

# **Matrox Monarch HDX**

Dev Tools Reference Guide

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**matrox**<sup>®</sup>  
Digital Video Solutions

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**Matrox Electronic Systems Ltd.**

**1055 St. Regis Blvd., Dorval, Quebec, Canada H9P 2T4**

**Tel: (514) 685-2630 Fax: (514) 685-2853 World Wide Web: [www.matrox.com](http://www.matrox.com)**

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# 1

## Using the Monarch HDX Control API

This chapter describes how to use the Monarch HDX HTTP-based Control API to control the streaming and recording functions for a Monarch device.

## Monarch HDX Control API Overview

The Monarch HDX Control API is an HTTP-based API that allows you to control the streaming, recording, and other related functions for a Monarch HDX device using third-party applications and scripting languages.

Users and system integrators can create their own software to control the various functions of a Monarch device, such as starting or stopping streaming/recording, getting the device status, and more.

## Commands

Commands can be sent to Monarch HDX using the following URL syntax (HTTPS is also supported):

<http://<username>:<password>@<ipAddress>/Monarch/synconnect/sdk.aspx?command=<command>>.

Where:

- <username> and <password> are the username and password set in the Monarch device (default for both is “admin”).



**Note** Certain web browsers may no longer accept the “username:password” syntax in order to comply with publication RFC 3986 section 3.2.1 which describes the userinfo subcomponent (see <https://www.rfc-editor.org/>).

- <ipAddress> is the network IP address of the Monarch device.
- <command> is one of the following commands:

API commands	
<a href="#">GetStatus</a>	<a href="#">GetRTSP</a>
<a href="#">StartEncoder1 and StartEncoder2</a>	<a href="#">SetRTMP</a>
<a href="#">GetInputStatus</a>	<a href="#">GetRTMP</a>
<a href="#">StartBothEncoders</a>	<a href="#">SetRecordFileName</a>
<a href="#">StopEncoder1 and StopEncoder2</a>	<a href="#">GetRecordFileName</a>
<a href="#">StopBothEncoders</a>	<a href="#">SetVideoInput</a>
<a href="#">GetStreamingVideoDataRate</a>	<a href="#">GetVideoInput</a>
<a href="#">SetStreamingVideoDataRate</a>	<a href="#">SetAudioInput</a>
<a href="#">SetRTSP</a>	<a href="#">GetAudioInput</a>

For examples of how to use the command line in third-party applications, see “[Example third-party tools](#)” on page 9.

## GetStatus

This command is used to acquire the current status of a Monarch HDX device.

Returns:

- ENC1:<mode>,<state>, ENC2:<mode>,<state>, NAME:<devicename>

Where:

- <state> is ON, READY, or DISABLED
- <mode> is RTSP, RTMP, RECORD, or NONE
- <devicename> is the name of the Monarch HDX device as set by the client in the Monarch HDX Command Center
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

The following table shows example returns based on the device name, encoding mode, and stream/record status:

	Device name	Encoder modes	Stream status	Record status
<b>Example 1</b>	Device1	Encoder 1: Record Encoder 2: RTMP	Not streaming	Not recording
	ENC1:RECORD,READY, ENC2:RTMP,READY, NAME:DEVICE1			
<b>Example 2</b>	Device2	Encoder 1: Record Encoder 2: RTSP	Client not connected	Recording
	ENC1:RECORD,ON, ENC2:RTSP,READY, NAME:DEVICE2			
<b>Example 3</b>	Device3	Encoder 1: Record Encoder 2: None	N/A	Not recording
	ENC1:RECORD,READY, ENC2:NONE,DISABLED, NAME:DEVICE3			

## StartEncoder1 and StartEncoder2

These commands are used to start Encoder 1 or Encoder 2 on a Monarch HDX. The encoder will start in the encoding mode that has been set (e.g. RTSP streaming, RTMP streaming, or Record). If the Monarch HDX is in RTMP streaming mode, this call will also start the streaming process.

Returns:

- SUCCESS, if the encoder starts successfully, the encoder is already started, or the encoder mode is set to “none”.
- FAILED, if the encoder could not be started.
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## GetInputStatus

This command is used to acquire the input resolution(s) of a Monarch.

Returns:

- This command will return the active connector (SDI or HDMI), its resolution and framerate, and closed caption information (if applicable).  
**Example:** SDI A: 1280 x 720p, 59.94 fps (SDI-CEA-608)
- If an input does not have an SDI or HDMI cable connected to it, this command will return “No video input”.
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## StartBothEncoders

This command is used to start Encoder 1 and Encoder 2 simultaneously on a Monarch device. The encoders will start in the encoding mode that has been set (e.g. RTSP streaming, RTMP streaming, or Record).

Returns:

- SUCCESS, if both encoders started successfully.
- FAILED, if either one or both encoders could not be started.
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## StopEncoder1 and StopEncoder2

These commands are used to stop Encoder 1 or Encoder 2 on a Monarch HDX.

