

# USER MANUAL

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MCX-G2-CTRL-12, -24, -48, -120, -250, -500

# MCX NETWORK MANAGEMENT CONTROLLER

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## 1. GLOBAL SETTINGS

Here you will find all the global settings of the software.

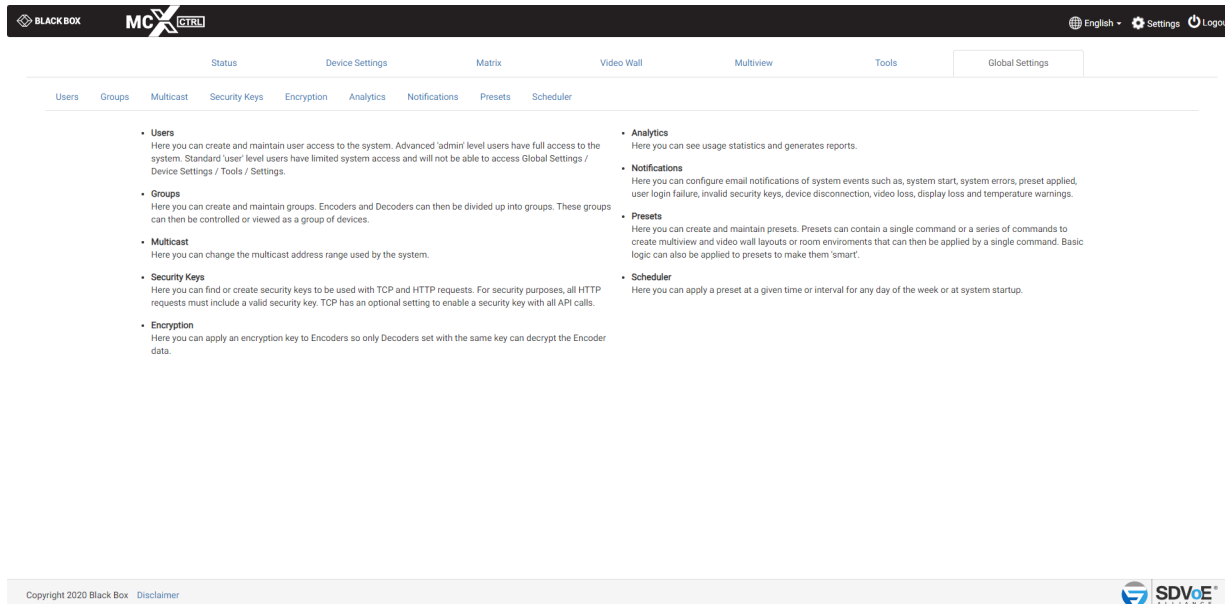


FIGURE 1-1.

### 1.1 USERS

The system can be configured for user access control. Two levels of access are available, administrator and user. An administrator will have complete access, while a user is limited to the following areas:

- ♦ Status
- ♦ Matrix
- ♦ Video Wall
- ♦ Multiview
- ♦ The device groups for a user can also be limited so that only selected groups of Encoders and Decoders may be accessed.

## 1.1.1 ADD USER

Here you can add a user to the system by selecting Administrator or User access level, then enter a name and password for the new user. For user level access, you can also select the accessible groups and functions.

The screenshot shows the 'Global Settings' page in the Black Box MCX CTRL interface. The 'Users' tab is selected. The 'Add' option is chosen from the 'Select Option' dropdown. The 'Level' is set to 'User'. The 'Username' field contains 'RoomDirector'. The 'Password' and 'Confirm password' fields are masked with dots. Under 'Group', 'CommandCenter' is selected. Under 'Functions', 'Status', 'Video Wall', and 'Multiview' are selected. A 'Save' button is at the bottom.

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FIGURE 1-2.

1. Select Add.
2. Select Level.
3. Enter Username.
4. Enter Password.
5. Confirm Password.
6. Select Groups.
7. Select Functions.
8. Click Save button.

## 1.1.2 EDIT USER

Here you can edit an existing users Username, Password, allocated groups, and functions.

The screenshot displays the Black Box MCX web interface. The top navigation bar includes the Black Box logo, the MCX logo, and links for English, Settings, and Logout. Below this, a secondary navigation bar contains tabs for Status, Device Settings, Matrix, Video Wall, Multiview, Tools, and Global Settings. The 'Global Settings' tab is active, and the 'Users' sub-tab is selected. The main content area shows the 'Edit User' form for the user 'RoomDirector'. The form includes a 'Select Option' dropdown set to 'Edit', an 'Edit' dropdown set to 'RoomDirector', a 'Username' field containing 'RoomDirector', and empty fields for 'New password' and 'Confirm password'. Under the 'Group' section, there are three checkboxes: 'All Devices' (unchecked), 'CommandCenter' (checked), and 'TrainingRoom' (unchecked). Under the 'Functions' section, there are four checkboxes: 'Status' (checked), 'Matrix' (unchecked), 'Video Wall' (checked), and 'Multiview' (checked). A 'Save' button is located at the bottom of the form. The footer of the page contains the copyright notice 'Copyright 2020 Black Box Disclaimer' and the SDVoE logo.

FIGURE 1-3.

1. Select Edit.
2. Select User.
3. Change Username.
4. Enter new Password.
5. Select Groups.
6. Select Functions.
7. Click Save button.



## 1.1.3 DELETE USER

Here you can delete an existing user from the system.

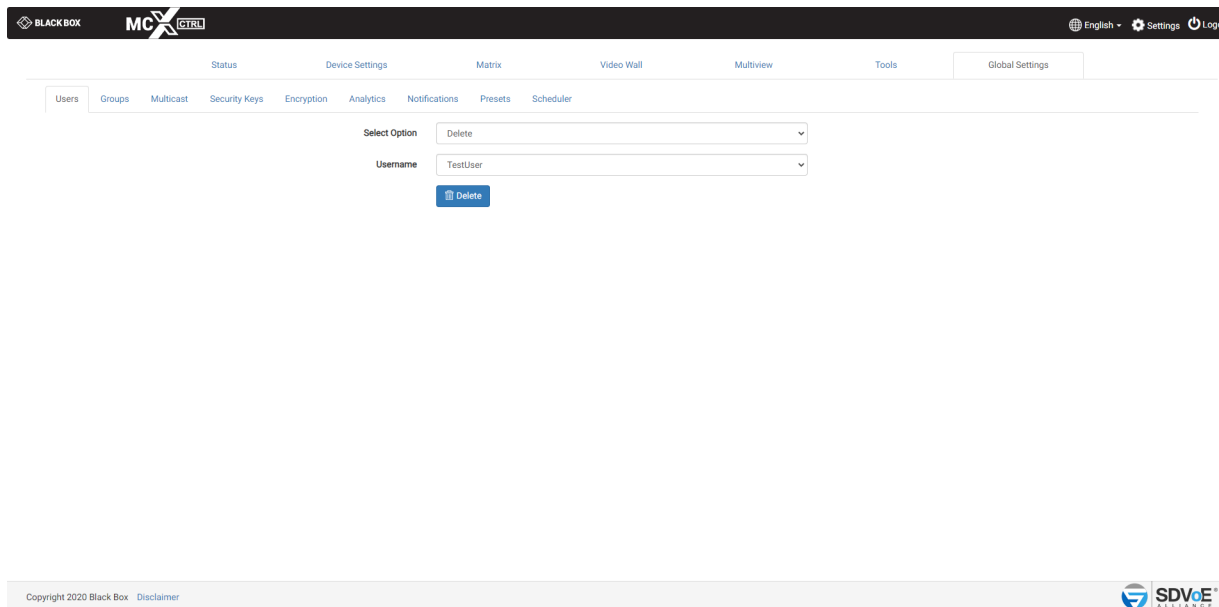


FIGURE 1-4.

1. Select Delete.
2. Select User.
3. Click Delete button.

NOTE: There is no confirmation for user deletion.

1.1.4 ACTIVE USERS

Here you can see all the active users logged into the system and the time of their last activity.

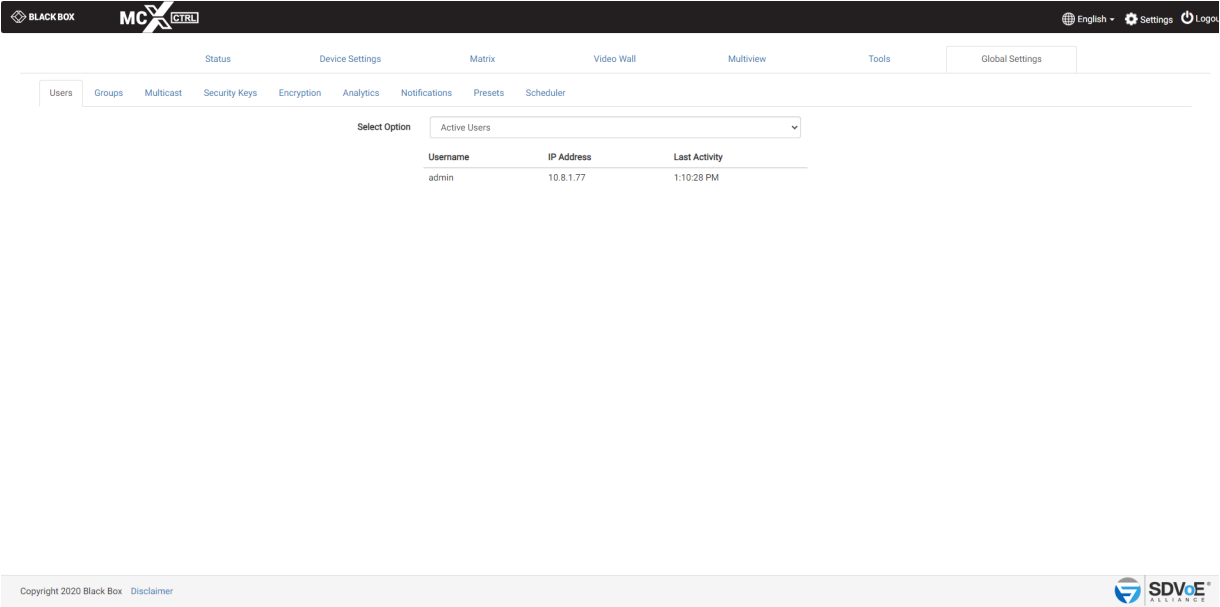


FIGURE 1-5.

- 1. Select Active Users.

# CHAPTER 1: GLOBAL SETTINGS

## 1.2 PRESETS

The system can store a virtually unlimited number of presets. A preset can be applied with a single “preset load” command. The preset can contain a virtually unlimited number of commands.

Presets can contain anything from a single command to a multiview or video wall layout.

Presets can also contain basic if else logic to allow you to build some “smarts” into your system. Refer to Appendix E – Preset Logic in the command manual for further details.

### 1.2.1 NEW PRESET

Here you can create a new preset to be stored on the system. Give the preset a name and then start adding control commands as required by either entering commands directly, using the Assistant or Record function which will record interactions from the UI.

The screenshot displays the 'New Preset' configuration interface in the Black Box MCX CTRL system. The top navigation bar includes the Black Box logo, 'MCX CTRL', and user settings (English, Settings, Logout). The main menu features 'Status', 'Device Settings', 'Matrix', 'Video Wall', 'Multiview', 'Tools', and 'Global Settings'. The 'Presets' tab is selected, showing a 'New' preset configuration. The form includes the following fields and controls:

- Select Option:** A dropdown menu set to 'New'.
- Preset Name:** A text input field containing 'Weekdays'.
- Select Control Command:** A dropdown menu set to 'get video'.
- Control Command:** A text input field containing 'get video S7\_Encoder all'.
- Preset Commands:** A text input field containing 'get video S7\_Encoder all'.
- Buttons:** 'Assistant' (blue), 'Add' (blue), 'Delay (ms)' (blue), 'Inactive Bypass' (blue), 'Record' (red), 'Stop' (blue), 'Save' (blue), and 'Apply' (blue).

The footer of the interface shows 'Copyright 2020 Black Box Disclaimer' and the 'SDVoE ALLIANCE' logo.

FIGURE 1-6.

1. Select New.
  2. Enter a name.
  3. Select a command or click Record button.
- NOTE: Recording is discussed in section 1.2.11.
4. Fill in the required data or use the Assistant or click Stop if recording.
  5. Click Add button.
  6. Click Save button.

## CHAPTER 1: GLOBAL SETTINGS

### 1.2.2 EDIT PRESET

Here you can edit any existing preset by adding, deleting or changing control commands as required.

FIGURE 1-7.

1. Select Edit.
  2. Select Preset.
  3. Click Load button.
  4. Change preset name.
  5. Select a command or click Record button.
- NOTE: Recording is discussed in section 1.2.11.
6. Fill in the required data or use the Assistant or click Stop if recording.
  7. Click Add button.
  8. Manually edit.
  9. Click Apply button to test preset.
  10. Click Save button.

## 1.2.3 DUPLICATE PRESET

Here you can duplicate any existing preset.

The screenshot displays the Black Box MCX CTRL web interface. The top navigation bar includes the Black Box logo, the MCX CTRL logo, and links for English, Settings, and Logout. Below this, a secondary navigation bar shows tabs for Status, Device Settings, Matrix, Video Wall, Multiview, Tools, and Global Settings. The Global Settings tab is active, and within it, the 'Presets' sub-tab is selected. The main content area shows a form with three fields: 'Select Option' (a dropdown menu with 'Duplicate' selected), 'Select Preset' (a dropdown menu with 'Weekdays' selected), and 'Preset Name' (a text input field containing 'Weekdays2'). A blue 'Save' button is located below the 'Preset Name' field. At the bottom of the interface, a footer bar contains the copyright notice 'Copyright 2020 Black Box Disclaimer' on the left and the SDVoE Alliance logo on the right.

FIGURE 1-8.

1. Select Duplicate.
2. Select existing preset.
3. Enter new preset Name.
4. Click Save button.

## 1.2.4 DELETE PRESET

Here you can delete any existing preset from the system.

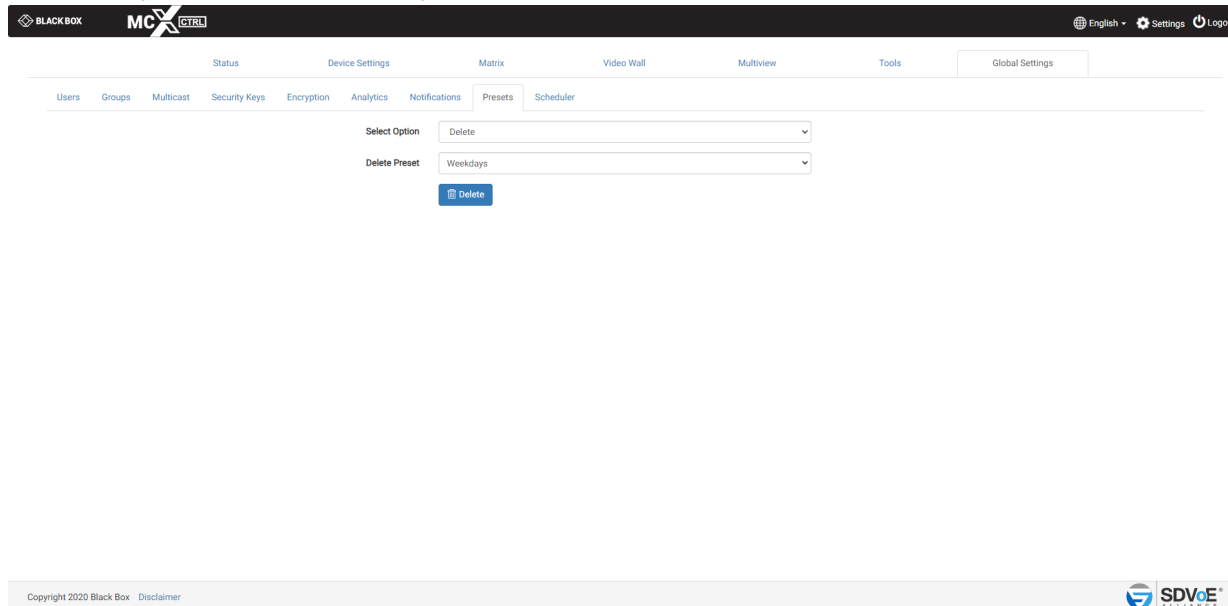


FIGURE 1-9.

1. Select Delete.
2. Select Preset.
3. Click Delete button.

## 1.2.5 APPLY PRESET

Here you can apply any existing preset on the system.

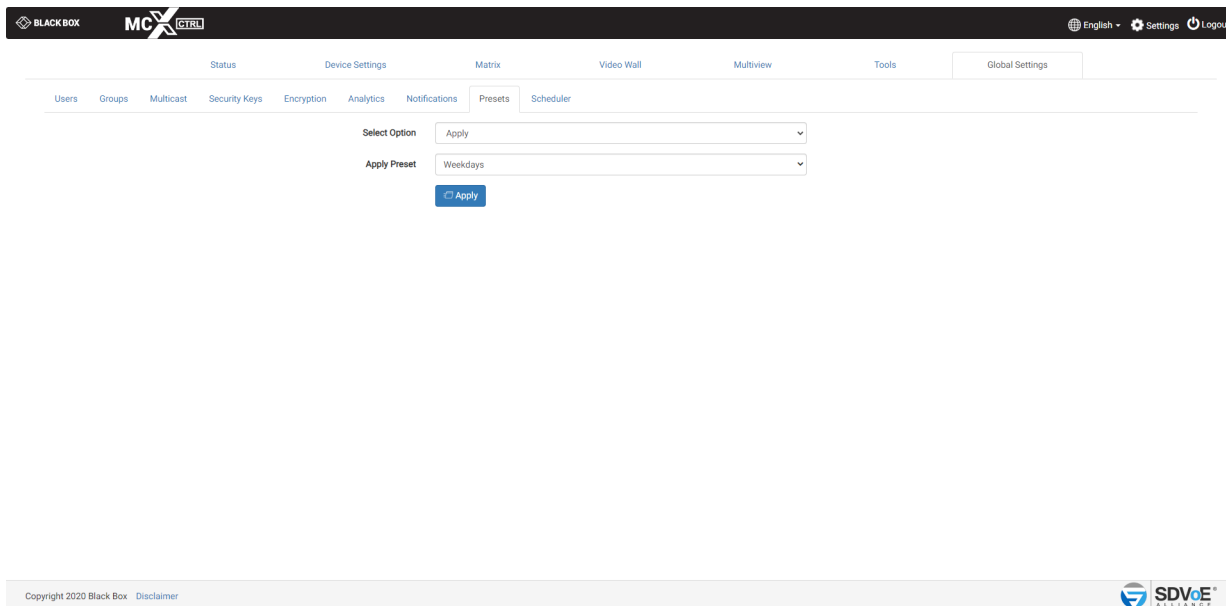


FIGURE 1-10.

1. Select Apply.
2. Select Preset.
3. Click Apply button.

## 1.2.6 EXPORT PRESET

Here you can export an existing preset on the system which can then be used as a backup or edited. The preset will be saved to your Downloads folder as an ini file like MyNewPreset.ini.

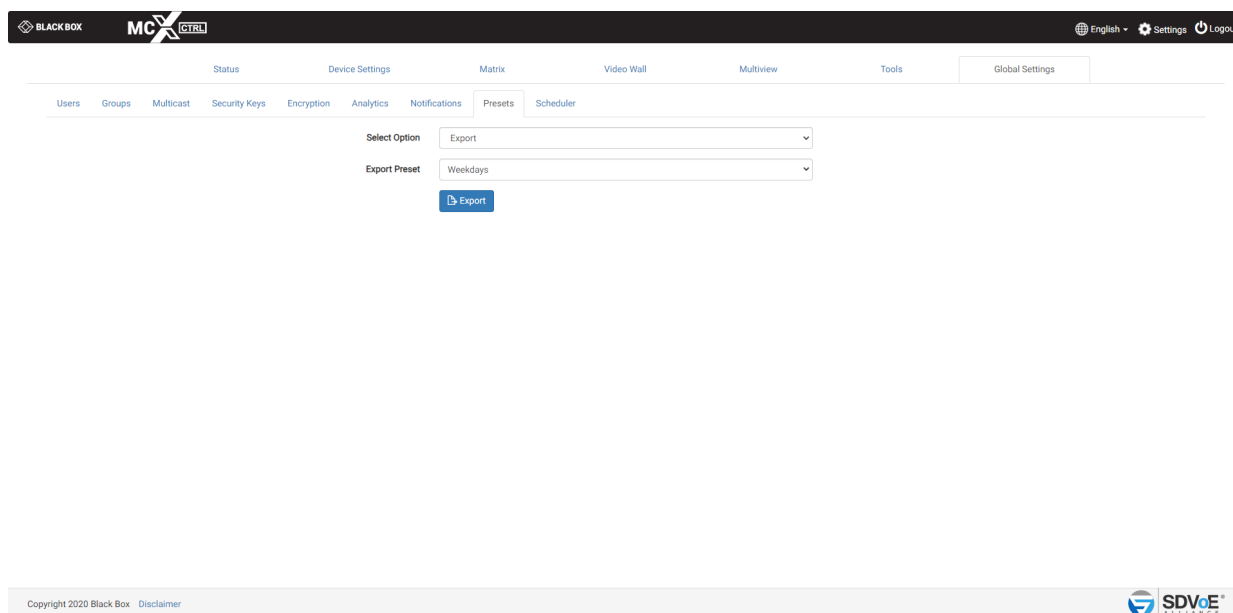


FIGURE 1-11.

1. Select Export.
2. Select Preset.
3. Click Export button.

NOTE: The export preset can be edited with an application like Notepad++. Right click the file and select "Open with..."

## 1.2.7 EXPORT ALL PRESETS

Here you can export all existing presets on the system. These can then be used as a backup or edited. The presets will be saved to your Downloads folder as a ZIP file named “presets.exp”.

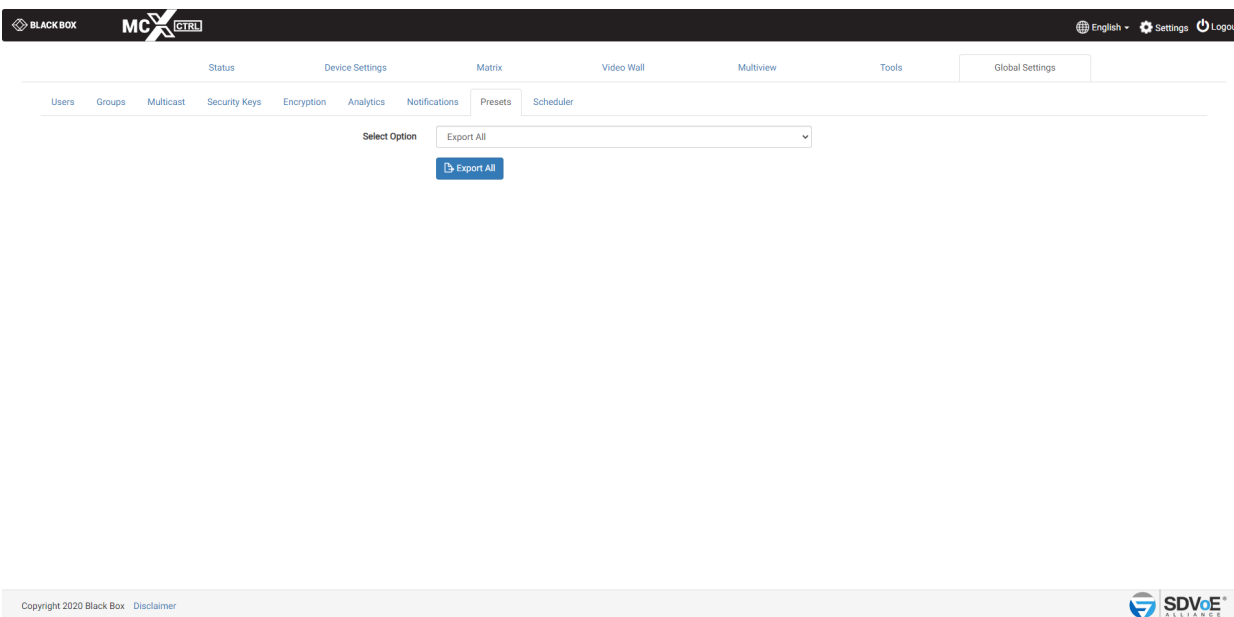


FIGURE 1-12

## 1.2.8 IMPORT PRESET

Here you can import a new preset into the system. (If updating an existing preset, the existing preset on the system will need to be deleted prior to importing.)

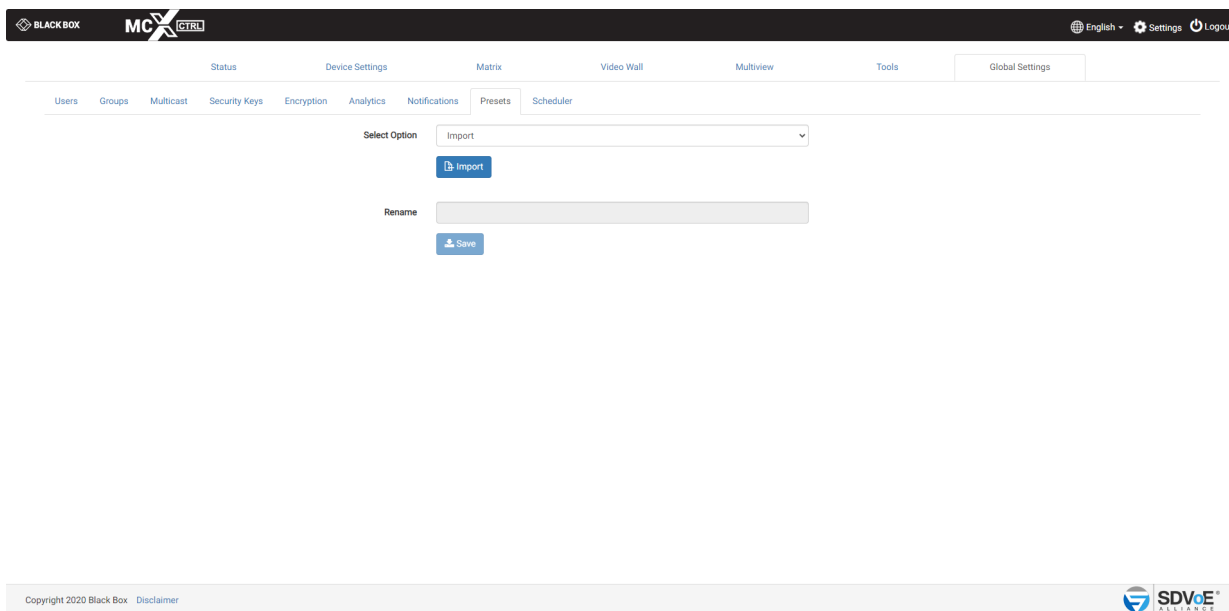


FIGURE 1-13.

