

# **PRIME Matrox IP NMOS**

## **User Guide**

Version 5.1

March 2025



Chyron PRIME Matrox IP NMOS User Guide • 5.1 • March 2025 • This document is distributed by Chyron in online (electronic) form only, and is not available for purchase in printed form.

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## OVERVIEW

This user guide is an addendum to the Prime IP Playout Configuration Guide. It describes the additional configuration required for Matrox IP Devices to support the NMOS (Networked Media Open Specification) IS-04 Discovery and Registration Specification.

The current Prime MX and HX platforms support NMOS IS-04 and IS-05 for Matrox ST 2110 Network Adapters. The hardware supported by Prime are the Matrox DSXLE5 IP Q25 or the DSXLE4 IP E.

### NMOS IS-04 and IS-05

The Matrox NMOS API supports the NMOS IS-04 Node and Registry API. This allows for control and monitoring applications to find the Matrox Node on the network, as well as querying information about its Devices, Senders, Receivers, Sources, and Flows. It also supports the NMOS IS-05 Connection API, allowing for Input and Output Connection requests to modify the Sender and Receiver.

NMOS IS-04 and IS-05 enables automation and reduces manual overhead in setting up networked systems.

The Matrox Nodes will automatically locate an IS-04 registry using DNS-SD, as well as automatically registering their resource information using HTTP and JSON. A monitoring application can query the Matrox Node using HTTP. An NMOS explorer can issue input and output connection requests to the Matrox Senders and Receivers.

## MATROX DRIVER AND SUPPORTED OPERATING SYSTEM

Matrox IP is supported on Windows 10 and 11 using Matrox DSX.Topology-Utils Driver version 10.3.101 for Prime 5.0. This driver is automatically installed as a component within the Prime Installer. It is downloadable through the Compact Installer.

Existing MX and HX platforms using the DSXLE4 IP E will require the firmware to be upgraded from 9.9.1 to be compatible with Prime 5.x and later.

# CONFIGURING THE SYSTEM FOR NMOS

## NMOS Configuration

The Matrox NMOS API is configured using a Matrox NMOS configuration file, based on the serial number of the installed Matrox card (for example, C:\Program Files\Matrox\DSX-TopologyUtils\System64\A123456.json).

Prime automatically enables the Matrox NMOS API by configuring the Matrox NMOS configuration file on startup. No further intervention is typically required by the user if automatic discovery of the RDS using DNS-SD has already been configured.

## Advanced NMOS Configuration

Advanced configuration may be performed by modifying the configuration file manually. The user can reset their settings by deleting this file. Any modification to the configuration requires a system restart.

These fields have been renamed from previous versions and may need to be reconfigured. Refer to section [Deprecated NMOS Configuration](#).

By default, “use service discovery” is enabled by Prime, which requires DNS-SD to be configured on the network. However, the user can also manually specify a fallback registration server’s host name and port if DNS-SD is either not configured or to be ignored.

```
"fallback registration server":  
{  
  "api version": "auto",  
  "host name": "127.0.0.1",  
  "port": 5000  
}
```

**Fallback Registration Server** is the block describing the Registration and Discovery Server (RDS) configurable settings.

**API Version** is the IS-04 Node and Registry API and IS-05 Connection API version. Matrox supports API version 1.2 (as “v1.2”), and version 1.3 (as “v1.3”). Automatic detection of the supported API version (as “auto”) is the default recommended setting.

**Host Name** is the IPv4 of the Registration and Discovery Server (RDS).

**Port** is the UDP port in use by the RDS.

By default, the “local port” is 50000. However, the user can also specify a particular port if this conflicts with another application on the system.

```
"local host name": "0.0.0.0",  
"local port": 50000,
```

**Local Host Name** specifies the address of the network adapter that will be used for listening to NMOS related HTTP requests. Typically this is the address of the network interface card (NIC) within the system that communicates with the RDS. The default value is 0.0.0.0, which indicates any IPv4 address on any Ethernet adapter.

**Local Port** indicates the port that will be used for listening to incoming NMOS related HTTP requests, reserved exclusively for the Matrox NMOS API.

## Deprecated NMOS Configuration

If the user previously upgraded from Prime 4.1 or earlier using Matrox DSX.Topology-Utils Driver version 10.1.101, then the settings file will contain default settings for new fields described in section [Advanced NMOS Configuration](#), while ignoring the following deprecated fields which must be manually ported by the user.