Returns:

- SUCCESS, if the encoder was stopped successfully.
- FAILED, if the encoder did not stop.
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## StopBothEncoders

This command is used to stop Encoder 1 and Encoder 2 simultaneously on a Monarch device.

Returns:

- SUCCESS, if both encoders stopped successfully.

- **FAILED**, if either one or both encoders could not be stopped.
- **RETRY**, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return **RETRY**.

## SetStreamingVideoDataRate

This command is used to set the data rate (in kb/s) on a Monarch encoder dynamically without stopping a current streaming operation. For this command to work, the selected encoder must be actively streaming. The minimum data rate will be set to 90% of the average, and the maximum data rate will be set to 110% of the average data rate.

Format:

- `SetStreamingVideoDataRate,<encoder>,<average bit rate>`
- Encoder value must be 1 or 2.
- Average bit rate value must be between 50 and 20000.

Returns:

- **SUCCESS**, if the bit rate is set.
- **FAILED**, if the value is outside the 50 to 20000 range.
- **RETRY**, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return **RETRY**.

## GetStreamingVideoDataRate

This command is used to acquire the average video data rate in kb/s (bit rate) that is currently set on one of the Monarch encoders. The encoder must be in a streaming state for this call to succeed.

Format:

- `GetStreamingVideoDataRate,<encoder>`
- Encoder value must be 1 or 2.

Returns:

- **BITRATE**: <average bit rate>
- **FAILED**, if there is a network connection issue and the command cannot get through to the Monarch.
- **RETRY**, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return **RETRY**.

## SetRTSP

This command is used to set the RTSP URL and port on a Monarch encoder. This command will always fail unless the Monarch is idle (not streaming or recording).

Format:

- SetRTSP,<encoder>,<url name>,<port>.
- Encoder value must be 1 or 2.
- <url name> is the path to connect to and <port> is either 554 or 8554.

Returns:

- SUCCESS, if the settings were applied.
- FAILED, if the device is currently streaming or recording, or the port is not 554 or 8554. The call will also fail if the URL contains invalid characters. Alphanumeric characters are accepted, as well as the following characters in brackets ( . : = / ).
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## GetRTSP

This command is used to get the URL and port on a Monarch HDX encoder that is currently programmed for RTSP streaming. Returning this call does not necessarily mean that the device is set to stream in RTSP mode.

Format:

- GetRTSP,<encoder>.
- Encoder value must be 1 or 2.

Returns:

- URL, name, port
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## SetRTMP

This command is used to configure the RTMP parameters on a Monarch encoder. This command will always fail unless the device is idle (not streaming or recording).

Format:

- <encoder>, <url>, <stream name>, <username>, <password>
- Encoder value must be 1 or 2.
- Username and password are optional.

Returns:

- **SUCCESS**, if the settings were applied.
- **FAILED**, if the device is currently streaming or recording. The call will also fail if the URL contains invalid characters. Alphanumeric characters are accepted, as well as the following characters in brackets (. : = /).
- **RETRY**, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return **RETRY**.

## GetRTMP

This command is used to get the RTMP settings that are currently programmed on a Monarch encoder. Returning this call does not necessarily mean that the device is set to stream in RTMP mode.

Format:

- GetRTMP,<encoder>
- Encoder value must be 1 or 2.

Returns:

- Url name, stream name
- **RETRY**, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return **RETRY**.

## SetRecordFileName

This command is used to set the individual filenames in which recorded files are saved to in either encoder. This call will fail if an invalid character is found in the filename.

Format:

- SetRecordFileName,<encoder>,<filename>

Returns:

- **SUCCESS**, if the setting was applied.
- **FAILED**, if the device is currently streaming or recording. The call will also fail if the filename contains invalid characters. Alphanumeric characters are accepted, as well as the dash (-) and forward slash (/) characters. When in network recording mode, the acceptable characters are the dash (-), forward slash (/), period (.), and colon (:).
- **RETRY**, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return **RETRY**.

## GetRecordFileName

This command is used to get the Record filename of a Monarch encoder.

Format:

- GetRecordFileName,<encoder>.
- Encoder value must be 1 or 2.

Returns:

- RECORD FILENAME: <filename> or <path/filename>
- FAILED
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## SetVideoInput

This command is used to set which video input on the Monarch HDX receives video content (SDI or HDMI).

Format:

- SetVideoInput,<input>
- Input value can be SDI or HDMI.

Returns:

- SUCCESS, if the setting was applied.
- FAILED, if the device is currently streaming or recording.
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## GetVideoInput

This command is used to get the video input (SDI or HDMI) that is currently in use.

Returns:

- VIDEO INPUT: <HDMI/SDI>
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## SetAudioInput

This command is used to set which audio input on the Monarch HDX receives audio content (analog or digital).

Format:

- SetAudioInput,<input>
- Input value can be ANALOG or DIGITAL.

Returns:

- SUCCESS, if the setting was applied.
- FAILED, if the device is currently streaming or recording.
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## GetAudioInput

This command is used to get the audio input (analog or digital) that is currently in use.