1. Select Import.
2. Click Import button.
3. Select preset file.
4. Click Open.

# CHAPTER 1: GLOBAL SETTINGS

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NOTE: The imported preset can be renamed during import.

The screenshot displays the Black Box MCX CTRL web interface. The top navigation bar includes the Black Box logo, MCX CTRL branding, and links for English, Settings, and Logout. Below this, a secondary navigation bar lists various system components: Status, Device Settings, Matrix, Video Wall, Multiview, Tools, and Global Settings. The Global Settings section is further divided into Users, Groups, Multicast, Security Keys, Encryption, Analytics, Notifications, Presets, and Scheduler. The 'Presets' sub-tab is selected, showing a 'Select Option' dropdown menu with 'Import' chosen. Below this, there is an 'Import' button and a 'Rename' section where the preset name 'Weekdays' is entered. A 'Save' button is located at the bottom of the rename section. The footer contains copyright information for 2020 Black Box and a disclaimer, along with the SDVoE Alliance logo.

FIGURE 1-14.

5. Rename preset.
6. Click Save button.



## 1.2.9 IMPORT ALL PRESETS

Here you can import all presets into the system from an All Preset export.

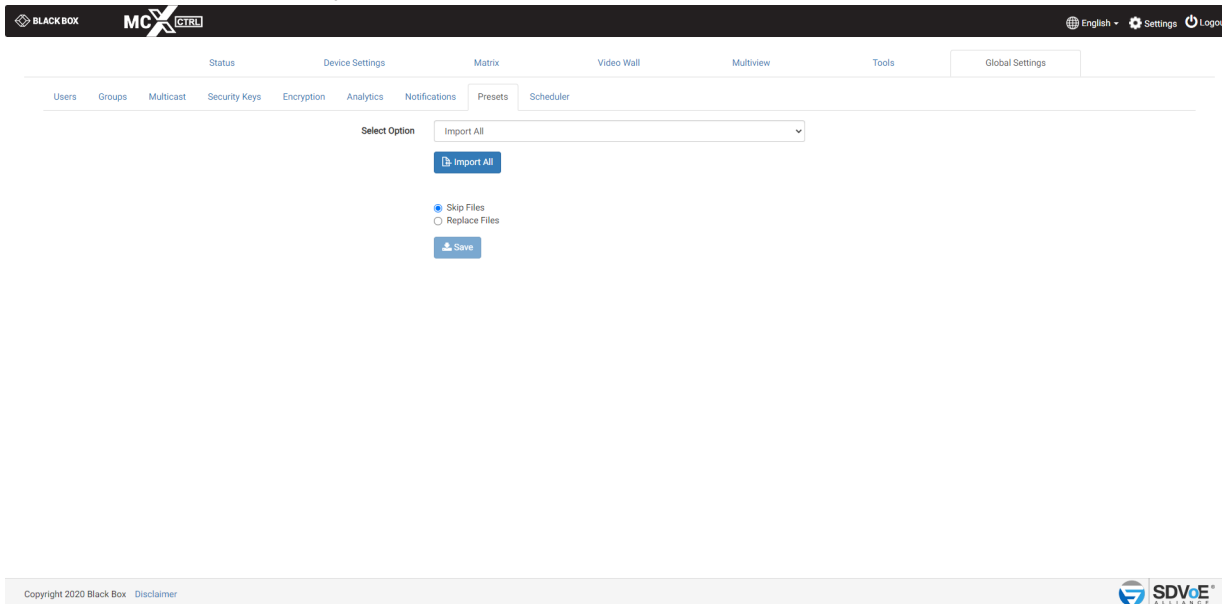


FIGURE 1-15.

1. Select Import All.
2. Click Import All button. Then select presets.exp.
3. Choose either Skip File or Replace File. Skip File will not overwrite a preset with the same name. Replace File will overwrite a preset with the same name.



## 1.2.10 QR CODE

A QR Code can be created to directly execute a preset. Here you can set how the result of a preset will be displayed when scanned from a QR code. This includes QR Code buttons used in Control UI.

After the QR Code has been scanned and opened in a browser, the preset will be executed, and the selected result will be displayed in the browser.

The QR Result can be Text for a standard API text response. Select Static Image to display a user-uploaded image on success or failure of the preset, or select User Interface to be redirected to a User Interface.

The below will provide a text response: "preset load MyNewPreset success"

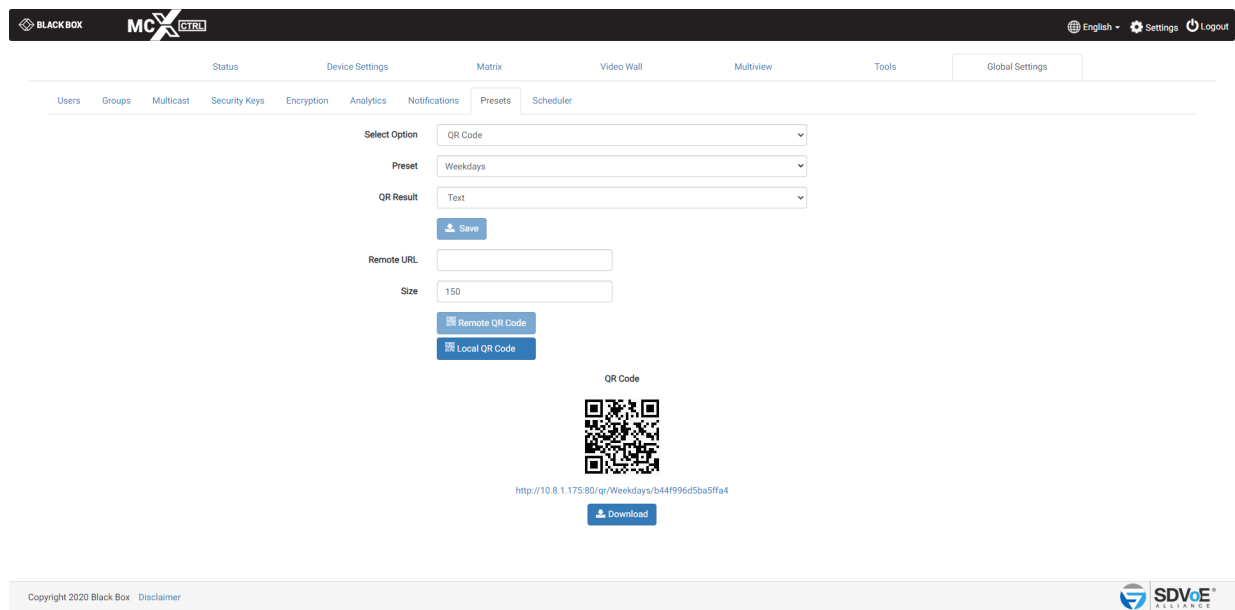


FIGURE 1-16.

1. Select QR code.
2. Select Preset.
3. Change size, if required.
4. Click Local QR code button.
5. Click Download button to download the QR code.

## 1.2.11 PRESET RECORD

Selecting Record within Presets New or Presets Edit will record interactions from the UI directly into the selected preset.

The following UI tabs will record interactions:

- ◆ Device Settings/Edit
- ◆ Status/Details
- ◆ Tools/Send Serial
- ◆ Tools/Send Infrared
- ◆ Tools/Send Control Command
- ◆ Matrix
- ◆ Video Wall
- ◆ Multiview

The screenshot displays the Black Box MCX CTRL web interface. The top navigation bar includes 'BLACK BOX', 'MCX CTRL', and user options like 'English', 'Settings', and 'Logout'. Below this, a secondary navigation bar highlights 'Preset Record In Progress' in red. The main content area is divided into two sections: 'Presets' and 'Scheduler'. The 'Presets' section is active, showing a form for creating or editing a preset. The form includes a 'Select Option' dropdown set to 'New', a 'Preset Name' text field with 'Alert', a 'Select Control Command' dropdown, an 'Assistant' button, a 'Control Command' text area, and a row of buttons: 'Add', 'Delay (ms)' (set to 1000), 'Inactive Bypass', 'Record' (highlighted in red), and 'Stop'. Below these is a 'Preset Commands' text area and 'Save' and 'Apply' buttons. The footer contains 'Copyright 2020 Black Box Disclaimer' and the 'SDVoE' logo.

FIGURE 1-17.

1. Click Record to start recording.
2. Click Stop to stop recording.
3. Click "Preset Record In Progress" from any tab to return to the recording preset tab.

# CHAPTER 1: GLOBAL SETTINGS

## 1.3 GROUPS

System Encoders and Decoders can be arranged into various groups. These groups can then be individually controlled via the API or displayed in the UI. Here we manage the groups by adding, editing or deleting them. Once a group has been added to the system, the group can then be assigned to any or all Encoders and Decoders from the Device Settings tab.

### 1.3.1 ADD GROUP

Here you can add a new group to the system to easily manage Encoders and Decoders. A group must be created before any Encoders or Decoders can be assigned to it from Device Settings/Group.

FIGURE 1-18.

1. Select Add.
2. Enter a Group name.
3. Click Save.

## 1.3.2 EDIT GROUP

Here you can change the name of an existing group.

The screenshot displays the Black Box MCX CTRL web interface. The top navigation bar includes the Black Box logo, the MCX CTRL logo, and links for English, Settings, and Logout. Below this is a secondary navigation bar with tabs for Status, Device Settings, Matrix, Video Wall, Multiview, Tools, and Global Settings. The Global Settings tab is active, and the 'Groups' sub-tab is selected. The main content area shows the 'Edit Group' form. It includes a 'Select Option' dropdown set to 'Edit', a 'Group' dropdown set to 'CommandCenter', and a 'New name' text field containing 'CommandCenter' with a 'Max 19 characters allowed' warning. Below these are three radio button options for 'Select Device': 'All Devices', 'All Decoders', and 'All Encoders'. The 'Individual' option is selected. Under 'All Decoders', there are checkboxes for G2D\_BottomRight, G2T\_TopLeft, S7\_Encoder, G2D\_TopRight, S9D\_BottomLeft, and S9\_Encoder2, all of which are checked. Under 'All Encoders', there are checkboxes for G2\_Encoder and S7D\_TrainingRoom, both of which are unchecked. A 'Save' button is located at the bottom of the form. The footer of the page contains the copyright notice 'Copyright 2020 Black Box Disclaimer' and the SDVoE Alliance logo.

FIGURE 1-19.

1. Select Edit.
2. Select Group.
3. Enter a new name.
4. Click Save button.

## 1.3.3 DELETE GROUP

Here you can delete an existing group from the system.

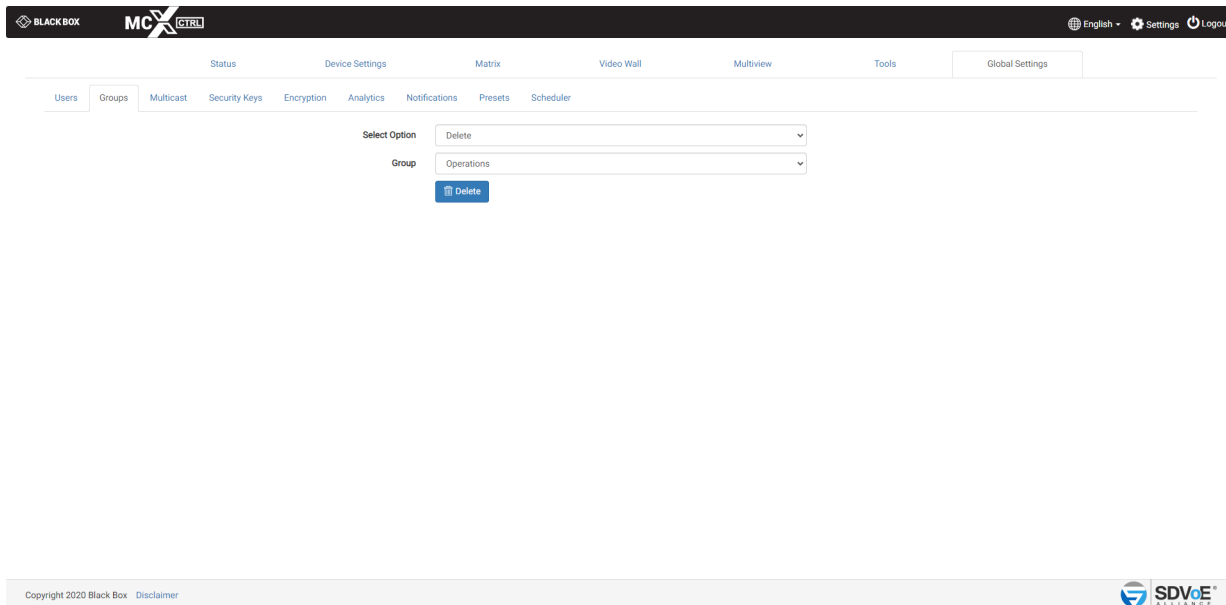


FIGURE 1-20.

1. Select Delete.
2. Select Group.
3. Click Delete.

NOTE: There is not a confirmation for group deletion.

# CHAPTER 1: GLOBAL SETTINGS

## 1.4 MULTICAST

The Multicast section is used to initially set the system to use automatically assigned Multicast addresses within a specified range, or manually assign a range of Multicast addresses per stream type.

When in AUTO mode, all stream types will be assigned the next available Multicast address when the stream is started.

When in MANUAL mode, all streams will have their own statically assigned Multicast addresses to use.

### 1.4.1 MULTICAST AUTO

Multicast Auto will automatically assign Multicast addresses to streams and is used by default. Device settings will not include a Multicast tab to assign individual Multicast addresses to streams.

FIGURE 1-21.

1. Select AUTO.
2. Enter desired addresses or select Default values.
3. Click Save & Restart to apply the changes.

## CHAPTER 1: GLOBAL SETTINGS

### 1.4.2 MULTICAST MANUAL

Multicast Manual will initially assign static Multicast addresses to all Encoder stream types. Manual mode by default allocates a starting range address for the separate stream types in different subnets to ensure there is no possibility of mixed subscriptions whereby a Decoder might receive a video stream on an audio subscription. So by default all video streams will use the 224.2.x.x range, all digital audio streams will use the 224.3.x.x range and analog audio will use the 224.4.x.x range.

Device settings will now include a Multicast tab to assign individual Multicast addresses to streams.

FIGURE 1-22.

1. Select MANUAL.
2. Enter IP addresses or select Default values.
3. Click Save & Restart to apply the changes.

## CHAPTER 1: GLOBAL SETTINGS

### 1.5 SECURITY KEYS

Security keys are required with all HTTP level requests and optional for TCP commands on port 6980. Only keys generated from the software can be used.

#### 1.5.1 HTTP API SECURITY KEY

The MCX Network Management Controller can be accessed via HTTP GET and POST requests. To ensure security over the internet, a HTTP security key is required to be passed with all such requests. Here you can generate a new key or import a saved key that had been previously generated.

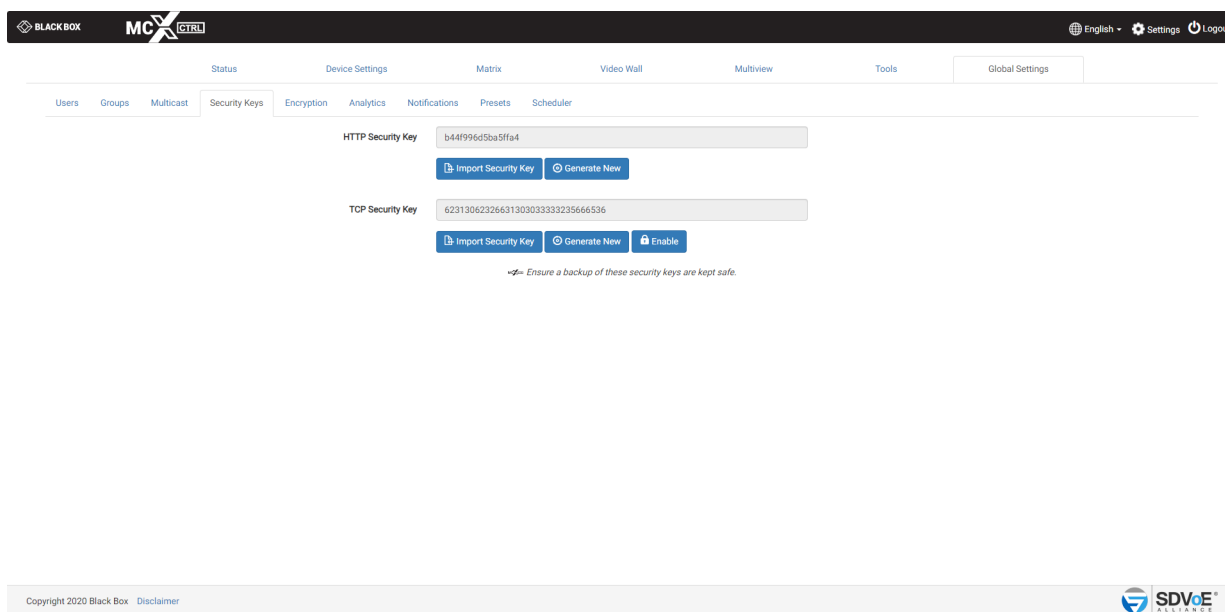


FIGURE 1-23.



## Importing an HTTP API Security Key

1. Enter the Security Key.
2. Click Save button.

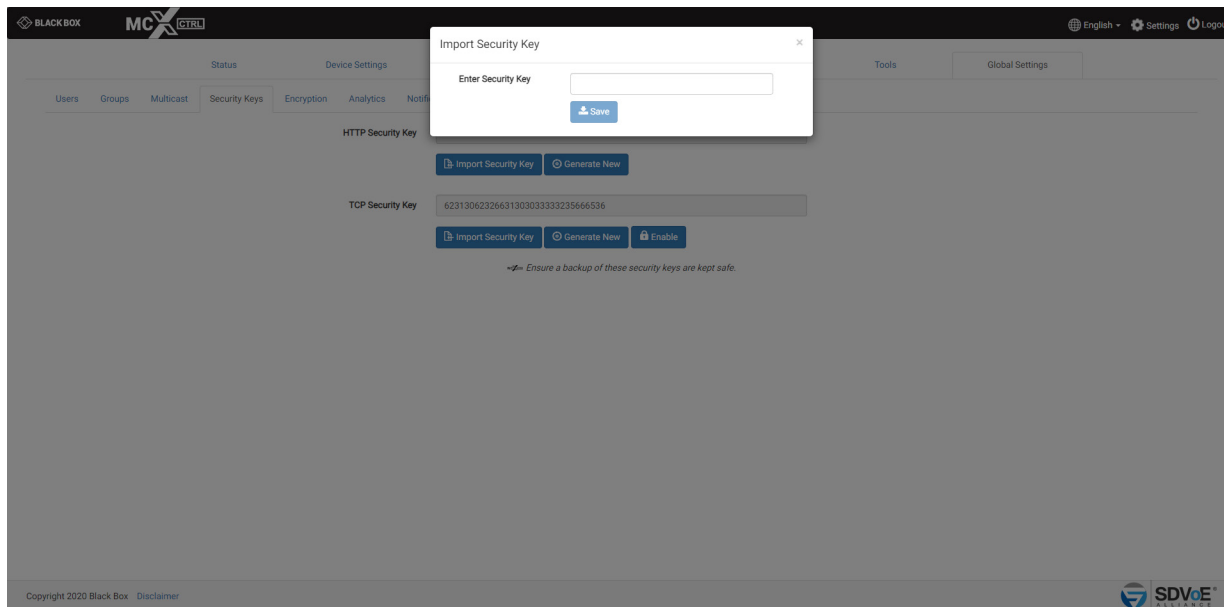


FIGURE 1-24.

## CHAPTER 1: GLOBAL SETTINGS

### 1.5.2 TCP SECURITY KEY

The MCX Network Management Controller can be accessed via Telnet requests on TCP port 6980. To ensure security over the network a TCP security key can be passed with all such commands. Here you can generate a new key or import a saved key that had been previously generated. As the TCP security key is optional, its use can be Enabled or Disabled from here.

#### Importing a TCP API Security Key

1. Enter the Security Key.
2. Click the Save button.
3. Click the Enable button.

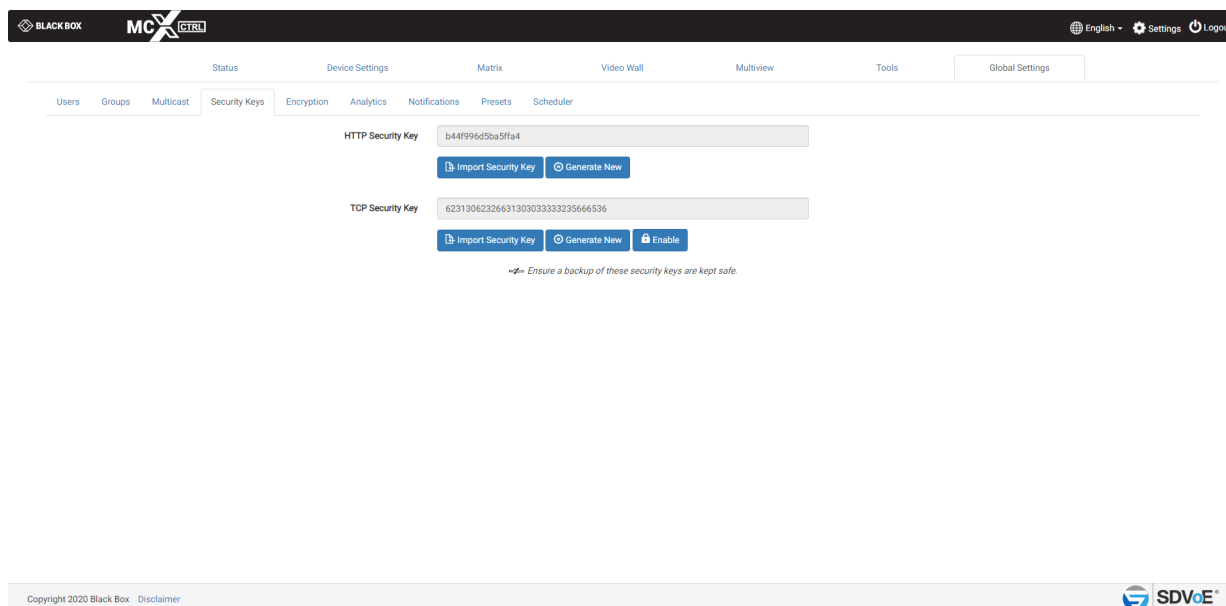


FIGURE 1-25.



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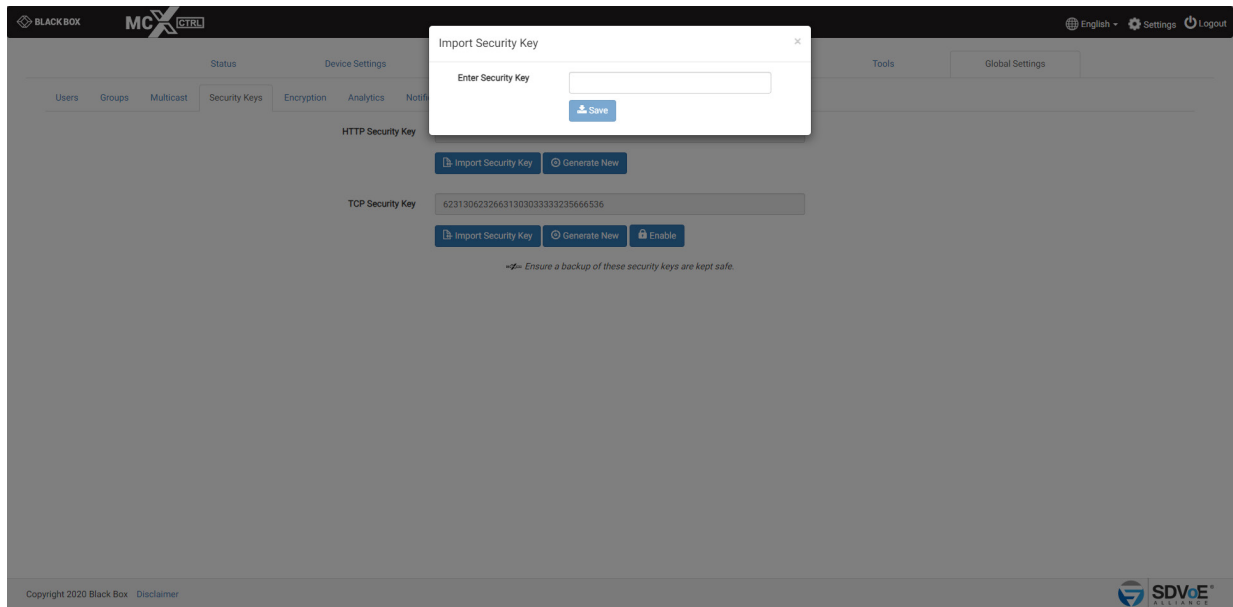


FIGURE 1-26.



## CHAPTER 1: GLOBAL SETTINGS

### 1.6 ANALYTICS

Analytical data is constantly being stored on the system. By default data will be maintained for 1 month, but this can be changed up to 12 months.

Various types of information is stored and can be exported for use in a 3rd party analytical application such as Microsoft's Power Bi. Internal results for the following can be generated from the UI:

- ♦ Source Availability: The Source Availability represents the time in hours an Encoder has video signal.
- ♦ Display Availability: The Display Availability represents the time in hours a Decoder has a monitor connected.
- ♦ Source Resolution: The Source Resolution represents the combination of different resolutions used as a source.
- ♦ Source Count: The Source Count represents the number of times an Encoder detects a source available.
- ♦ Display Count: The Display Count represents the number of times a Decoder detects a display available.
- ♦ Display Source Change: The Display Source Change represents the number of times a Decoder has been switched to an Encoder.
- ♦ Network Downtime: The Network Downtime represents the time in hours a device is missing from the network.
- ♦ Temperature: The Temperature represents the operating temperature in either °C or °F of a device.
- ♦ Bandwidth: The Bandwidth represents the total bandwidth of an Encoder in Gbps.

#### 1.6.1 SOURCE AVAILABILITY

The Source Availability represents the time in hours an Encoder has video signal.

