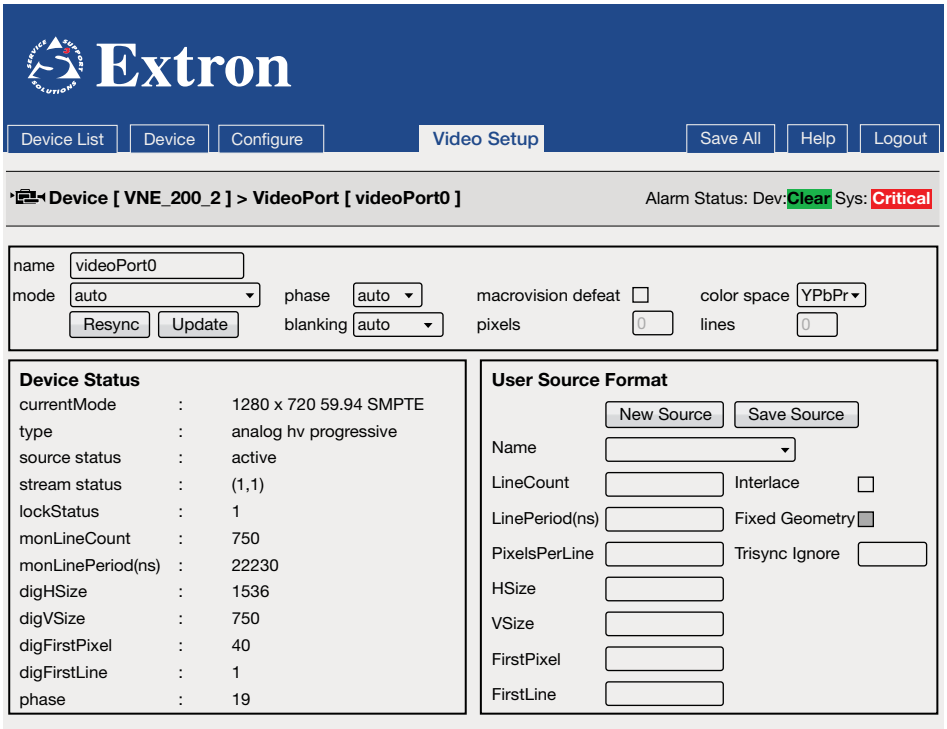


Figure 50. Manual Overrides

① **Phase (pixel clock)** — When an analog graphics signal is being digitized, it is essential that each pixel be sampled as close as possible to its center in order to obtain a stable value. Sampling too close to a pixel boundary causes unreliable data capture and results in noise or artifacts, especially between pixels of significantly different hue or intensity.

Normally the phase is set to **`auto`**. This allows the VNC 225 to determine the optimum clock phase. If the auto setting proves unsatisfactory for any reason, try adjusting the phase manually. The phase is determined by selecting a value between **Ø** and **31**. Positive numbers advance the clock phase relative to the start of the active line; it is not possible to select negative numbers.

> **TIP:** Optimum phase adjustment is easier to establish when a suitable test pattern is displayed. Typically, this contains a series of alternating black and white vertical lines at one pixel intervals.

② **Macrovision defeat** — Macrovision copy protection is often applied to commercially produced videos and DVDs. This adds additional sync-level pulses to the video waveform and these need to be ignored for proper auto-detection on the VNC 225.

- If you know (or suspect) that your source material has Macrovision encoding, select the **`macrovision defeat`** option on the Video Setup page.
- Leave this parameter unchecked for all other sources. Checking this parameter for non-Macrovision sources may result in tearing at the top of the image.

③ **Blanking (image positioning)** — In analog video and graphics sources, active video occupies an area in the middle of the video frame. Around this is a non-active area used for horizontal and vertical blanking signals.

The VNC 225 normally ignores the blanking area and digitizes only the active video area. To do this, it needs to know the position of the first active line of video and the first active pixel on that line. This is controlled by the blanking parameter. This is normally set to **`auto`** which allows the VNC 225 to calculate the values automatically.

If required, the calculated values for the first line and first pixel can be adjusted by applying a manual offset. To do this, set the blanking parameter to **`manual`** and type a positive or negative integer value into the **`pixels`** or **`lines`** fields as required and click **`Update`**.

NOTE: The offsets are made relative to the current source format "`digFirstPixel`" and "`digFirstLine`" values.

④ **Color space (color space, RGB/YPrPb)** — Because of the similarity between analog RGsB (sync on green) and component YPrPb signals, sources using these formats may not auto-detect correctly. RGsB and YPrPB sources have different color spaces and if the wrong setup is applied the resulting image, although stable, has a red or green color cast.

Set the color space parameter to either RGB or YPrPb as required.

⑤ **Resync** — Click Resync to force an auto-detection of the source signal.

Custom Input Modes

There may be instances in which a VN-Matrix device configured as an encoder may not detect an input source. Examples of this may include:

- An unrecognized input source that is not defined in the User Source Format of the encoder.
- The timing of the input source may deviate from the standard timings for that signal.

In these situations, you need to create a custom input mode for the new source.

NOTE: Custom input modes are necessary only for analog sources. A VN-Matrix automatically creates custom input modes for DVI sources based on their EDID.

Setting the EDID mode

It is easier to configure the custom input mode if the EDID mode on the VN-Matrix encoder is set correctly.

To set the EDID mode, perform the following steps:

1. From the web interface, select the VN-Matrix defined as an encoder (source) device.

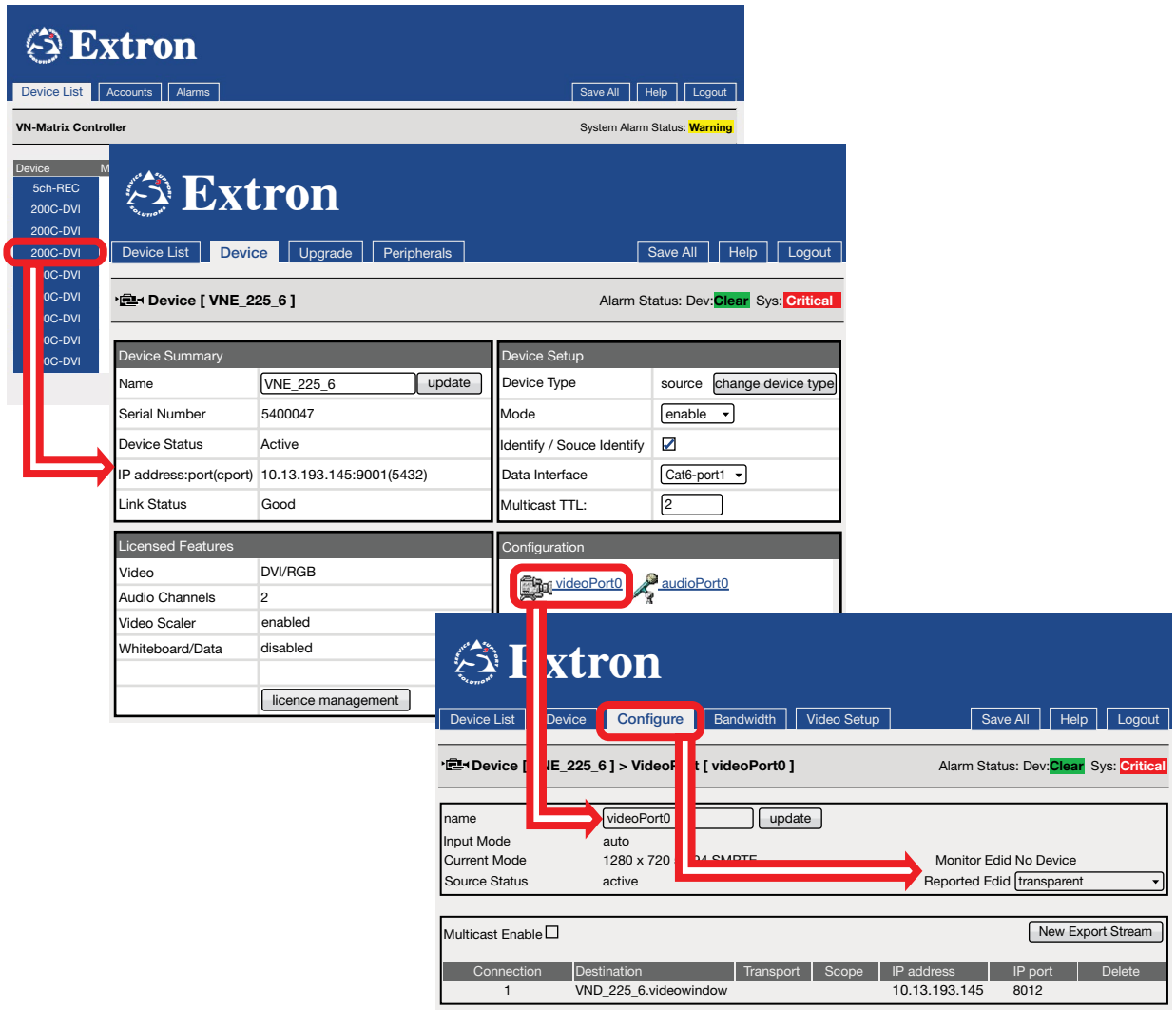


Figure 51. Setting the EDID Mode

2. Click the **`videoPortØ`** icon.
3. Click the **`Configure`** tab.
4. From the **`Reported Edid`** menu, select the appropriate EDID mode. In most cases, **`transparent`** is the correct option. This allows the EDID data of the display to pass through the matrix to the source PC.
5. Reboot the source PC to ensure that it reads the proper EDID selection.

TIPS:

- The EDID of your monitor has a significant effect on what mode your graphics card displays. Also, the mode selected on the source PC may not produce the expected output resolution. For example, if the EDID of a monitor does not report any wide screen modes, your graphics card may still allow resolutions such as 1280x960, 1280x768, or 1280x720.
- In this instance, the PC may output 1280x1024, and letterbox the wide screen image so it is vertically centered on the monitor.
- Therefore, although you have selected a mode such as 1280x960 on the computer, the VN-Matrix and your monitor detect this as 1280x1024. In this situation, creating a custom input mode is unnecessary, because the VN-Matrix has detected a valid 1280x1024 input mode. The VN-Matrix may ignore the mode because it has already found an internal mode that correctly captured the source.

Creating a custom input mode

To create a custom input mode following the following four basic steps:

1. Configure a source to display the unrecognized source format and connect it to the VN-Matrix encoder.
2. Create a custom input mode to match the resolution and timing of the source.
3. Verify that the VN-Matrix encoder can automatically detect (auto-detect) the source format created in step 2.
4. Fine-tune the custom input mode.

NOTE: After the custom input mode is created for the VN-Matrix encoder, you may need to create a custom output mode to match it (see **Custom Output Modes** on page 74)..

TIPS:

- When creating a custom input mode, it is recommended that a monitor be connected to the video loop-out of the VN-Matrix encoder, as well as the video out of the VN-Matrix decoder.
- It is also recommended that the same monitors be used in the final system configuration.

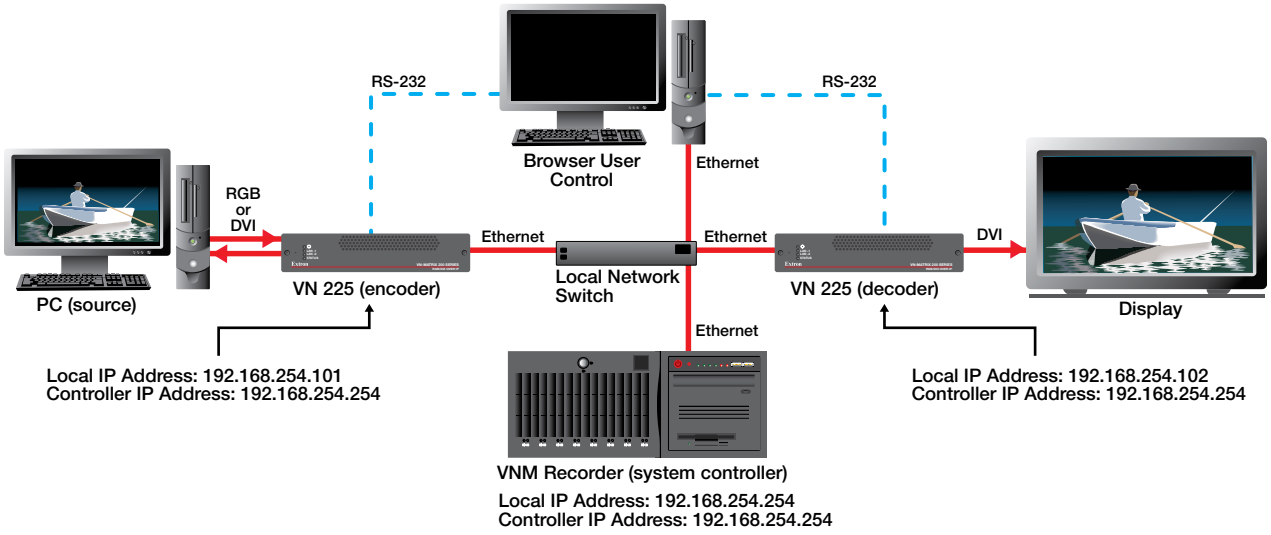


Figure 52. Input Configuration Example

1. From the web interface, select the VN-Matrix device defined as an encoder (source) (①).

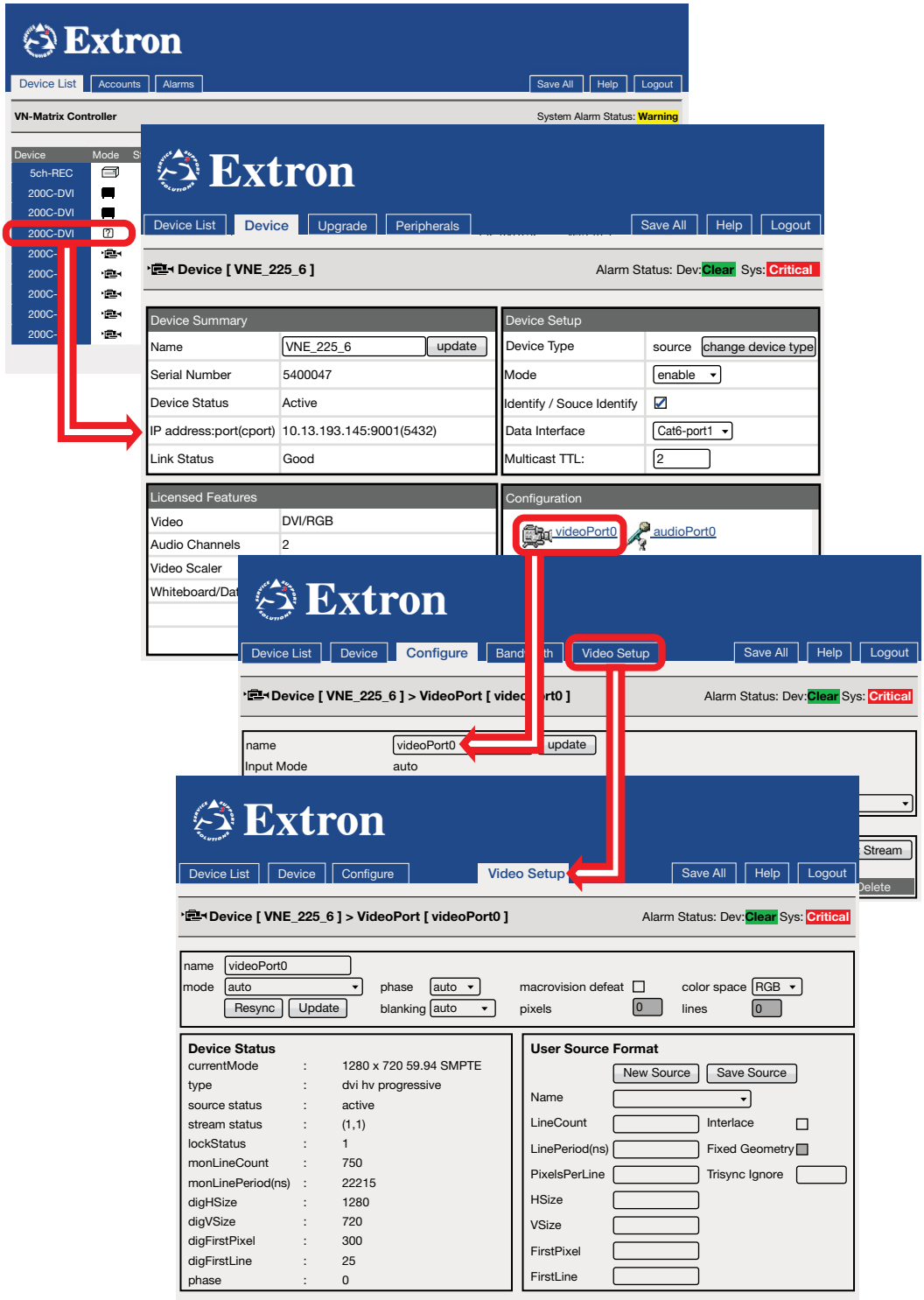


Figure 53. Custom Input Mode

2. Click on the **`VideoPort`** icon (②).
3. Select the **`Video Setup`** tab (③).
4. Set the phase to **`Auto`**.

5. Set the **macrovision defeat** mode to the appropriate setting. If the source has Macrovision encoding, select the check box; otherwise, leave it deselected.
6. Set color space to **RGB** or **YPrPb**, based on the input signal type.