Returns:

- AUDIO INPUT: <ANALOG/DIGITAL>.
- RETRY, if two or more commands are sent to the Monarch at the same time, or if the Monarch is executing a command while receiving another. The first command received will execute, and the others will return RETRY.

## Example third-party tools

Different tools can be used to send commands to Monarch HDX. Matrox has tested the following applications and scripting languages for use with Monarch HDX:

- GNU Wget
- cURL
- C# (C Sharp)



**Note** Please note the following:

- In order for third-party applications to send commands to Monarch HDX successfully, they must support username and password authentication.
- Certain web browsers may no longer accept the “username:password” syntax in order to comply with publication RFC 3986 section 3.2.1 which describes the userinfo subcomponent (see <https://www.rfc-editor.org/>).

The following are examples of how to use the Monarch HDX API command line in third-party applications.

### GNU Wget

```
wget --user=<username> --password=<password>
http://<ipAddress>/Monarch/synconnect/sdk.aspx?command=<command>
```

### cURL

```
curl http://<username>:<password>@<ipAddress>/Monarch/syncon-
```

```
nect/sdk.aspx?command=<command>
```

## PHP (cURL)

```
<?php
    ch =
        url_init("http://<username>:<password>@<ipAddress>/Monarch/syn
connect/sdk.aspx?command=<command>");
    response = curl_exec($ch);
    header_size = curl_getinfo($ch,CURLINFO_HEADER_SIZE);
    rint substr( $response, $header_size );
    url_close($ch);
?>
```

## C#

```
using System.Net;
WebClient webclient = new WebClient();
webclient.Credentials = new NetworkCredential("<username>", "<pass-
word>");
string pageContent = string.Empty;
try
{
    using (Stream stream = webclient.OpenRead(new Uri ( "http://<ipAd-
dress>/Monarch/synconnect/sdk.aspx?command=<command>"))
    {
        using (StreamReader reader = new StreamReader(stream))
        {
            pageContent = reader.ReadToEnd();
        }
    }
}
catch (WebException e)
{
}
```

# 2

## **Configuring the Monarch HDX XML File**

This chapter describes how to properly configure an XML file for use with the automatic configuration feature of the Monarch HDX device.

## Monarch HDX XML configuration overview

This section explains how to generate an XML file that you can use to automatically configure the Monarch HDX without logging on to the web-based Monarch HDX Command Center.

### How it works

Monarch HDX settings can be defined as parameters in an XML file, which you can generate from the Monarch HDX Command Center (see “[Generating an XML file](#)” on page 12). You can then use this XML configuration file to configure other Monarch devices by importing the settings in the following ways:

- From the Monarch HDX Command Center, you can import the settings by loading a previously-generated XML configuration file.
- You can host the XML parameters on a web page, and then have the Monarch HDX download the settings from the web page URL. You can specify the URL through the Command Center, or in a parameter in the XML file.
- You can copy the XML file to a USB device, connect it to the USB2 port on the Monarch, and then perform a factory reset of the Monarch. On startup, the Monarch will automatically import the settings from the XML file located on the USB device.

Importing settings from an XML file makes configuring the Monarch device more convenient, and will minimize or potentially eliminate the need to log on to the Command Center to configure each device individually.

### Generating an XML file

Instead of building an XML configuration file from scratch, you can use any Monarch HDX to generate a valid XML file for you. From the Command Center you can configure a single Monarch device with your desired settings, and then generate a configuration file (named *MonarchHDX\_Settings.xml* by default) with those settings expressed as valid XML parameters. For more information on how to generate an XML configuration file, see the *Matrox Monarch HDX User Guide*.

If you want to edit the parameters in the file, you can open it with Notepad or a similar text editor. It is recommended that you use a more advanced text editor (such as Notepad++ or a Linux text editor) to see the XML as properly formatted code.

### Guidelines for working with the XML file

This section explains some general things you should know about working with the Monarch HDX XML configuration file:

- Some of the parameters are optional, and may not need to be defined.
- An XML tag can be either a *leaf* or a *branch*. A leaf tag defines a specific value, while a branch tag contain other tags. In the Monarch HDX XML configuration

file, all the leaf tags correspond to actual settings in the Monarch HDX Command Center user interface, and they are subject to the same conditions and limitations.

- Parameters can be listed in the XML file in any order. For example, you can have the height tag listed before the width if you choose.
- XML tags are case-sensitive but the content of the tag is not. For example, the tag Deblocking Filter must be written as <deblockingFilter>, but the content for the tag (which is either “true” or “false”) can be written “False”, “FALSE”, or “false”.
- If a tag name has a syntax error, that section will not be parsed but no error will be reported. However, for leaf tags, a specific error will be returned for syntax errors.

For example, the following tag contains a syntax error because there is no such thing as “encoder 0”:

```
– <MatroxMonarch><encoder0>...</encoder0></MatroxMonarch>
```

Only encoder1 and encoder2 are valid tags. In this case, the content of the tag encoder0 will not be processed since it is an invalid tag, but no error will be reported.