1. Select Source Availability.
2. Select Group.
3. Select Start Date.
4. Select End Date.
5. Click Export Report.

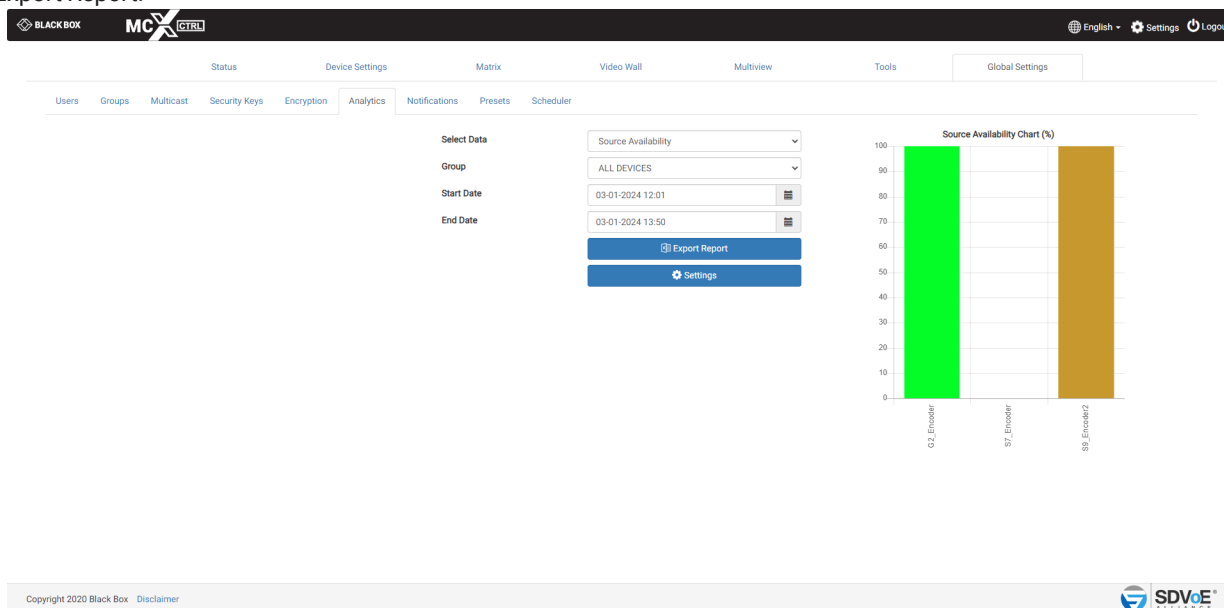


FIGURE 1-27.

## 1.6.2 DISPLAY AVAILABILITY

The Display Availability represents the time in hours a Decoder has a monitor connected.

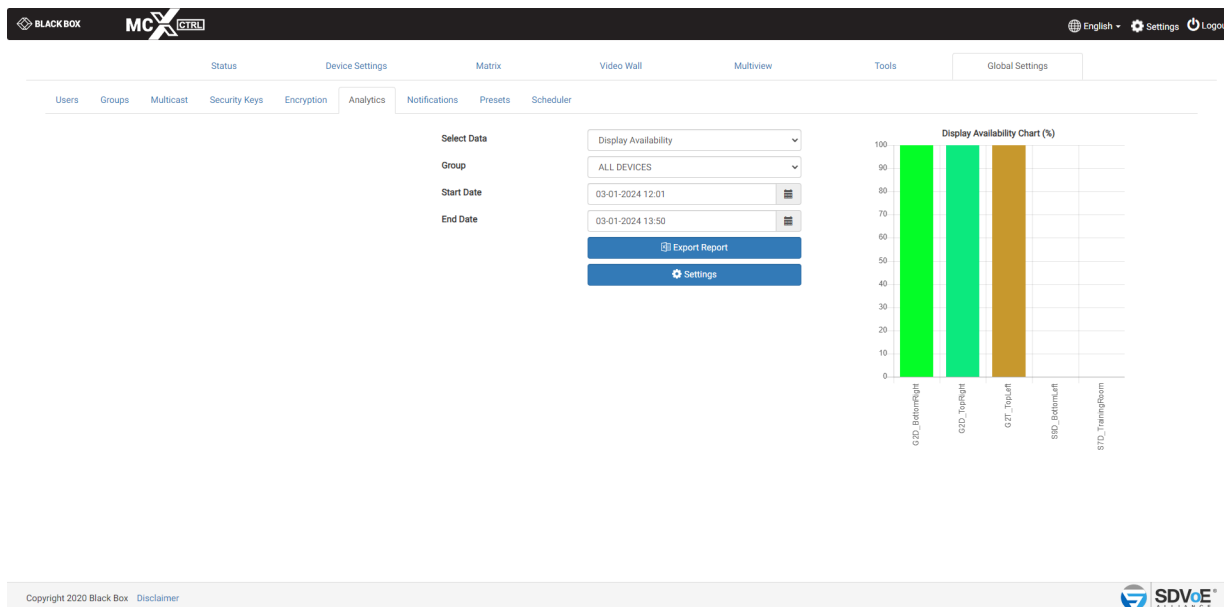


FIGURE 1-28.

1. Select Display Availability.
2. Select Group.
3. Select Start Date.
4. Select End Date.
5. Click Export Report.

## 1.6.3 SOURCE RESOLUTION

The Source Resolution represents the combination of different resolutions used as a source.

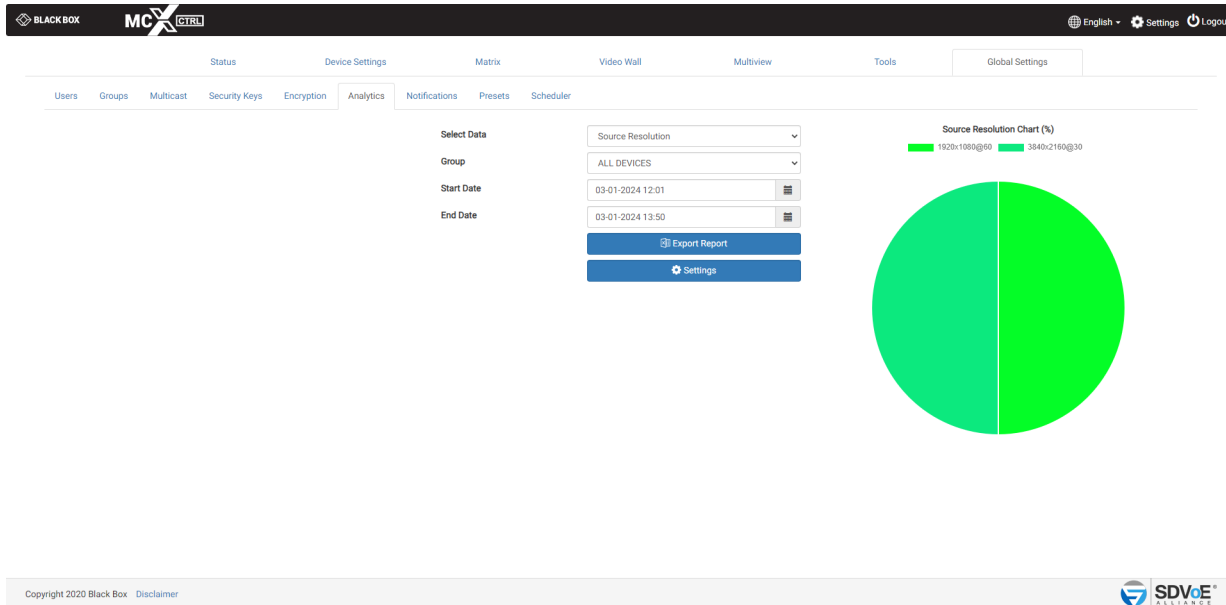


FIGURE 1-29.

1. Select Source Resolution.
2. Select Group.
3. Select Start Date.
4. Select End Date.
5. Click Export Report.

## 1.6.4 SOURCE COUNT

The Source Count represents the number of times an Encoder detects a source available.

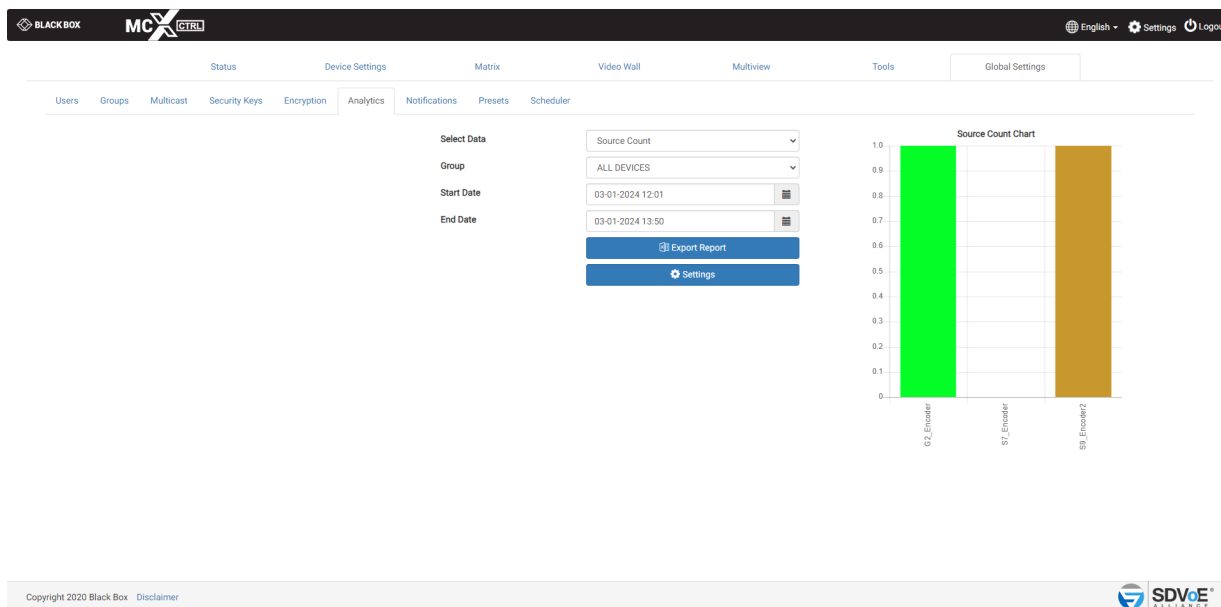


FIGURE 1-30.

1. Select Source Count.
2. Select Group.
3. Select Start Date.
4. Select End Date.
5. Click Export Report.

## 1.6.5 DISPLAY COUNT

The Display Count represents the number of times a Decoder detects a display available.

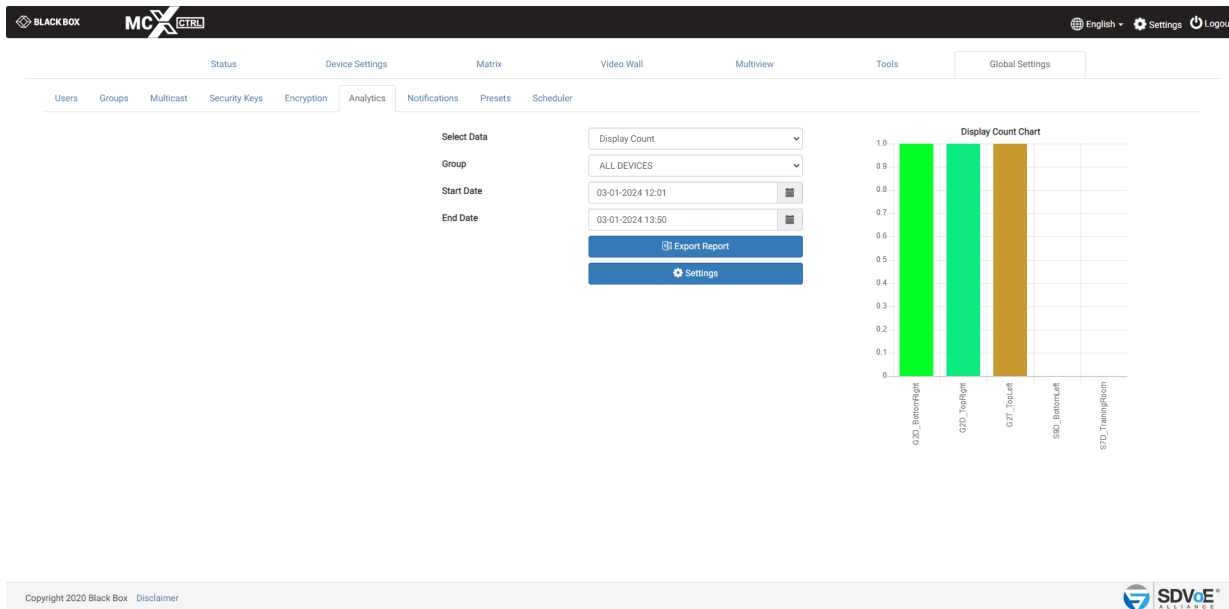


FIGURE 1-31.

1. Select Display Count.
2. Select Group.
3. Select Start Date.
4. Select End Date.
5. Click Export Report.

## 1.6.6 DISPLAY SOURCE CHANGE

The Display Source Change represents the number of times a Decoder has been switched to an Encoder.

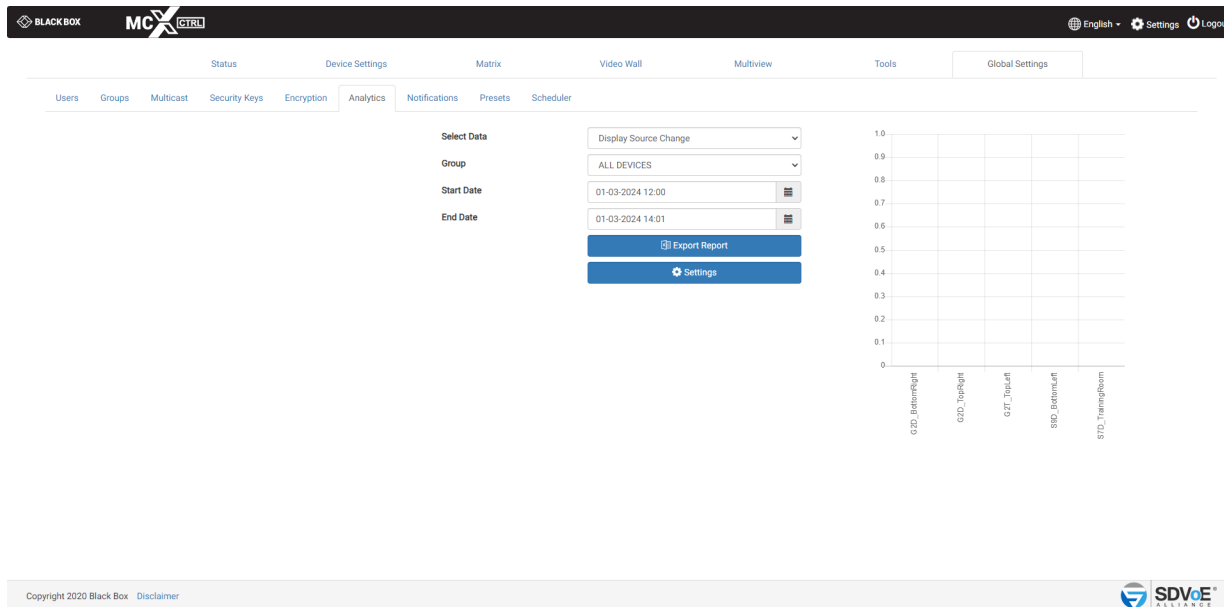


FIGURE 1-32.

1. Select Source Change.
2. Select Group.
3. Select Start Date.
4. Select End Date.
5. Click Export Report.

## 1.6.7 NETWORK DOWNTIME

The Network Downtime represents the time in hours a device is disconnected from the network.

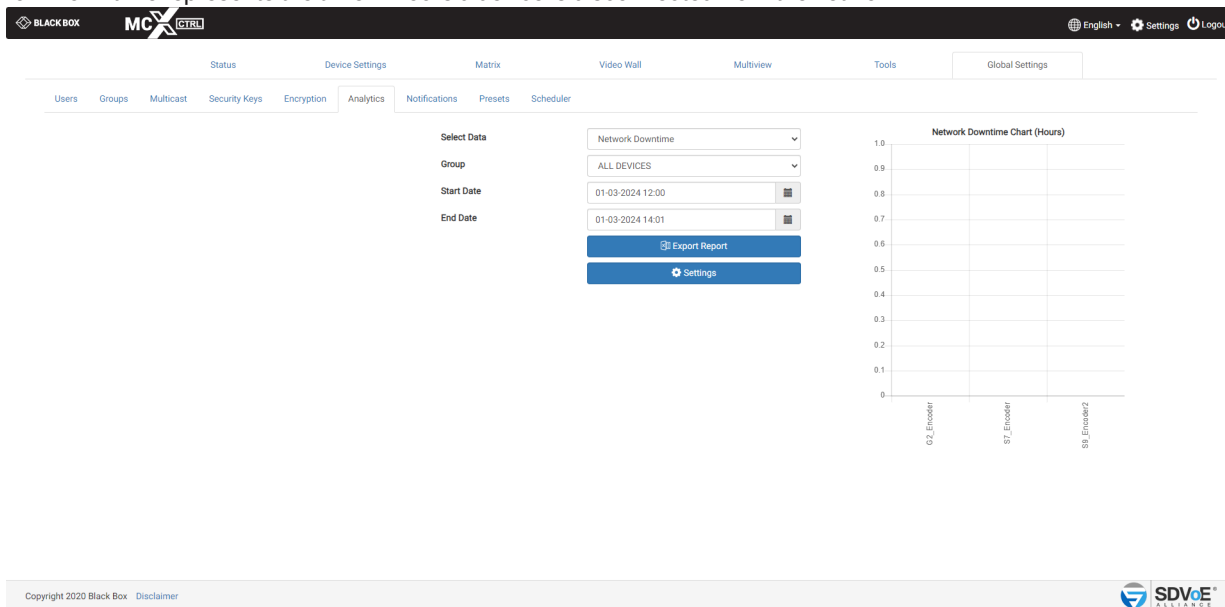


FIGURE 1-33.

1. Select Network Downtime.
2. Select Group.
3. Select Start Date.
4. Select End Date.
5. Click Export Report.

## 1.6.8 TEMPERATURE

The Temperature represents the operating temperature in either °C or °F of a device.

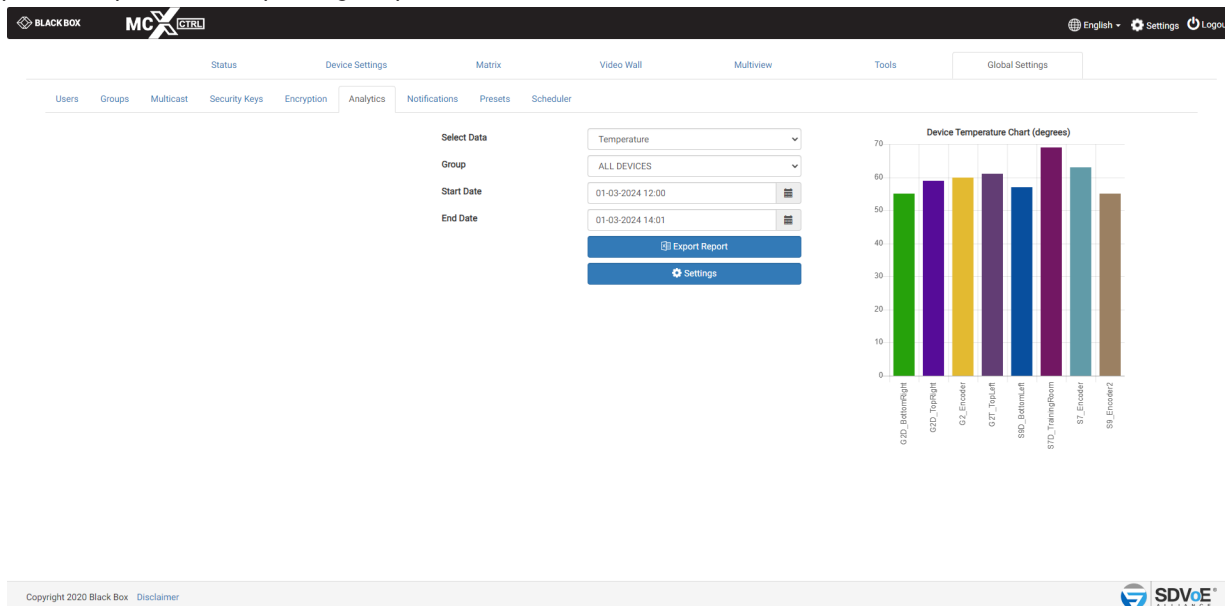


FIGURE 1-34.

1. Select Temperature.
2. Select Group.
3. Select Start Date.
4. Select End Date.
5. Click Export Report.

## 1.6.9 BANDWIDTH

The Bandwidth represents the total Encoder bandwidth in Gbps.

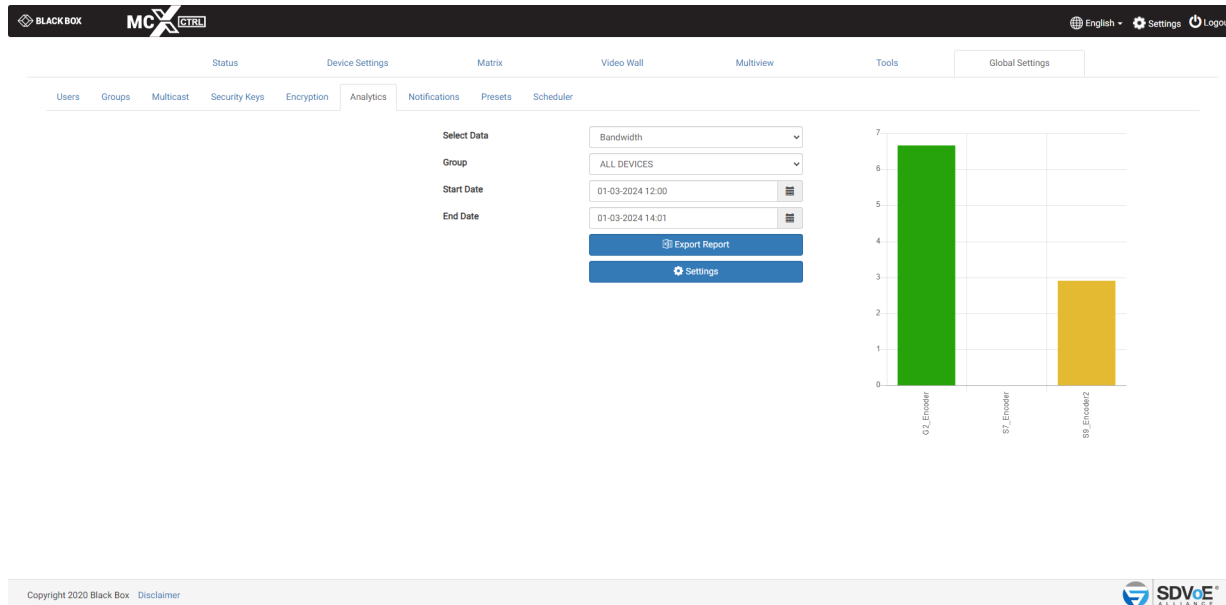


FIGURE 1-35.

1. Select Bandwidth.
2. Select Group.
3. Select Start Date.
4. Select End Date.
5. Click Export Report.

## 1.7 SCHEDULER

The Scheduler is used to apply presets at a particular time of a given day or system start.

Sequence	Event Name	State	System Start	Interval	Event Time / Interval	Event Day(s)	Event Preset
↓	Normal_Operations	Enabled	<input type="checkbox"/>	<input type="checkbox"/>	09:00	Mon [x] Tue [x] Wed [x] Thu [x] Fri [x] Sat [ ] Sun [ ]	Weekdays
↑ ↓	C_Level_Updates	Enabled	<input type="checkbox"/>	<input type="checkbox"/>	11:00	Mon [x] Tue [ ] Wed [ ] Thu [ ] Fri [ ] Sat [ ] Sun [ ]	demo_multiv
↑	Training	Enabled	<input type="checkbox"/>	<input type="checkbox"/>	16:00	Mon [ ] Tue [ ] Wed [x] Thu [ ] Fri [ ] Sat [ ] Sun [ ]	demo_videow
		Disabled	<input type="checkbox"/>	<input type="checkbox"/>		Mon [ ] Tue [ ] Wed [ ] Thu [ ] Fri [ ] Sat [ ] Sun [ ]	

Ensure the system clock is set correctly.

FIGURE 1-36.

1. Enter a name.
2. Select a time.
3. Select day(s).
4. Select preset.
5. Click Save button.
6. Once saved, use the pen icon to edit the event.
7. Click the cross icon to delete the event, if needed.

## CHAPTER 1: GLOBAL SETTINGS

### 1.8 ENCRYPTION

Encryption can be applied to an Encoder's HDMI AV network data. A user defined key is set and only Decoders with the same key will be able to decrypt the HDMI AV network data.

(Device firmware > 3.5.2.0 and MCX firmware > 2.14.0 required)

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FIGURE 1-37.

1. Select device(s).
2. Enable / Disable encryption.
3. Enter Encryption Key (when Enabled).
4. Click Save button.



## 1.9 NOTIFICATIONS

Notifications will send E-Mail alerts whenever a selected event occurs on the system.

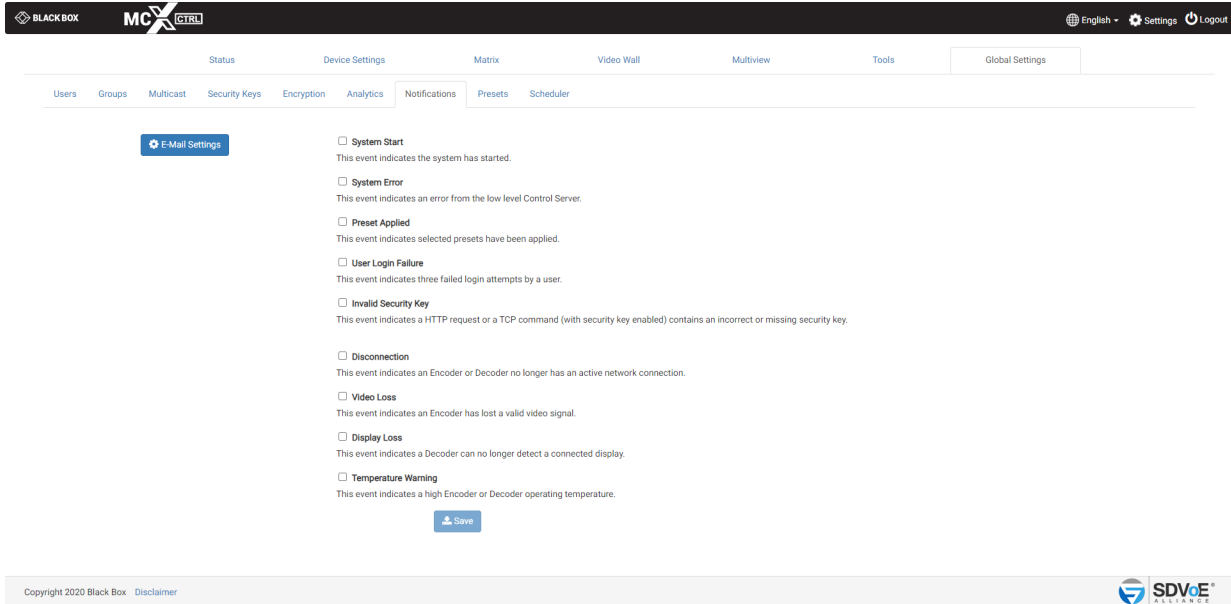


FIGURE 1-38.