   NOTE: The above values are not saved as part of the source format; they are global setting saved for the mode selected in the **mode** drop-down list. If **auto** is selected from the **mode** drop-down list, the settings apply to any detected mode.

7. Set blanking to **auto**.
8. Select a source type similar to the desired source type in the **name** field of the User Source Format region. If an existing (incorrect) mode was detected and displayed in the **currentMode** field, select that mode from the drop-down list.
9. Click the **New Source** button, and enter a name for new source format. Suggested naming scheme is `HresxVres Frequency Timing`; for example, "1360x768 60Hz CVT."
10. Select the appropriate interlacing mode by selecting the **Interlace** box for an interlaced source, or leaving it deselected for a progressive source.
11. If configuring a HD video mode that uses TriSync, set the **Trisync Ignore** field to `100`. Otherwise, leave it at `0`.
12. Copy the value in the Device Status **monLineCount** field to the User Source Format **LineCount** field.
13. Copy the value in the Device Status **monLinePeriod** field to the User Source Format **LinePeriod** field.
14. Enter the pixels per line in the **Pixels Per Line** field. If this is unknown, consult a VESA timing chart, or calculate the value by using the following formula:

    `(Horizontal location of first pixel) -1) + (pixels per line of detected source) * (1+[desired mode hsize - digHSize]/digHSize).`

    For example, if the new mode you are creating has a resolution of 1360x768, but 1280x768 is the detected mode and **digFirstPixel** is 401, the formula would be:

    `(digFirstPixel-1+digHsize) * (1 + [((1360 - 1280)/1280]))`; resulting in:

    `(401-1+1280) * (1 + [80/1280]);` resulting in:

    `1680 * (1 + .0625);` resulting in:

    `1680 * (1.0625)` resulting in:

    `1785`
15. Enter the active horizontal resolution in the **HSize** field.
16. Enter the active vertical resolution in the **VSize** field.
17. Copy the value in the Device Status **digFirstPixel** field to the User Source Format **FirstPixel** field.
18. Copy the value in the Device Status **digFirstLine** field to the User Source Format **FirstLine** field.
19. Click the **Update** button. This copies the User Source Format settings into the `User.Source.Config` file of the VN-Matrix device designated as the controller.
20. Click the **Save Source** button; this saves the `User.Source.Config` file of the VN-Matrix device designated as the controller.

21. With the **mode** drop-down list still set to **auto**, the VN-Matrix device should now select the new user mode in the **currentMode** field.

22. Display a moiré pattern and check for any clocking errors in the same user format area. Clocking errors appear as vertical banding on the displayed image. If clocking errors exist, select the User mode from the **Name** drop-down menu and adjust the value in the **PixelsPerLine** field. Each time you enter a new value in the field, you must click the **Update** button, click the **Save Source** button, and reboot the VN-Matrix controller and encoder. Repeat this process until the clocking error is gone.

    After you create a custom input mode, if the decoder does not find a suitable output mode, you need to create a custom output mode (see **Creating a custom output mode**, on page 76).

NOTE: A stable video signal on the loop output of the VN-Matrix encoder does not necessarily indicate that the signal is being properly recognized. A VN-Matrix encoder generates the loop output signal by passing sync directly from the input connector to the output connectors (a pass-through), so it is not dependent on any previously stored modes to create a loop output.

TIPS:

- Before creating the custom mode, be aware that the VN-Matrix may report inaccurate values for active horizontal pixels (digHSize) and active vertical lines (digVSize).
- The VN-Matrix analyzes the content displayed by the source PC to determine these values. As a result, if your source is displaying a 100 pixel by 100 pixel white box against a black background, the VN-Matrix may report a digHSize value of 100, and a digVSize value of 100 as well.
- Given this fact, it is a good practice to ensure that your PC is displaying a full image, preferably full white or a moiré pattern, before creating a custom input mode.

Managing Compression and Bandwidth Settings

The VNC 225 and VNE 225 can apply various types of compression to an input source in order to reduce the volume of source data being streamed across the network. In addition, various parameters are provided to manage and, if necessary, limit the amount of data flow to ensure that the available network bandwidth is not exceeded.

The default compression settings applied by the VNC 225 and VNE 225 offer a balance between the quality of the displayed material and network bandwidth. Where network bandwidth is restricted, extra compression can be applied. Depending on the source type and content, significant reduction in streamed data can be achieved with little or no perceptible effect on image quality.

Alternatively, where network bandwidth is not an issue, compression can be reduced to provide increased image quality. However, in most cases, there is no real benefit in doing this due to the highly efficient compression algorithms used by the VNC 225.

Bandwidth (Source) Page

All advanced source setup is achieved via the Bandwidth (source) page. This is accessed by clicking the **`Bandwidth Management`** button on the Configure (videoPort) page for the relevant VNC 225 encoder.

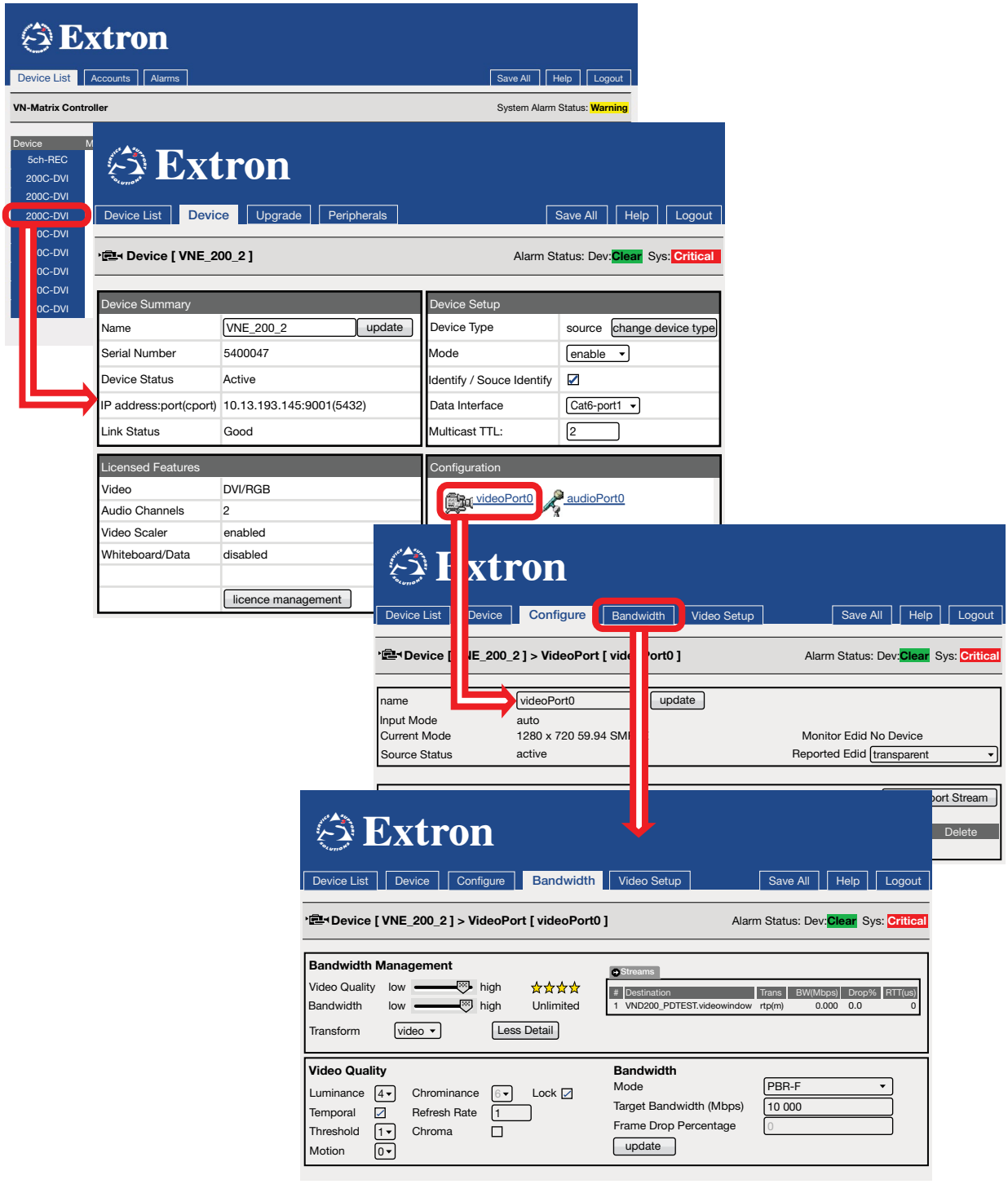


Figure 54. Accessing the Bandwidth Page

Bandwidth Management

The Bandwidth page can be set to show two levels of detail, by selecting the More Detail button or Less Detail button.

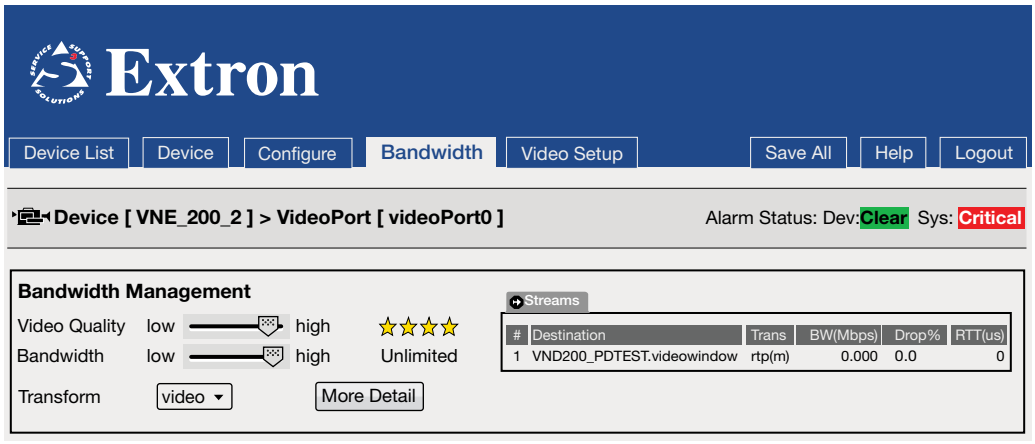


Figure 55. Basic View of the Bandwidth Page

The above view provides simple control of the encoder compression settings. Select **`More Detail`** to reveal the view as shown below.

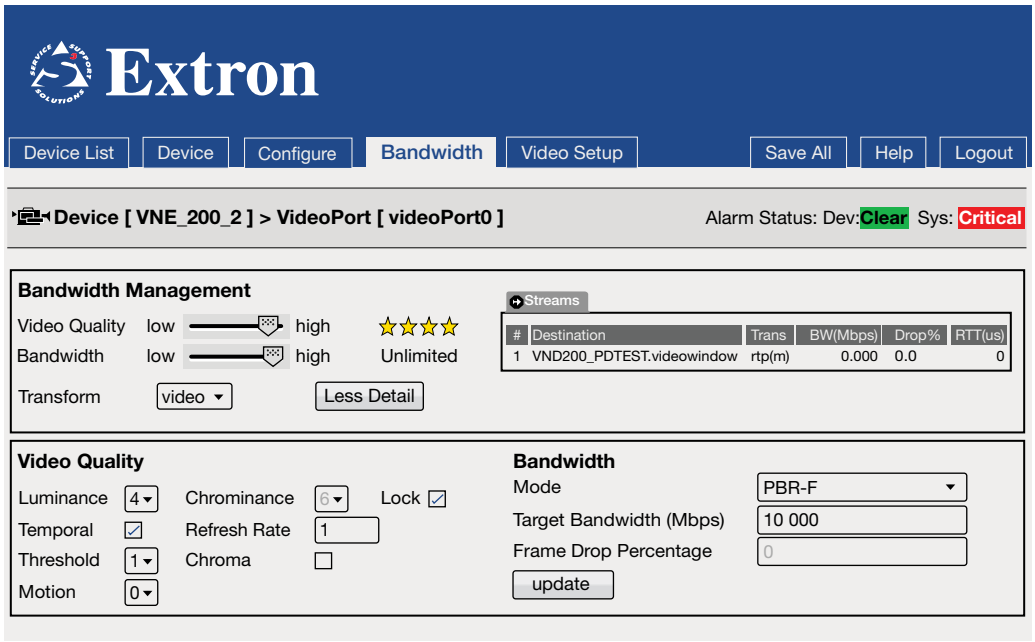


Figure 56. Detailed View of the Bandwidth Page

Using the lower control panel (Video Quality) provides for more complex control of the encoder compression settings (see the illustration below).

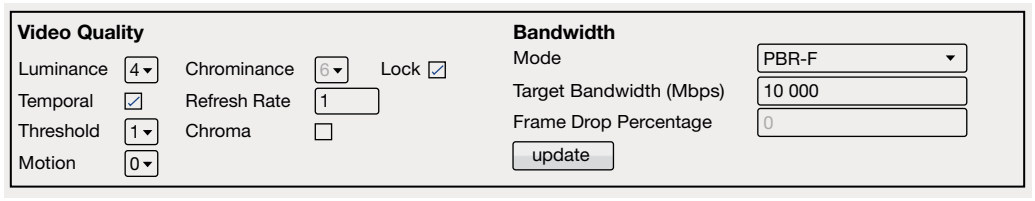


Figure 57. Video Quality Section of the Bandwidth Page

Bandwidth Management – Simple Control

Setting the maximum bit rate

The maximum bit rate of the streamed image may be set using the Bandwidth slider.

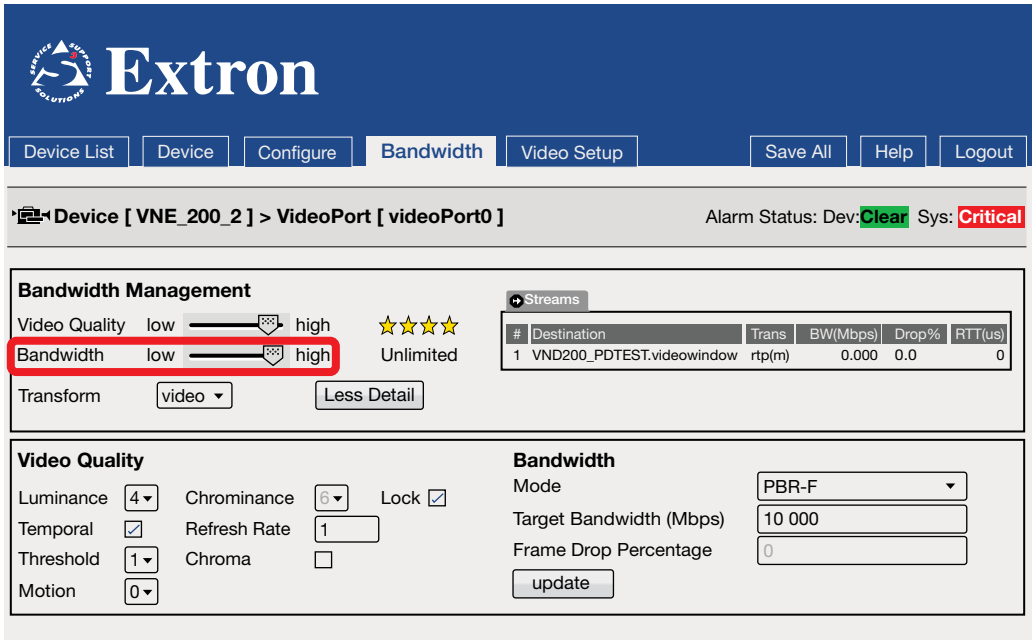


Figure 58. Bandwidth Slider

The **Bandwidth** slider may be adjusted from unlimited to 1 Mbps. The selected maximum bit rate is displayed on the right hand side of the slider bar.

When the slider is set to unlimited, no bit rate limit is applied and the actual bit rate depends on the complexity (detail and motion) of the source image.

As the slider is adjusted to reduce the maximum bit rate, the encoder progressively drops frames in order to limit the instantaneous bit rate. The number of frames dropped depends on the source image complexity.

NOTE: This setting is independent of the Video Quality settings described on the next page.

Setting the video quality

The Video Quality slider controls the amount of spatial compression that is applied to the source image.

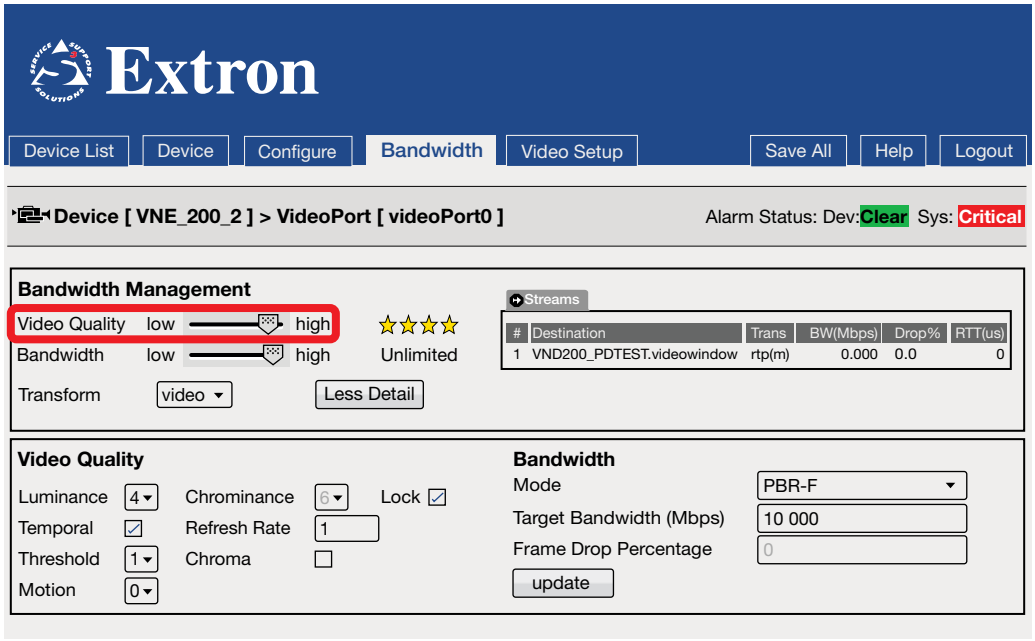


Figure 59. Video Quality Slider on Bandwidth Page

The Video Quality slider can be adjusted in steps from high to low video quality.