## Sample XML and parameter descriptions

This section provides a sample of the XML structure in the configuration file, followed by descriptions of each parameter:

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<MatroxMonarch
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <deviceName>MonarchHDX</deviceName>
  <monarchUPnPEnabled>true</monarchUPnPEnabled>
  <hardwareButtonLocked>>false</hardwareButtonLocked>
  <monarchSettingsVersion>1.0.0</monarchSettingsVersion>
  <video>
    <videoPort>HDMI</videoPort>
  </video>
  <audio>
    <audioPort>DIGITAL</audioPort>
    <audioBitRateInKbps>192</audioBitRateInKbps>
    <audioSamplingRateInKHz>48</audioSamplingRateInKHz>
    <audioVolume>0</audioVolume>
  </audio>
  <configuration>
    <encoder1>
      <mode>STREAMINGONLY</mode>
```

```

</encoder1>
<encoder2>
  <mode>DISABLED</mode>
</encoder2>
</configuration>
<encoder1>
  <encoderParam>
    <sameResAsInput>>false</sameResAsInput>
    <width>1280</width>
    <height>720</height>
    <framerate>60/50</framerate>
    <videoBitRateInKbps>10000</videoBitRateInKbps>
    <gopStructSize>10</gopStructSize>
    <gopStructPRate>1</gopStructPRate>
    <profile>HIGH</profile>
    <sliceUnit>1</sliceUnit>
    <deblockingFilter>false</deblockingFilter>
    <minVideoBitrateInKbps>9000</minVideoBitrateInKbps>
    <maxVideoBitrateInKbps>11000</maxVideoBitrateInKbps>
  </encoderParam>
  <recordParam>
    <audioEnabled>>true</audioEnabled>
    <mediatype>USB1</mediatype>
    <fileSwitchDurationInMinutes>0</fileSwitchDurationInMinutes>
    <maxRecordDurationInMinutes>0</maxRecordDurationInMinutes>
    <pathAndFilename>File1</pathAndFilename>
    <credentials>
      <domain></domain>
    </credentials>
    <fileType>MOV</fileType>
    <fileIDMode>DATETIME</fileIDMode>
  </recordParam>
  <streamParam>
    <rtmpMode>DEFAULT</rtmpMode>
    <audioEnabled>>true</audioEnabled>
    <rtspStreamName>Stream1</rtspStreamName>
    <rtspPort>8554</rtspPort>
    <jumboFramesEnabled>false</jumboFramesEnabled>
    <rtmpDestinationURL></rtmpDestinationURL>
    <rtmpStreamName></rtmpStreamName>
    <rtmpUsername></rtmpUsername>
    <rtmpPassword></rtmpPassword>
    <wowzaLongToken>XXXXXXXXXX</wowzaLongToken>
    <streamType>RTSP</streamType>
  </streamParam>

```

```

</encoder1>
<encoder2>
  <encoderParam>
    <sameResAsInput>false</sameResAsInput>
    <width>1280</width>
    <height>720</height>
    <framerate>60/50</framerate>
    <videoBitRateInKbps>10000</videoBitRateInKbps>
    <gopStructSize>10</gopStructSize>
    <gopStructPRate>1</gopStructPRate>
    <profile>HIGH</profile>
    <sliceUnit>1</sliceUnit>
    <deblockingFilter>false</deblockingFilter>
    <minVideoBitrateInKbps>9000</minVideoBitrateInKbps>
    <maxVideoBitrateInKbps>11000</maxVideoBitrateInKbps>
  </encoderParam>
  <recordParam>
    <audioEnabled>true</audioEnabled>
    <mediatype>USB1</mediatype>
    <fileSwitchDurationInMinutes>0</fileSwitchDurationInMinutes>
    <maxRecordDurationInMinutes>0</maxRecordDurationInMinutes>
    <pathAndFilename>File1</pathAndFilename>
    <credentials>
      <domain></domain>
    </credentials>
    <fileType>MOV</fileType>
    <fileIDMode>DATETIME</fileIDMode>
  </recordParam>
  <streamParam>
    <rtmpMode>DEFAULT</rtmpMode>
    <audioEnabled>true</audioEnabled>
    <rtspStreamName>Stream1</rtspStreamName>
    <rtspPort>554</rtspPort>
    <jumboFramesEnabled>false</jumboFramesEnabled>
    <rtmpDestinationURL></rtmpDestinationURL>
    <rtmpStreamName></rtmpStreamName>
    <rtmpUsername></rtmpUsername>
    <rtmpPassword></rtmpPassword>
    <wowzaLongToken>XXXXXXXXXXXX</wowzaLongToken>
    <streamType>RTSP</streamType>
  </streamParam>
</encoder2>
</MatroxMonarch>

```

## <MatroxMonarch>

The XML file generated by the Monarch specifies the XML declaration (<?xml version> tag) but this is optional. If you generate your own XML using some kind of application or code, you do not need to include a declaration. If you do include it, make sure that it matches the following line:

```
<?xml version="1.0" encoding="UTF-8" standalone="true"?>
```

The root is the <MatroxMonarch> tag. The XML file generated by the Monarch contains the namespace xmlns:xsd and xmlns:xsi, but you can leave those out and use a simpler <MatroxMonarch> tag such as the following:

```
<MatroxMonarch xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
</MatroxMonarch>
```

Anything outside the <MatroxMonarch></MatroxMonarch> tags is ignored by the Monarch. However, to avoid validation errors with the XML file, you should not have anything outside those root tags.

## <deviceName>

This is the name you want to give to this specific device. When you are in the Command Center, this name will be displayed in the browser tab. You can leave this tag blank if you choose.

Example: <deviceName>MonarchHDX</deviceName>

## <monarchUPnPEnabled>

This is the option to have the Monarch broadcast itself as a Universal Plug and Play (UPnP) device. This means that it will appear in Windows Explorer (not visible in Mac OS) as if it were a printer, external hard drive, or similar UPnP device.

Example: <monarchUPnPEnabled>true</monarchUPnPEnabled>

## <hardwareButtonLocked>

This is the option to lock the **Input Select**, **Switch** and **ENCD** (encode) buttons on the Monarch device. This can prevent someone from inadvertently switching inputs or stopping a streaming or recording session.

Example: <hardwareButtonLocked>false</hardwareButtonLocked>

## <monarchSettingsVersion>

This is the version of the XML configuration file (currently at 1.0.0). You **must** have this tag in the XML file, however it is not related to the version of the Monarch HDX firmware.

Example: <monarchSettingsVersion>1.0.0</monarchSettingsVersion>

## <configuration>

This tag allows you to configure the operating mode for each individual Monarch HDX encoder. You must first specify the encoder you want to configure, then specify the encoder mode with the values RecordingOnly, StreamingOnly, or Disabled.

There are three parameters:

- <encoder1>  
Specifies the mode for encoder 1.
- <encoder2>  
Specifies the mode for encoder 2.
- <mode>  
Specifies the mode for the selected encoder (RECORDINGONLY, STREAMINGONLY, or DISABLED).

Example:

```
<configuration>
  <encoder1>
    <mode>STREAMINGONLY</mode>
  </encoder1>
  <encoder2>
    <mode>DISABLED</mode>
  </encoder2>
</configuration>
```

The operating mode dictates the maximum average video bit rate you can set for recording and streaming. For more information, see the tag [<videoBitRateInKbps>](#) .

## <video>

This tag specifies which video input to use on the Monarch HDX. You can specify SDI or HDMI. For example: <videoPort>HDMI</videoPort>

## <audio>

This tag contains all the information related to audio encoding. There are three parameters:

- <audioPort>  
Specify the audio input as either Analog or Digital.  
Example: <audioPort>Digital</audioPort>
- <audioBitRateInKbps>  
Specifies the bit rate (in kilobits per second) at which the audio will be encoded. Accepted values are 32, 96, 128, 192, and 256. For analog audio, 32 Kbps must be used with a 22.05 KHz sampling rate  
Example: <audioBitRateInKbps>32</audioBitRateInKbps>

- `<audioSamplingRateInKHz>`  
Specifies the audio sampling rate (in kilohertz) at which the audio will be encoded. Accepted values are 22.05, 24, 32, 44.1, and 48. For analog audio, 32 Kbps must be used with a 22.05 KHz sampling rate  
Example: `<audioSamplingRateInKHz>44.1</audioSamplingRateInKHz>`
- `<audioVolume>`  
Mutes the audio coming from the Monarch. A value of 0 is mute and 100 is full volume.  
Example: `<audioVolume>0</audioVolume>`

## **<encoder1> and <encoder2>**

The Monarch includes two encoders that can stream, record, or be disabled. You can choose to omit one or both encoder tags in the XML to keep using the parameters that are currently programmed in the Monarch HDX Command Center. The encoder tags include the following branch sub-tags:

- `<encoderParam>`
- `<recordParam>`
- `<streamParam>`

### **<encoderParam>**

This branch tag defines the encoding of the input. All the value tags inside this tag are mandatory, meaning that if you have the `<encoderParam>` included in your XML file, all the following values must be present and contain valid values:

- `<sameResAsInput>`  
Value can be “true” or “false”. When true, the values in the width and height are ignored and the encoding resolution will match the input resolution. This tag reflects the option “Use input resolution” in the Monarch HDX Command Center.
- `<width>`  
Width of the encoding resolution. Must be between 128 and 1920, and be a multiple of 16. If the connected input resolution width is smaller than this value, the input resolution is used and supersedes this width.
- `<height>`  
Height of the encoding resolution. Must be between 128 and 1080, and be a multiple of 2. If the connected input resolution height is smaller than this value, the input resolution is used and supersedes this height.
- `<framerate>`  
The frame rate to use based on the input resolution. Values are 60/50, 30/25, 24, or 15/12.5.

Example: `<framerate>60/50</framerate>`

- `<videoBitRateInKbps>`  
The average video bit rate in kilobits per second. The minimum value is 50. The maximum value is based on the operating mode(s) selected for the encoders:
  - When recording only, the maximum for an encoder is 30000.
  - When streaming only, the maximum for an encoder is 20000.
  - When streaming and recording, one encoder (e.g. encoder 1) can be set up to 10000, but the other encoder (e.g. encoder 2) is limited to 30000 minus the encoder 1 average bit rate.
- `<gopStructSize>`  
The number of frames inside a GOP. Value can be 1 to 1000.
- `<gopStructPRate>`  
Number of frames between P frames. A value of 1 results in a “IPPP” GOP, while a 3 results in a GOP with “BBPBBPBBP”. The maximum value you can give is 6, and it must be a multiple of the value used for the `<gopStructSize>`. If you are using the baseline profile, encoder 2 must always have a `<gopStructPRate>` of 1.
- `<profile>`  
You can have Baseline, Main, and High.
- `<sliceUnit>`  
Number of slices inside a frame. The accepted values are 1, 2, 4, or 8.
- `<deblockingFilter>`  
Enable a deblocking filter to get a better image. Value must be “true” or “false”.
- `<minVideoBitrateInKbps>`  
Lowest acceptable bit rate for video segments that are easy to encode, such as segments with black frames. The minimum value is 50, and the maximum is the value set as the average video bit rate in the parameter `<videoBitRateInKbps>`.
- `<maxVideoBitrateInKbps>`  
Highest acceptable bit rate for video segments that are difficult to encode. The minimum value is the value set for the average video bit rate in the parameter `<videoBitRateInKbps>`. The maximum value is 8x times the average video bit rate.

### **`<recordParam>`**

This branch tag defines the recording parameters for an encoder. The following parameters are included:

- `<audioEnabled>`  
Specifies whether or not to record audio. Values can be “true” or “false”.
- `<fileType>`

Specifies if you want to encode a MOV file or a MP4 file. Values can be “MOV” or “MP4”.

- <maxrecordDurationInMinutes>

Enter a Maximum recording duration (in minutes) to set an overall time limit for your recording session. The session will automatically end when this limit is reached, or when the selected storage media is full (whichever occurs first). If you enter a value of 0, the recording session will continue indefinitely, and will stop only when your storage media is full.

- <fileSwitchDurationInMinutes>

Enter a file switching duration (in minutes) to separate your recording session into more than one file at predetermined intervals. For example, if you enter a duration of 30 minutes, Monarch HDX will close the current file and start recording to a new file every 30 minutes. The maximum duration you can set is 290 minutes. If you enter a duration of 0, Monarch HDX will automatically switch to a new file every 290 minutes, as a built-in precaution to avoid possible data loss from having files that are too large.

- <pathAndFilename>

Specify the destination and filename for your recording based on your recording destination. When specifying the path, all folders in the path must already exist.

- <mediaType>

Specify on which media to record (USB1, USB2, SDCard, or Network). For networks, the <recordParam> section can also have a <credentials> section.

- <fileIDMode>

This tag corresponds to the “Save file as” option in the Monarch HDX Command Center, where you can add a customized suffix to the filename when saving it. There are three possible values:

- Save a file with the filename only (XML value is “Filename”).
- Save a file with the filename and the date/time (XML value is “DateTime”).
- Save a file with the filename and a numeric counter (XML value is “Numeric”).

For more information on the various use-cases for each type of filename format, see the *Matrox Monarch HDX User Guide*.

Example:

```
<recordParam>
  <fileIDMode>DATETIME</fileIDMode>
</recordParam>
```

### <streamParam>

This branch tag defines the RTMP or RTSP streaming parameters for an encoder. If you configure one stream type, RTSP for example, you can leave the RTMP values blank and vice-versa. You can also choose to program all fields, and the Monarch will use the parameters based on the stream type selected. The following parameters are included:

- <rtmpMode>  
Specifies the RTMP mode for the Monarch. Values are DEFAULT, LEGACY, or WOWZACLOUD. This is an optional tag. If this tag is not present in the XML, Monarch will assume the DEFAULT mode.
- <audioEnabled>  
Specifies whether or not to stream audio. Values can be “true” or “false”.
- <jumboFramesEnabled>  
Specifies whether or not to broadcast data in bigger network packets. Values can be “true” or “false”. The network card on the computer receiving the data must support this option.
- <rtspStreamName>  
You can provide a name for the stream. If you leave this blank, the stream name will be “Stream1”.
- <rtspPort>  
Specify the port on which to stream. Values can be either “554” or “8554”. If you leave this blank, port 554 will be used by default.
- RTMP parameters:
  - <rtmpDestinationURL>
  - <rtmpStreamName>
  - <rtmpusername>
  - <rtmpPassword>

Specify the destination server URL (must begin with **rtmp://**), stream name, username, and/or password. This information is typically provided by the CDN server administrator. If the stream name, username, and password is included in the URL, you can leave those parameters blank.
- <wowzaLongToken>  
This tag specifies the Wowza token used to connect to Wowza Cloud. The token is encrypted so you cannot set this tag manually. However, you can set it in the Monarch Command Center and then generate an XML file. You can then load the XML file on another Monarch to use the same Wowza token. For more information on the Wowza Cloud, see the Matrox Monarch User Guide.

## Additional XML configuration

In addition to the standard XML tags used in the Monarch XML configuration file, you can also use the tags in this section to further customize the Monarch's capabilities.

### Dynamic bit rate

This XML tag allows you to change the video bit rate while streaming. It can be used for either Monarch HDX encoder but it will not work if the tag `<videoBitRateInKbps>` is also present in the XML file for that encoder. The encoder must also be configured for streaming only.

This tag contains two other inner or sub-tags, one to define which encoder to set, and the other to define the bit rate. The value chosen for the bit rate must be between 50 and 20000.