1. Select events.
2. Click Save button.

## 1.9.1 EMAIL SETTINGS

Here you configure the Email client to allow notification alerts to be sent from a specified Email account. The Test button sends a confirmation Email to confirm the settings are correct.

The screenshot shows the 'E-Mail Settings' configuration window in the BlackBox MCX interface. The window is divided into two main sections: 'E-Mail Settings' on the left and 'Custom Subject Line' on the right. The 'E-Mail Settings' section includes fields for 'To', 'Cc', 'SMTP Server [acme.com]', 'From Address [me@acme.com]', 'Account Username', 'Account Password', 'Authentication' (set to 'NONE'), and 'Port [25]'. The 'Custom Subject Line' section includes fields for 'System Start', 'System Error', 'Preset Applied', 'User Login Failure', 'Invalid Security Key', 'Disconnection', 'Video Loss', 'Display Loss', and 'Temperature Warning'. At the bottom of the 'E-Mail Settings' section, there are 'Save' and 'Test' buttons. Below the 'Custom Subject Line' section, there is a 'Save' button. The background of the interface shows a 'Global Settings' tab and a 'Warning' message: 'This event indicates an Encoder has lost a valid video signal.' Below this, there are checkboxes for 'Display Loss' and 'Temperature Warning', each with a brief description of the event.

FIGURE 1-39.

### 2. DEVICE SETTINGS

This is where all the Encoders and Decoders are configured. Encoders and Decoders can be individually configured or all together taking advantage of exporting the csv formatted data and manipulating it as required before importing it back into the system. All changes made in the DeviceExport.csv configuration file will be applied to the Encoders and Decoders.

#### 2.1 EDIT SETTINGS

Here you can change the device settings for all Encoders and Decoders on the system.

BLACK BOX MCX CTRL English Settings Logout

Status Device Settings Matrix Video Wall Multiview Tools Global Settings

Select ALL DEVICES

Device Settings Edit

Select Device Type Encoder

Select Device G2\_Encoder

Name

Name G2\_Encoder Max 19 characters allowed

Alias 008C10257493 ☒ Update Alias with Name

Save Default

Group

Network

HDMI Input

Analog Audio

RS232 Serial Parameters

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FIGURE 2-1.

Here you can change the device name.

1. Select Edit.
2. Select Encoder or Decoder.
3. Select Device.

### 2.1.1 NAME

The name of the device is used for control. This is the device name used in API commands. Device names have a maximum of 19 characters and no spaces are allowed.

The screenshot displays the Black Box MCX CTRL web interface. The top navigation bar includes the Black Box logo, the MCX CTRL logo, and links for English, Settings, and Logout. Below the navigation bar, the 'Device Settings' tab is selected. The interface shows a list of devices with columns for Select, Device Settings, Select Device Type, and Select Device. The 'G2\_Encoder' device is selected. The 'Name' section shows the device name 'G2\_Encoder' and a note 'Max 19 characters allowed'. The 'Alias' section shows the alias '008C10257493' and a checkbox 'Update Alias with Name' which is checked. There are 'Save' and 'Default' buttons. Below the 'Name' and 'Alias' sections, there are sections for 'Group', 'Network', 'HDMI Input', 'Analog Audio', and 'RS232 Serial Parameters'.

FIGURE 2-2.

1. Enter Name or click Default button.
2. Select Update Alias.

NOTE: Alias is a user-friendly name that appears in the user interface (UI). The device name is used in the control interface.

3. Click Save button.

### 2.1.2 GROUPS

Encoders and Decoders can be assigned to groups. These groups are created from the Global Settings tab. Once an Encoder or Decoder has been placed in a group, an alias name and an icon can be assigned to it. This alias name and icon will then be used on the matrix page once a group is selected.

Group names have a maximum of 19 characters and no spaces are allowed.

FIGURE 2-3.

1. Select Group.
2. Enter an Alias.
3. Select an icon.
4. Click Save button.

## 2.1.3 NETWORK INTERFACE

To assign DHCP so the device is automatically assigned an IP address, select AUTO.

The screenshot displays the 'Device Settings' page for a Black Box MCX CTRL device. The 'Network' section is expanded, showing the 'IP Mode' set to 'AUTO'. Below this, the 'AVP Network' section contains fields for 'MAC Address' (00:8C:10:25:74:93), 'IP Address' (169.254.148.116), 'Subnet' (255.255.0.0), and 'Gateway' (0.0.0.0). The 'USB Network' section contains fields for 'USB MAC Address' (00:8C:10:25:74:92), 'USB IP Address' (169.254.82.75), 'USB Subnet' (255.255.0.0), and 'USB Gateway' (0.0.0.0). Each network section has 'Save' and 'Save To Devices' buttons. The 'Gigabit Port Mode' is set to 'Enabled' with similar save buttons. Other tabs like 'HDMI Input', 'Analog Audio', and 'RS232 Serial Parameters' are visible at the bottom of the settings panel.

FIGURE 2-4.

1. Select IP Mode AUTO.
2. Click Save button.

To assign a static IP address select MANUAL, then enter the details.

## CHAPTER 2: DEVICE SETTINGS

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SUPPORT**

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The screenshot displays the Black Box MC CTRL web interface. The top navigation bar includes 'BLACK BOX', 'MC CTRL', and links for 'English', 'Settings', and 'Logout'. The main menu has tabs for 'Status', 'Device Settings', 'Matrix', 'Video Wall', 'Multiview', 'Tools', and 'Global Settings'. The 'Device Settings' tab is active, showing a list of devices with columns for 'Select', 'Device Settings', 'Select Device Type', and 'Select Device'. The 'G2\_Encoder' device is selected. The 'Network' section is expanded, showing the following fields and values:

- IP Mode: MANUAL
- AVP Network: 00:8C:10:25:74:93
- MAC Address: 00:8C:10:25:74:93
- IP Address: 169.254.148.116
- Subnet: 255.255.0.0
- Gateway: 0.0.0.0
- USB MAC Address: 00:8C:10:25:74:92
- USB IP Address: 169.254.82.75
- USB Subnet: 255.255.0.0
- USB Gateway: 0.0.0.0
- Gigabit Port Mode: Enabled

Each section has a 'Save' button and a 'Save To Devices' button. The footer includes 'Copyright 2020 Black Box. Disclaimer' and the 'SDVoE ALLIANCE' logo.

FIGURE 2-5.

1. Select IP Mode MANUAL.
2. Enter an IP Address.
3. Enter a Subnet.
4. Enter a Gateway.
5. Click Save button.



## CHAPTER 2: DEVICE SETTINGS

The function of the local 1 Gigabit network port can be enabled or disabled from here.

1. Select Enable or Disable.
2. Click Save button.





## CHAPTER 2: DEVICE SETTINGS

Select Browse to copy the EDID directly from any Decoder. Only Decoders with a Display connected will be shown

1. Select Input HDMI/DisplayPort™/AUTO.
2. Enable/Disable HDCP.
3. Enable/Disable HDCP2.2.
4. Enable/Disable compression.
5. Select EDID.
6. Click Save button.



## CHAPTER 2: DEVICE SETTINGS

### 2.1.5 HDMI INTERFACE (DECODER)

Here you can view and save the EDID from the Decoder. The EDID can also be loaded to selected Encoders.

The Decoder's video Mute status and color can also be set from here. This mute feature is only supported when the Decoder is in a display mode other than sync\_scale.

Digital audio mute timeout can also be adjusted if required. This is the amount of time in milliseconds the HDMI audio is muted after a join to prevent audio popping. Some displays require longer than others to prevent audible noise during a join. The default is 600 with a range from 0 to 5000. (Device firmware > 3.5.2.0 and MCX firmware > 2.14.0 required)

The screenshot shows the Black Box MCX CEBT web interface. The top navigation bar includes 'BLACK BOX', 'MCX CEBT', and links for 'English', 'Settings', and 'Logout'. The main menu has tabs for 'Status', 'Device Settings', 'Matrix', 'Video Wall', 'Multiview', 'Tools', and 'Global Settings'. The 'Device Settings' tab is active, showing a 'Select' dropdown set to 'ALL DEVICES', a 'Device Settings' dropdown set to 'Edit', a 'Select Device Type' dropdown set to 'Decoder', and a 'Select Device' dropdown set to 'GET\_TopLeft'.

The 'HDMI Output' section contains the following settings:

- Video Mode:** Fast
- Aspect:** Keep
- Format:** UHD 2160P 60Hz
- Video Mute:** Disabled
- Color:** A color selection bar is visible.

Below these settings are buttons for 'Save' and 'Save To Devices'. The 'EDID' section displays a hexadecimal string representing the EDID data. Below the string are buttons for 'Save EDID to File', 'Save to Encoder(s)', and 'Copy to Clipboard'. The 'Digital Audio Mute Timeout (mS)' is set to 600, with 'Save' and 'Save To Devices' buttons.

The bottom of the interface shows sections for 'Analog Audio', 'HDMI Audio', and 'RS232 Serial Parameters'. The footer includes 'Copyright 2020 Black Box', a 'Disclaimer' link, and the 'SDVoE' logo.

FIGURE 2-7.

1. The EDID can be saved to a file, sent directly to Encoders or copied to the clipboard.
2. The Decoder's displays video mute status can be Enabled or Disabled.
3. If the Decoder's displays video is muted select a color.
4. Click the Save button

### 2.1.6 MULTICAST MANAGEMENT

When Multicast has been set to MANUAL from the Global Settings\Multicast tab, an Encoder will show the Multicast Management tab. Multicast Addresses will be automatically assigned and these can be manually changed as required. Make sure Multicast addresses are assigned in the same range as specified on the Global Settings\Multicast tab.

The screenshot displays the Blackbox MX CTRL web interface. At the top, there is a navigation bar with the Blackbox logo, 'MX CTRL' branding, and links for English, Settings, and Logout. Below this is a secondary navigation bar with tabs: Status, Device Settings (selected), Matrix, Video Wall, Multiview, Tools, and Global Settings. The main content area is titled 'Device Settings' and contains several dropdown menus: 'Select' (set to 'ALL DEVICES'), 'Device Settings' (set to 'Edit'), 'Select Device Type' (set to 'Encoder'), and 'Select Device' (set to 'G2\_Encoder'). Below these are input fields for 'Name', 'Group', 'Network', and 'HDMI Input'. The 'Multicast Management' section is expanded, showing four input fields: 'Main Video' (224.2.1.6), 'Sub Video' (224.2.1.7), 'Digital Audio' (224.3.1.4), and 'Analog Audio' (224.4.1.4). A 'Save' button is located below these fields. At the bottom of the form, there are sections for 'Analog Audio' and 'RS232 Serial Parameters'. The footer includes 'Copyright 2020 Black Box', a 'Disclaimer' link, and the SDVoE Alliance logo.

FIGURE 2-8.

1. Enter Main Video address.
2. Enter Sub Video address.
3. Enter Digital Audio address.
4. Enter Analog Audio address.
5. Click Save button.

### 2.1.7 ANALOG AUDIO INTERFACE

The 3.5-mm analog audio jack of an Encoder can work as either an input or an output.

The screenshot displays the Black Box MCX GYM web interface. The top navigation bar includes the Black Box logo, MCX GYM logo, and links for English, Settings, and Logout. The secondary navigation bar shows tabs for Status, Device Settings, Matrix, Video Wall, Multiview, Tools, and Global Settings. The Device Settings page is active, showing a list of devices with columns for Select, Device Settings, Select Device Type, and Select Device. The 'G2\_Encoder' device is selected. The 'Analog Audio' section is expanded, showing a 'Direction' dropdown menu set to 'INPUT'. Below the dropdown are 'Save' and 'Save To Devices' buttons. The 'RS232 Serial Parameters' section is also visible.

FIGURE 2-9.

1. Select either INPUT or OUTPUT.
2. Click Save button.

### 2.1.8 ANALOG AUDIO JACK

The 3.5mm analog audio jack of a Decoder can output analog audio either from the HDMI or Analog sources. To de-embed the HDMI audio select HDMI otherwise the analog audio source of an Encoder will be used.

The screenshot displays the Black Box MCX CTRL web interface. At the top, there's a navigation bar with the Black Box logo, 'MCX CTRL', and user options like 'English', 'Settings', and 'Logout'. Below this is a secondary navigation bar with tabs for 'Status', 'Device Settings', 'Matrix', 'Video Wall', 'Multiview', 'Tools', and 'Global Settings'. The 'Device Settings' tab is active, showing a configuration page for a 'Decoder' device named 'Q2T\_TopLeft'. The 'Analog Audio' section is expanded, revealing a 'Source' dropdown menu set to 'ANALOG (Stereo Audio)'. Below the dropdown are two buttons: 'Save' and 'Save To Devices'. Other sections visible include 'Name', 'Group', 'Network', 'HDMI Output', 'HDMI Audio', and 'RS232 Serial Parameters'. The footer of the interface shows 'Copyright 2020 Black Box' and 'Disclaimer' on the left, and the 'SDVoE' logo on the right.

FIGURE 2-10.

1. Select either ANALOG, HDMI or Other.
2. Click Save button.

### 2.1.9 HDMI AUDIO SOURCE

Audio options are HDMI (sync mode), HDMI (downmix), HDMI (multichannel), Analog (stereo) or Other.

The screenshot displays the Black Box MCX CTRL web interface. The top navigation bar includes the Black Box logo, the MCX CTRL logo, and links for English, Settings, and Logout. Below the navigation bar, the 'Device Settings' tab is selected, showing a list of tabs: Status, Device Settings, Matrix, Video Wall, Multiview, Tools, and Global Settings. The 'Device Settings' tab contains several dropdown menus: 'Select' (set to ALL DEVICES), 'Device Settings' (set to Edit), 'Select Device Type' (set to Decoder), and 'Select Device' (set to G2T\_TopLeft). Below these are input fields for Name, Group, Network, HDMI Output, Analog Audio, and HDMI Audio. The HDMI Audio section is expanded, showing a 'Source' dropdown menu set to 'HDMI (Sync Mode)'. Below the dropdown are two buttons: 'Save' and 'Save To Devices'. At the bottom of the page, there is a footer with 'Copyright 2020 Black Box Disclaimer' and the SDVoE logo.

FIGURE 2-11.

1. Select either ANALOG or HDMI.
2. Click Save button.

## 2.1.10 RS-232 SERIAL INTERFACE PARAMETERS

Here you configure the parameters for the serial RS-232 port.

The screenshot shows the Black Box MCX CH2M web interface. The top navigation bar includes 'Status', 'Device Settings', 'Matrix', 'Video Wall', 'Multiview', 'Tools', and 'Global Settings'. The 'Device Settings' tab is active. Below the navigation bar, there are dropdown menus for 'Select' (ALL DEVICES), 'Device Settings' (Edit), 'Select Device Type' (Decoder), and 'Select Device' (G2T\_TopLeft). The main configuration area is titled 'RS232 Serial Parameters' and contains the following fields:

- Name
- Group
- Network
- HDMI Output
- Analog Audio
- HDMI Audio
- RS232 Serial Parameters:
  - Protocol: ASCII
  - Baud Rate: 57600
  - Data Bits: 8
  - Stop Bits: 1
  - Parity: NONE

At the bottom of the RS232 Serial Parameters section, there are two buttons: 'Save' and 'Save To Devices'. The footer of the page includes 'Copyright 2020 Black Box Disclaimer' and the SDV-E logo.

FIGURE 2-12.

1. Select Baud rate.
2. Select Data Bits.
3. Select Stop Bits.
4. Select Parity.
5. Click Save button.

### 2.2 EXPORT SETTINGS

The current settings of all the Encoders and Decoders can be exported to a csv formatted file to be used as a configuration backup or be used to reconfigure the Encoders and Decoders by changing the required data and importing it back into the MCX Network Management Controller. A file named “DeviceExport.csv” will be exported to your Downloads folder.

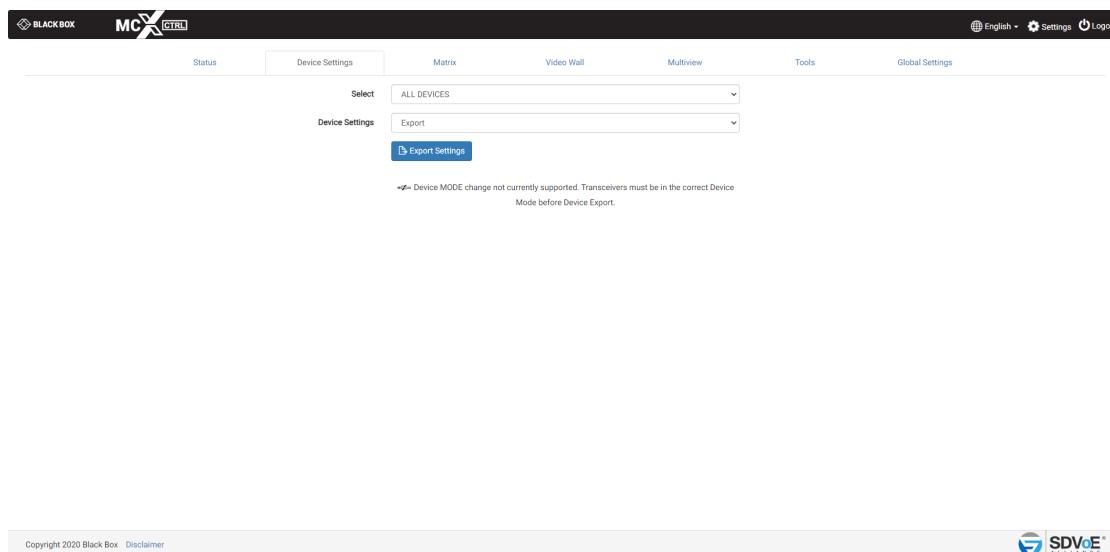


FIGURE 2-13.

1. Select Export.
2. Click Export Settings button.

### 2.3 IMPORT SETTINGS

The exported device settings file can be imported back into the system from here. Any device configuration changes made to the DeviceExport.csv will be applied once the file has been imported. This may take some time depending on the amount of configuration changes that need to be performed.

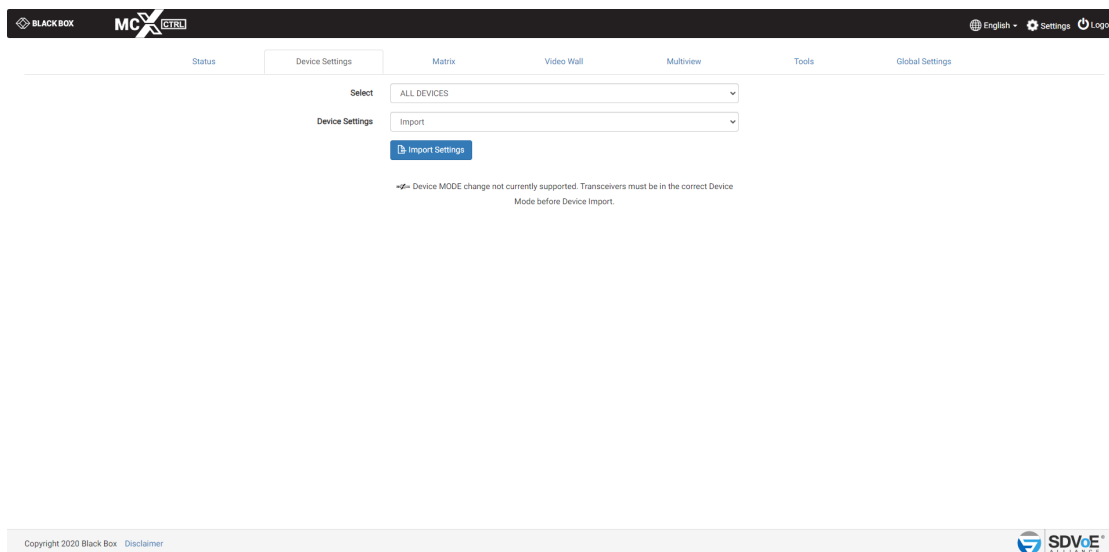


FIGURE 2-14.

1. Select Import.
2. Click Import Data button.
3. Select file.
4. Click Open button.

## CHAPTER 3: STATUS

### 3. STATUS

The Status tab contains information about how an Encoder or Decoder is currently functioning. Streams can also be stopped, started or frame rates halved to manage bandwidth.

Encoders and Decoders can be filtered by groups to limit the number of devices being displayed.

The status of all Encoders and Decoders can be exported to a csv formatted file using the “Export Status Report” button located at the top of the page. A StatusExport.csv file will be saved to your Downloads folder.

Icons are used to visually indicate the status of a device as follows:







-  Device is disconnected from the network.
-  Device is connected to the network, however, if the device is an Encoder it has no source, and if it is a Decoder it has no display connected.
-  Encoder is online and has a source connected.
-  Decoder is online and has a display connected.
-  Device error.
-  Device has a network issue and has timed out.

FIGURE 3-1.

### 3.1 IDENTIFY

To help physically find a connected Encoder or Decoder in a rack type installation the LED's on the front panel will flash for 30 seconds after the Identify button has been clicked.

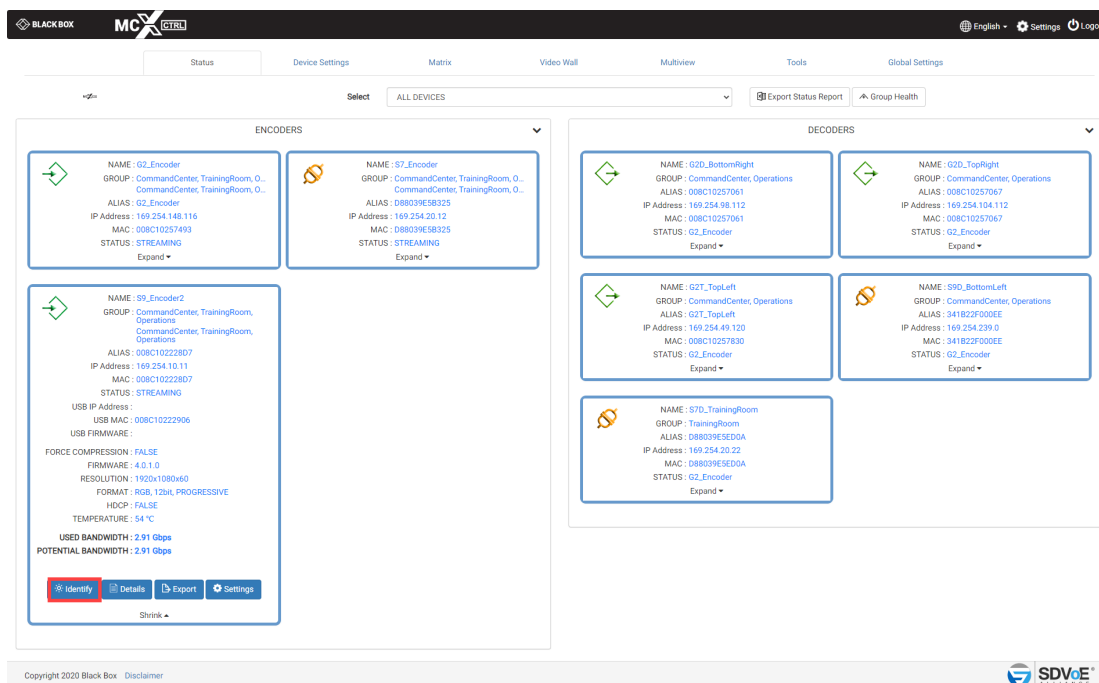


FIGURE 3-2.

Details contains information regarding the streams and subscriptions to those streams.

## 3.2.1 STREAMS (ENCODER)

The Streams tab of an Encoder will show the status of all streams along with their multicast address. The resolution, frame rate and bandwidth of the video streams is also indicated.

From here you can stop or start any video/audio stream. The frame rate of progressive video signals can be set to the original or half the original source frame rate.

When you free an Encoder stream, it will release its multicast address if working in multicast AUTO mode, and all connected Decoder subscriptions will be cleared.

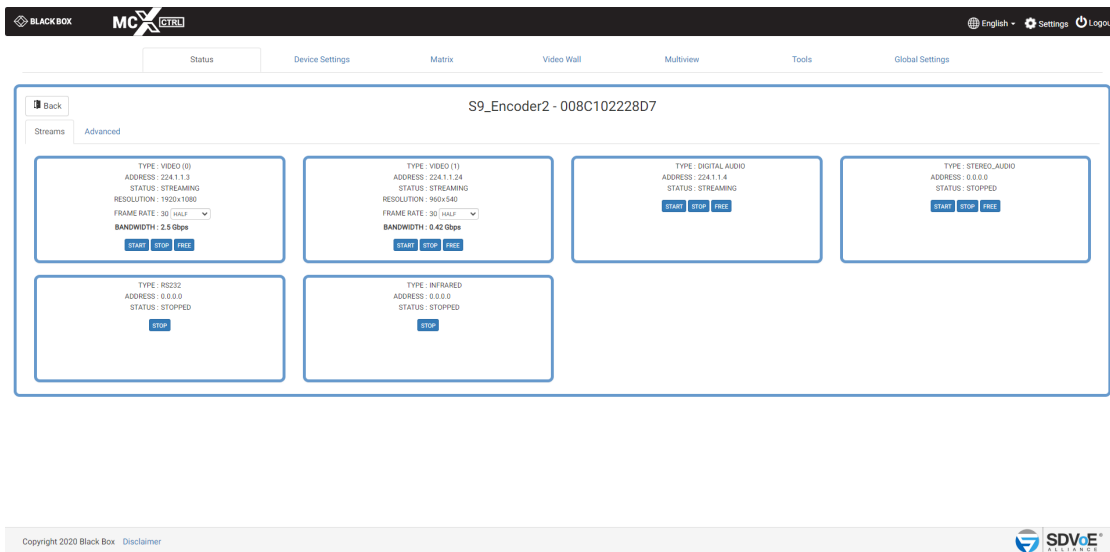


FIGURE 3-3.

## 3.2.2 STREAMS (DECODER)

The Streams tab of a Decoder will show the status of Infrared and RS-232 streams as these are the only streams sent from a Decoder. From here you can stop either the Infrared or RS-232 streams.