A high setting provides the highest image quality (with the lowest compression).

A low setting provides the lowest image quality (with the highest compression).

The bit rate of the streamed image is affected as the Video Quality slider setting is adjusted.

Note that a low setting may result in a blocky looking picture.

Setting the transform type:

The compression system supports two transform types that can be selected using the **transform** drop-down box:

- **Graphics** is optimized for text and sharp lines, as is present on most computer screens.
- **Video** is optimized for smooth tone changes such as is present in movies and other video content.

Bandwidth Management – Advanced Control

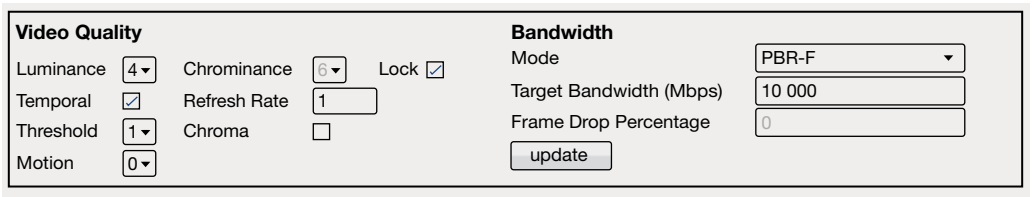


Figure 60. Video Quality Section of the Bandwidth Page

The controls in this section provide access to the complete set of image quality and bit rate tools for the VNC 225 encoder.

The controls are divided into two main categories.

- Video quality
- Bandwidth

Some of the controls available in the simple control interface previously described are also present in this section. Where controls are duplicated, the settings coincide.

Spatial compression luminance and chrominance settings

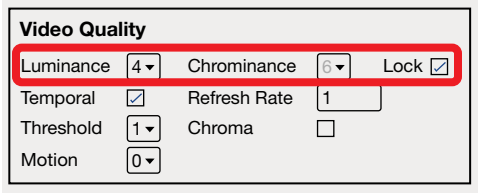


Figure 61. Luminance and Chrominance Controls on the Bandwidth Page

The level of spatial compression is set using the **Luminance** (luma) and **Chrominance** (chroma) drop-lists. These controls are normally locked (using the **Lock** check box), with an optimal offset of 2 units between them.

A luminance value of **0** provides the minimum spatial compression; a luminance value of **10** provides the maximum spatial compression.

If required, the chrominance compression may be set independently by clearing the **Lock** check box.

A spatial compression setting of **4**/**6** (luma **4**; chroma **6**) provides visually lossless compression.

NOTE: By default, the luma and chroma offset is set to **2** whenever the simple (standard) management scheme is selected.

Temporal compression setting

Temporal compression may be applied by selecting the **Temporal** check box (Temporal ☑). By default, this option is selected.

Temporal compression causes data to be transferred only when a change occurs between frames.

Quality control settings

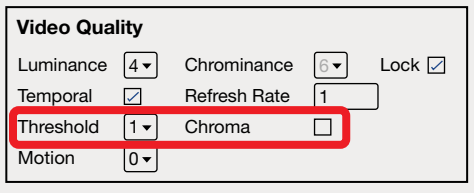


Figure 62. Quality Control Settings on the Bandwidth Page

The Threshold setting modifies the detection point of the temporal compression algorithm. A value of Ø results in all changes between frames being sent.

As the threshold value is increased, only changes above a certain level are sent, thus reducing the bit rate. This control is used to compensate for image sources that have a level of noise in them. In general, there is always a certain amount of noise in any source that is produced by an analog method. By applying a threshold, this noise can effectively be ignored by the PURE3 compression engine, resulting in a lower transmitted bit rate.

- A setting of Ø is suitable for DVI computer generated sources. Sources with more noise or video-type motion should use a setting between 1 and 4. Camera sources should always use a value greater than Ø.
- Motion compression can be modified between Ø and 15, where Ø is no additional motion compression and 15 is full motion compression. When enabled, where motion is detected on the screen that area is compressed more heavily. This reduces bandwidth at a time when the eye cannot perceive significant detail. When the motion stops, the screen area is re-sent at the standard resolution preserving the screen integrity.

> **NOTE:** Setting the motion to 1Ø or above can have detrimental effects when decoding the image with the software decoder.

Chroma controls whether the temporal algorithm should consider changes in the color or chrominance of the image. Enabling chroma gives better results on digital simulation type sources. However, chroma thresholds can increase the transmission bandwidth by up to 20%; therefore, it should be disabled on bandwidth sensitive systems. It is usually not required on video- or camera-type sources.

RefreshRate controls how frequently the non-changing parts of the screen are updated in temporal compression mode. This is useful when connecting new displays to a temporally encoded source and to fill in gaps in the data when using a lossy network transport such as RTP. A value of 1 refreshes the screen in one second, a value of Ø.1 refreshes the screen 10 times per second. A value of Ø disables the refresh.

Monitoring the bit rate

The bit rate of the streamed image may be monitored at the Streams information area of the Bandwidth page.

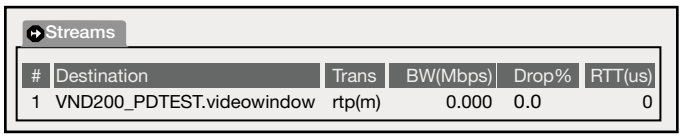


Figure 63. Streams Section of the Bandwidth Page

The **Streams** list shows network statistics for current RTP streams. For each RTP stream, three values are presented: the **transmit bandwidth** (Trans) (in megabits per second), the **packet drop percentage** (Drop %) and the **round trip delay time** (RTT, in microseconds). The transmit bandwidth is the true bandwidth of the source measured over the last second.

All of this data may not have arrived at the destination if the link shows packets are being dropped. Most networks show a small amount of dropped traffic, but when this loss rate rises above 5% it indicates that the capacity of the link has probably been exceeded. A lightly loaded network shows a fairly constant RTT. When this value starts to rise or fluctuates excessively it indicates the network is congested. Usually when network capacity has just been exceeded, the RTT rises to a large value just before packets start being dropped. The link latency rises as RTT increases.

Bandwidth Management Settings

The VNC 225 and VNE 225 can apply various control modes that allow the bit rate to be managed. These control modes are selected in the **Mode** drop-down box as described below. The **Target bandwidth (Mbps)** field and the **Frame Drop Percentage** fields are also described.

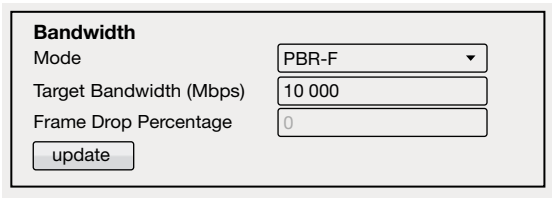


Figure 64. Bandwidth Section of the Bandwidth Page

- **None** — If **None** is selected, no bandwidth management policy is followed apart from the underlying compression settings.
- **Manual Frame Drop** — This mode allows you to specify the precise fraction of frames to drop. This does not manage the bandwidth at a fixed level, but does result in a smoother update given rapidly changing video content types. The percentage of frames to discard is entered into the **Frame Drop Percentage** field. For example, a value of **95** (95%) discards 19 out of every 20 frames and therefore reduces a 60 frames per second (fps) video signal to 3 fps.

  NOTE: Slowing the frame rate to 1 fps may cause the decoder to behave as if the source stream has been interrupted and it may flash up the no source splash screen.

- **Shared Flowrate** — When this option is selected, the total network video traffic for all streams of this source is limited to the flowrate (in Mbps) specified in the **Target Bandwidth** field. Frames are dropped if the instantaneous data rate is higher than the flow rate.

- **`Peak Flowrate`** — When this mode is selected The network video-traffic for each stream of this source is limited to the flow rate (in Mbps) specified in the **`Target Bandwidth`** field. Frames are dropped if the instantaneous data rate is higher than the flow rate.
- **`CBR-F`** — For this mode, the compression settings in this mode are dynamically modified to maintain the transmission bandwidth at the specified rate. The stream is refreshed more frequently in order to maintain the bandwidth as required. The filter averages the bit rate over a period of 1 second.
- **`PBR-F`** — In this mode, the compression settings are dynamically modified to limit the transmission bandwidth to the specified rate or below. The specified compression setting is used as the minimum compression value. The filter averages the bit rate over a period of 1 second.
- **`CBR-DFM`** — This mode is the same as CBR-F except frames are dropped when a larger reduction than can be achieved with just compression settings is required.
- **`PBR-DFM`** — This mode is the same as PBR-F except frames are dropped when a larger reduction than can be achieved with just compression settings is required.

Flow rate control modes (shared flow rate and peak flow rate modes) limit the instantaneous traffic on the network and are useful where the network pipe between source and display has limited bandwidth and drops traffic when this rate is exceeded. Non-flow rate control modes (none, manual frame drop, CBR-F, PBR-F, CBR-DFM and PBR-DFM) limit the average bandwidth, but the instantaneous bandwidth can be high. Non-flowrate control modes are best used on a LAN where the user does not wish the VNC 225 or VNE 225 to consume excess bandwidth.

NOTE: The actual bandwidth usage for unicast transports is multiplied by the number of data stream destinations. For example, if the encoder has two unicast RTP connections plus a TCP connection, it sends three data streams across the network and requires bandwidth for each stream.

Audio Compression

The S/PDIF digital data bus can carry two types of data:

- 2-channel (stereo) uncompressed audio, or
- Encoded digital data (typically AC-3 [Dolby® Digital] format)

The VNC 225 or VNE 225 supports limited compression of S/PDIF audio sources. This is controlled by the **`Compression`** setting on the Configure (audioPort) page. The following compression options are available:

Compression	2 Channel Audio Source	AC-3 Audio Source
No compression	24 bit native data (2975 kbps)	24 bit native data (2975 kbps)
Compress 1	16 bit data, full sampling rate (1517 kbps)	16 bit data, zeros run length encoded (430 kbps)
Compress 2	16 bit data, ½ sampling rate (784 kbps)	16 bit data, zeros run length encoded (430 kbps)
Compress 4	16 bit data, ¼ sampling rate (418 kbps)	16 bit data, zeros run length encoded (430 kbps)

NOTE: The native uncompressed setting passes the full 24 bit payload plus the four S/PDIF control bits, updating continuously. Other modes transmit only 16-bit data and reduce the S/PDIF control bits update rate to one per second.

Decoder Setup

This section provides details for advanced set up options for a VNC 225 or VND 225 decoder.

Setting Optimum Playback Delay

During playback of a source stream, data is transported from a VNC 225 and VND 225 encoder across the network and into a buffer on the VNC 225 or VND decoder. Data is then read from the buffer and output to the display. Because of the inherent time delay (latency) for data to be transported across the network, it is not possible for the decoder to display the source at exactly the same time as it is being encoded.

For this reason, the VNC 225 or VND decoder imposes a playback delay to account for the total data transit time. It also ensures smooth playback of a source stream by equalizing the flow of data into and out of the decoder buffer.

Setting the playback delay too small may cause the buffer to underrun (data is read from the buffer more quickly than it can be written). This results in the playback image jumping as network loading changes.

Setting the playback delay too large causes excessive image latency and may, particularly on high bandwidth data streams, cause the buffer to overflow (data is written to the buffer more quickly than it can be read). This results in jumpy screen updates and screen flashing.

NOTE: When a source has both a video and audio stream, these are treated separately and can be subject to different processing delays. In many applications, this does not present any noticeable issues. However, with some source material, especially where correct lip sync must be maintained, it may be necessary to set different values for the video and audio playback delay.

The default playback delay is 0.1 seconds which will be suitable for most applications and is the minimum recommendation for a 30 Hz source (or a 60 Hz interlaced source). For a 60 Hz frame rate source, the minimum recommended playback delay is 0.05 seconds.

Valid playback delay settings can be determined by setting values and then checking the Pipeline Status meter on the right side of the bandwidth page.

Accessing the bandwidth page

Playback delay is adjusted via the Bandwidth page for the VNC 225 or VND 225 decoder. This is accessed via the video or audio hyperlink on the Display page.

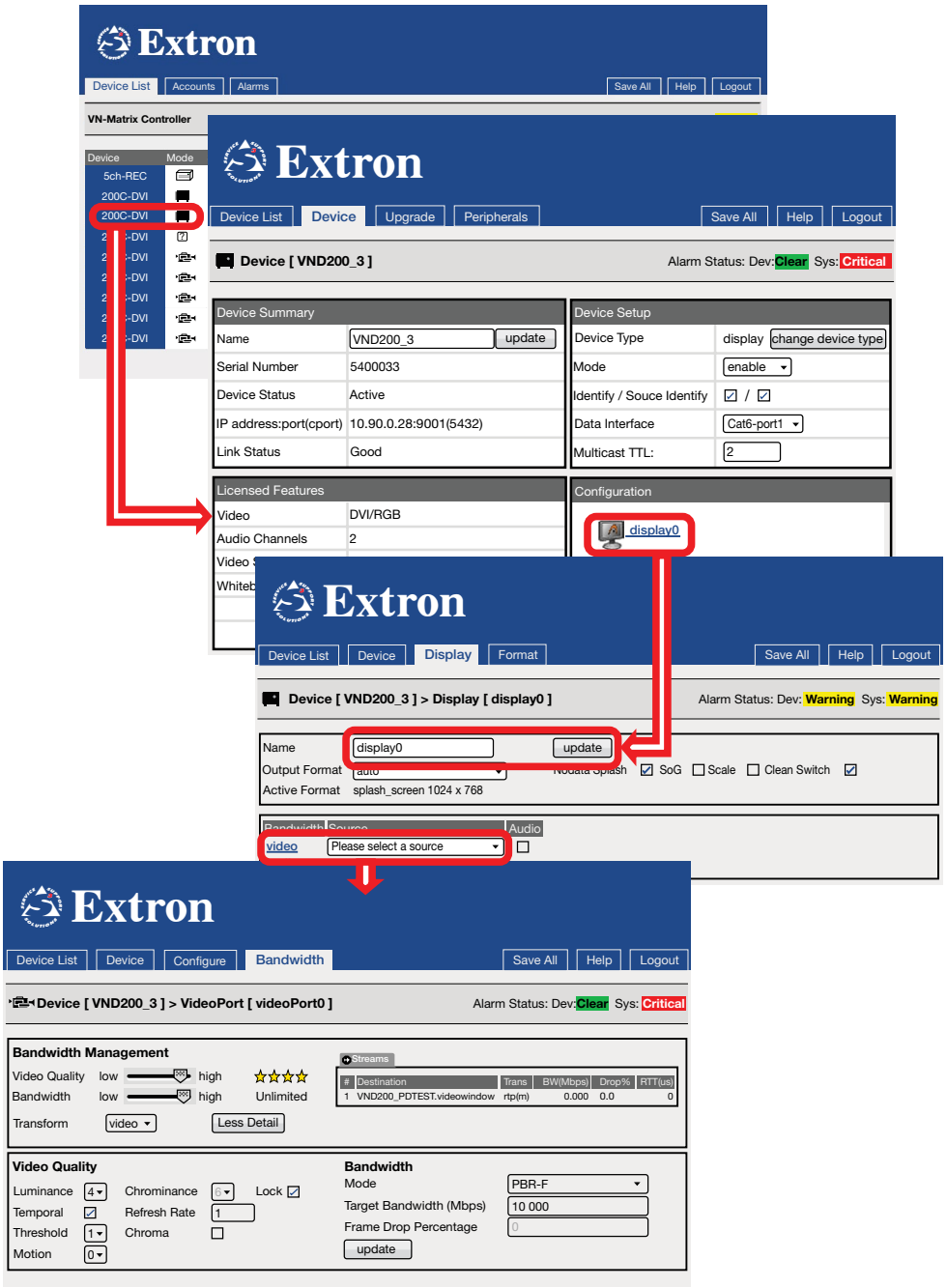


Figure 65. Accessing the Bandwidth Monitoring Page

To access the decoder Bandwidth page:

1. On the Device List page, select the decoder. The Device page opens.
2. On the Device page, click the Display0 button in the Configuration section. The Display page opens.
3. On the Display page, click the video button. The decoder Bandwidth page opens.