```
<dynamicBitrateInKbps>
  <encoder2>
    <bitrate>value</bitrate>
  </encoder2>
</dynamicBitrateInKbps>
```

### Call home

Instead of the Monarch importing settings from a USB key or from a network drive, you can host the XML file on a webpage and have the Monarch “call home” to that page to import the settings. You can have the Monarch do this on start-up or on demand.

```
<home>
  <url>value</url>
</home>
```

The URL value must start with the common web-based prefix “http://”. You can disable this feature by leaving the tag blank.

After the Monarch validates the XML file from the webpage, it will send an error to the same URL server, but with the device serial number, error and the status. If the error is 0, then the XML is considered validated. The status is the same as the [GetStatus](#) call described in the control API section of this document.

Here is an example of the response sent by the Monarch after an XML file with a `<home>` field is loaded:

```
http://url?serialNumber=Bx12345&error=0&status=RECORD:READY,STREAM:R
TSP,READY,NAME:MonarchHDX
```



**Note** If you generate the XML from the Monarch Command Center, the <home> tag will be included in the XML file if there is a value in the URL field in the Automatic configuration page of the Command Center.

## Periodic call home

You can also configure the Monarch to call home (or poll) periodically to check for new configuration instructions by using the tag <MatroxReservedOption1>. The value for this tag can either be “0” which disables polling, or a value in seconds up to 4,230,000.

```
<MatroxMonarch>
  <MatroxReservedOption1>value</MatroxReservedOption1>
</MatroxMonarch>
```

## Stop and Start control

You can use this XML tag to stop and start recording or streaming on the Monarch device. You must specify which encoder to stop/start, and the encoder must be set to the appropriate mode for the start/stop command to work (e.g. you can't stop streaming on an encoder that has been set to record and vice-versa).

For more information on the conditions for these commands succeeding or failing, see [“Commands”](#) on page 2.

The available values are:

- Startrecord
- Stoprecord
- Startstream
- Stopstream

Example:

```
<control>
  <encoder1>
    <action>Startrecord</action>
  </encoder1>
  <encoder2>
    <action>Startstream</action>
  </encoder2>
</control>
```

## Processing order of the XML tags

You can add any of the XML tags in any order inside the configuration file and they will always be processed in the following order:

- 1 Settings inside these tags (if present):
  - Audio
  - Configuration
  - Encoder 1
  - Encoder 2
- 2 Dynamic bit rate
- 3 If the call home tag `<home>` is present, the Monarch retrieves the content of the XML at the specified URL, and then follows the regular processing order of XML tags. If a new URL is provided, the Monarch will not retrieve the new settings but will save the name of the new URL.
- 4 Any action specified in the `<control>` tag (if present).

## XML configuration sample scenarios

This section provides some examples of how to configure the XML file to handle a number of real-world Monarch scenarios.

### Streaming to a CDN using RTMP only (no recording enabled)

This is an example of what the XML would look like for streaming to a CDN using RTMP only.

```
<?xml version="1.0" encoding="UTF-8" standalone="true"?>
<MatroxMonarch>
  <monarchSettingsVersion>1.0.0</monarchSettingsVersion>
  <encoder2>
    <streamParam>
      <audioEnabled>true</audioEnabled>
      <rtspStreamName> </rtspStreamName>
      <rtspPort></rtspPort>
      <jumboFramesEnabled>false</jumboFramesEnabled>
      <rtmpDestinationURL>rtmp://monarchStream/live</rtmpDestina-
tionURL>
      <rtmpStreamName>livestream</rtmpStreamName>
      <rtmpUsername> </rtmpUsername>
      <rtmpPassword>
      </rtmpPassword>
      <streamType>RTMP</streamType>
    </streamParam>
```

```

</encoder2>
</MatroxMonarch>

```

You don't need the <encoder1> tag or the <encoderParam> tags inside the <encoder2>, but you need all the tags inside <streamParam></streamParam>.

## Changing encoding parameters for recording

This is an example of what the XML would look like if you wanted to change the encoding parameters for a recording session.