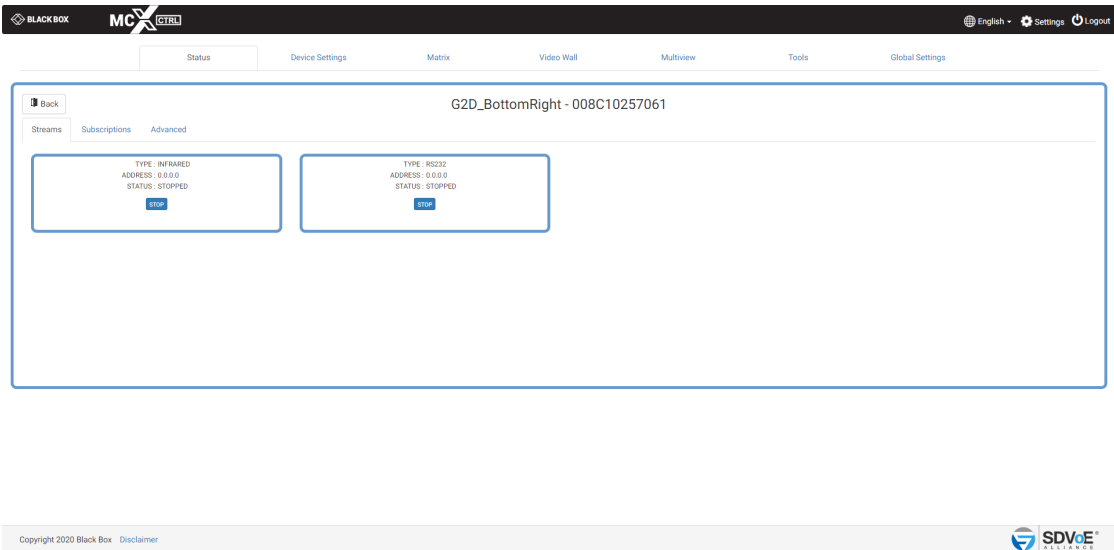


FIGURE 3-4.

## 3.2.3 SUBSCRIPTIONS (DECODER)

The Subscriptions tab of a Decoder will show what multicast address is being used to receive data. It will also indicate from what Encoder it is receiving the streams and the video streams bandwidth. From here you can leave any of the streams.

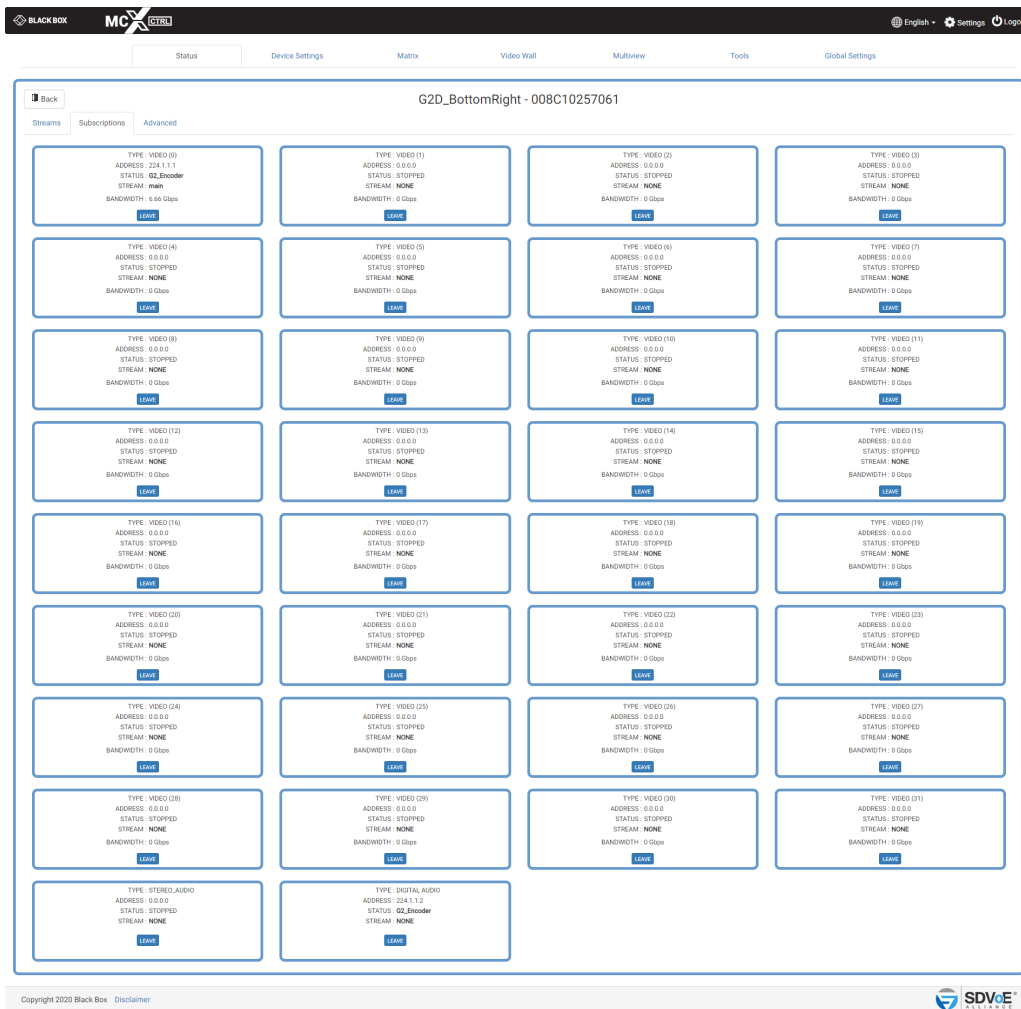


FIGURE 3-5.



## 3.2.4 ADVANCED

The Advanced tab contains details of the device such as identification numbers, boot status along with the encryption status of the device.

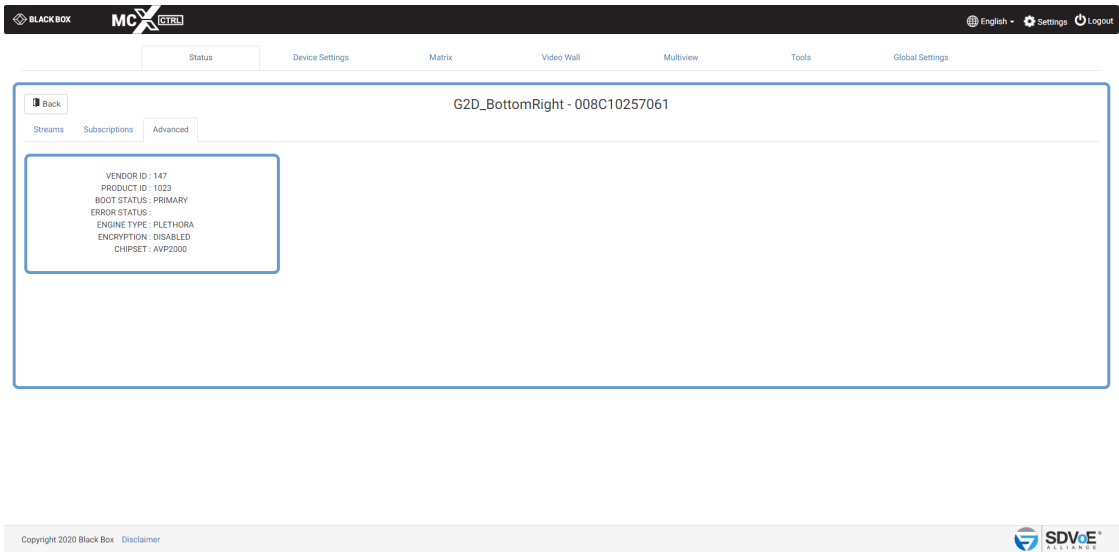


FIGURE 3-6.

## 3.3 EXPORT

A JSON formatted file will export the complete status of the selected device. This is to be used for system diagnostics. A \*.ini file with the device name will be saved to your Downloads folder.

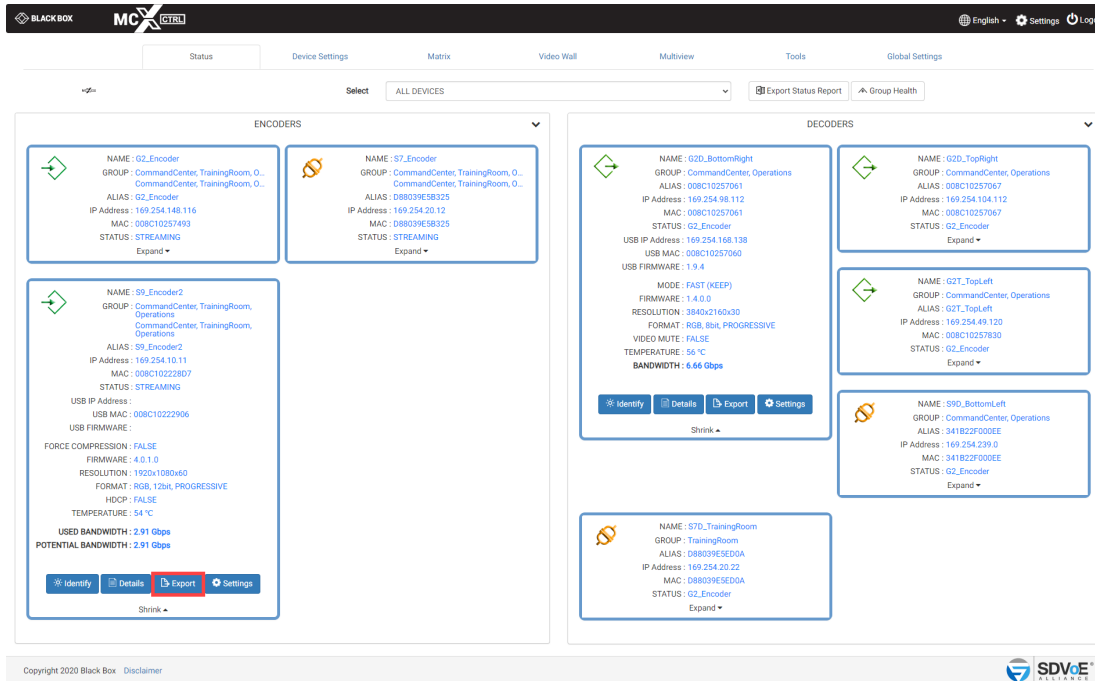


FIGURE 3-7.

Clicking the Settings button on a device will send you directly to the device settings tab.

## 3.4 EXPORT STATUS REPORT

Export Status Report will save a csv formatted file with all the status details from this section.

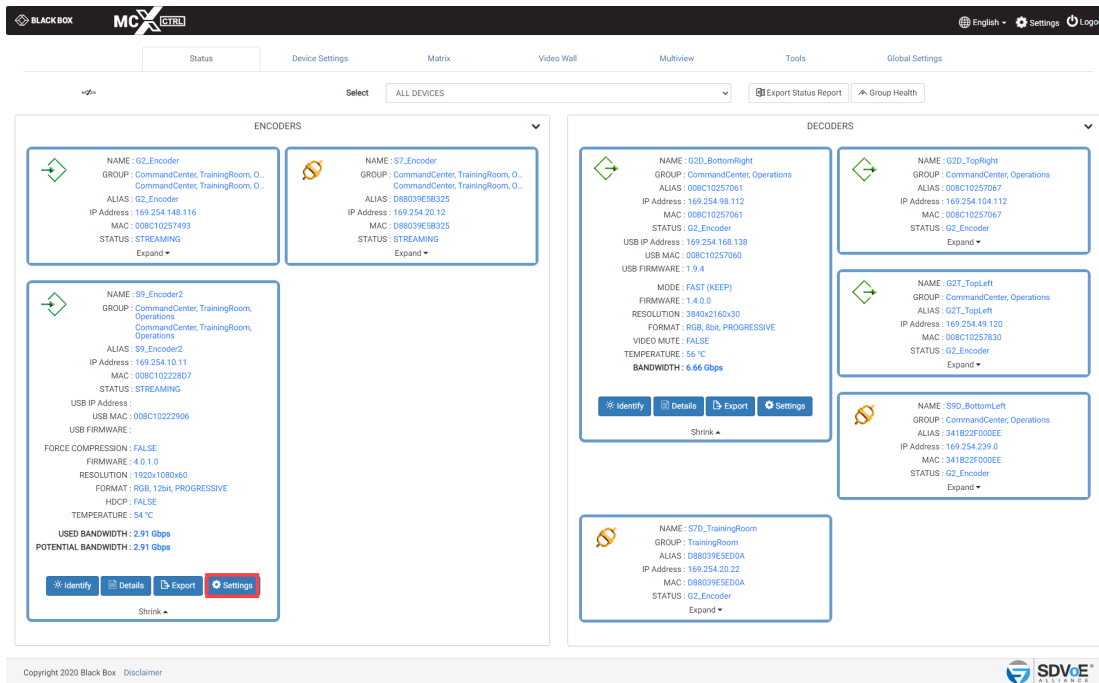


FIGURE 3-8.

## 3.5 GROUP HEALTH

Group Health will report the status of all the Encoders and Decoders in the selected group. If a group has a default preset associated with it, this can also be selected and applied to make sure there are no issues before the system is put into use.

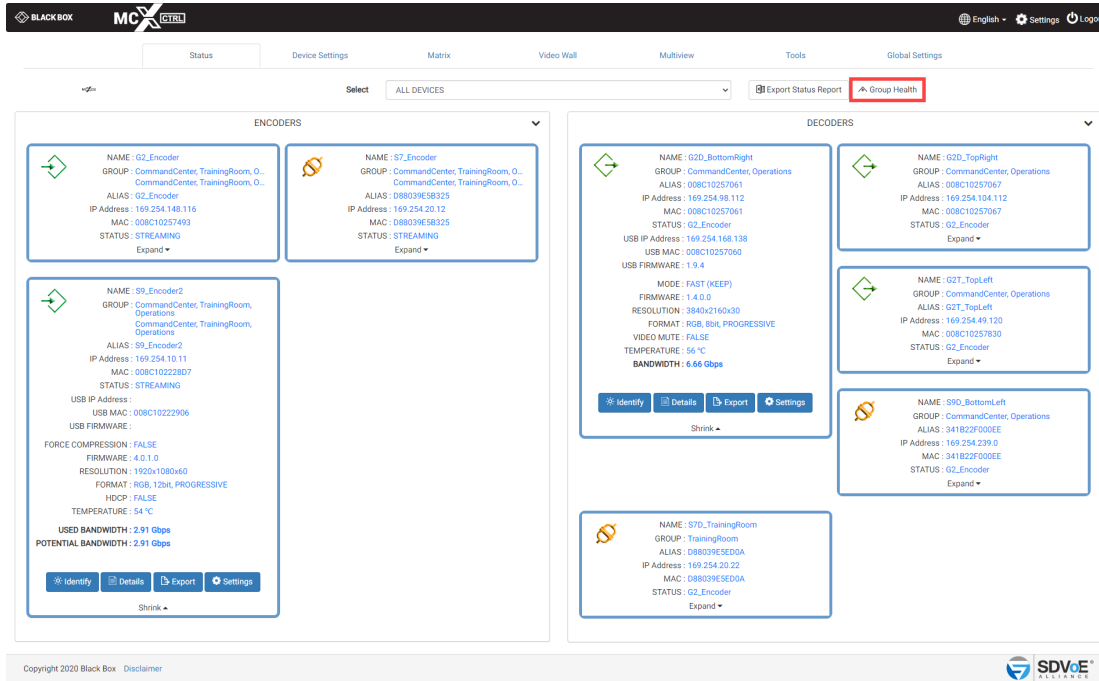


FIGURE 3-9.

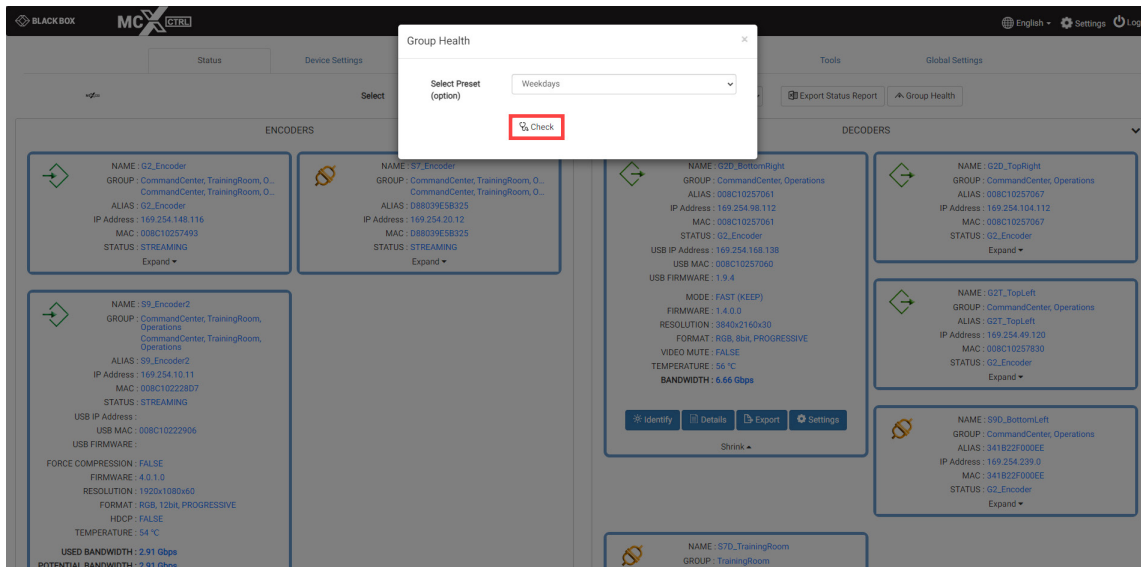


FIGURE 3-10.

## 4. TOOLS

The Tools tab contains utilities to assist in the installation process and updating device firmware.

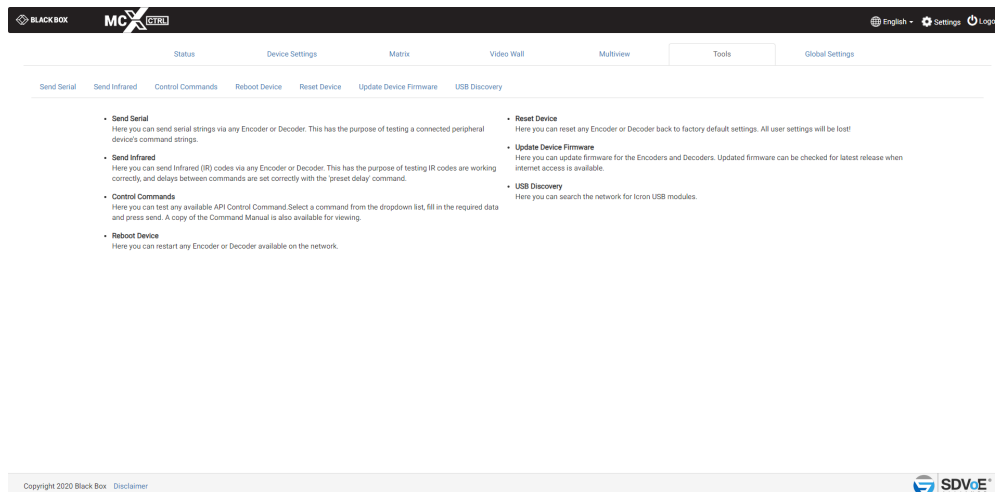


FIGURE 4-1.

## 4.1 SEND SERIAL

The Send Serial tab is used to test serial strings being sent from an Encoder or Decoder to 3rd party peripheral devices such as projectors.

FIGURE 4-2.

1. Select Device.
2. Select either ASCII or HEX.
3. Enter the Data String.
4. Select a terminator if required.
5. Click Send button.

## 4.2 SEND INFRARED

The Send Infrared tab is used to test IR signals being sent from an Encoder or Decoder to 3rd party peripheral devices such as TV's and DVD players.

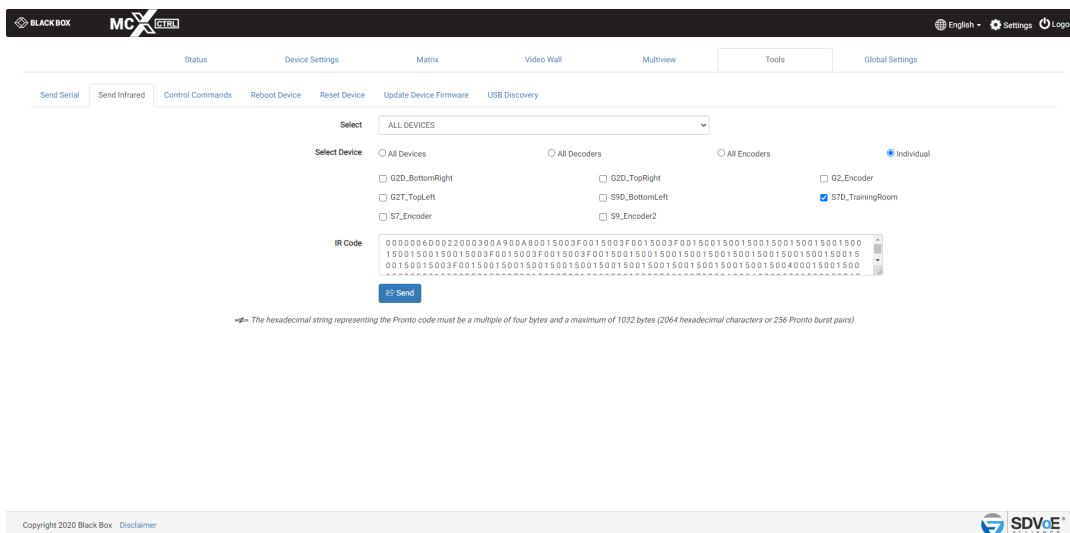


FIGURE 4-3.

1. Select Device.
2. Enter the IR Code to send.
3. Click Send button.

## 4.3 SEND CONTROL COMMAND

The Send Control Command is used to send any of the API commands available to the system for testing purposes.

The screenshot displays the Black Box MCX web interface. The top navigation bar includes the Black Box logo, the MCX logo, and links for English, Settings, and Logout. Below this, a secondary navigation bar contains tabs for Status, Device Settings, Matrix, Video Wall, Multiview, Tools, and Global Settings. The 'Tools' tab is active, and within it, the 'Send Control Command' sub-tab is selected. The main content area features a 'Select Control Command' dropdown menu with 'layout new' chosen. Below this is a blue 'Assistant' button. A 'String' input field contains the text 'layout new Company\_X 3840 2160'. A blue 'Send' button is positioned below the string field. A 'Receive' section with a large grey text area and an orange 'Clear' button is located at the bottom of the tool interface. The footer of the page shows 'Copyright 2020 Black Box Disclaimer' on the left and the SDVoE Alliance logo on the right.

FIGURE 4-4.

### 4.4 REBOOT DEVICE

The Reboot Device tab is used to reboot the selected device(s).

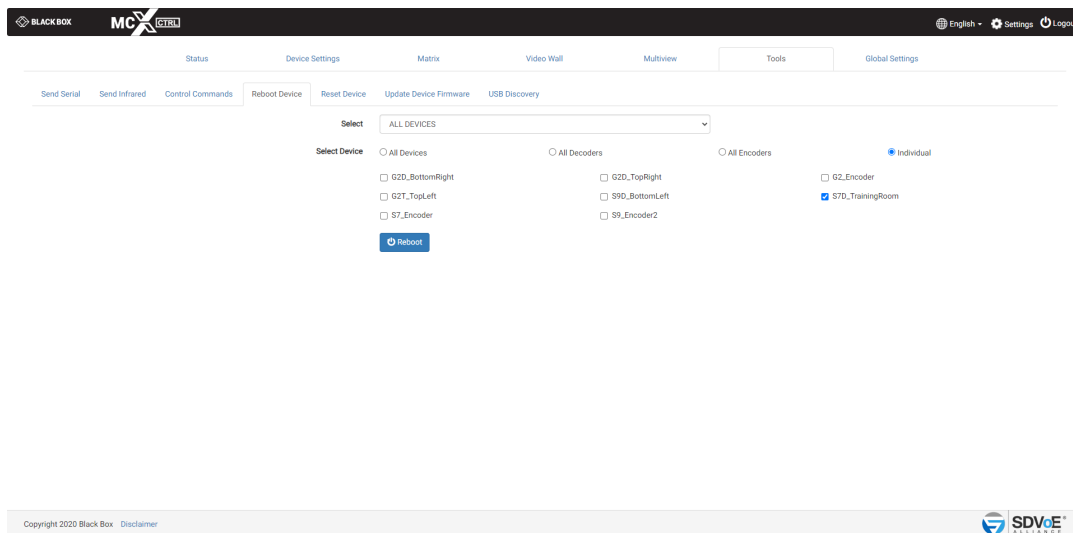


FIGURE 4-5.

1. Select Device(s).
2. Click Reboot button.

## 4.5 RESET DEVICE

The Reset Device tab is used to reset the selected device(s) back to factory defaults.

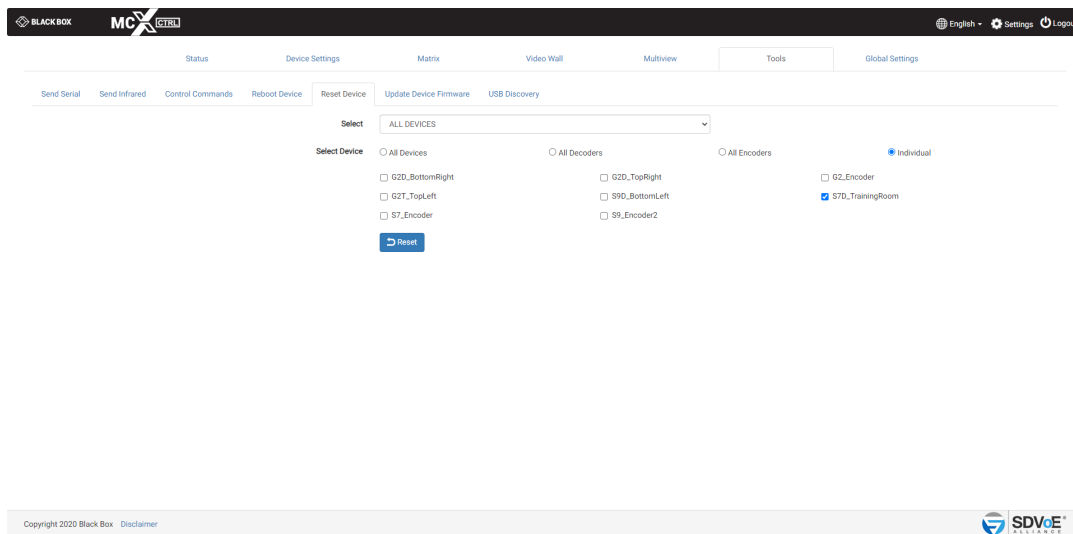


FIGURE 4-6.