Adjusting the playback delay

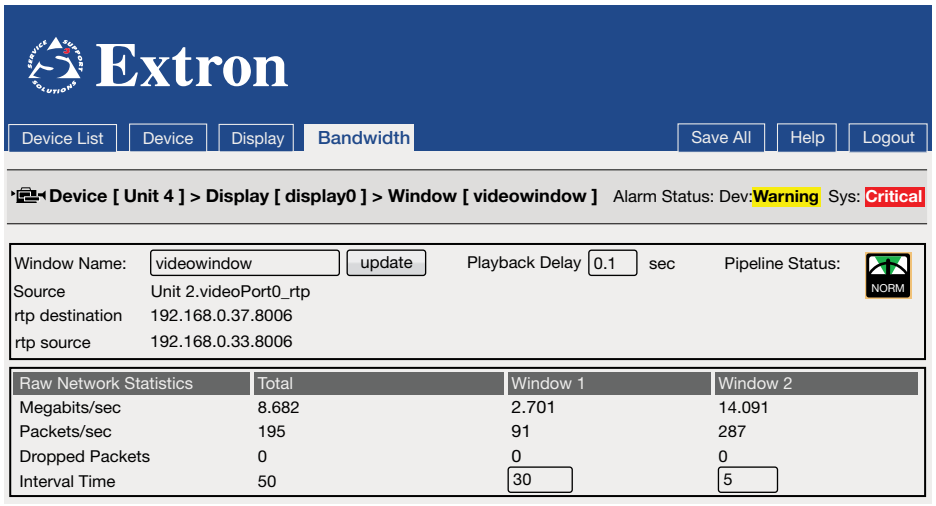


Figure 66. Adjusting the Playback Delay

1. Open the video Bandwidth page for the video object.
2. Enter a value into the Playback Delay field.
3. Click the Update button.
4. Check the Pipeline Status indicator to ensure that the playback delay is at a valid level:

   Setting is valid and should give a stable image.

   Playback delay is too small. This results in the playback image jumping as network loading changes.

   Playback delay is too large. This increases the image latency and may result in internal buffer overflow on high bandwidth data streams. This causes a jumpy and flashing screen.

5. If the source also has an audio stream, open the audio Bandwidth page for the audio object and adjust the playback delay in the same way.

TIP: To achieve lip sync between video and audio streams, adjust the video playback delay first to obtain a normal meter reading, and then adjust audio playback delay as required.

Custom Output Modes

The Format screen allows you to create custom video output formats or displaying decoded video data streams.

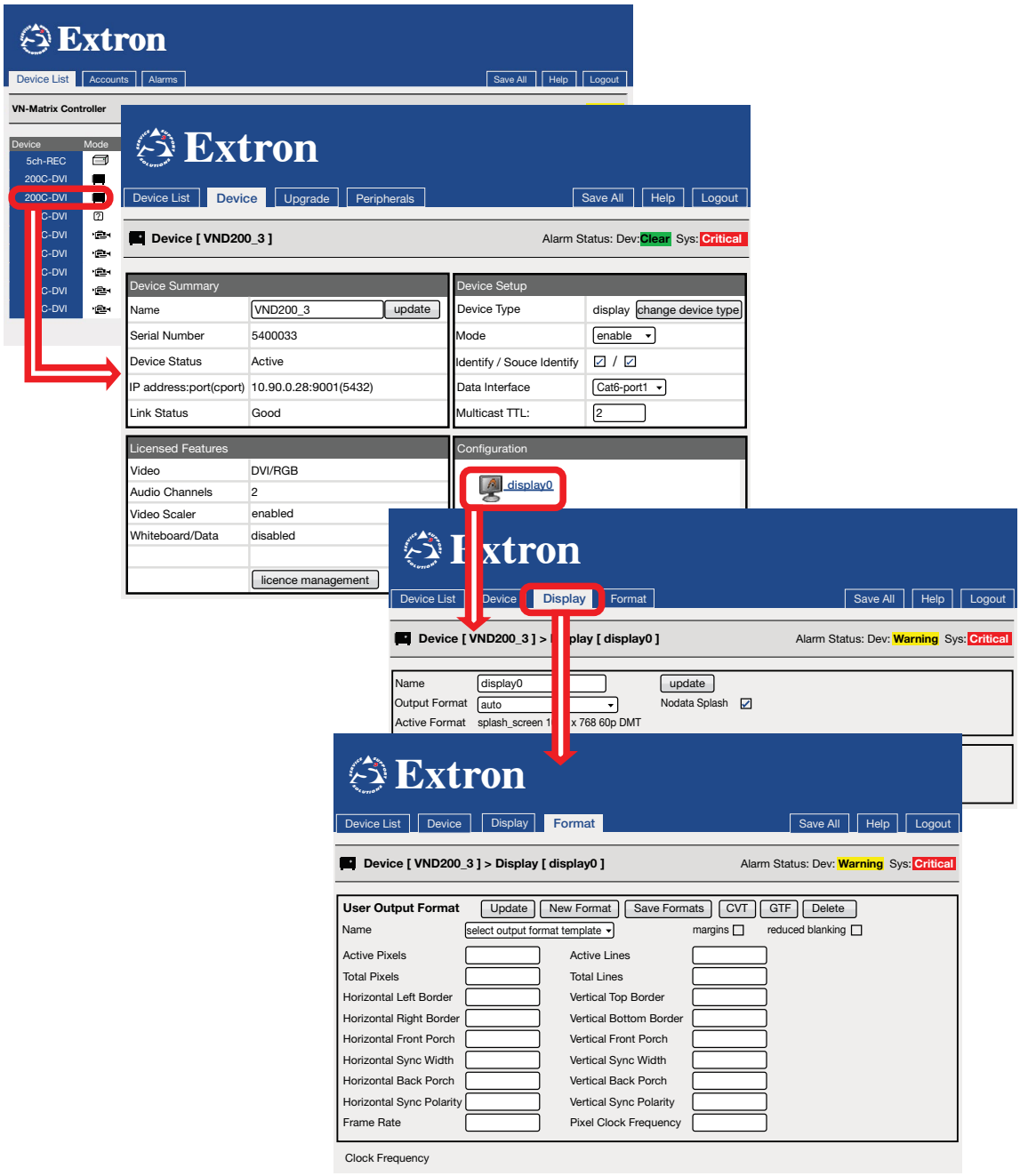


Figure 67. Accessing the Format Page to Create a Custom Output Mode

One of the issues encountered when some graphics sources are used in conjunction with VN-Matrix encoder and decoder systems is that the encoder often produces a loop-through image and states that it has detected a valid input mode. However, the decoder outputs a display splash screen that states “No Matching Output Mode.”

This following section describes how to create a custom output mode that will be automatically selected by the decoder when it encounters the corresponding input mode from the encoder.

Creating a CVT output mode

This procedure requires you to access the VN-Matrix decoder unit over a Telnet connection and access the VN-Matrix web GUI using a browser.

To create a coordinated video timing (CVT) mode:

1. Ensure that the graphics source causing the issues is connected to the VN-Matrix encoder, and that the encoder has detected the correct mode for that source.

   NOTE: Make sure that the source is displaying an image that occupies the entire desktop, such as a window that has been maximized.

2. Verify that an image is present on the loop-through output of the encoder.
3. Connect a PC to the VN-Matrix network and start the VN-Matrix web GUI (see **Accessing the Web Interface**).
4. From the web GUI, select the encoder. Click the **videoPortØ** link in the Configuration region, and then select the **Video Setup** tab.
5. When the Video Setup page is displayed, make a note of the horizontal resolution (**digHSize**) and vertical resolution (**digVSize**) that are displayed in the Device Status section of the page. These will be used as the basis for the new output mode.
6. From the web GUI, select the decoder:
   a. Select the decoder that is displaying the “No Matching Output Mode” screen.
   b. Click **displayØ** in the Configuration region.
   c. Select the **Format** tab.
7. When the Format page is displayed, click the **New Format** button. An Explorer User Prompt window opens.
8. In the **New Output Format Name** field in the prompt window, enter a name for the mode you are building. It is a good idea to use the resolution, refresh rate, and PC type (such as Mac or Linux) in the title. The name “**128Øx96Ø_6ØHz_Dell**” is used in the example below. Click **OK**.

Figure 68. Prompt for New Format Name

9. Using the **Name** drop-down list, select the mode (**128Øx96Ø_6ØHz_Dell**).
10. In the **Active Pixels** field, enter the horizontal resolution that was noted in step 5.
11. In the **Active Lines** field, enter the vertical resolution that was noted in step 5.
12. In the **Frame Rate** field, enter the refresh rate of the source.

13. Click the **CVT** button. The VN-Matrix unit now attempts to build a mode using the standard CVT timing calculator. The remaining values on the screen update automatically.
14. Click **Update** and then click **Save** Formats.
15. From the source device that is supplying the encoder, change the resolution and allow the encoder to display the image on the loop out. This forces the VN-Matrix to change both input and output modes.
16. Change the source back to the original resolution.

If the image appears correctly on the decoder, the new mode that you created is working correctly. The mode creation is now complete and you can stop here.

If the decoder still displays the "No Matching Output Mode" splash screen, the new mode is not a close enough match to the source to be automatically selected. To resolve this, see **Creating a custom output mode**, below.

Creating a custom output mode

If the CVT output mode that you created in the previous section is not automatically selected when the source was selected, create a new mode and manually enter specific timing values for it. To do this, perform the following steps:

1. Select the decoder in the **Device List** tab of the web interface.
2. Select the **Device** tab.
3. Click on the **displayØ** link in the Configuration region.
4. Use the **Output Format** drop-down list to select the CVT mode that you created in the previous section.
5. Select **Update**. The source should now be displayed correctly on the decoder output.

The mode must now be modified so it can be detected automatically when the source is connected to the encoder.

To do this, you will:

1. Retrieve timing information using a Telnet session (see **Opening a Telnet session on port 4002 with a VN-Matrix decoder**, below).
2. Enter the observed timing values in the VN-Matrix web GUI (see **Entering the timing values in the VN-Matrix web GUI**, on the next page)

Opening a Telnet session on port 4002 with a VN-Matrix decoder

To open a Telnet session with the VN-Matrix decoder, perform the following procedure:

1. From the Windows taskbar, open a terminal window and then type

   `telnet` *`xxx.xxx.xxx.xxx`* `4002`, where *`xxx.xxx.xxx.xxx`* represents the IP address of the VN-Matrix decoder (leading zeros are not required). Press <Enter>.

   Source information is now continually streamed to the Telnet window. Although the numeric values may be different, you see a line similar to the one shown below:

   ```
   resolution update message: 128Ø,96Ø,6Ø,1ØØØ,18ØØ,fbbd,1Ø8ØØ144Ø,1:
   ```

   The first five numeric values are interpreted as:

Parameter	Meaning
1280	Active area width of current source (in pixels)
960	Active area height of current source (in pixels)
60	Frame rate of current source, in Hz
1000	Total line count of current source
1800	Total pixels per line of current source

2. Write down the values that are reported for:
   - Active area width
   - Active area height
   - Frame rate
   - Total line count
   - Total pixels per line

   These values are required in the next section.

Entering the timing values in the VN-Matrix web GUI

1. Return to the VN-Matrix GUI and navigate to the **Format** tab of the decoder.
2. In the **Name** drop-down list, ensure that the mode you have just built is selected, then click **Update**.

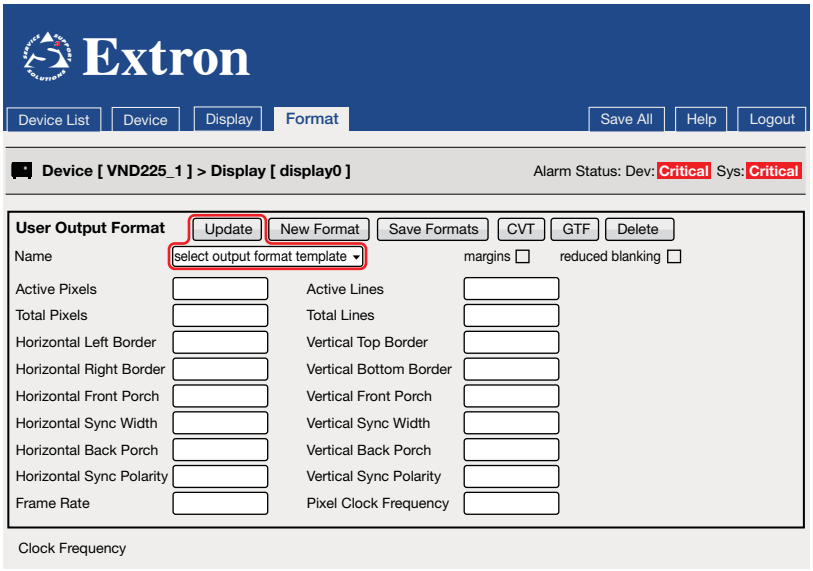


Figure 69. Format Page

3. Calculate the correct horizontal values for the mode you are using. Assume that the values for the horizontal left border, horizontal right border, horizontal front porch, and horizontal sync width are already correct.

4. Enter the values for active pixels, frame rate, and total pixels that were returned in the Telnet session.

   Example:

   The values in the table below are from the example shown under **Opening a Telnet session on port 4002 with a VN-Matrix decoder**, on page 76.

Parameter	Meaning
1280	Active area width of current source (in pixels)
960	Active area height of current source (in pixels)
60	Frame rate of current source, in Hz
1000	Total line count of current source
1800	Total pixels per line of current source

5. Calculate and enter the horizontal back porch value. This value is calculated with the formula:

   total pixels per line – (active pixels in width + horizontal left border + horizontal right border + horizontal front porch + horizontal sync width)

   In the example in step 4, above, this equates to:

   1800 – (1280 + 0 + 0 + 80 + 128) = 312

6. Enter the value from step 4 into the **Horizontal Back Porch** field.
7. Calculate the correct vertical values for the mode. Assume that the vertical top border, vertical bottom border, vertical front porch, and vertical sync width are already correct.
8. Enter the values for active lines and total lines that were returned in the Telnet session (see step 4, above).
9. Calculate the vertical back porch value. This value is calculated with the formula:

   total lines – (active pixels in height + vertical top border + vertical bottom border + vertical front porch + vertical sync width)

   In the step 4 example, this equates to:

   1000 – (960 + 0 + 0 + 3 + 4) = 33

10. Enter the value from step 8 in the **Vertical Back Porch** field.
11. Calculate the pixel clock frequency. This is calculated with the formula:

    total lines x total pixels x frame rate

    In the step 4 example, this equates to:

    1000 x 1800 x 60 = 108000000

12. Enter your value from step 10 in the **Pixel Clock Frequency** field.
13. Click **Update**, and then click **Save Formats**. The new mode should now be an exact match for the connected source.
14. To test the new mode select the **Display** tab for the decoder, and ensure that **Auto** is selected in the **Output Format** selector.
15. Switch the resolution on the source to a different resolution and then switch it back again. The mode should display. If it does not, see **Troubleshooting** on page 38.

Controller Configuration

The unit that has been designated as the controller for the system is responsible for all communications to the VN-Matrix 225 devices that are part of that system. In addition, all system specific information is stored on the system controller. Each time a system is powered, each device communicates with the controller to obtain information about its status within the system as a whole. The controller is the device that serves the web page for the browser to provide user control.

Changing User Login Passwords

1. Log in to the web interface (see **VNC 225 Web Interface** on page 21).
2. From the Device List page click the **`Accounts`** tab.

   The following page displays:

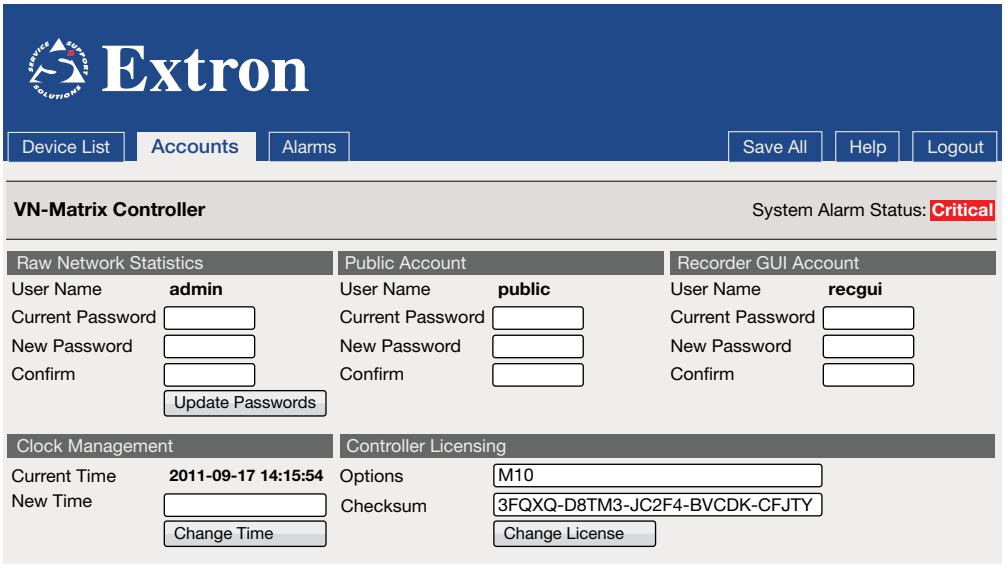


Figure 70. Accounts Page

   The VNC 225 has two user accounts:

Admin	Allows full read and write access to all setup parameters. The default user name and password for this account are **`admin`**, **`admin`**.
Public	Allows read-only access to setup parameters. The default user name and password for this account are **`public`**, **`public`**.

3. Enter the current password for the user account that you want to change.
4. Then enter the new password in both the **`New Password`** and **`Confirm`** fields.