**Registration Server IP** has been renamed **Host Name** in the **Fallback Registration Server** block.

**Registration Server API Version** has been renamed **API Version** in the **Fallback Registration Server** block.

**Registration Server Port** has been renamed **Port** in the **Fallback Registration Server** block.

**Control IP** has been renamed **Local Host Name**.

**Control Port** has been renamed **Local Port**.

## Enabling NMOS Connection Requests through Windows Firewall

In order to allow NMOS connection requests, the control port must be opened to allow inbound TCP (Transmission Control Protocol) socket communication for the mvNetworkService.exe service.

The following rule must be manually added to the firewall settings using Network Shell (netsh) in administrator mode.

```
netsh advfirewall firewall add rule name="Matrox NMOS API"  
protocol=TCP dir=in localport={control port} action=allow  
program="C:\Program Files\Matrox DSX-TopologyUtils\System64\  
mvNetworkService.exe"
```

Where {control port} is the port that will be used for listening to incoming NMOS related HTTP requests defined in the Matrox NMOS configuration file that is associated to your Matrox card. It is **50000**, by default.

## Enabling mDNS Configuration through Windows Firewall

The Matrox Driver automatically adds a rule to Windows Firewall to allow mDNS to automatically discover network services.

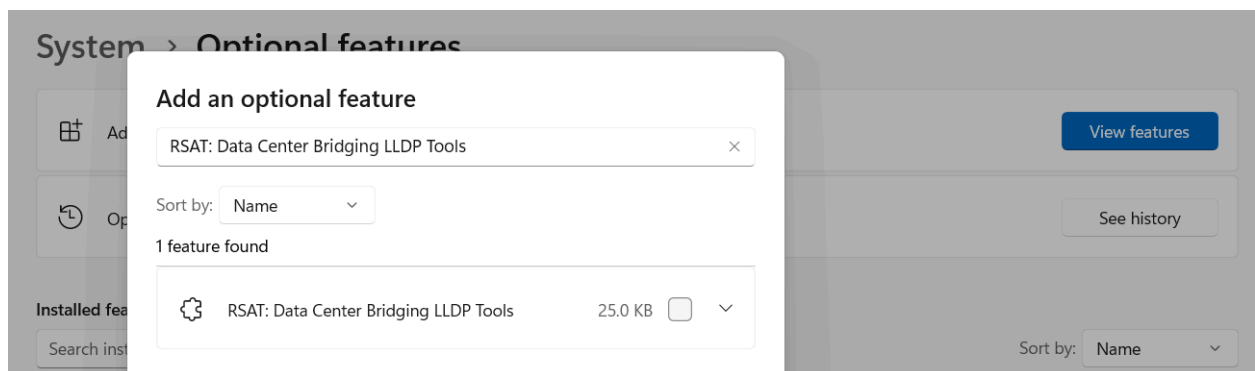
If the default Windows firewall is not in use, the following port must be opened through Bonjour. Through command line, from the Bonjour subdirectory (C:\Program Files\Bonjour), execute:

***mDNSResponder.exe process inbound UDP 5353***

## Enabling Link Layer Discovery Protocol

Link Layer Discovery Protocol (LLDP) is supported on Prime platforms which use the DSXLE5 IP. If LLDP is desired, such as according to JT-NM TR-1001-1 recommendation to help switches and endpoints advertise their capabilities, then LLDP must be configured from Windows Powershell.

First, verify LLDP Tools has been installed on your device. To verify this, in Windows 11, go to Settings -> System -> Optional Features, and verify it is in the list of Installed Features. If not, go to Add an Optional Feature, and add “RSAT: Data Center Bridging LLDP Tools”.



Windows 11 LLDP Feature Setting (Settings -> System -> Optional Features -> Add an Optional Feature)

Then, through Windows Powershell, execute:

**Enable-NetLldpAgent -NetAdapterName "Ethernet1"**

Where Ethernet1 is the system's primary network adapter interface name that NMOS commands will be sent to.

## NMOS IS-04 AND IS-05 WORKFLOWS

### Registering Matrox NMOS Receivers and Senders

The Matrox NMOS API will use the Matrox NMOS configuration file that is associated to the Matrox card (for example, A123456.json) to register the NMOS Nodes, Devices, Senders, and Receivers to a Registration and Discovery Server (RDS).

An NMOS Receiver and Sender will be registered dynamically into an RDS as soon as its associated connector is used with a Prime Input or Output Channel, respectively. This occurs when Prime starts.

The NMOS Receiver and Sender will be automatically unregistered when Prime exits.