1. Select Device(s).
2. Click Reset button.

## 4.6 UPDATE DEVICE FIRMWARE

The Update Device Firmware tab is used to update the MCX or Icron USB firmware of Encoders and Decoders. Here you can also check for updated MCX firmware from the internet when the MCX Network Management Controller has access. If a previous version of MCX firmware is on the system then rolling back the device firmware is also possible.

### 4.6.1 UPDATE MCX FIRMWARE

MCX firmware is the device firmware for Encoders and Decoders.

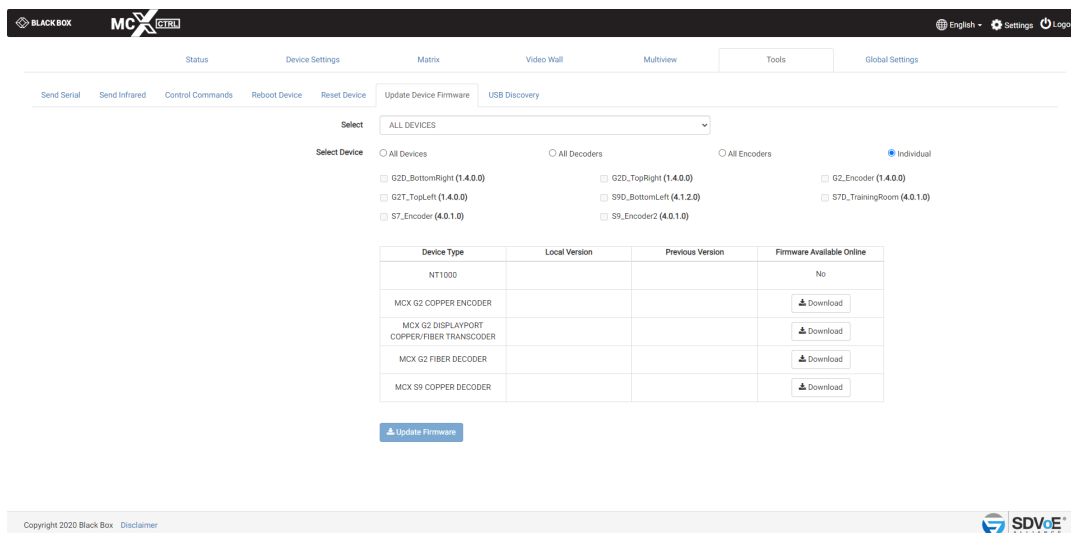


FIGURE 4-7.

1. Select Device(s).
2. Click Update Firmware button.

## CHAPTER 4: TOOLS

### 4.7 USB DISCOVERY

The USB Discovery tab is used to help find undiscovered USB modules that might be out of range from the rest of the system or have incompatible firmware version. If the USB module has had a static IP applied then it will not respond when on a different subnet to the MCX Network Management Controller (for example controller IP 169.254.1.1 and USB module IP 192.168.1.222). The MCX Network Management Controllers IP will need to be set to the same range as the USB module before it can be found.

\* Icron USB modules must have at least version 1.8.5 firmware to be compatible with this system.

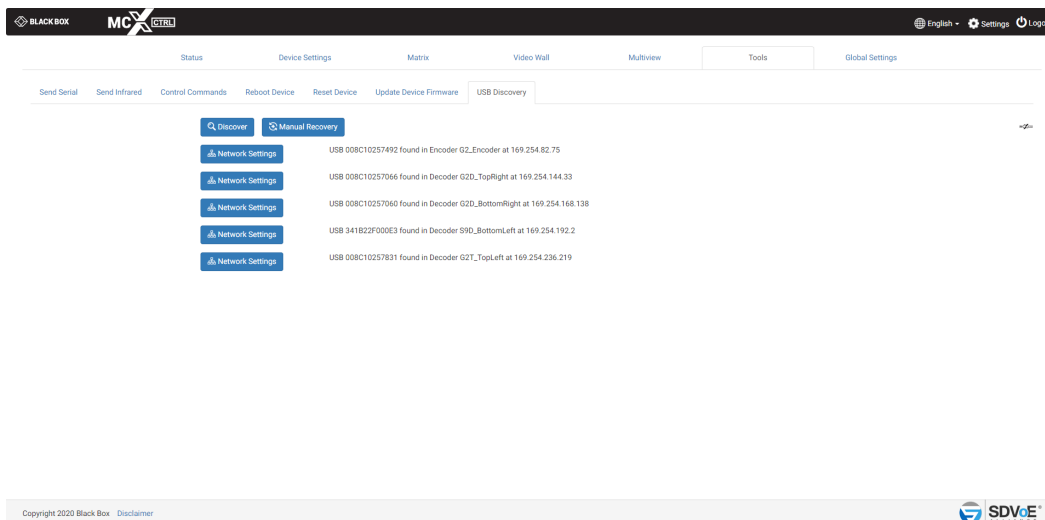


FIGURE 4-8.

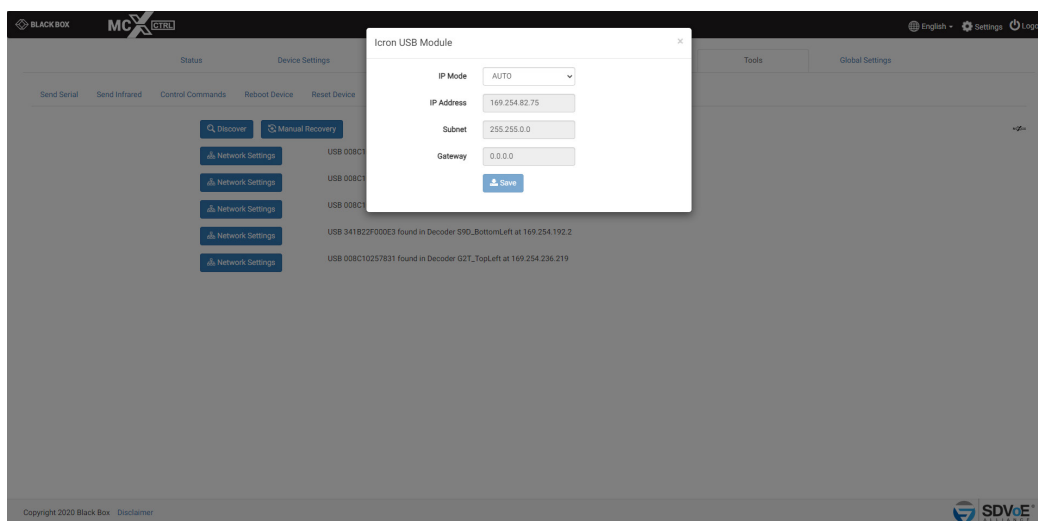


FIGURE 4-9.

1. Click Discover button.
2. Click a Network button to show network.

## CHAPTER 5: MATRIX

### 5. MATRIX

The Matrix tab contains up to 6 individual matrix tabs for each of the signal types, Video, Digital Audio, Analog Audio, Serial, Infrared and USB. Here you can create or stop joins between Encoders and Decoders. The video modes of MCX Decoders can also be changed by clicking the individual Decoder settings buttons.

The matrix has a KVM (Keyboard Video Mouse) checkbox that will control USB along with Video routing. When Separate Digital Audio Routing is not selected, Digital Audio will also follow the Video routing.

Click a white square to make a join.

Click a blue square to remove a join.

#### 5.1 VIDEO/DIGITAL AUDIO

Here the Video and Digital Audio are combined so they are both joined to the destination device.

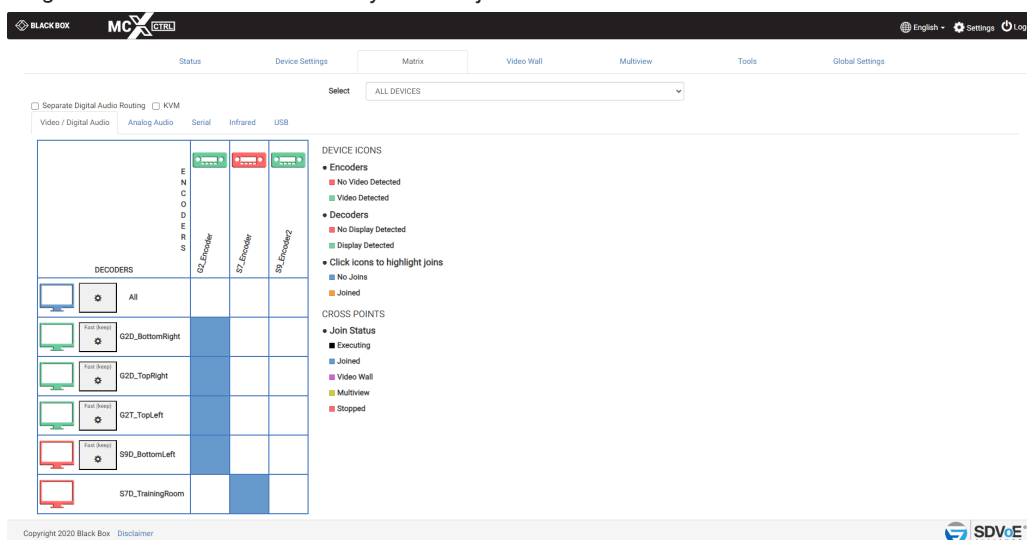


FIGURE 5-1.

## 5.2 VIDEO

When independent routing of the Video and Digital Audio is required, select the Separate Digital Audio Routing checkbox. Now the Video and Digital Audio will appear in separate independent matrix tabs.

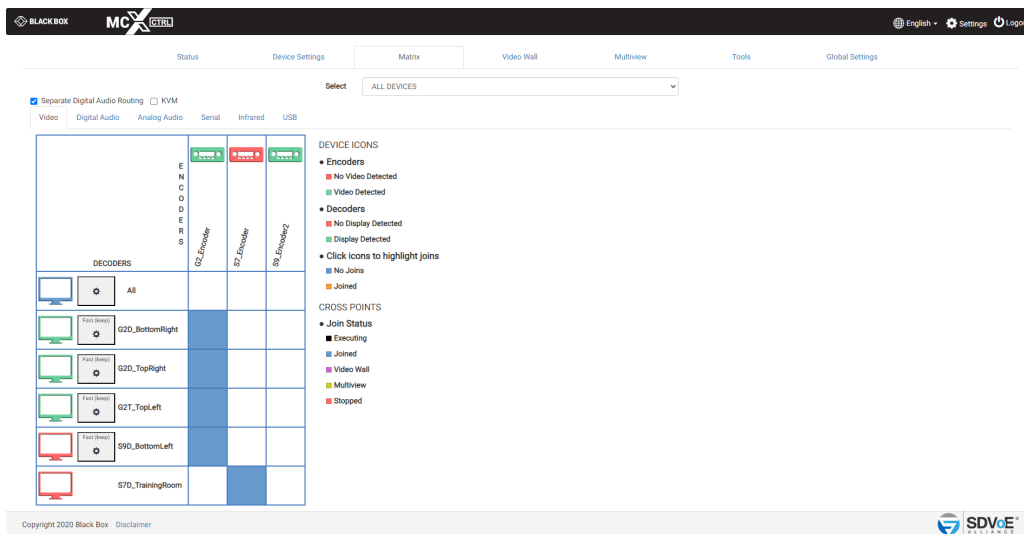


FIGURE 5-2.

## 5.3 DIGITAL AUDIO

When independent routing of the Video and Digital Audio is required select the Separate Digital Audio Routing checkbox. Now the Video and Digital Audio will appear in separate independent matrix tabs.

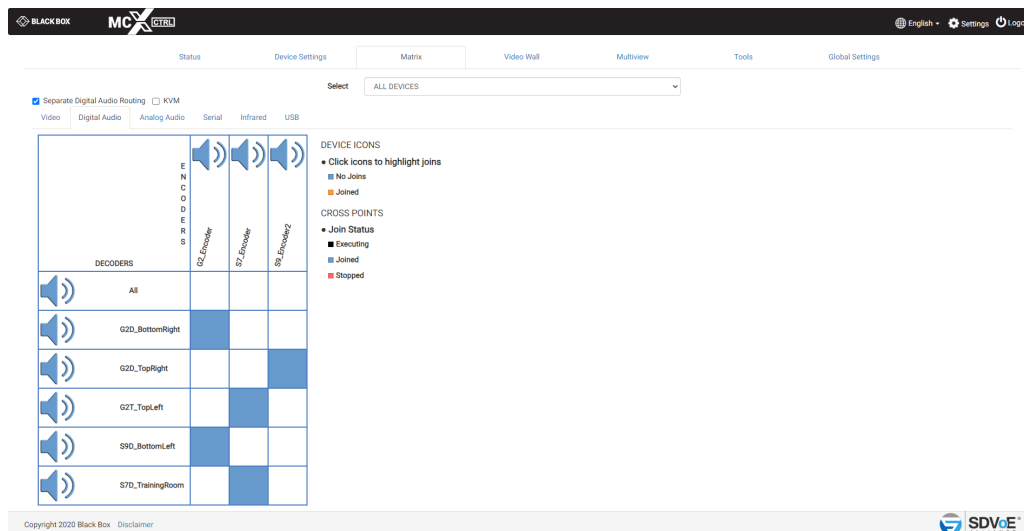


FIGURE 5-3.

## 5.4 ANALOG AUDIO

The matrix Analog Audio tab is intended for making analog audio joins between Encoders and Decoders.

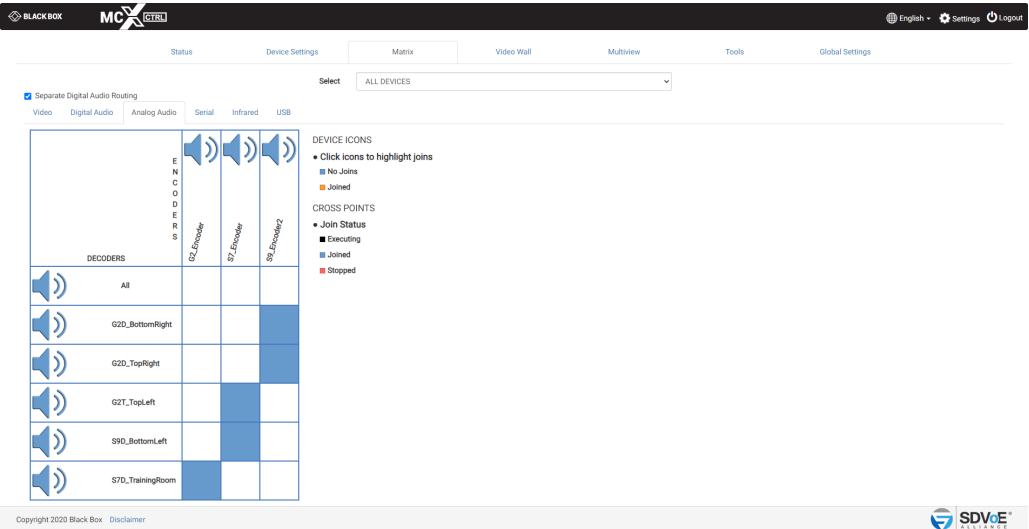


FIGURE 5-4.

## 5.5 SERIAL

The matrix Serial tab is intended for making serial joins between Encoders and Decoders. Serial joins work on a one way principle in that the RX of the sender device is connected to the TX of the receiver device. This only creates a 1-way connection. For a 2-way (Bi-Direction) connection select the Bi-Directional checkbox before making joins.

The screenshot displays the Black Box Matrix Serial tab interface. At the top, there are navigation tabs: Status, Device Settings, Matrix (selected), Video Wall, Multiview, Tools, and Global Settings. Below these, there are checkboxes for 'Separate Digital Audio Routing' (checked) and 'Bi-Directional' (unchecked). A 'Select' dropdown menu is set to 'ALL DEVICES'. The main area is a matrix with 'SENDERS' on the vertical axis and 'RECEIVERS' on the horizontal axis. The senders listed are G2D\_AudioRight, G2D\_TopRight, G2\_Encoder, G2T\_TopLeft, S9D\_BottomLeft, S7D\_TrainingRoom, S7\_Encoder, and S9\_Encoder2. The receivers listed are API, G2D\_BottomRight, G2D\_TopRight, G2\_Encoder, G2T\_TopLeft, S9D\_BottomLeft, S7D\_TrainingRoom, S7\_Encoder, and S9\_Encoder2. The matrix cells show various icons representing different join types. To the right of the matrix, there are legends for 'DEVICE ICONS' (Click icons to highlight joins, No Joins, Joined) and 'CROSS POINTS' (Join Status, Executing, Joined). The footer includes 'Copyright 2020 Black Box Disclaimer' and the SDVoE logo.

FIGURE 5-5.

## 5.6 INFRARED

The matrix Infrared tab is intended for making infrared joins between Encoders and Decoders. Infrared joins work on a one-way principle in that the sender device is connected to the receiver device. This only creates a 1-way connection. For a 2-way (Bi-Directional) connection select the Bi-Directional checkbox before making joins.

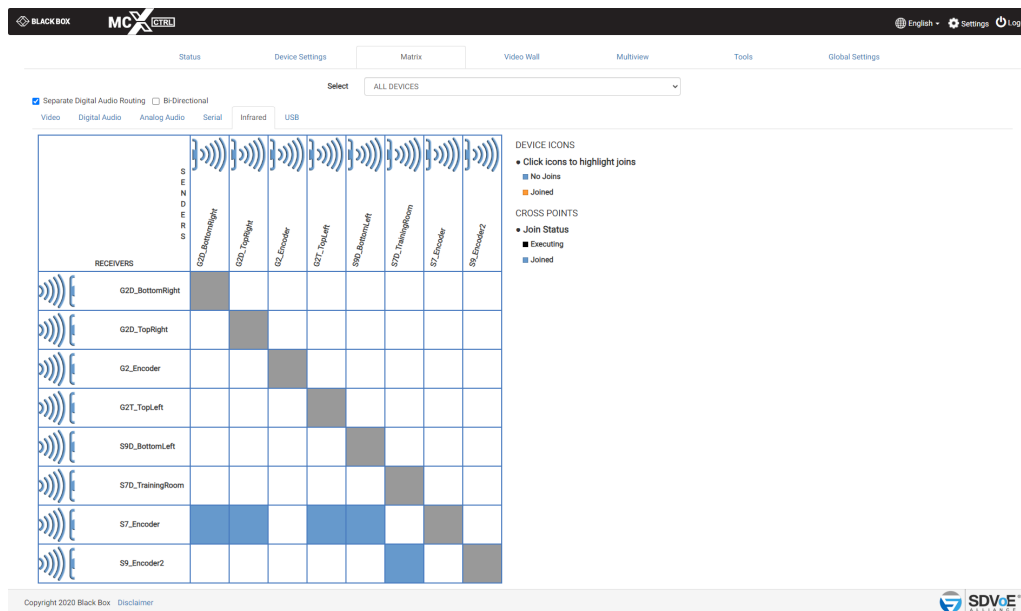


FIGURE 5-6.

## 5.7 USB

The matrix USB tab will only show Encoders and Decoders with USB installed and correctly configured.

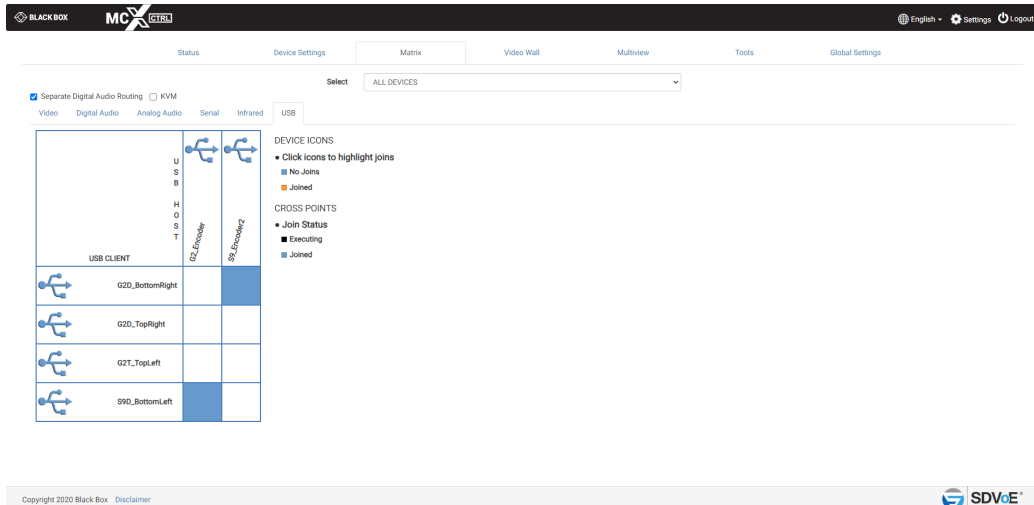


FIGURE 5-7.

## CHAPTER 6: VIDEO WALL

### 6. VIDEO WALL

Video Wall configuration has two modes of operation, standard and advanced.

Standard mode has simple bezel compensation when a uniform bezel size is used so only the display width and viewable width are required to calculate the required bezel compensation.

Advanced mode has various types of bezel compensation and can be used to specify individual monitor bezel sizes.

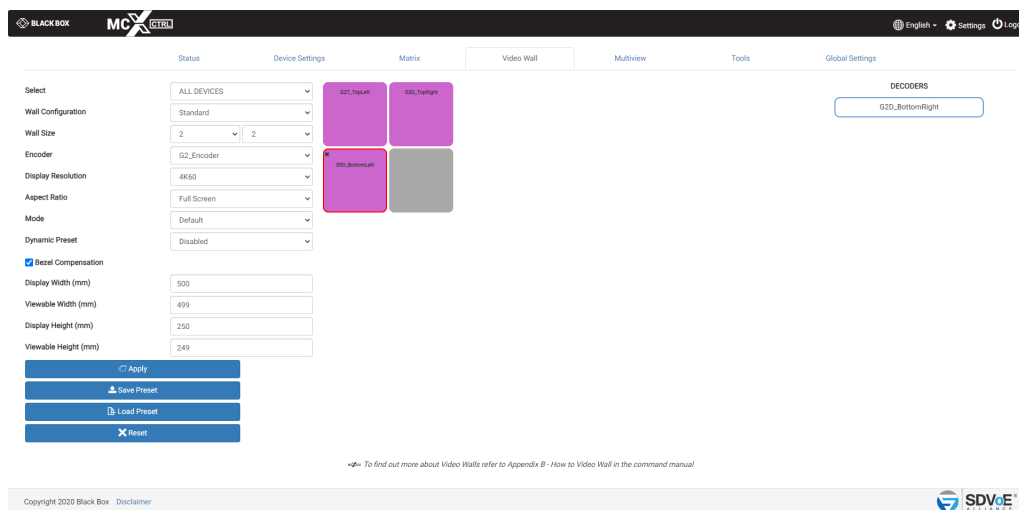


FIGURE 6-1.

## 6.1 VIDEO WALL STANDARD

The screenshot displays the Black Box MCX interface for configuring a Video Wall. The top navigation bar includes 'Status', 'Device Settings', 'Matrix', 'Video Wall' (selected), 'Multiview', 'Tools', and 'Global Settings'. The 'Video Wall' tab is active, showing a 2x2 grid of displays labeled 'G2\_TopLeft', 'G2\_TopRight', 'G2\_BottomLeft', and 'G2\_BottomRight'. On the left, a 'Select' panel lists configuration options: 'ALL DEVICES', 'Advanced', '2' (Wall Size), 'G2\_Encoder', '4K60' (Display Resolution), 'Full Screen' (Aspect Ratio), and 'Default' (Mode). On the right, a 'Global Settings' panel shows 'S10\_BottomLeft' selected, with 'Bezel Size (px)' set to 0 for Top, Bottom, Left, and Right. A 'Varying Bezel Size' dialog box is open, showing 'Display Width' (500), 'Display Height' (250), and 'Bezel Top', 'Bottom', 'Left', 'Right' (all 1). Below this, there are options for 'Uniform Bezel Size' and 'Bezel Size (px)' (all 0). At the bottom of the dialog are buttons for 'Apply', 'Save Preset', 'Load Preset', and 'Reset'. A footer note states: 'To find out more about Video Walls refer to Appendix B - How to Video Wall in the command manual'. The bottom left corner shows 'Copyright 2020 Black Box Disclaimer' and the bottom right corner shows the 'SDVoE ALLIANCE' logo.

FIGURE 6-2.

1. Select the group of Encoders and Decoders to be available.
2. Select a Group to be shown.
3. Select Configuration Standard.
4. Select layout.
5. Select source.
6. Select Display Resolution.
7. Select Aspect Ratio.
8. Select switching Mode.
9. Select Dynamic Preset.
- 9.1 Select Compensation.
- 9.2 Enter display width. Enter viewable width.
- 9.3 Enter display height. Enter viewable height.
10. Drag displays to position.

## CHAPTER 6: VIDEO WALL

- 10.1 Save or Apply the layout.
- 10.2 Drag display to position.
- 10.3 Drag display to position.
11. Drag display to position.
12. Drag display to position.
- 12.1 Select either Standard or Advanced mode. In this case Standard Advanced mode provides more options for Bezel Compensation.
- 12.2 Select the video wall layout up to 8 x 5.
- 12.3 Select the source Encoder for the video to be displayed. Only Encoders with an active source will be shown.
- 12.4 Select the resolution of the displays. The cropped video area from the original source content will be scaled to a display resolution. For example, if the cropped area is only 960x540, it will be scaled to 1920x1080 for the display.
13. Select Aspect Ratio. Either select Full Screen or Maintain Aspect Ratio. Full Screen may stretch the video image to fill the display area while Maintain Aspect Ratio will add black to the sides and top and bottom of the displayed image to maintain the original video aspect ratio.
14. Select switching Mode Normal (Sync) or Fast. (Device firmware > 3.5.2.0 and MCX firmware > 2.14.0 is required.)
15. Enable or Disable Dynamic Preset. When Enabled the preset will be applied on a change of source resolution to reapply the correct crop settings for the new resolution.
16. Select Bezel Compensation to automatically compensate for the bezel widths. (Standard mode assumes a constant display bezel size.)
17. Enter the physical width of the display in mm. Enter the physical viewable width of the display in mm.
18. Drag Decoders / Displays to the correct wall position.
19. Save or apply the layout. The layout can be saved as a preset to be recalled via the "preset load."