   NOTE: The password can include letters, numbers, and the underscore character, and is case sensitive.

5. Click the **`Update Passwords`** button to save the change. The new password is required the next time you log in.

   NOTE: The Recorder GUI Account (recgui) is provided for specific system use. It is not required for normal operation and is not covered in this user guide.

Controller Licensing

Each VNC 225 device is supplied with a default level of functionality that can be upgraded by obtaining a special license key from Extron.

In addition to the individual device licenses, the system itself holds a license on the unit that has been designated as the controller for the system. This license defines which VNC 225 devices are permitted to run on the system.

Currently, the controller license is used to license (permit) the correct number of users with access to the VNM software decoder.

A license key contains two elements – an option and a checksum. New licenses may be obtained from your Extron dealer when they are required.

Changing a Device License

Each VNC 225 unit is supplied with a default level of functionality that can be upgraded by obtaining a special license key from Extron.

A license key contains two elements: an option and a checksum. These are entered using the License page, which is accessed via the **`license management`** button on the Device page.

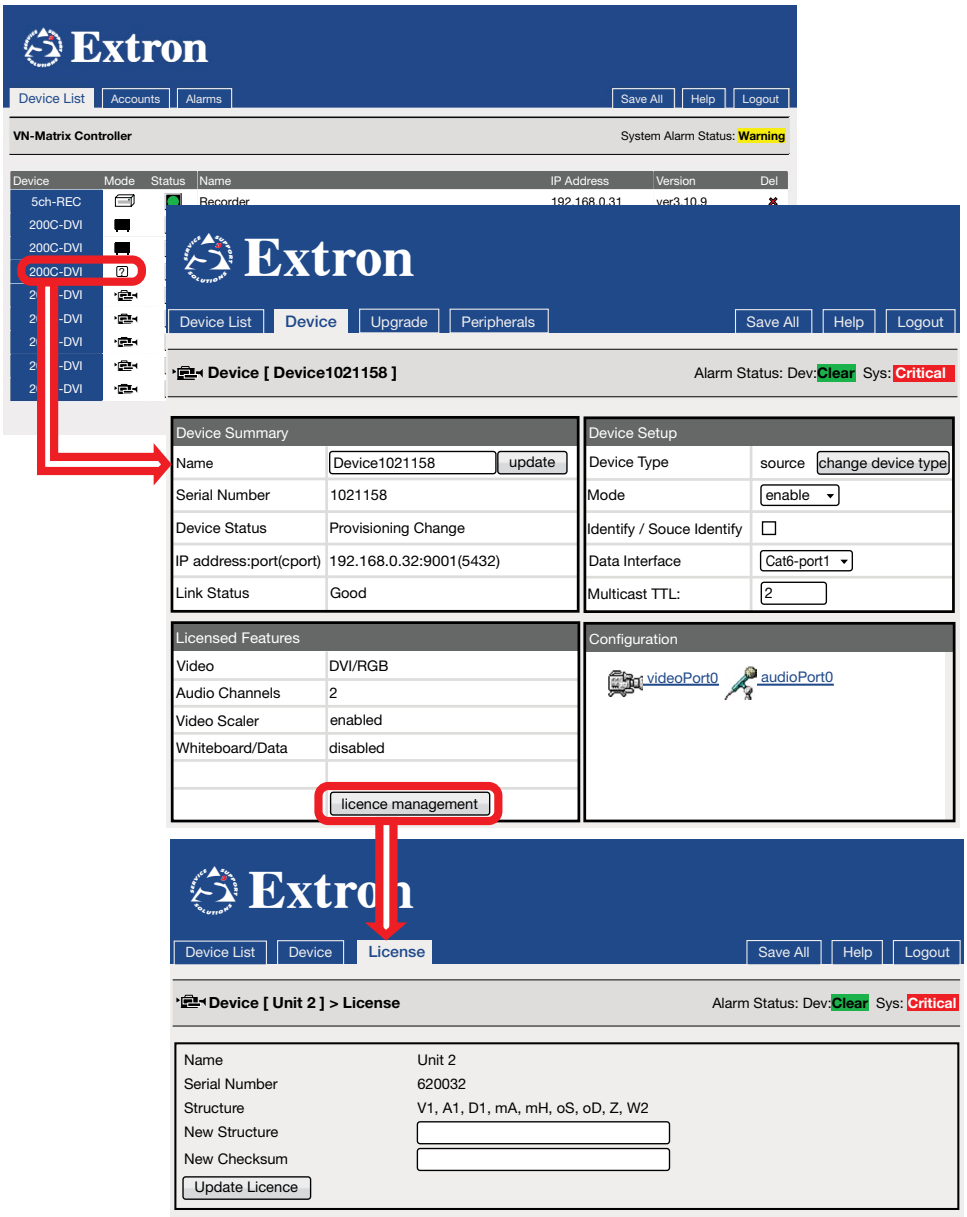


Figure 71. Changing a Device License

1. On the Device List page, select the device name. The Device page appears.
2. On the Device page, click **`license management`**.
3. On the License page, enter the new information into the **`New Structure`** and **`New Checksum`** fields.
4. Click the **`Update Licence`** button.

Upgrading Device Firmware

Extron may issue firmware upgrades for the VNC 225 in order to make new functionality available. Details of the latest firmware release will be published on our website.

Upgrades are supplied in a single file, with a name like `upgrade_ver3.3c.tar`, where `ver3.3c` is the version number. Before you start, copy the upgrade file on to the computer you use to access the VNC 225 controller.

The update process consists of the following stages:

Stage	Function Summary	Performed On
Upload	The upgrade file is being copied from the control PC to a temporary storage area on the VNC 225 controller.	The VNC 225 controller only
Prepare	The new firmware is being unpacked and copied (from the controller) into the VNC 225 alternate flash memory	Each VNC 225 device including the controller
Activate	The VNC 225 is rebooting to start using the new firmware. This is a temporary mode that allows you to test the new firmware. If you encounter any problems, you can ”back out” of this mode and return to the previous firmware version.	Each VNC 225 device including the controller
Commit	The VNC 225 is rebooting to start using the new firmware permanently.	Each VNC 225 device including the controller

All stages of the upgrade process are carried out using the web interface. It is recommended that all VNC 225 units in the same system are upgraded to the same firmware version in order to ensure full compatibility.

NOTES:

- Performing the Activate function on the controller causes the device to reboot and, as a result, the upgrade file (in the temporary storage area) is erased. It is recommended, therefore, that you prepare all devices first, after which the upgrade file is no longer needed. Then perform the Activate function on each device, starting with the controller.
- The Activate function must be performed on the controller device first, such that the new firmware is in control of upgrading the remaining devices.
- When you are performing the Activate or Commit functions on the controller, the device reboots. This causes temporary loss of the web interface, since this is provided by the controller.
- Wait 30 seconds to allow the device time to reboot, then refresh the browser.

Uploading the firmware file to the VNC 225 controller

1. Log in to the web interface (see **VNC 225 Web Interface** on page 21).
2. On the Device List page click on the VNC 225 controller device.
3. On the Device page click the **Upgrade** tab. The Upgrade page displays.

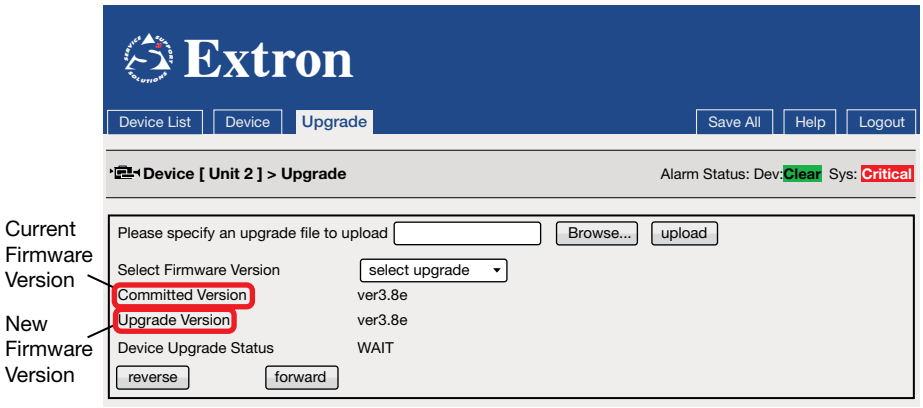


Figure 72. Upgrade Tab

4. Click the **Browse** button to navigate to the required upgrade file, or type the path and filename directly into the field.
5. Click the **Upload** button to begin uploading the file to the VNC 225 controller. This may take a few minutes.
6. After the file is uploaded, begin installing it into each unit (see **Installing the new firmware into each VN-Matrix unit**, below) starting with the controller unit.

Installing the new firmware into each VN-Matrix unit

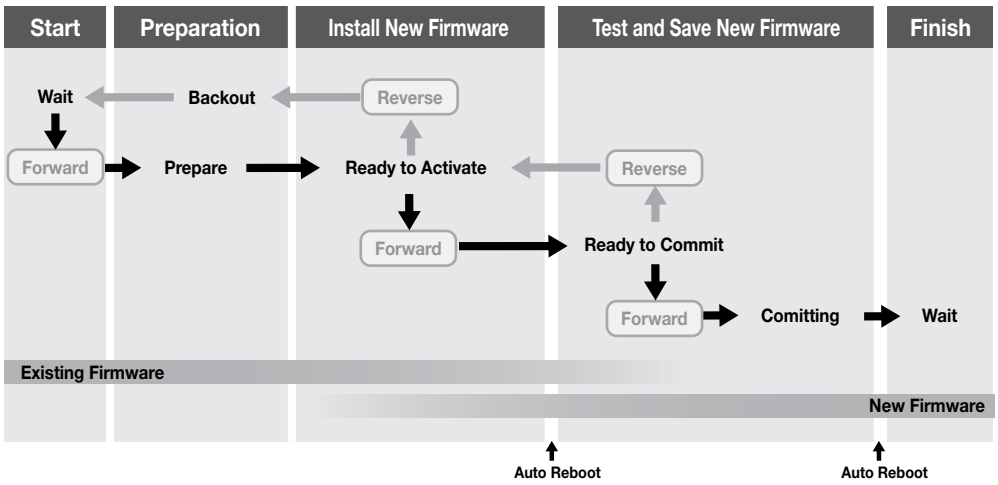
NOTE: You must upgrade the VNC 225 controller first. However, once you go past the READY TO ACTIVATE stage, the unit will reboot and the upgrade file will be erased from the controller. It is recommended, therefore, that you get ALL devices to the READY TO ACTIVATE stage before completing the controller upgrade, otherwise you will need to upload the file again (as described in the previous section).

1. On the Device List page, click on the VN-Matrix 225 unit you want to upgrade. The Device page opens.
2. On the Device page, click the **Upgrade** tab. The Upgrade page displays.
3. Click the **Select Firmware Version** drop-down menu and choose the new firmware file you want to install. Usually there will only be one file listed (the file you uploaded using the procedure in the previous section).

To complete the installation procedure, use the **forward** and (if necessary) **reverse** buttons to move the installation between the stages. The current stage and status is shown in the **Device Upgrade Status** field.

The process allows you to temporarily install and test the new firmware and if everything is functioning correctly, permanently install (commit) the new firmware. Until the last stage, you can return to the current firmware version.

The firmware update process is summarized in **figure 73**, on the next page.



NOTE: While the VN-Matrix is rebooting the device, the Upgrade Status Field shows "Device Restarting."

Figure 73. Firmware Upgrade Process

4. Click the **forward** button. The **Device Upgrade Status** field displays **Prepare** and the progress percentage. This stage may last a few minutes.

   TIP: The chosen firmware version is confirmed in the **Upgrade Version** field.

5. When Ready to Activate appears, click the **forward** button again. The unit reboots. When the reboot is complete, the **Device Upgrade Status** field displays **Ready to Commit**. The VN-Matrix 225 is now using the new firmware.
6. Test for correct operation.
7. If everything is working correctly, click **forward** again to permanently install the new firmware. The **Device Upgrade Status** field shows "**Committing**" and the progress percentage. This stage may last a few minutes.

   NOTE: If you experience any problems, click reverse to return to the previous stage.

8. When the **Device Upgrade Status** field returns to "**Wait**," the unit is ready for use.

Alarms and SNMP

This section describes the following:

Overview — Alarms

The VN-Matrix system is configured to generate alarms for error conditions. A list of these error conditions and their meanings are presented in the following sections. To access the Alarms pages, open the VN-Matrix Controller software and click the **`Alarms`** tab.

Alarms can be monitored at a number of locations throughout the web GUI on the following pages:

- **Alarms page** — The list immediately below the Filter Settings box provides details on the alarm conditions that are currently active on the system.
- **Alarm Logs page** — The list immediately below the Filter Settings box provides a historical log of alarm conditions that are raised and cleared.
- **Device List page** — A traffic light system is used on this page to represent the status of a device.
- **Top left-hand corner of each page in the web GUI** — The device status and system status are displayed here.

In addition, the red LED located on the front panel of the VN-Matrix 225 illuminates whenever a critical alarm is triggered.

When an alarm condition is triggered, it remains active until the error that caused it is cleared and then for an additional 5 seconds.

Alarms Page

The Alarms page enables you to define and monitor system alarms.

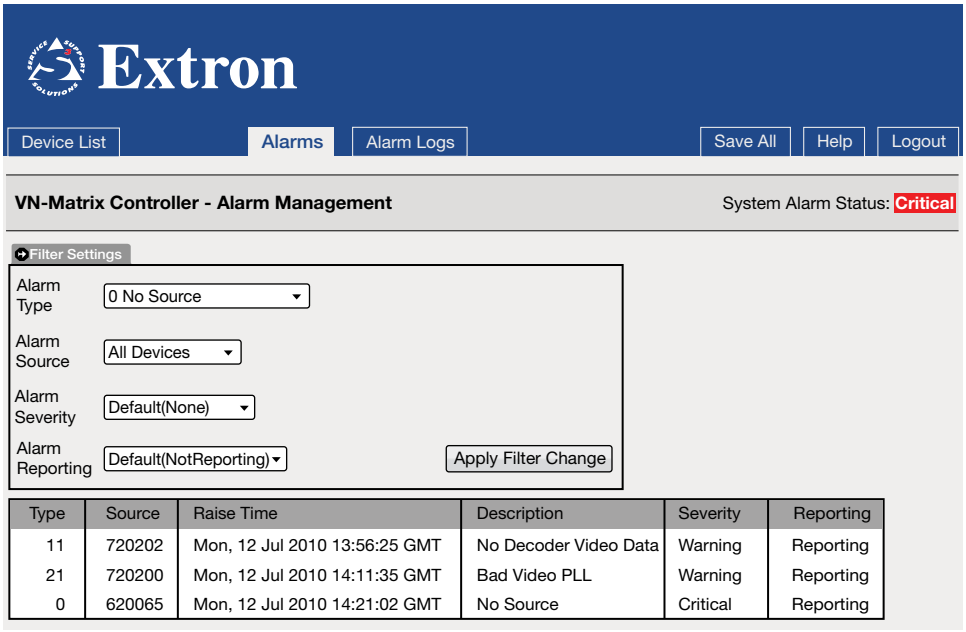


Figure 74. Alarms Page

Filter Settings

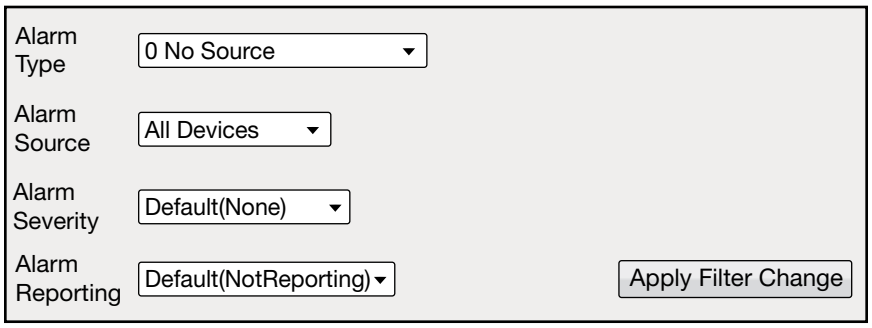


Figure 75. Filter Settings Section

The Filter Settings section allows the default settings for each alarm type to be modified.

- **Alarm Type** — Select the particular alarm that is to have its default setting changed.
- **Alarm Source** — Select the device on which the alarm is to change.
- **Alarm Severity** — Set the alarm severity. Each alarm condition has a default severity that may be overwritten using the filter controls. Note that the default setting listed in this drop-down list is independent of any changes that have been made to the alarm severity.
- **Alarm Reporting** — Set the alarm to be either “reporting” or “not reporting.” Each alarm condition has a default reporting setting. Note that the default setting listed in this drop-down menu list is independent of any changes that have been made to the alarm reporting.

Alarm Type

This drop-down menu lists the available alarm error conditions for all units. Alarm error conditions are divided into two categories:

- Alarm errors that occur on an encoder
- Alarm errors that occur on a decoder

In addition, there is one alarm error that only occurs on the device that is configured as the system controller.

Alarm Source

Alarm filters may be set for either a single, specific unit or for all VN-Matrix 225 devices in the system.