### Finding the Matrox NMOS Node

Every NMOS Node acts as an HTTP server providing functionality defined using the NMOS Node API. The user can monitor the status of the NMOS Node that is associated to the Matrox card using a web browser by entering the address of the local host name (eg. localhost when 0.0.0.0 is used in the Matrox NMOS configuration file) and port as a URL eg <http://localhost:50000>.

Additional status information about the RDS used when automatic discovery is enabled can be viewed on the x-manufacturer page (control IP:control port/x-manufacturer/registration-info/ eg. <http://localhost:50000/x-manufacturer/registration-info/>).

### Processing Connection Requests

After NMOS Receivers and Senders are dynamically registered with the RDS, the Matrox NMOS Application (*mvNmos*) is invoked as a sub-process of Prime to handle NMOS IS-05 Connection Requests. This application will monitor and log connection requests to the user.

These requests can configure the Receivers and Senders matching the IP Input and Output Connector Flow settings associated with a Prime Input or Output Channel, respectively. Refer to the Prime IP Playout Configuration Guide for a complete description of available IP Connector Flow settings.

Each NMOS Sender (IP Video, Audio, or Ancillary Out) or Receiver (IP Video, Audio, or Ancillary In) can be separately enabled or disabled using a **Master Control toggle**. Further, the request can be handled **immediately** or as a **scheduled activation**. Pending activation requests can also be cancelled.



## Senders

The following settings can be configured for NMOS Senders:

**Primary Destination Address.** Indicates the IPv4 address of the destination (that is, receiver).

**Primary Destination Port.** Indicates the UDP port of the destination (that is, receiver).

**Primary Source Port.** Indicates the User Datagram Protocol (UDP) port of the sender (that is, transmitter).

**Redundancy.** Enable the redundant stream for seamless reconstruction conforming to SMPTE ST 2022-7.

**Redundant Destination Address.** Indicates the redundant stream IPv4 address of the destination (that is, receiver).

**Redundant Destination Port.** Indicates the redundant stream UDP port of the destination (that is, receiver).

**Redundant Source Port.** Indicates the redundant stream UDP port of the sender (that is, transmitter).

Remaining settings must be statically configured when the channel is created. This includes the RTP Payload Filter and RTP Sync Source, the Type of Service (DSCP or ECN), the Packet Time to Live, and the Audio Packet Duration.

## Receivers

The following settings can be configured for NMOS Receivers:

**Primary Multicast Address.** Indicates the reception multicast IPv4 address.

**Primary Destination Port.** Indicates the reception User Datagram Protocol (UDP) port.

**Primary Source Address.** Indicates the sender's IPv4 address. When this is configured, it is applied to an Inclusion Filter for Source Specific Multicast (SSM) using IGMP Version 3.

**Redundancy.** Enable the redundant stream for seamless reconstruction conforming to SMPTE ST 2022-7.

**Redundant Multicast Address.** Indicates the redundant reception multicast IPv4 address.

**Redundant Destination Port.** Indicates the redundant reception User Datagram Protocol (UDP) port.

**Redundant Source Address.** Indicates the redundant sender's IPv4 address. When this is configured, it is applied to an Inclusion Filter for Source Specific Multicast (SSM) using IGMP Version 3.

Remaining settings must be statically configured when the channel is created. This includes the RTP Payload Filter, the Multicast Join Type, the IGMPv3 Filter, and the Audio Packet Duration.

## Known Issues and Feature Limitations

### **SDP Session Profiles with Input Connection Requests**

Modifying the NMOS Receiver's Video and Audio Format through an SDP session profile attached to an Input Connection Request is not yet supported in Prime.

This includes the Video Width, Height, Scan Mode, Frame Rate and Colorimetry for Video Input Streams, and the Audio Packet Duration and Track Count for Audio Input Streams. This must be configured within the Prime IP Payout Configuration on Prime start.

However, the Matrox NMOS Application will honor Video and Audio Format activation requests obtained from the SDP session profile, if used in this way, causing unpredictable behavior on the Input Channel, including malformed video and audio present in Prime's Video and Audio Mix.

If this workflow is required, then a separate Prime IP Input Channel should be used for each SDP session profile, and toggled during run-time using the Master Control feature.

### **Logging**

Persistent logging of NMOS IS-05 Connection Requests to the Prime Logger is not yet supported. This is only visible at run-time using the Matrox NMOS Application, or by referring to the Matrox driver's internal logs at:

*C:\Windows\System32\config\systemprofile\AppData\Roaming\MatroxVideo\DSX.Utils\logs*

# Troubleshooting

## **What is in-band and out-of-band NMOS?**

NMOS traffic is only able to be set out-of-band, that is on one of the Local Network Adapters; where in-band would refer to NMOS traffic on the Media Adapter (SFP A through D).