## 6.2 VIDEO WALL ADVANCED

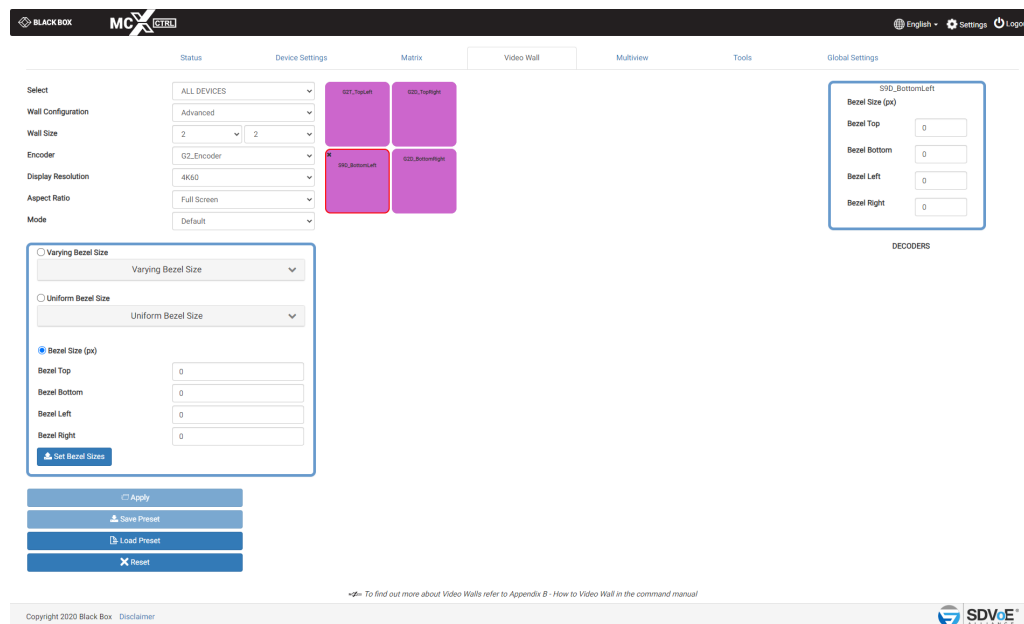


FIGURE 6-3.

1. Select a Group to be shown.
2. Select Configuration Advanced.
3. Select layout.
4. Select source.
5. Select resolution.
6. Select Aspect Ratio.
7. Select switching Mode.
- 8.1. Select Compensation method.
- 8.2. Enter required sizes for selected method.
9. Click Set Bezel Sizes button.
10. Drag display to position.
11. Save or Apply the preset.
12. Select the group of Encoders and Decoders to be available.
13. Select either Stand or Advanced modes, in this case Advanced. (Advanced mode provides more options for Bezel Compensation.)
14. Select the video wall layout up to 8 x 5.
15. Select the source Encoder for the video to be displayed. Only Encoders with an active source will be shown.
16. Select the resolution of the displays. The cropped video area from the original source content will be scaled to a display resolution. For example, if the cropped area is only 960x540, it will be scaled to 1920x1080 for the display.
17. Select Aspect Ratio. Either select Full Screen or Maintain Aspect Ratio. Full Screen may stretch the video image to fill the display area while Maintain Aspect Ratio will add black to the sides and top and bottom of the displayed image to maintain the original video aspect ratio.
18. Select switching Mode Normal (Sync) or Fast.

## CHAPTER 6: VIDEO WALL

19. Select Bezel Compensation method to automatically compensate for the bezel widths.

Uniform Bezel Size is used when the display has a constant bezel size.

Varying Bezel Size is used when the display has different bezel sizes.

Bezel Size (px) is used when you manually want to specify the pixel compensation, otherwise this area will show the resulting pixel compensation calculated from the physical dimension of the display from either Uniform Bezel Size or Varying Bezel Size calculations.

### Uniform Bezel Size

Enter the physical width of the display in mm.

Enter the physical viewable width of the display in mm.

### Varying Bezel Size

Enter the physical width of the display in mm.

Enter the physical height of the display in mm.

Enter the top physical bezel width of the display in mm.

Enter the bottom physical bezel width of the display in mm.

Enter the left physical bezel width of the display in mm.

Enter the bottom physical bezel width of the display in mm.

### Bezel Size (px)

Enter the top bezel compensation in pixels.

Enter the bottom bezel compensation in pixels.

Enter the left bezel compensation in pixels.

Enter the right bezel compensation in pixels.

20. Load the Bezel Compensation values to the displays. If no displays are selected at this stage, then all will be populated with the values. Individual displays can be selected to load the values which is useful when different display types are used in the layout, or when varying bezel sized monitors are rotated within the layout.

21. Drag Decoders/Displays to the correct wall position.

22. Save or apply the layout. The layout can be saved as a preset to be recalled via the "preset load" command or loaded back into the UI.



## CHAPTER 6: VIDEO WALL

In advanced mode, each individual display of the video wall can have separate bezel compensation applied when using a mix of display types. Click the display position and the displays bezel compensation window will popup. Here you can change the bezel sizes as required.

## CHAPTER 7: MULTIVIEW

### 7. MULTIVIEW

The Multiview function has a lot of bandwidth considerations to take into account if both Encoder video streams are working. Keep in mind that an Encoder has two separate video streams. Stream 0 is the main stream used for normal video switching. This stream will automatically be slightly compressed with all streams greater than 9 Gbps. Stream 1 is a dedicated RGB stream that can be scaled for use with Multiview. This stream is NOT compressed and is therefore limited to 30 Hz refresh rates. In some cases, stream 0 itself can use all the available bandwidth leaving no room for stream 1 on the network. In these cases, the software can perform a few functions to maintain a total Encoder bandwidth less than 9 Gbps.

- Both stream 0 and stream 1 are set to half frame rate for PROGRESSIVE signals over 30 Hz.
- Stream 0 may be used instead of stream 1 if the source video resolution matches the window size.
- Stream 0 may be turned off completely if not enough bandwidth is available for stream 1.
- The layout size will automatically be reduced to 1920 x 1080 when an Encoder with an INTERLACED source > 30 Hz is dropped on a window larger than 2,073,600 pixels when the layout size has been set for 3840 x 2160. This is because the frame rate of an INTERLACED signal cannot be reduced so the bandwidth must be managed by reducing the video size.

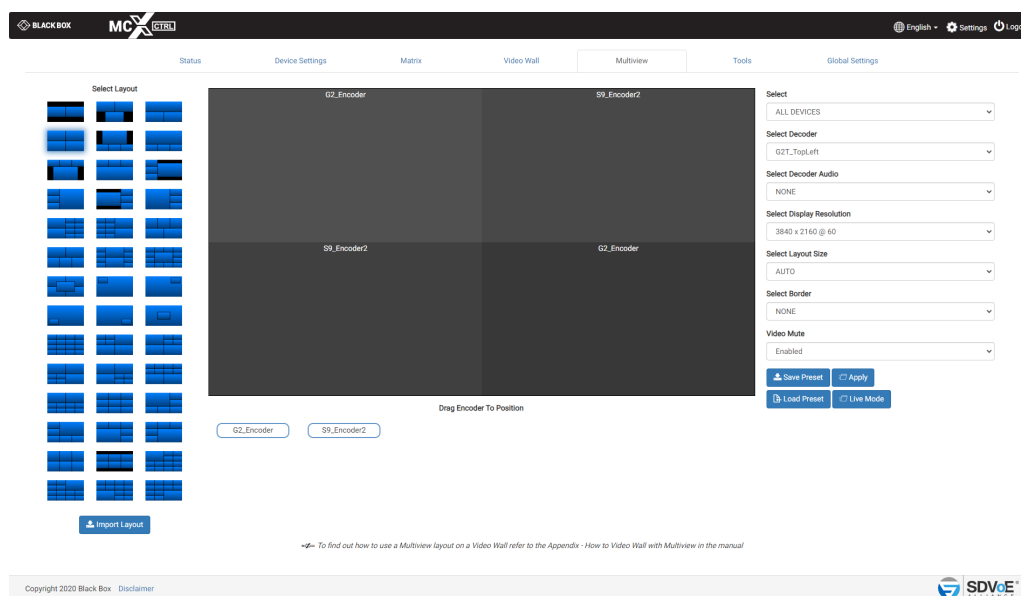


FIGURE 7-1.

## 7.1 MULTIVIEW LAYOUT

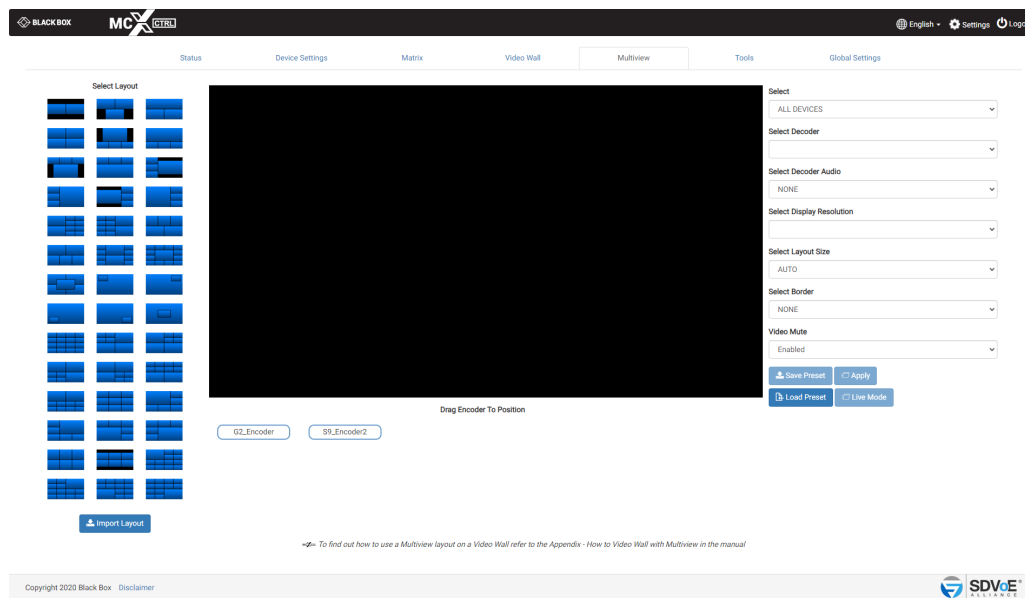


FIGURE 7-2.

1. Select 1 of the 42 predefined layouts.
2. Select the group of Encoders and Decoders to be available.
3. Select the required Decoder to display the layout.
4. Select Decoder Audio by selecting either None or an Encoder.
5. Select the display resolution as either AUTO, 3840 x 2160 @ 30, 3840 x 2160 @ 60, 1920 x 1080 @ 60 or Custom.

AUTO will use the displays preferred resolution from the EDID.

Display resolution is independent of layout size. The Decoder will scale the output resolution to the display. So this is the resolution the layout will be shown. A 1920 x 1080 layout can be shown at 3840 x 2160 and a 3840x2160 layout can be shown as 1920 x 1080.

6. Select the layout size of AUTO, 3840 x 2160 or 1920 x 1080 (AUTO will use the Display Resolution)

Let's look at the example shown of a 2 x 2 layout.

If the layout size was 3840 x 2160 then each window is sized 1920x1080. So the resolution of the Encoder streams will be scaled to 1920 x 1080.

If the layout size was 1920 x 1080 then each window is sized 960 x 540. So the resolution of the Encoder streams will be scaled to 960 x 540. Which in turn only uses half the network bandwidth.

7. Select default border or none.
8. Drag the required Encoder/Source to desired window location. Only same-sized windows can use the same duplicated Encoder/Source.

9. Save or apply the layout. The layout can be saved as a preset to be recalled via the “preset load” command or loaded back into the UI.

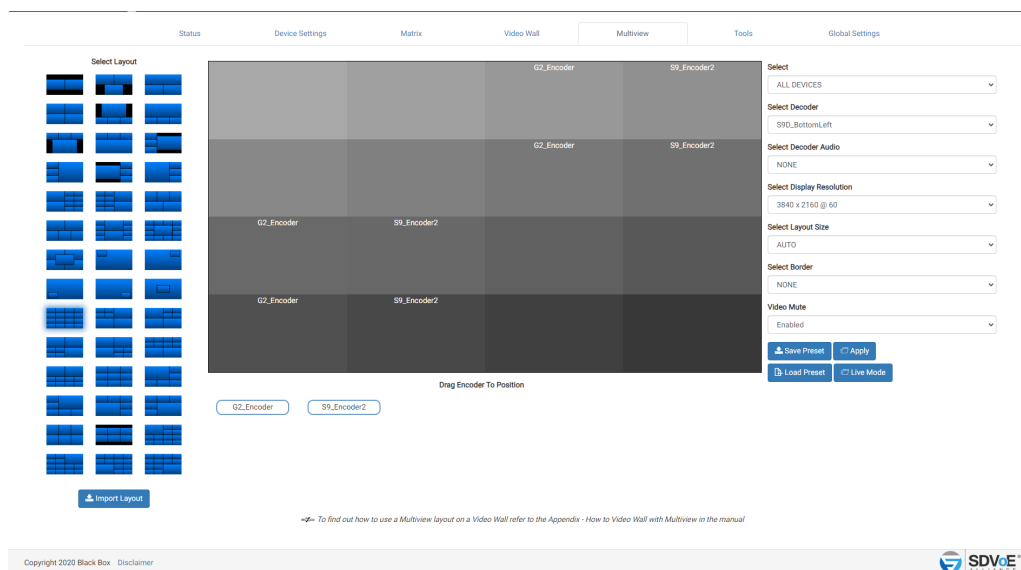


FIGURE 7-3.

## CHAPTER 7: MULTIVIEW

### 7.2 MULTIVIEW LIVE

1. Use the “Live Mode” button to toggle the function on/off.
2. Drag sources to window locations or remove sources from windows.

Live mode will provide an instant change to the sources applied to a layout. Live mode is automatically disabled when changing layouts or any of the dropdown options.



## CHAPTER 7: MULTIVIEW

### 7.3 MULTIVIEW LAYOUT IMPORT

Custom Multiview layouts are available on request. The supplied custom layout file can be imported here into the system and will be added to the displayed available layouts. (Keep in mind that any layout is achievable using direct API commands or editing an existing preset.)

1. Click Import Layout button.
2. Select layout file.
3. Click Open button.



## CHAPTER 7: MULTIVIEW

### 7.4 MULTIVIEW PRESETS

Multiview presets created and saved from the UI contain optional commands and logic that are present to manage system bandwidth and to provide a clean viewable experience. These optional commands and logic blocks can be removed or replaced with constant commands for known system conditions.

Here is an example of the code generated from the 1st UI multiview layout:

#### Define a new layout

```
layout new MV_e1 3840 2160
```

#### Define layout windows

```
layout window MV_e1 0 0 540 1920 1080 0
```

```
layout window MV_e1 1 1920 540 1920 1080 1
```

#### Clear all previous Decoder subscriptions (optional)

```
leave all Decoder2
```

#### Turn on video mute to blank the display until all the video streams are joined (optional)

```
set video_mute Decoder2 true 000000
```

To reduce Encoder1 bandwidth workout if the main hdmi:0 stream can have half frame rate applied or if the original frame rate needs to be restored (optional)

```
if(get video Encoder1 sm == PROGRESSIVE)
    { if(get video Encoder1 fps > 30){ if not(get frame_converter Encoder1 main){
        set frame_converter Encoder1 main true
    }
    }else{
        if(get frame_converter Encoder1 main){
            set frame_converter Encoder1 main false
        }
    }
}
```



## CHAPTER 7: MULTIVIEW

To reduce bandwidth from Encoder1 workout if we can use the main hdmi:0 stream instead of the sub stream hdmi:1 (optional, otherwise keep "join multi Encoder2 Decoder1 1 scaled MV\_e1")

```
if(get video Encoder2 width == get window MV_e1 1 width){
    if(get video Encoder2 height == get window MV_e1 1 height){
        if(get video Encoder2 sm == PROGRESSIVE){
            if(get video Encoder2 bpp == 8){
                if(get video Encoder2 cs == YBCBR_420){
                    join multi Encoder2 Decoder1 1 scaled MV_e1
                }else{
                    join multi Encoder2 Decoder1 1
                    stop sub Encoder2
                }
            }else{
                join multi Encoder2 Decoder1 1 scaled MV_e1
            }
        }else{
            join multi Encoder2 Decoder1 1 scaled MV_e1
        }
    }else{
        join multi Encoder2 Decoder1 1 scaled MV_e1
    }
}
```

Check Encoder1 bandwidth is not exceeding 9 Gbps and turn off the main stream hdmi:0 if required (optional)

```
if(get status Encoder1 video 1 == STREAMING){
    if(get bandwidth Encoder1 > 9){
        stop video Encoder1
    }
}
```

Check Encoder2 bandwidth is not exceeding 9 Gbps and turn off the main stream hdmi:0 if required (optional)

```
if(get status Encoder2 video 1 == STREAMING){
    if(get bandwidth Encoder2 > 9){
        stop video Encoder2
    }
}
```

## CHAPTER 7: MULTIVIEW

Turn off the Decoder video mute so the multiview can now be displayed (optional)

```
set video_mute Decoder2 false
```

Remove any audio from the multiview Decoder (optional)

```
leave audio_d Decoder2
```

Here is the layout with all the optional commands and logic blocks removed. This would be a minimalistic approach to a multiview preset.

Define a new layout

```
layout new MV_e1 3840 2160
```

Define layout windows

```
layout window MV_e1 0 0 540 1920 1080 0
```

```
layout window MV_e1 1 1920 540 1920 1080 1
```

Set the Decoder to multiview mode with the required display resolution

```
multiview Decoder2 MV_e1 3840 2160 30
```

Join Encoder1 to multiview window 0

```
join multi Encoder1 Decoder1 0 scaled MV_e1
```

Join Encoder2 to multiview window 1

```
join multi Encoder2 Decoder1 1 scaled MV_e1
```



## CHAPTER 8: SYSTEM SETTINGS

### 8. SYSTEM SETTINGS

All the system level settings can be accessed by admin level users by clicking the gear icon on the top of the page.

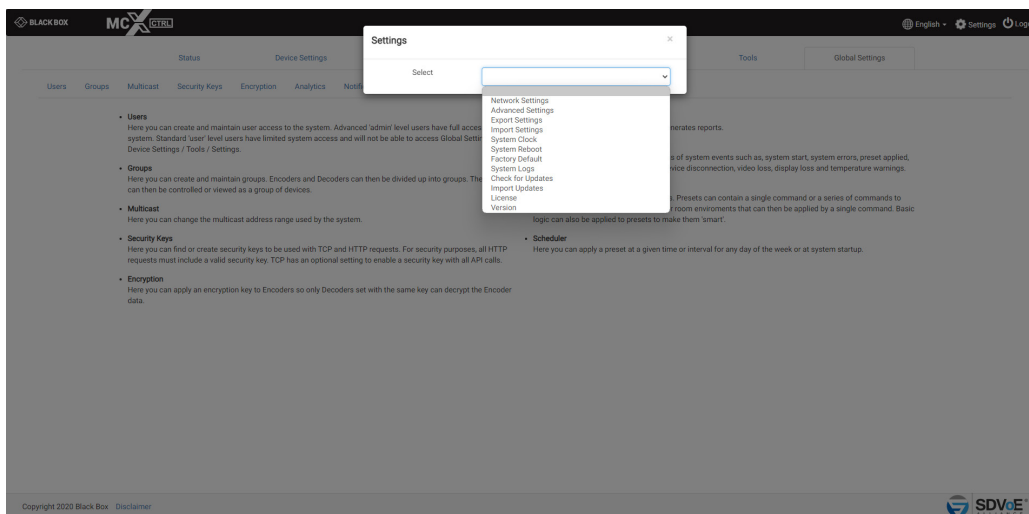


FIGURE 8-1.

## CHAPTER 8: SYSTEM SETTINGS

### 8.1 NETWORK SETTINGS

Here you can change the IP configuration of the MCX Network Management Controller. This address must be set in the same range as the Encoders and Decoders. By default the MCX Network Management Controller will be found at 169.254.1.1. Use the Finder if unable to locate the controller on the network.

A USB to Gigabit Ethernet NIC Network Adapter can be attached to the controller providing a dedicated AV Endpoint network. Black Box recommends VA-YSBC31-RJ45.

By default, the MCX G2 Controller will be found on the primary NIC at 192.168.1.1 while maintaining 169.254.1.1 for the second network.

The primary NIC is dedicated for Client and Browser communication while the secondary NIC is dedicated for AV Endpoint communication.

Only a static IP address can be applied to the secondary NIC; the primary NIC will support static or DHCP.

All AV Endpoints must be connected to secondary NIC and set in the same IP range.

Plug a display into the controller's HDMI port if you are having trouble determining the IP address.

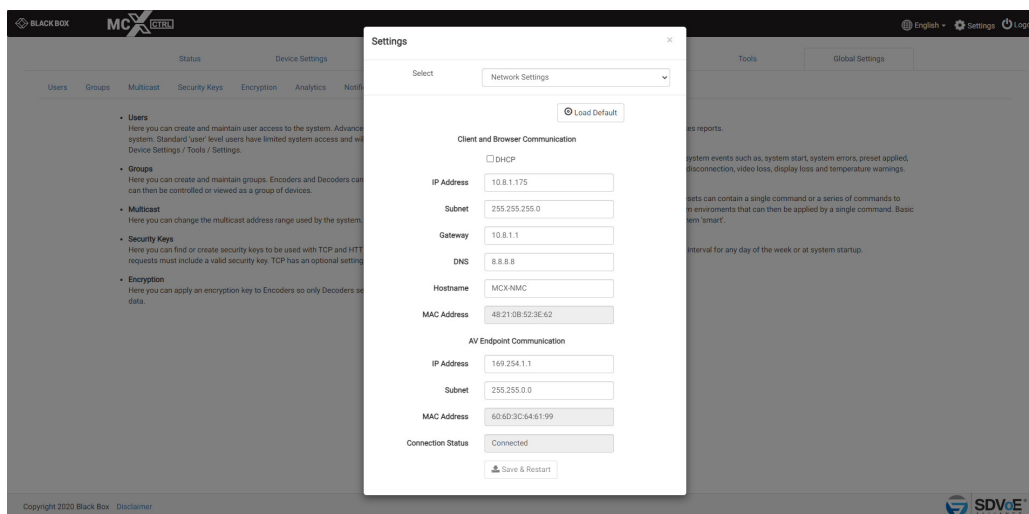


FIGURE 8-2.

## CHAPTER 8: SYSTEM SETTINGS

### 8.2 ADVANCED SETTINGS

The Advanced Settings section contains the settings of the MCX Network Management Controller.

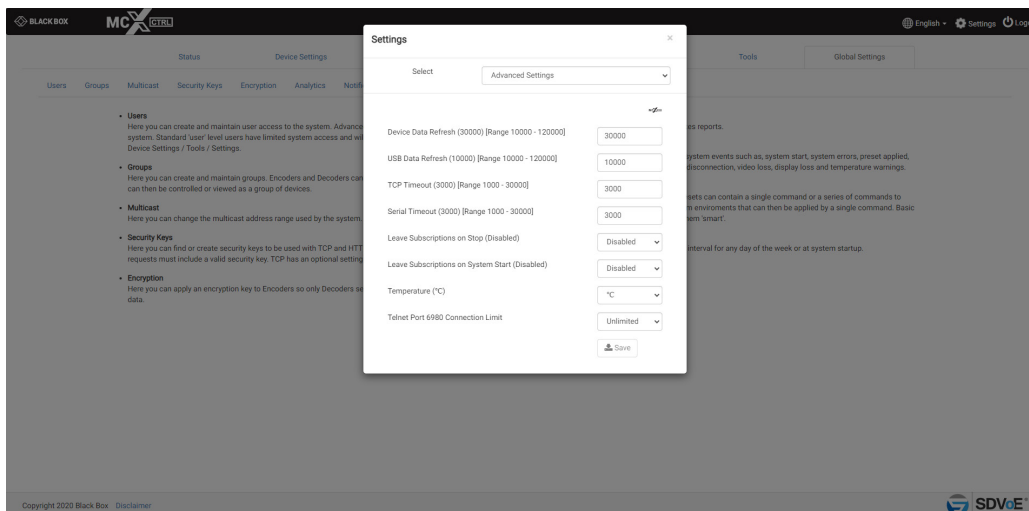


FIGURE 8-3.

#### 8.2.1 DEVICE DATA REFRESH

Device Data Refresh is the time in milliseconds the MCX Network Management Controller requests information about the Encoders and Decoders. This keeps the UI up-to-date with any changes that have occurred that do not cause an event which would automatically update data. The default is 30000 = 30 seconds with a range of 10000 – 120000.

#### 8.2.2 USB DATA REFRESH

USB Data Refresh is the time in milliseconds the MCX Network Management Controller requests information about the Encoder's and Decoder's USB. This keeps the UI up-to-date with any changes that have occurred that don't cause an event which would automatically update data. The default is 10000 = 10 seconds with a range of 10000 – 120000.

#### 8.2.3 LEAVE SUBSCRIPTIONS ON STOP

Leave Subscriptions on Stop is an optional condition of the system whereby all Decoders will leave their subscription to a stream when the Encoder's stream is stopped. The default is disabled.

#### 8.2.4 LEAVE SUBSCRIPTIONS ON SYSTEM START

Leave Subscriptions on system start is an optional condition of the system whereby all Decoders will leave their subscription to a stream when the system starts. The default is disabled.

## CHAPTER 8: SYSTEM SETTINGS

### 8.2.5 TEMPERATURE

Here you can select the system to display temperature of the Encoders and Decoders in either Celsius (°C) or Fahrenheit (°F). The default is Celsius (°C).

### 8.2.6 CONNECTIONS LIMIT

Here you can set the number of simultaneous connections to the TCP control port 6980 to unlimited or from 1 to 10 connections.

## 8.3 EXPORT SETTINGS

Export Settings will save a file named UlSettings.exp to your Downloads folder. This file contains all the settings of the MCX Network Management Controller. Use this exported file as a configuration backup that can be imported back into the system to restore the current configuration.