Alarm Severity

Alarms may be set to one of three severities:

Alarm Severity	Description
Critical	When a critical alarm is triggered, the red LED Illuminates on the front panel of the affected unit. In addition, the normally open contacts of the relay accessed via the Comm 2 connector close. The traffic light indicator for the device (Device List) is shown in red.
Warning	When a warning alarm is triggered, the traffic light indicator for the device (Device List) lights amber.
None	A setting of **`None`** effectively filters the alarm condition. The alarm still appears in the alarms list, but it does not affect any colored indicators.

Alarm Reporting

An alarm condition can be either **reporting** or **not reporting**. A reporting condition causes an SNMP trap to be sent to an SNMP client whenever that alarm condition is triggered. A trap can be used by network management software to signal abnormal conditions to network administrators.

Applying Alarm Filter Settings

Changes made to the filter settings may be applied from the **`Apply Filter Change`** button. Changes are lost after a power down unless you use the **`Save All`** tab to make these changes permanent.

Alarm List

The Alarm list provides information on all alarm events that are currently active. The list is refreshed each time the **`Alarms`** tab is selected.

Alarm events that are listed may be sorted by type, raise time, and severity. Position the mouse pointer over the required sorting heading (**`Type`**, **`Raise Time`**, or **`Severity`**) and left-click to change the list order. The list is refreshed each time the sorting criteria is applied.

Type	Source	Raise Time	Description	Severity	Reporting
11	720202	Mon, 12 Jul 2010 13:56:25 GMT	No Decoder Video Data	Warning	Reporting
21	720200	Mon, 12 Jul 2010 14:11:35 GMT	Bad Video PLL	Warning	Reporting
0	620065	Mon, 12 Jul 2010 14:21:02 GMT	No Source	Critical	Reporting

Figure 76. **Alarm List**

Alarm Logs

A list of the last 200 alarm events is provided on the Alarm Logs page.

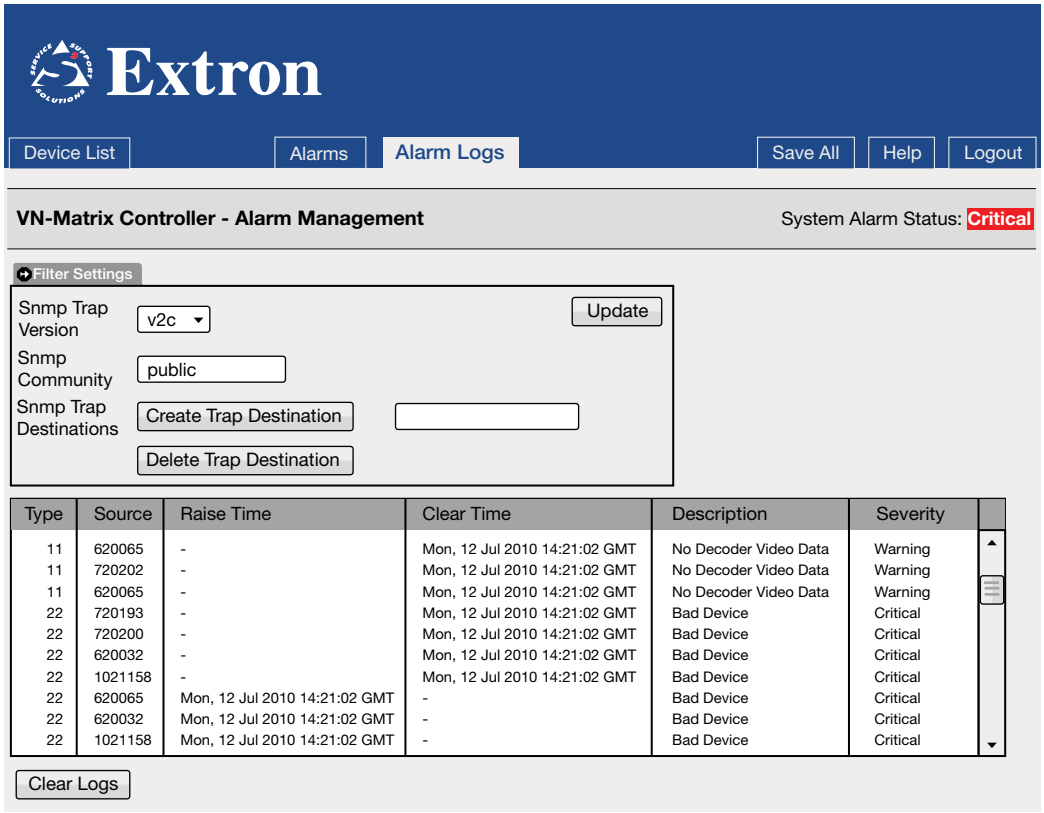


Figure 77. Alarm Logs Page

The log provides data regarding the times an alarm error condition was raised and cleared. It holds a historical record of the last 200 alarm events. When more than 200 events have occurred, the oldest event is deleted from the log.

Alarm events listed in the log may be sorted by type, raise time, and severity. Position the mouse pointer over the required sorting heading (**`Type`**, **`Raise Time`**, or **`Severity`**) and left-click to change the list order. The list is refreshed each time the sorting criteria is applied.

Alarm Type Description — Encoder

Alarm Type	Description	Action	Default Settings
No source	No source present at the input.	Check input connections; is there an output on the loop- through connector?	Critical, reporting
Bad source syncs	Source is present, but unrecognized due to bad sync measurement.		Critical, reporting
No SDI source lock	Ignored for VN-Matrix 225		Critical, reporting
Unsupported SDI mode	Ignored for VN-Matrix 225		Critical, reporting
Unsupported mode	Source is present, mode not supported.		Critical, reporting
Bad source			Critical, reporting
Analog phasing error			Warning, reporting
Hardware encoding error	The hardware is unable to encode the input signal.		Critical, reporting
Unsupported audio source			Critical, reporting
Data rate overload	The compressed data rate is too high.	Increase the compression or reduce the required bit rate.	Critical, reporting
Network overload	The network is dropping too many packets.		Warning, reporting

Alarm Type Description — Decoder

Alarm Type	Description	Default Settings
No decoder video data	Indicates that there is a valid connection, no video data present. Usually accompanied by “no source data stream” message in the web interface.	Warning, reporting
No decoder mode	No matching decoder mode for the incoming stream.	Warning, reporting
No source report	Unable to detect the format of the received data stream.	Warning, reporting
Recovered audio		Warning, reporting
No decoder audio data		Warning, reporting
Bad audio at decoder		Warning, reporting
Bad audio PLL		Warning, reporting
Video network packets dropped	Excessive network packet loss has occurred	Warning, reporting
Decoder buffer overflow	The incoming data rate is high; reduce the pipeline delay.	Warning, reporting
Decoder buffer underflow	The incoming data rate is too low; increase the pipeline delay.	Warning, reporting
Bad video PLL	The decoder cannot synchronize to the video data.	Warning, reporting
No decoder ANC data	The decoder is not receiving any embedded audio (ancillary) data.	Warning, reporting
Missing ANC at decoder	The decoder is receiving poor quality ANC data.	Warning, reporting
Recovered ANC	Error correction has recovered corrupted or missing ANC.	Warning, reporting

Alarm Type Description — Controller

Alarm Type	Description	Action	Default Settings
Bad device	The controller is unable to contact the specified device. The device is not available or has failed. Note that this alarm is only generated on the controller	Check the device in question. Is power applied? Is the network cable or connection present? Has the unit been removed?	Critical, reporting

Overview — SNMP

Simple Network Management Protocol (SNMP) is a protocol used to configure and monitor a network. The VN-Matrix 225 device has the ability to report alarm events via an SNMP trap (traps are used by network entities to signal abnormal conditions to network administrators).

When communicating using SNMP, the VN-Matrix 225 complies with the requirements of SNMPv3. When generating SNMP traps, the VN-Matrix 225 complies with the requirements of SNMPv1 and SNMPv2c.

NOTE: The VN-Matrix supports both version 1 and version 2 SNMP traps (SNMPv1 and SNMPv2c).

Using an SNMP Password

The SNMP password is the same as the administrator password. By default this is set to **`admin`**.

NOTE: It is necessary to enter the administrator password in the accounts page before SNMP can be used. This process must be carried out for each of the following circumstances:

- When you are first using the system
- After a firmware upgrade to the system

A password for SNMPv3 must be eight characters long. If the administrator password is less than eight characters in length, additional characters from the password are concatenated as follows:

`admin` becomes `adminadm`.

If the administrator password is longer than eight characters, the value is truncated:

`administrator` becomes `administ`.

SNMP Community

The value in the **`SNMP Community`** field acts as a password. It is used to authenticate messages between the VN-Matrix 225 system and the NMS. By default, the **`SNMP Community`** field is set to public. The SNMP Community string must match that in use by the NMS; if not, it may not be possible to manage the VN-Matrix 225 device.

SNMP Trap Destinations

The Filter Settings dialogue on the Alarm Logs page is used to add and remove destination IP addresses for NMS servers.

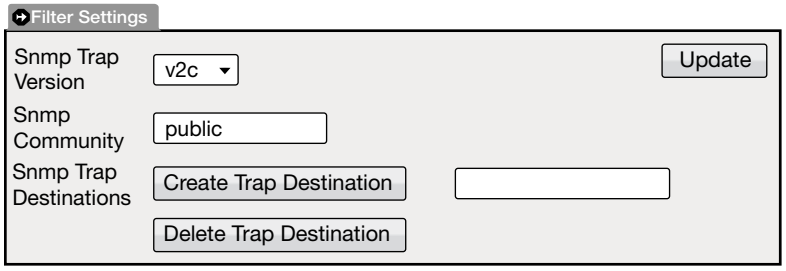


Figure 78. Filter Settings Section of the Alarm Logs Page

The IP address of the NMS should be entered in the **`Create Trap Destination`** field. Multiple destinations may be added.

IP Addressing

This section covers the following topics:

What is an IP Address?

A full explanation of IP addressing is beyond the scope of this user guide. However, the following details will provide you with enough information to get started.

An IP address is a 32-bit binary number that is used to identify each device on an Ethernet network. This number is usually represented by four decimal numbers (each in the range 0 to 255) separated by dots, for example, 198.123.34.240. This is called “dotted decimal notation.”

An IP address is divided into two parts:

- The network identifier
- The host identifier

On a given network each address must have the same network identifier value but have a unique host identifier. There are, therefore, different classes of address that define:

- The range of valid addresses
- Which parts of the address are used for the network and host identifiers.

The most common IP address classes are:

Class	Valid Address Range	Identifier Arrangement*
Class A	0.0.0.1 to 127.255.255.254	*NNN.HHH.HHH.HHH*
Class B	128.0.0.1 through 191.255.255.254	*NNN.NNN.HHH.HHH*
Class C	192.0.0.1 through 223.255.255.254	*NNN.NNN.NNN.HHH*

**NNN* = network identifier

HHH = host identifier

Private and Public Address Ranges

Within each of the above classes are a range of addresses designated as “private” addresses. These are addresses that should only be used on private local networks and intranets and cannot be accessed directly from the Internet.

10.0.0.0 – 10.255.255.255

172.16.0.0 – 172.31.255.255

169.254.0.0 –169.254.255.255

192.168.0.0 – 192.168.255.255

All other addresses outside these ranges are considered “public” addresses.

Multicast Address Range

A further range of addresses is available for multicast usage:

224.0.0.0 – 239.255.255.255

These addresses (also known as class D addresses) are used to allow several devices to be part of the same multicast group. Each device in the group has the same multicast address and can effectively send data to all other devices in the same group simultaneously.

Choosing IP Addresses

If your VN-Matrix 225 units are connected via their own independent network, then follow the guidelines below for choosing your IP addresses. However, if you intend to connect your VN-Matrix 225 units to an existing network, you will need to advise the network administrator and ask them to allocate suitable addresses to you.

On an independent network, you can (in theory) use nearly any addresses you wish. However, it is generally recommended that you use the class C format (192.0.0.1 to 223.255.255.253).

Remember that there are two rules for choosing IP addresses:

- The network identifier must be the same for each address.
- The host identifier must be unique for each address.

Applying these rules to class C addresses, it can be seen that the first three decimal values of your IP addresses must all be the same, while the last value is used to uniquely identify each device.

The following is an example of a valid Class C addressing scheme:

Device	IP Address
Device 1	208.132.180.41
Device 2	208.132.180.42
Device 3	208.132.180.43

NOTE: The host identifiers (41, 42, and 43 in the above example) need not be sequential or in any particular order. However, it is recommended that you group the numbers for simplicity.

The following is an example of an invalid class C addressing scheme:

Device	IP Address
Device 1	208.132.180.41
Device 2	192.157.180.42
Device 3	208.132.180.41

Assuming the IP address for Device 1 is valid, the address for Device 2 is invalid because the network identifier for each address must begin 208.132.180. The address for Device 3 is invalid because it is identical to the address for Device 1.

You can use the ping command from your computer to ensure that a device at a particular address is responding correctly (see **Network Components and Performance** on page 95).

Subnet Mask

The subnet mask is another 32-bit binary number used to “mask” certain bits of the IP address. This provides a method of extending the number of network options for a given IP address. It works by allowing part of the host identifier to be used as a subnetwork identifier.

It is important that you set the correct value for the subnet mask. The basic values depend on the class of IP address being used:

Class	Subnet Mask
Class 1	255.0.0.0
Class 2	255.255.0.0
Class 3	255.255.255.0

Using the Ping Utility to Test Communications

You can test for communications between a Windows-based computer and another device on the same network by using the ping command.

1. From the Windows desktop of the computer, click the **`Start`** button, and select **`Run`**. The Run dialog box displays.
2. In the Open box, enter `ping` *`nnn.nnn.nnn.nnn`* `–t`

   where *`nnn.nnn.nnn.nnn`* is the IP address of the VN-Matrix 225 device that you want to test.
3. Click the **`OK`** button or press the <Enter> key.

   A text window displays showing a series of response messages (explained below).
4. To stop the ping utility, press <Ctrl> + <C> on the keyboard.

NOTE: The ping command can also be run from the command line of the serial interface (see **Serial Port Login Procedure** on page 110).

Response Messages

When you run the ping utility, it displays a series of response messages that you can use to determine the state of the communications link. For example, if you have pinged a device with the address 208.132.180.48, you should get a message similar to the following:

```
Reply from 208.132.180.48: bytes=32 time=2ms TTL=32
```

This is the correct response which indicates that the device at the specified address is communicating correctly. Note that the response time value may vary according to network traffic. If you receive one of the following messages:

- `Request timed out` — There has been no response from the specified address. Either the processor is not receiving data from the computer or is not sending data back. Check that the device is powered up and set to the same address you pinged. Also, check that you are using the correct type of connecting cables (for example, straight through or crossover) and that they are not damaged or faulty.
- `Reply from 208.132.180.48: Destination host unreachable` — The IP address of the computer is not in the same class (or subnet) as that of the device being pinged. Check that the subnet mask on both the computer and the device are set to the same value (see **Subnet Mask**, above). Also check that both IP addresses are within the correct range for the chosen class and are compatible (see **Choosing IP Addresses** on the previous page).

Network Components and Performance

There are a number of characteristics of networks to be considered when transmitting image data. These characteristics affect network performance. This section describes features of networks and considerations applicable to sending video on a network. The following topics are covered:

- **Data Packets and Frames**
- **Nodes, Switchers, and Routers**

When a conventional analog or digital video signal is sent from a source to a display, the image is transmitted in real time with negligible delay (or “latency”). The signal, itself, is continuous with (even in the case of a digital signal) very little redundancy in the signal (the great majority of the signal is image data, so little bandwidth is “wasted”). In general, the signal is not subject to any unpredictable degradation.

Data Packets and Frames

If a digital image stream is sent across a network, it must be converted into packets. The network, itself, is indifferent to the nature of data, and treats all digital information in a standard way. Before it can be sent over a network, the data must be reformatted into packets called “IEEE MAC frames.”

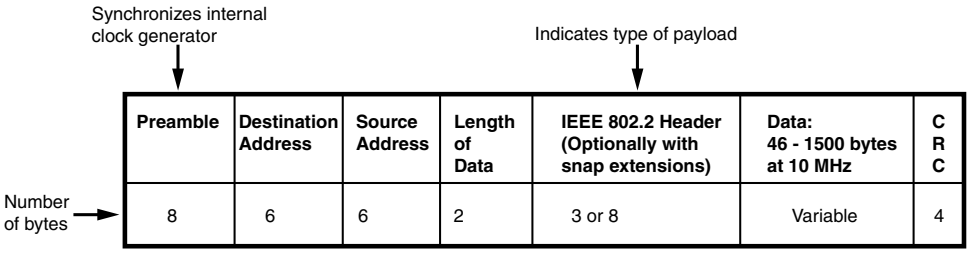


Figure 79. IEEE 802.3 Media Access Control Frame

The following points arise from this:

- The data carried within a frame/packet is limited to the MTU (maximum transmission unit) of the network, typically 1500 bytes.
- The data must include any additional overhead arising from the protocol being used (UDP or TCP/IP).

The MTU is the largest physical packet size (measured in bytes) that a network can transmit. Any messages larger than the MTU are divided into smaller packets before being sent.

The introduction of gigabit (1 Gb/s) Ethernet has allowed the introduction of “jumbo” frames with more than 1500 data bytes. The overhead involved by limiting the number of bytes to 1500 is considerable, and using jumbo frames makes more efficient use of the network. However, the following should be noted:

- Many real-world networks operate only at 100 Mb/s at local level and these cannot accept jumbo frames.
- Many gigabit networks are not configured to accept jumbo frames. Only networks so configured can use them.
- The maximum data size of a jumbo frame is 9000 bytes and typically jumbo frames carry 8000 data bytes.
- While network efficiency goes up with larger frames, the effect of a lost frame or packet is more serious.