This is the Local Host Name and Local Port of the Matrox JSON Configuration File. See section [Advanced NMOS Configuration](#).

## **I need to explicitly set the NMOS IS-04 Node API version**

When using mDNS or DNS-SD, the API version is automatically negotiated by the Registration and Discovery Server from the highest API version supported, where Matrox supports either v1.2 or v1.3. If a fallback registration server is configured, the version may be explicitly forced to v1.2 or v1.3. See section [Advanced NMOS Configuration](#).

## **I am not seeing the NMOS Node on my Local System**

Verify that mvNetworkService is running. If it is not running, verify NMOS is enabled, and the Local Host Name : Local Port is properly enabled in Windows.

Restart mvNetworkService and verify that it does not have an exception in Windows Event Viewer. If it did have an exception, disable mDNS / DNS-SD by disabling 'Use Service Discovery' and instead configure a fallback registration server. See section [Advanced NMOS Configuration](#). There is a known issue in which the application is crashing in certain scenarios and using a fallback registration server is a known workaround.

## **I don't see the system with my Network Orchestration (NMOS IS-04)**

By default, Prime configures the system to enable NMOS and Service Discovery using mDNS or DNS-SD. If the user is not using mDNS or DNS-SD, then a fallback registration server must be configured. See section [Advanced NMOS Configuration](#).

## **Everything was working fine, but I upgraded from an earlier version of Prime and I no longer see the system with my Network Orchestration (NMOS IS-04)**

Advanced NMOS Configuration changed from version 4.1 and earlier. These settings are now deprecated by the Matrox Driver. Refer to section [Deprecated NMOS Configuration](#) and re-configure the fallback registration server. See section [Advanced NMOS Configuration](#).

### **The system is visible by Network Orchestration, but I am not able to connect an Input Flow by Static IPv4**

If IGMPv3 Filtering is enabled on the network, you must set the Source IP for the IP Connector Flows in an Inclusion Filter.

### **The system is visible by Network Orchestration, but I am not able to connect to Output Flow by Static IPv4**

Verify the Packet Time to Live has been set for each Flow. A good default value is 64.

### **I am using Network Orchestration (NMOS IS-05) to dynamically configure my Output Connector Flow, but I can't connect to it**

When provided with an IPv4 at startup, the Matrox Driver configures a flow with master control enabled. If this is to be dynamically configured, the Destination (Multicast) IPv4 may be set to 0.0.0.0:0. The Matrox Driver will create the flow with a default IPv4 but will leave the flow disabled. As part of the Output Connection Request, master control must be enabled for the flow.

Ensure IGMP has been properly configured for your receiver to process the IGMP join request.

### **My Network Orchestration doesn't see the correct SDP session profile information / NMOS IS-05 Input or Output Connection Requests do not appear to work**

Verify that the NMOS IS-05 Connection Request is logged in the Matrox NMOS Application with the proper Destination Multicast Address : Destination Port and that Master Control is enabled for all flows as part of the request.

The SDP session profile of individual Input and Output Connector Flows may be directly monitored by checking the stream metadata of the Matrox Node:

<http://localhost:50000/x-nmos/node/v1.3/receivers/>

<http://localhost:50000/x-nmos/node/v1.3/senders/>

The SDP file link will contain a fully qualified domain name reflecting the "local host name" field in the Matrox NMOS Configuration file. See [NMOS Configuration](#) for how to configure the Matrox NMOS Configuration file manually to modify the local host name. For example:

<http://{local host name}:50000/x-matrox/senders/6751aa6b-af21-44b3-bfea-a1b7df8f24a/stream.sdp>

**I want to dynamically change to an Audio Flow with a different Audio Channel Count**

This is currently not supported. It may be resolved in a future version of Prime.

## ABOUT US

Chyron is ushering in the next generation of storytelling in the digital age. Founded in 1966, the company pioneered broadcast titling and graphics systems. With a strong foundation built on over 50 years of innovation and efficiency, the name Chyron is synonymous with broadcast graphics. Chyron continues that legacy as a global leader focused on customer-centric broadcast solutions. Today, the company offers production professionals the industry's most comprehensive software portfolio for designing, sharing, and playing live graphics to air with ease. Chyron products are increasingly deployed to empower OTA & OTT workflows and deliver richer, more immersive experiences for audiences and sports fans in the arena, at home, or on the go.

## CONTACT SALES

EMEA • North America • Latin America • Asia/Pacific  
+1.631.845.2000 • [sales@chyron.com](mailto:sales@chyron.com)