```

<MatroxMonarch>
  <monarchSettingsVersion>1.0.0</monarchSettingsVersion>
  <encoder1>
    <encoderParam>
      <sameResAsInput>true</sameResAsInput>
      <width>1280</width>
      <height>720</height>
      <framerate>Full</framerate>
      <videoBitRateInKbps>4000</videoBitRateInKbps>
      <gopStructSize>15</gopStructSize>
      <gopStructPRate>3</gopStructPRate>
      <profile>Baseline</profile>
      <sliceUnit>1</sliceUnit>
      <deblockingFilter>false</deblockingFilter>
      <minVideoBitrateInKbps>3600</minVideoBitrateInKbps>
      <maxVideoBitrateInKbps>4400</maxVideoBitrateInKbps>
    </encoderParam>
  </encoder1>
</MatroxMonarch>

```

Even though the encoding will use the same resolution as the input, you must still set all the tags inside the encoder tag, including the width and height.

## Start streaming

This is an example of what the XML would look like if you wanted to issue a control command to the Monarch to start streaming.

```

<?xml version="1.0" encoding="UTF-8" standalone="true"?>
<MatroxMonarch>
  <monarchSettingsVersion>1.0.0</monarchSettingsVersion>
  <control>
    <encoder1>
      <action>Startrecord</action>
    </encoder1>
    <encoder2>
      <action>Startstream</action>
    </encoder2>
  </control>
</MatroxMonarch>

```

```
    </encoder2>  
</control>  
</MatroxMonarch>
```

Since the action value is not case-sensitive, the value “StartStream” is valid as written. However, you would not be able to write the control tag any other way.

## Change bit rate while streaming

This is an example of what the XML would look like if you wanted to change the average video bit rate to 8.5 Mbits/s while the Monarch is streaming.

```
<MatroxMonarch>  
  <dynamicBitrateInKbps>  
    <encoder2>  
      <bitrate>8500</bitrate>  
    </encoder2>  
  </ dynamicBitrateInKbps >  
</MatroxMonarch>
```

# 3

## Using the Monarch HDX Command Line Utility

This chapter describes how to use the Windows command line to remotely reboot or update Monarch HDX devices.

## Updating or rebooting the Monarch HDX using the command line

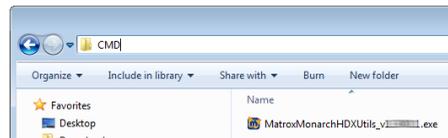
By using the Windows command line utility, you can remotely reboot or update one or more Monarch HDX devices on the same subnet, or on a different subnet if you know the Monarch's IP address(es). You can choose to manually execute the command line calls (from the CMD prompt), or you can develop your own application based on the Monarch HDX command line calls to programatically update and/or reboot the devices.

Please note the following:

- This feature is not supported on Mac OS. It is available only through the Windows command line.
- You must have the Monarch HDX Utils installed, and you must run the command prompt from the folder that contains the Monarch HDX Utils executable (.exe).
- You must know the IP address or the serial number of the Monarch(s) that you want to update or reboot, You can use the serial number if you are on the same subnet, but you must use the IP address if you are on a different subnet. Generally, using the IP address is preferable in all cases.
- If you initiate an update or a reboot, the Monarch device will comply with the command even if it is in an active process at the time. For example, if the Monarch is streaming and/or recording when it receives a reboot command, it will reboot and interrupt the streaming or recording process.

### ⇒ To update or reboot the Monarch HDX from the command line:

- 1 (Optional) If you do not already have Monarch HDX Utils, download it from our [website](#) and save it to a folder that is accessible from your computer.
- 2 Go to the folder containing the Monarch HDX Utils executable, and then run the Windows command prompt.



**Tip** A quick way to open command prompt from the folder is to delete the text in the network path field at the top, type **CMD**, and then press **ENTER**.

- 3 From the command prompt, type the following command:

```
MonarchHDXUtils.exe ACTION OPTION MONARCH MONARCH MONARCH MON-ARCH...
```

Where:

- ACTION is **Reboot** or **Update**.
- OPTION is **IP** or **Serial**.
- MONARCH is the IP address or serial number of the Monarch device(s).

You can update or reboot as many Monarch devices as you want by including a single space between each IP address or serial number.

#### **4 Press ENTER.**

The Monarch(s) will update or reboot according to the command issued.

### **Update/reboot command line syntax examples**

To help you understand the proper syntax for using the command line update/reboot feature, see the following examples:

#### **Update on a different subnet**

To update three Monarch devices on a different subnet (IP addresses needed), use the following syntax:

```
MonarchHDXUtils.exe Update IP 192.168.12.34 192.168.56.78  
192.168.9.10
```

#### **Reboot on the same subnet**

To reboot four Monarch devices on the same subnet, you can use the serial numbers or IP addresses.

##### **With serial numbers:**

```
MonarchHDXUtils.exe Reboot Serial 123456 654321 654789 987456
```

##### **With IP addresses:**

```
MonarchHDXUtils.exe Reboot IP 192.168.12.34 192.168.56.78  
192.168.9.10 192.168.10.11
```

## Your notes





[www.matrox.com/video](http://www.matrox.com/video)