Nodes, Switchers, and Routers

An Ethernet local area network (LAN) has a number of nodes and, in principle, all nodes can communicate with each other. The principle used is carrier sense, multiple access/collision detection or CSMA/CD. This means that when not transmitting, all nodes are listening. When a node transmits, no other node attempts transmission. However, signal speed limits mean that a collision is possible. Such collisions are detected and the competing parties “back off” for another attempt. The principle works well for small networks, but introduces inefficiency in networks with high traffic.

Networks are constrained by the use of various switching and routing devices.

- An Ethernet hub allows nodes to be connected together, and CSMA/CD applies.
- An Ethernet switch intelligently routes internode traffic (nodes only receive traffic addressed to them). This reduces or eliminates bus contention at the local level. A switch can also allow a node to operate duplex communication (simultaneous transmit and receive).
- An Ethernet bridge is a two port switch used for segmenting networks or joining dissimilar media.
- An Ethernet router connects multiple networks and connects to networks of other types.

Routers and switches use routing tables to determine how traffic is directed. These can be dynamic, in the sense that they are generated as needed by examining the traffic. They can also be static, imposing strict rules about how traffic is directed.

This factor is of great importance with respect to transmitting image data over networks. In practice, unless a network is specifically programmed to carry image data, it is likely that the data will be blocked at the first router it encounters.

Protocols

For communication to work over networks, there must be some formality about how communication is done in order to ensure interoperability between different systems. The International Organization for Standardization (ISO) proposed a model for this in its Open Systems Interconnection (OSI) model. It defines seven different layers for any intercommunication protocol, starting at the bottom with a “physical” layer (which might be Ethernet, wireless, or some standard serial communications method) going to the top which is the application layer relating to the actual task in hand.

The OSI model is used as a reference, and, while some systems follow the full model, others simplify it by combining the functions of certain layers. In particular the protocol stack (which is the basis of standard Ethernet communication) has only four layers, as indicated in **figure 80**, on the next page.

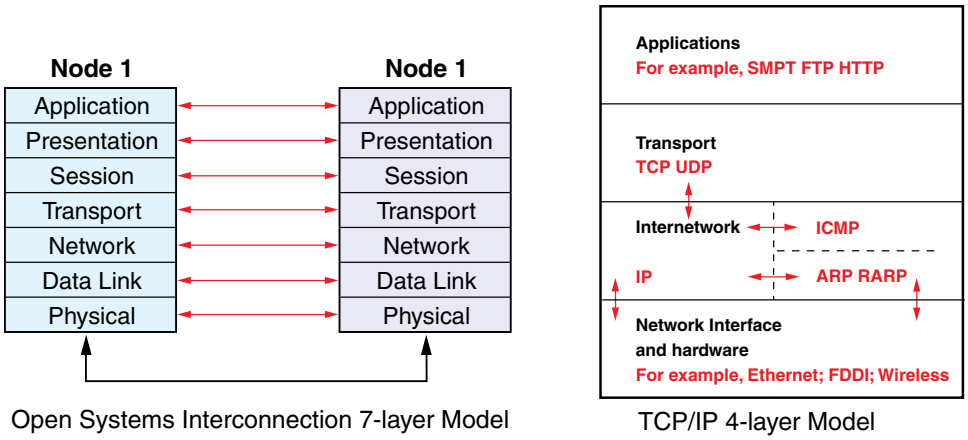


Figure 80. OSI Model and the TCP/IP Model

The Internetwork layer combines the functions of the Data Link and Network layers of the OSI model and looks after addressing, carrying Internetwork Protocol (IP) within the MAC frame. The current version of Internetwork protocol is IPv4 which uses a 32-bit address. IPv6 with 128-bit addressing is being introduced to solve the possible problem of running out of available IP addresses and to provide certain other enhancements.

The Transport layer is significant with respect to the transmission of images over networks. It is here that data is formatted into datagrams suitable for transmission by IP. There are two significant protocols, UDP and TCP.

The OSI model (left) defines seven layers of interconnection. The system behaves as if, at each layer, there is direct connection between each node; but in fact, communication is through the layers. With Ethernet and most data networks, the preferred model is the TCP/IP four layer protocol stack (right).

Comparison between UDP and TCP

The two different transport layer protocols are compared in the following table:

UDP	TCP
Connectionless	Connection oriented
Datagrams must be formatted in the application	Automatically generates datagrams from the bit stream
Multiple applications using ports	Multiple applications using ports
Unreliable (best effort) communication	Reliable (guaranteed) communication
No flow control (must be in application if required)	Flow control (deals with out of order data and error corrections)
No error recovery	Error recovery
Multicast possible (one to many)	One to one only
Minimum latency	Significant latency

The most significant difference is that UDP is “best effort” and TCP is “guaranteed delivery.” TCP is used in most networks for tasks such as exchanging file information between nodes because absolute accuracy is required and because the delivery requirement is usually point to point.

The table on the previous page implies several different methods of transmission, for example:

- For Broadcast, in which a message goes to all nodes on the network, the protocol must be UDP.
- For Unicast, in which a message goes from one node to another, transmission protocol must be used.
- For Multicast, in which a message goes from one node to many nodes, each assigned to a multicast address group, the protocol must be UDP.

The information in the transport protocol comparison table is significant for transmitting images over networks. A few points that arise from it include:

- Many, if not most, applications involve the transmission of an image from one node to many nodes, indicating that multicast operation is required and that UDP is necessary.
- Many, if not most, applications require minimum latency, which also indicates the use of UDP.
- UDP does not provide entirely reliable communication; therefore, any application has to account for the effect of lost data packets, out of order packets, and errors.
- Time critical data (like video) is often sent using an additional protocol called RTP (Real Time Protocol). This “time stamps” the packets and can be used to provide UDP with some measure of flow control.

These issues can be significant. If a data bit goes missing in a dedicated digital video link (like SDI) the result is not catastrophic; its effect is at a single pixel level within a single video frame. If a data bit goes missing in an MPEG stream, however, it can prevent the reconstruction of an entire group of images.

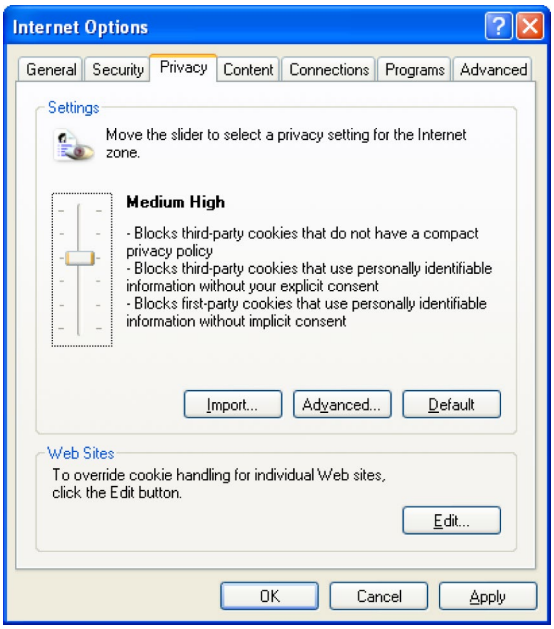
Browser Configuration

Microsoft Internet Explorer (v6 or Above)

Open Internet Explorer and from the Tools menu, select Internet Options to open the Internet Options dialog.

To enable cookies:

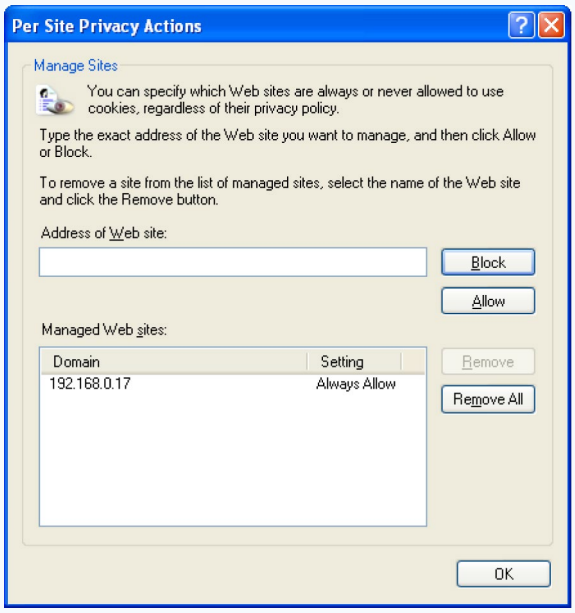
- Select the Privacy tab and, if required, adjust the slider control to set the required security level. The VN-Matrix 225 series operates correctly at privacy settings up to and including Medium High.



NOTE: Setting the security slider to block all cookies prevents the VN-Matrix web interface from operating.

Figure 81. Internet Explorer Internet Options

TIP: If you need to use a high security level, you can click the Edit button and add the address of the VN-Matrix to allow the VN-Matrix web interface to use cookies. For example:



Enabling JavaScript in Internet Explorer

1. Select the **`Security`** tab.

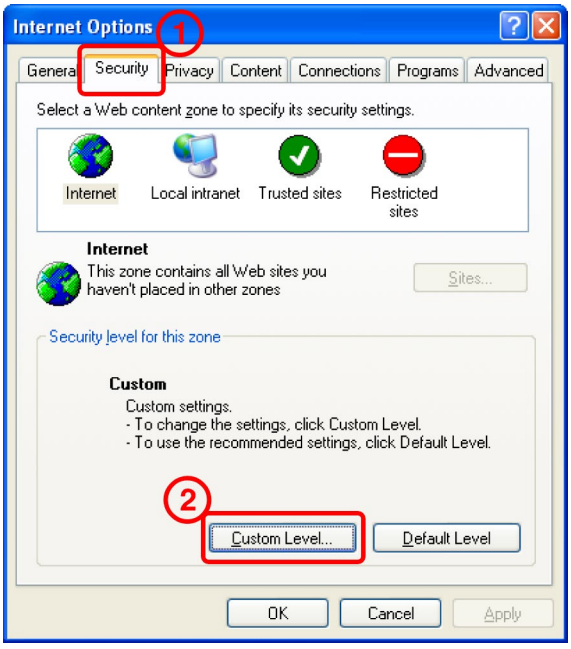


Figure 82. Internet Explorer Security Tab

2. On the Security screen, click the **Custom Level** button. The Security Settings dialog displays.

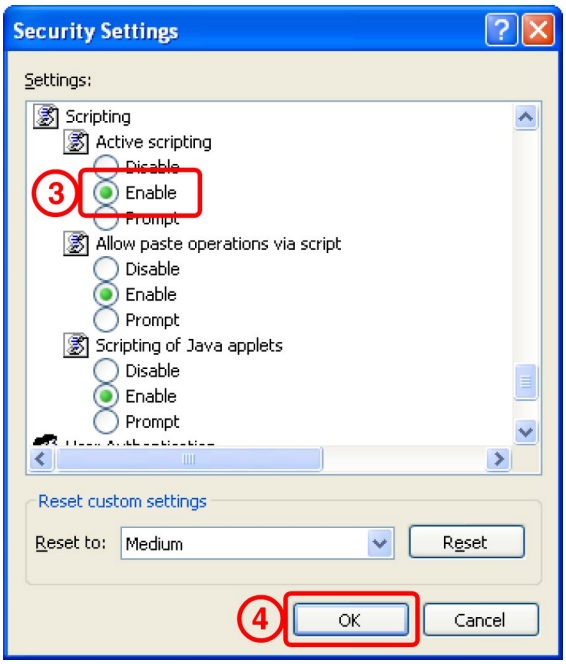


Figure 83. **Internet Explorer Security Settings**

3. Scroll down to the **Scripting** setting and, under Active scripting, select the **Enable** radio button.
4. Click **OK** on both dialogs to close them and save the new settings.

Mozilla Firefox (v1.3 or Above)

Open Mozilla Firefox and from the Edit menu, select Preferences to open the Preferences dialog.

NOTE: This procedure is based on Mozilla Firefox version 5.0. Earlier versions may have a different appearance.

Enabling cookies

1. From the **Tools** menu, select **Options** and click the **Privacy** tab.
2. From the **Firefox Will** drop-down menu, select **Use Custom settings for history**.
3. Ensure that the **Accept cookies from sites** and **Accept third-party cookies** radio buttons are selected.
4. Click **OK**.

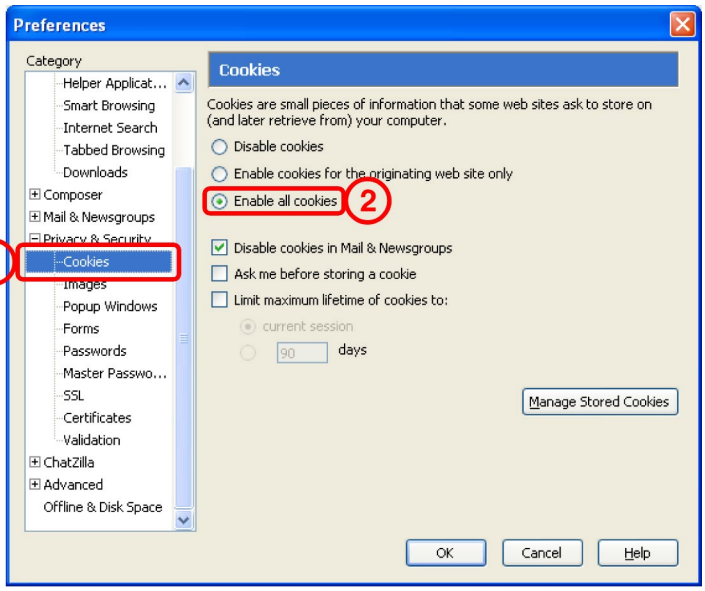


Figure 84. **Firefox Preferences: Cookies**

5. Ensure that either the Enable all cookies or Enable cookie for the originating web site only option is selected.

Enabling JavaScript in Mozilla Firefox

1. In the Advanced category, choose Scripts & Plugins.

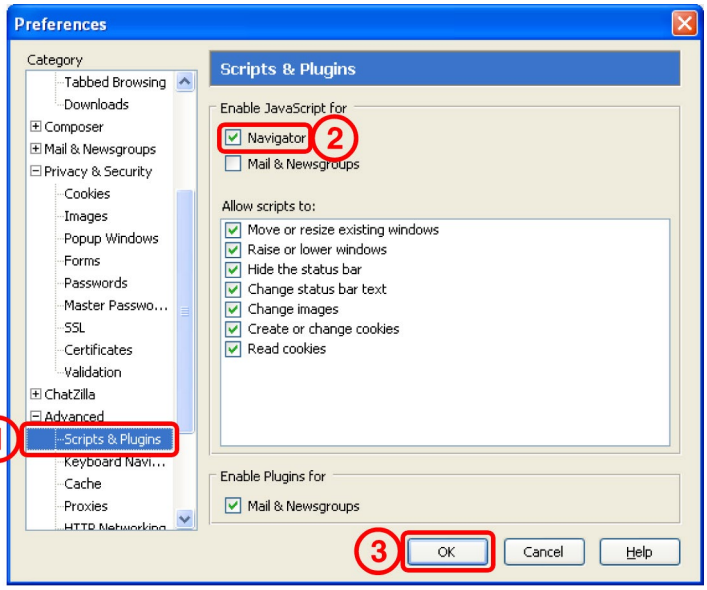


Figure 85. **Firefox Preferences: Scripts and Plugins**

2. Ensure that the Enable JavaScript for **`Navigator`** option is selected.
3. Click **OK** to close the dialog and save the settings.

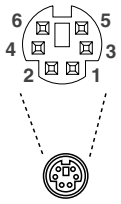
Technical Data

This section lists the hardware requirements for the VNC 225 unit. The following topics are discussed:

VNC 225 Hardware

Connectors

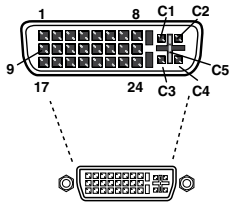
Keyboard and mouse (PS/2)

Function	Keyboard and mouse pass-through connections for source computer
Connector Type	Female 6-pin mini-DIN
Pin-out Details	Close-up view of 6-pin female mini-DIN 
Mating Connector	Male 6-pin mini-DIN
Recommended Cable	Supplied screened PS/2 cable
Maximum Cable Length	2.95 meters (9.5 feet)

Pin	Function
1	Data
2	No connection
3	Ground
4	+5 V supply
5	Clock
6	No connection

NOTE: 5 V on pin 4 is limited to 225 mA by a thermal fuse.

DVI input

<table>
<tr><td>Function</td><td>Digital or analog video input for encoding</td></tr>
<tr><td>Connector Type</td><td>Female DVI-I</td></tr>
<tr><td>Pin-out Details</td><td>
Close-up view of Dual Link female DVI-I input connector


Digital Connections
<table>
<tr><th>Pin</th><th>Function</th><th>Pin</th><th>Function</th><th>Pin</th><th>Function</th></tr>
<tr><td>1</td><td>TMDS 2-</td><td>9</td><td>TMDS 1-</td><td>17</td><td>TMDS 0-</td></tr>
<tr><td>2</td><td>TMDS 2+</td><td>10</td><td>TMDS 1+</td><td>18</td><td>TMDS 0+</td></tr>
<tr><td>3</td><td>Ground (2/4)</td><td>11</td><td>Ground (1/3)</td><td>19</td><td>Ground (0/5)</td></tr>
<tr><td>4</td><td>Not used</td><td>12</td><td>Not used</td><td>20</td><td>Not used</td></tr>
<tr><td>5</td><td>Not used</td><td>13</td><td>Not used</td><td>21</td><td>Not used</td></tr>
<tr><td>6</td><td>DDC Clock</td><td>14</td><td>+5 V supply*</td><td>22</td><td>Ground (Clock)</td></tr>
<tr><td>7</td><td>DDC Data</td><td>15</td><td>Ground (for 5 V)</td><td>23</td><td>TMDS Clock+</td></tr>
<tr><td>8</td><td>Analog V-Sync</td><td>16</td><td>Hot Plug Detect</td><td>24</td><td>TMDS Clock-</td></tr>
</table>
NOTES:

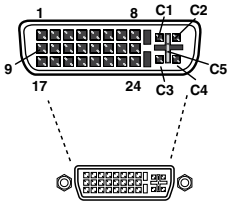
*5 V supply is provided by VN-Matrix 225 and limited by 225 mA resettable fuse.
All ground pins are linked internally.

Analog Connections
<table>
<tr><th>Pin</th><th>Function</th></tr>
<tr><td>C1</td><td>Red signal</td></tr>
<tr><td>C2</td><td>Green signal</td></tr>
<tr><td>C3</td><td>Blue signal</td></tr>
<tr><td>C4</td><td>Horizontal sync</td></tr>
<tr><td>C5</td><td>Ground</td></tr>
</table>
</td></tr>
<tr><td>Mating Connector</td><td>Male DVI-D or DVI-I</td></tr>
<tr><td>Recommended Cable</td><td>Supplied DVI cables</td></tr>
<tr><td>Maximum Cable Length</td><td>2.95 meters (9.5 feet)</td></tr>
<tr><td>Signal Type</td><td>DVI (PanelLink® TMDS)</td></tr>
<tr><td>Pixel Clock (DVI sources)</td><td>Up to 162 MHz</td></tr>
</table>

DVI input (continued)

Analog Sources	VGA 640x480 @ 60, 72, 75, 85 Hz SVGA 800x600 @ 56, 60, 72, 75, 85 Hz XGA 1024x768 @ 60, 72, 75, 85 Hz XGA+ 1152x864 @ 75 Hz SXGA 1280x1024 @ 60, 75, 85 Hz UXGA 1600x1200 @ 60 Hz WUXGA 1920x1200 @ 60 Hz **NOTE:** This list may not be fully up to date and other resolutions may also be supported through custom input modes. Please check with your Extron dealer if the mode you require is not listed here.
Color Depth	24-bit maximum
Scan Mode	Progressive
DVI Standard	DVI 1.0
Display Data Channel Standard	DDC2B
DDC Levels	VIH = 2.4 V VOH = 0.9 V ILOADMAX = 2 mA

DVI output (out/loop)

<table>
<tr><td>Function</td><td>Loop-through video connection providing buffered output of the DVI IN connector</td></tr>
<tr><td>Connector Type</td><td>Female DVI-I</td></tr>
<tr><td>Pin-out Details</td><td>
Close-up view of Dual Link female DVI-I input connector


Digital Connections
<table>
<tr><th>Pin</th><th>Function</th><th>Pin</th><th>Function</th><th>Pin</th><th>Function</th></tr>
<tr><td>1</td><td>TMDS 2-</td><td>9</td><td>TMDS 1-</td><td>17</td><td>TMDS 0-</td></tr>
<tr><td>2</td><td>TMDS 2+</td><td>10</td><td>TMDS 1+</td><td>18</td><td>TMDS 0+</td></tr>
<tr><td>3</td><td>Ground (2/4)</td><td>11</td><td>Ground (1/3)</td><td>19</td><td>Ground (0/5)</td></tr>
<tr><td>4</td><td>Not used</td><td>12</td><td>Not used</td><td>20</td><td>Not used</td></tr>
<tr><td>5</td><td>Not used</td><td>13</td><td>Not used</td><td>21</td><td>Not used</td></tr>
<tr><td>6</td><td>DDC Clock</td><td>14</td><td>+5 V supply*</td><td>22</td><td>Ground (Clock)</td></tr>
<tr><td>7</td><td>DDC Data</td><td>15</td><td>Ground (for 5 V)</td><td>23</td><td>TMDS Clock+</td></tr>
<tr><td>8</td><td>Analog V-Sync</td><td>16</td><td>Hot Plug Detect</td><td>24</td><td>TMDS Clock-</td></tr>
</table>
NOTES:

*5 V supply is provided by VN-Matrix 225 and limited by 225 mA resettable fuse.
All ground pins are linked internally.

Analog Connections
<table>
<tr><th>Pin</th><th>Function</th></tr>
<tr><td>C1</td><td>Red signal</td></tr>
<tr><td>C2</td><td>Green signal</td></tr>
<tr><td>C3</td><td>Blue signal</td></tr>
<tr><td>C4</td><td>Horizontal sync</td></tr>
<tr><td>C5</td><td>Ground</td></tr>
</table>
</td></tr>
<tr><td>Mating Connector</td><td>Male DVI-D or DVI-I</td></tr>
<tr><td>Recommended Cable</td><td>Supplied DVI cables</td></tr>
<tr><td>Maximum Cable Length</td><td>2.95 meters (9.5 feet)</td></tr>
<tr><td>Signal Type</td><td>DVI (PanelLink® TMDS)</td></tr>
<tr><td>Pixel Clock (DVI sources)</td><td>Up to 162 MHz</td></tr>
</table>

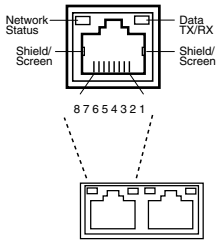
DVI output (out/loop) (continued)

Analog Sources	VGA 640x480 @ 60, 72, 75, 85 Hz SVGA 800x600 @ 56, 60, 72, 75, 85 Hz XGA 1024x768 @ 60, 72, 75, 85 Hz XGA+ 1152x864 @ 75 Hz SXGA 1280x1024 @ 60, 75, 85 Hz UXGA 1600x1200 @ 60 Hz WUXGA 1920x1200 @ 60 Hz **NOTE:** This list may not be fully up to date and other resolutions may also be supported through custom input modes. Please check with your Extron dealer if the mode you require is not listed here.
Color Depth	24-bit maximum
Scan Mode	Progressive
DVI Standard	DVI 1.0
Display Data Channel Standard	DDC2B
DDC Levels	VIH = 2.4 V VOH = 0.9 V ILOADMAX = 2 mA

Digital Audio I/O (SPDIF In and Out/Loop)

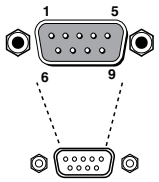
Function	Input and output loop-through for digital audio
Connector Type	Female RCA jack
Mating Connector	Male RCA jack
Recommended Cable	75 ohms coaxial
Max. Cable Length	10 meters (32 feet)

Network (1 and 2)

<table>
<tr><td>Function</td><td>Two separate network ports (labeled as 1 and 2). Port 1 is used for primary network connectivity (for data transport and configuration). Port 2 is reserved for future expansion.</td></tr>
<tr><td>Connector Type</td><td>Shielded RJ-45 socket</td></tr>
<tr><td>Pin-out Details</td><td>
Close-up view of RJ-45 female plug


<table>
<tr><th>Pin</th><th>Function</th><th>Pin</th><th>Function</th></tr>
<tr><td>1</td><td>Tx_D1+ (Tx+)</td><td>5</td><td>Bl_D3–</td></tr>
<tr><td>2</td><td>Tx_D1– (Tx–)</td><td>6</td><td>Rx_D2– (Rx–)</td></tr>
<tr><td>3</td><td>Rx_D2+ (Rx+)</td><td>7</td><td>Bl_D4+</td></tr>
<tr><td>4</td><td>Bl_D3+</td><td>8</td><td>Bl_D4–</td></tr>
</table>
</td></tr>
<tr><td>Mating Connector</td><td>Shielded RJ-45 plug</td></tr>
<tr><td>Recommended Cable</td><td>CAT 7 shielded twisted pair (STP)</td></tr>
<tr><td>Maximum Cable Length</td><td>100 meters (330 feet)</td></tr>
<tr><td>Comms Standard</td><td>10/100/1000Base-T (gigabit Ethernet)</td></tr>
<tr><td>Ethernet (MAC) Address</td><td>Each address is unique and in the format 00:E0:AA:10:xx:yy where yy is in the range 00 – FF.</td></tr>
<tr><td>IP Address</td><td>Factory-set default is:
• Port 1: 192.168.0.1
• Port 2: 192.168.1.12 (reserved for future use)
Both are user-definable via the serial interface.
Optional DHCP mode</td></tr>
</table>

RS-232 Serial I/O (Remote and RS-232))

Function	Remote – Used for low level setup or system recovery. RS-232 – Used for cross-network serial communications or serial remote control of the ES6*xxx* controller.
Connector Type	9-pin D-type (male)
Pin-out Details	Close-up view of 9-pin D-type male 
Mating Connector	9-pin D-type (female) with metal cover
Recommended Cable	6-core plus overall screen (low capacitance) 0.22 mm^2 min. per core
Maximum Cable Length	2.95 meters (9.5 feet)
Comms Standard	RS-232
Remote Default Setting	Baud: 115200 Bits: 8 Parity: None Stop bits: 1 Flow control: None

Pin	Function	Pin	Function
1	DCD	6	DSR
2	RX (data in)	7	RTS
3	TX (data out)	8	CTS
4	DTR	9	RING
5	Ground		

RS-232 port settings

Baud	115200
Bits	8
Parity	None
Stop bits	1
Flow control	None

Serial Port Login Procedure

1. At the `Login:` prompt, type `config`, then press the <Enter> key.
2. When prompted for a password, type `config` again, then press <Enter>. The following menu displays:

Network Port 1			Network Port 2		
Ø	Speed/Duplex:	auto_1Ø_1ØØ_1ØØØ	1Ø	Speed/Duplex:	auto_1Ø_1ØØ_1ØØØ
1	Boot method:	static [dhcp]	11	Boot method:	static [dhcp]
2	address:	192.168.Ø.1	12	address:	192.168.1.1
3	netmask:	255.255.255.Ø	13	netmask:	255.255.255.Ø
4	gateway:	192.168.Ø.1	14	gateway:	192.168.Ø.1
5	broadcast:		15	broadcast:	
6	mtu:	15ØØ	16	mtu:	15ØØ
7	controller ip:	192.168.Ø.18	17	ip forwarding:	Ø
8	controller port:	5432	18	webserver port:	8Ø
9	Exit				

3. Type the desired menu option number, then press the <Enter> key.
4. Where required, type the new value, then press <Enter>.
5. To exit the menu and return to the main command prompt, type 9, then press <Enter>.

Command Options

The following commands are also supported from the main command prompt:

`Exit`	Log out from the session.
`Reboot`	Force the VN-Matrix 225 device to restart.
`Ping`	Test network communications with another device (see **Network Components and Performance**).

Telnet Interface — Quick Reference

Starting Telnet

1. Click the Windows **`Start`** button, then click **`Run`**.
2. In the **`Open`** field, type `telnet`, then press the <Enter> key. The Telnet application starts in a separate window.

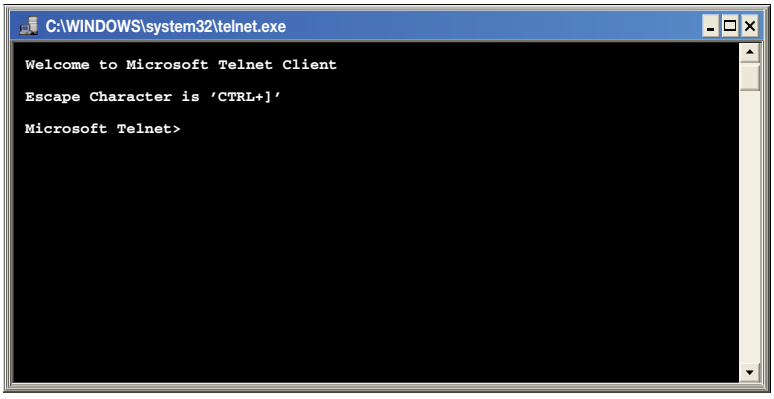


Figure 86. Telnet Prompt

Login Procedure

1. At the prompt, type `open` followed by the IP address of the VN-Matrix controller and the telnet port number (9998), then press <Enter>. For example:

   `open 192.168.Ø.18 9998 <Enter>`

2. At the command prompt, type `user admin`, then press <Enter>.
3. Type `pass` followed by a space and the appropriate password, then press <Enter>.

   NOTE: By default the password is `admin`, but this can be changed via the web interface (see **Changing User Login Passwords** on page 79).

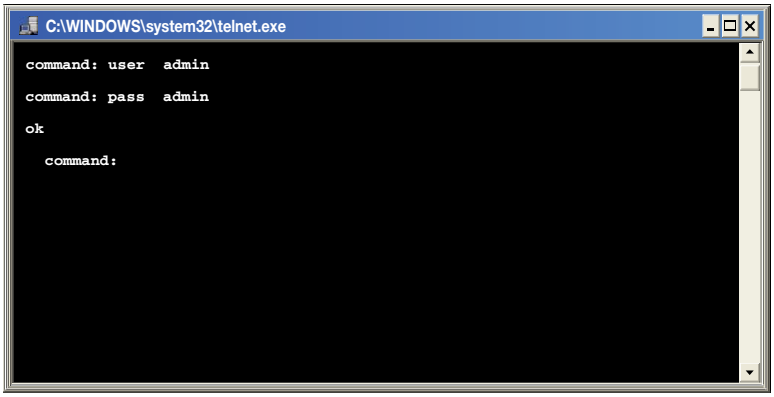


Figure 87. Logging In

4. Type further commands as required (see **Serial and Telnet Commands**, on page 45, for command options).
5. To logout, type `exit`, then press <Enter>.

Reference Information

This section contains reference information on the VN-Matrix 225 Series. The following topics are covered:

- **Specifications**
- **Accessories**
- **Mounting the VN-Matrix 225**

Parts Provided

Part Description	Part Number
VNC 225 codec *or*	60-1118-02
VNE 225 encoder *or*	60-1119-02
VND 225 decoder	60-1120-02
12 V power supply unit (PSU)	
Power cord for PSU (For use in the USA)	
Digital monitor cable (2 meter DVI-D to DVI-D)	
Analog monitor cable (2 meter 15-pin HD type to DVI-A)	
DVI-A to 15-pin HD adapter	
Mouse and keyboard cable (2 meter PS/2 to PS/2)	
Serial cable (9-pin D-type to 9-pin D-type)	
VN-Matrix 225 Setup Guide	

Mounting the VN-Matrix 225

The VN-Matrix 225 Series encoders and decoders are housed in rack mountable, 1U high, metal enclosures. Included mounting hardware lets you install the unit in any standard 19-inch rack or under or through furniture.

Tabletop Use

For tabletop use, affix one of the supplied self-adhesive rubber feet to each corner of the bottom of the unit.

UL Rack-Mounting Guidelines

The following Underwriters Laboratories (UL) requirements pertain to the installation of the VN-Matrix 225 into a rack.

1. **Elevated operating ambient temperature** — If the equipment is installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, consider installing the equipment in an environment compatible with the maximum ambient temperature (Tma = +122 °F [+50 °C]) specified by Extron.
2. **Reduced air flow** — Install the equipment in a rack so that the amount of air flow required for safe operation of the equipment is not compromised.
3. **Mechanical loading** — Mount the equipment in the rack so that uneven mechanical loading does not create a hazardous condition.
4. **Circuit overloading** — When connecting the equipment to the supply circuit, consider the effect that circuit overloading might have on overcurrent protection and supply wiring. Consider equipment nameplate ratings when addressing this concern.
5. **Reliable earthing (grounding)** — Maintain reliable grounding of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (such as use of power strips).

Mounting Instructions

If desired, mount the unit in a rack or under or through furniture in accordance with the directions included with the mounting kit.

Extron Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron Electronics
1230 South Lewis Street
Anaheim, CA 92805
U.S.A.

Japan:
Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe and Africa:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:
Extron Electronics Asia Pte. Ltd.
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
Dubai , United Arab Emirates

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or if modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA:	714.491.1500 or 800.633.9876	**Europe:**	31.33.453.4040
Asia:	65.6383.4400	**Japan:**	81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

Extron Headquarters	Extron Europe	Extron Asia	Extron Japan	Extron China	Extron Middle East	Extron Korea	Extron India
+1.800.633.9876 (Inside USA or Canada Only) Extron USA - West: +1.714.491.1500, +1.714.491.1517 FAX Extron USA - East: +1.919.850.1000, +1.919.850.1001 FAX	+800.3987.6673 (Inside Europe Only) +31.33.453.4040 +31.33.453.4050 FAX	+65.6383.4400 +65.6383.4664 FAX	+81.3.3511.7655 +81.3.3511.7656 FAX	+86.21.3760.1568 +86.21.3760.1566 FAX	+971.4.299.1800 +971.4.299.1880 FAX	+82.2.3444.1571 +82.2.3444.1575 FAX	1800.3070.3777 (Inside India Only) +91.80.3055.3777 +91.80.3055.3737 FAX