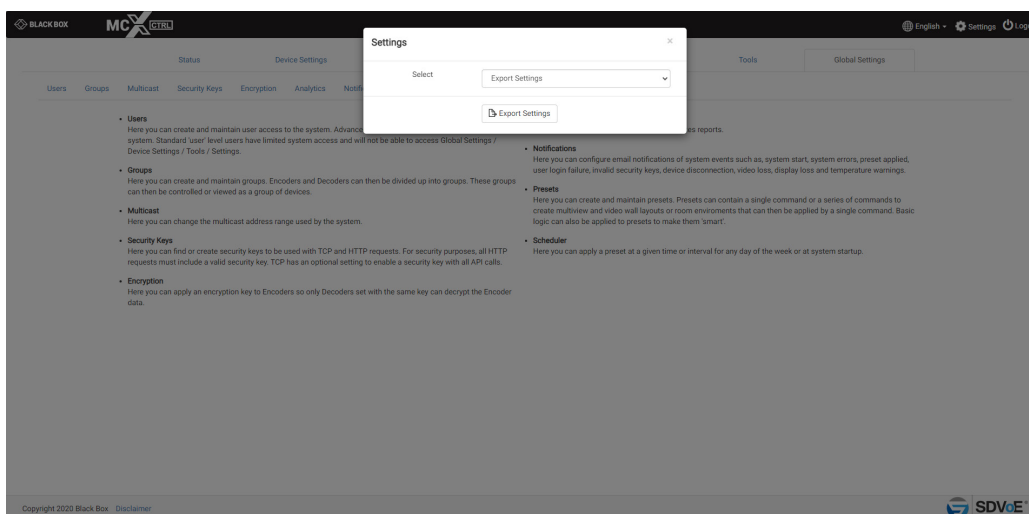


FIGURE 8-4.

## CHAPTER 8: SYSTEM SETTINGS

### 8.4 IMPORT SETTINGS

Import Settings loads an exported Ulsettings.exp file which will restore the MCX Network Management Controllers settings.

**NOTE:** This option should be used with caution, since it will reset licensing and will copy critical settings, such as NIC configuration and IP settings. It is best used as a backup tool.

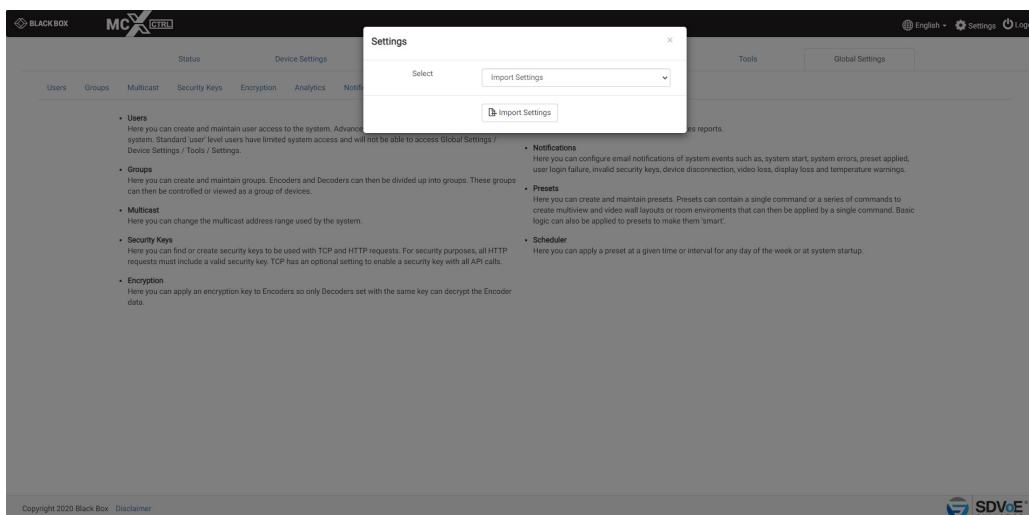


FIGURE 8-5.

## CHAPTER 8: SYSTEM SETTINGS

### 8.5 SYSTEM CLOCK

The MCX Network Management Controller contains a RTC (Real Time Clock) to maintain the correct time and date. Set your local time and date here and click the Save button to apply the changes. The system clock is used for the scheduler and also time stamping the log entries.

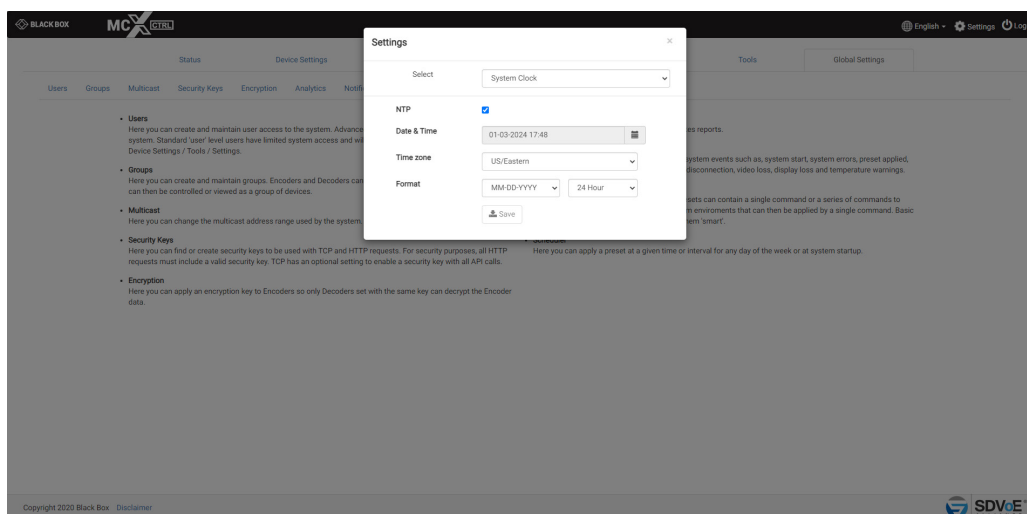


FIGURE 8-6.

## CHAPTER 8: SYSTEM SETTINGS

### 8.6 SYSTEM REBOOT

Here you can reboot the MCX Network Management Controller. It takes 90 seconds for the controller to Reboot.

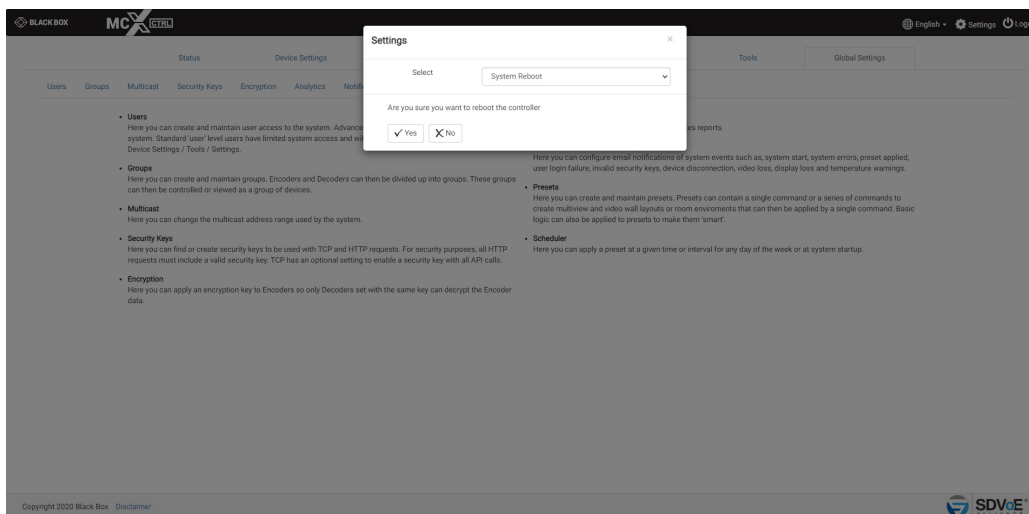


FIGURE 8-7.

## CHAPTER 8: SYSTEM SETTINGS

### 8.7 FACTORY DEFAULT

NOTE: There are two ways to restore to factory default settings. The method described in this section involves navigating to Settings/Factory Default. This method requires administrative access to the web user interface. **It should be noted that all settings and licensing will be lost upon completion of the factory default process.**

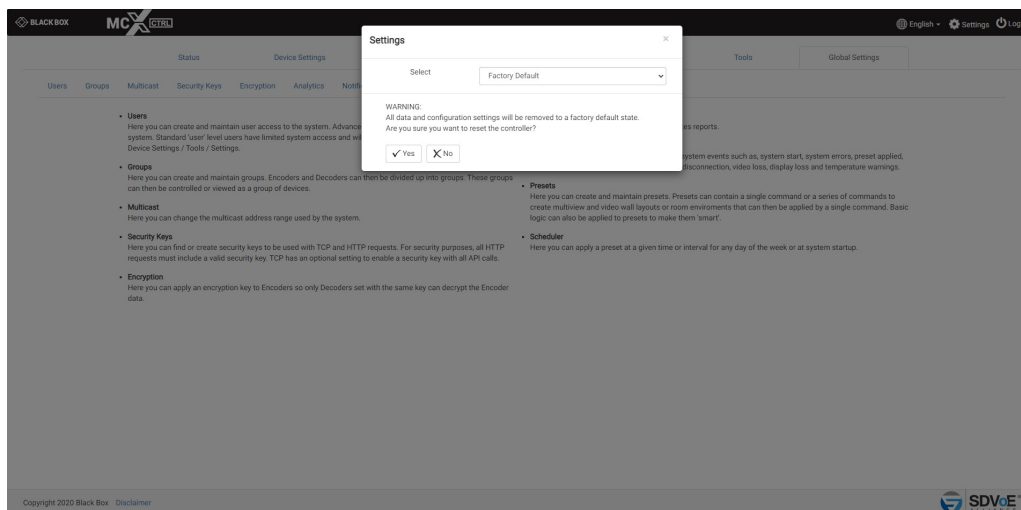


FIGURE 8-8.

The second way to achieve a factory default is described in Appendix E: Frequently Asked Questions (FAQs). This method must be used if administrative credentials are lost.

## CHAPTER 8: SYSTEM SETTINGS

### 8.8 SYSTEM LOGS

The system keeps three (3) different log files, Control Server, Software & USB. Select the required log from the dropdown list. Click the save button to export the selected log. A file named \*.exp will be saved to your Downloads folder. This file has zip compression.

#### 8.8.1 CONTROL SERVER LOG

An Control Server Log contains all the Control Server logged information.

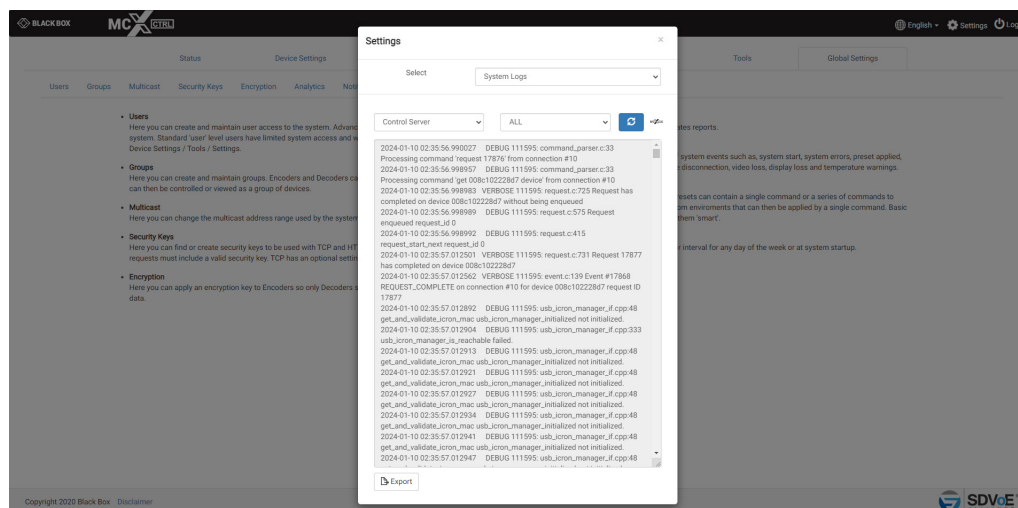


FIGURE 8-9.

## CHAPTER 8: SYSTEM SETTINGS

### 8.8.2 SOFTWARE LOG

A Software Log contains all the control layer and UI logged information.

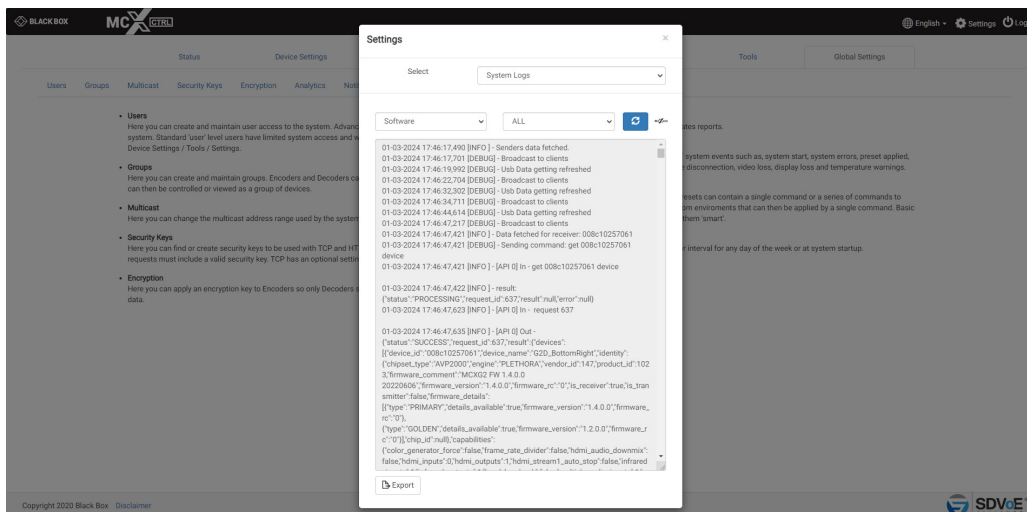


FIGURE 8-10.

## CHAPTER 8: SYSTEM SETTINGS

### 8.8.3 USB LOG

A USB Log contains USB discovery and control logged information.

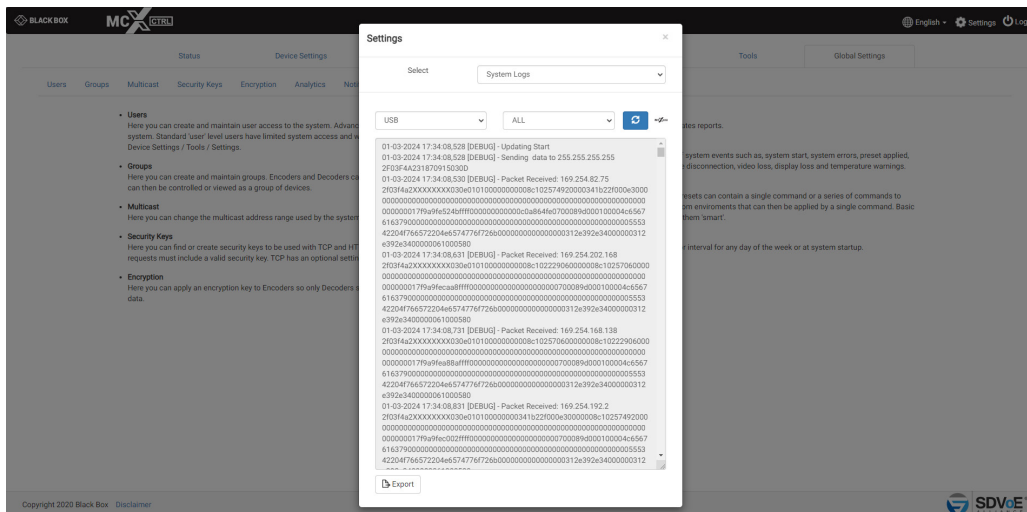


FIGURE 8-11.

## CHAPTER 8: SYSTEM SETTINGS

### 8.9 CHECK FOR UPDATES

Check for Updates will contact an ftp server over the internet to obtain the latest releases. These system updates are separated into different sections depending on the type of data to be updated.

Software is User Interface and Control Layer (API) updates MCX is MCX control layer updates

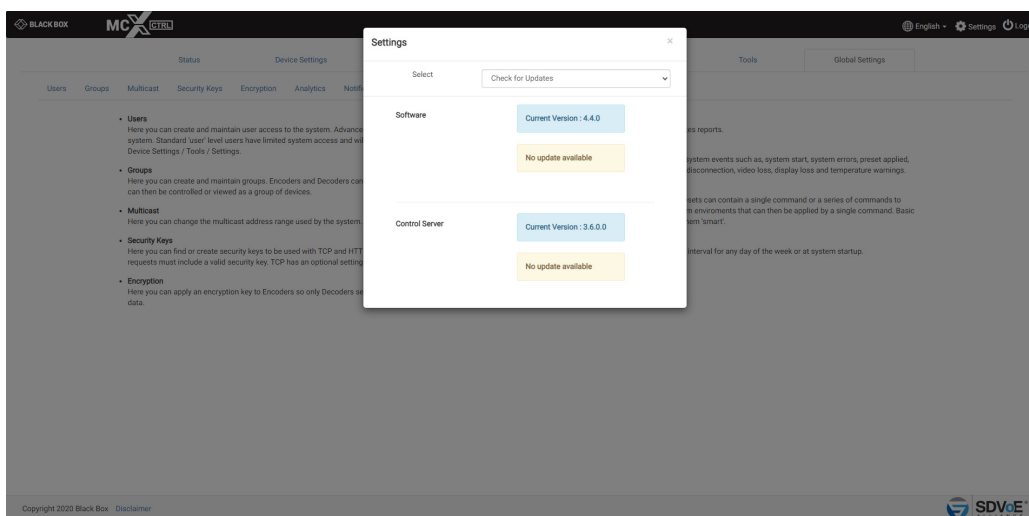


FIGURE 8-12.

## CHAPTER 8: SYSTEM SETTINGS

### 8.10 IMPORT UPDATES

When no internet access is available, you may contact Black Box to see if updates are available. If available, you can update the system. Select the type of update being performed by either selecting Software, Control Server or Device Firmware. Then click the browse button to select the required file from the file dialog popup.

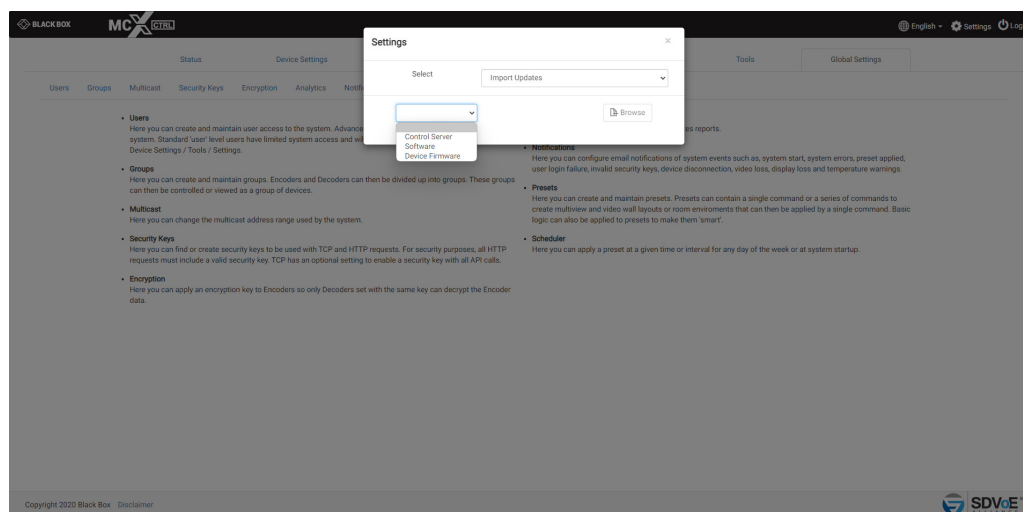


FIGURE 8-13.

## CHAPTER 8: SYSTEM SETTINGS

### 8.11 LICENSE

The SDVoE MCX Management Controller will not operate without a valid license. When the MCX Network Management Controller is used for the first time you will be prompted to enter a License Key. If a License Key has already been issued it can be entered into the system from here. Contact Black Box for all licensing requirements.

**NOTE:** This information will be needed when a factory default restoration is performed. Therefore, it should be kept in a safe place.

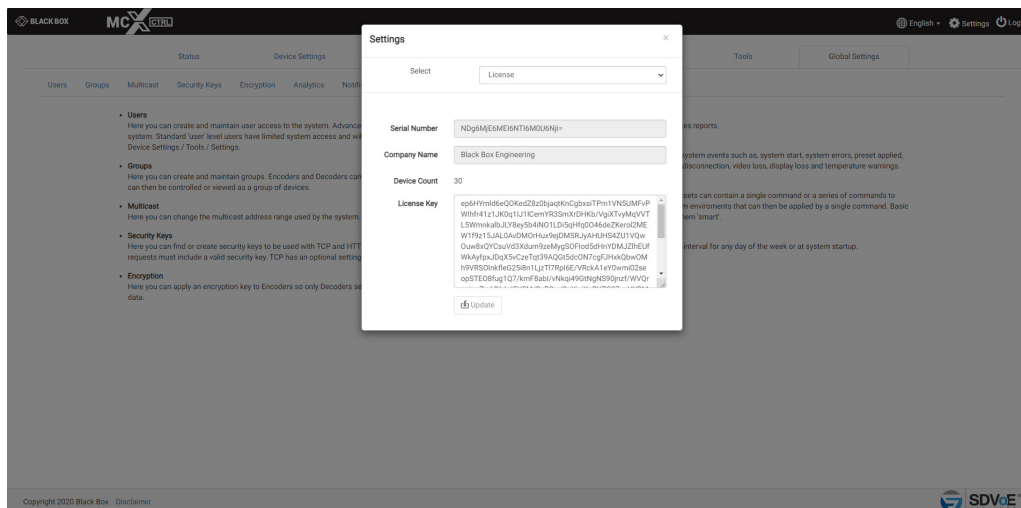


FIGURE 8-14.

## CHAPTER 8: SYSTEM SETTINGS

### 8.12 VERSION

Here you can find the current software version.

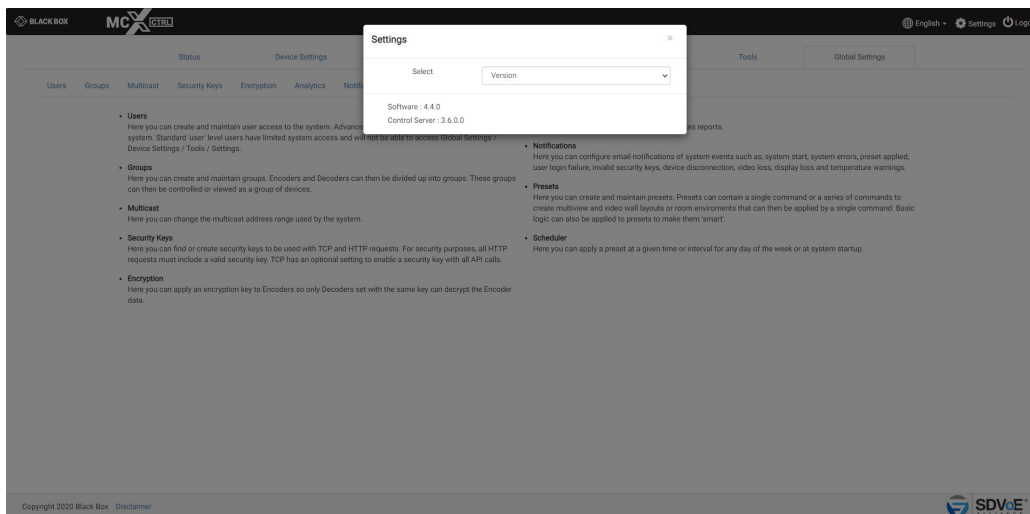


FIGURE 8-15.

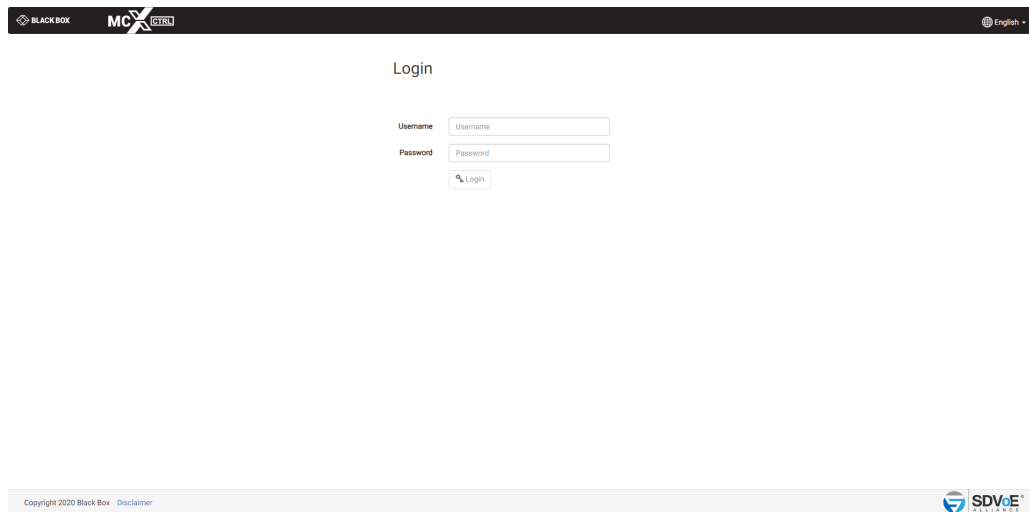
### 9. UI OVERVIEW

Initially when the SDVoE MCX Network Management Controller is first used you will be prompted to enter a Registration Key obtained from your distributor. The controllers Serial Number (as shown) along with a company name will be provided to your distributor to create the Registration Key for you. The Registration Key is also used to unlock features of MCX Network Management Controller and the number of controllable Encoders and Decoders.

The screenshot shows the registration interface of the SDVoE MCX Network Management Controller. At the top, there is a header bar with the 'BLACK BOX' logo, the 'MCX' logo, and a language selector set to 'English'. The main content area is titled 'License' and contains three input fields: 'Serial Number' (pre-filled with 'NDG6MJE6ME16NT16MOJ6N6'), 'Company Name', and 'License Key'. Below these fields is a 'Register' button. At the bottom of the page, there is a footer bar with 'Copyright 2020 Black Box Disclaimer' on the left and the 'SDVoE' logo on the right.

FIGURE 9-1.

After a successful Registration Key has been entered you will be prompted to login to the system. Initially the default login is Username: admin Password: admin. You will be forced to change the default password as the default login will no longer be allowed. From here you can change the language.



The screenshot shows the Black Box login interface. At the top, there is a dark header bar with the Black Box logo on the left, the MCX logo in the center, and an 'English' language selector on the right. Below the header, the word 'Login' is centered. Underneath, there are two input fields: 'Username' and 'Password'. Below the 'Password' field is a 'Login' button with a magnifying glass icon. At the bottom of the page, there is a light gray footer bar containing copyright information 'Copyright 2020 Black Box' and a 'Disclaimer' link on the left, and the SDVCE logo on the right.

FIGURE 9-2.

NOTE: During the initial login, you will be prompted to accept the End User License Agreement (EULA) and change the default password.

Once logged into the system, the Device Status tab will be displayed by default.  
Users will automatically be logged out after 30 minutes of inactivity.

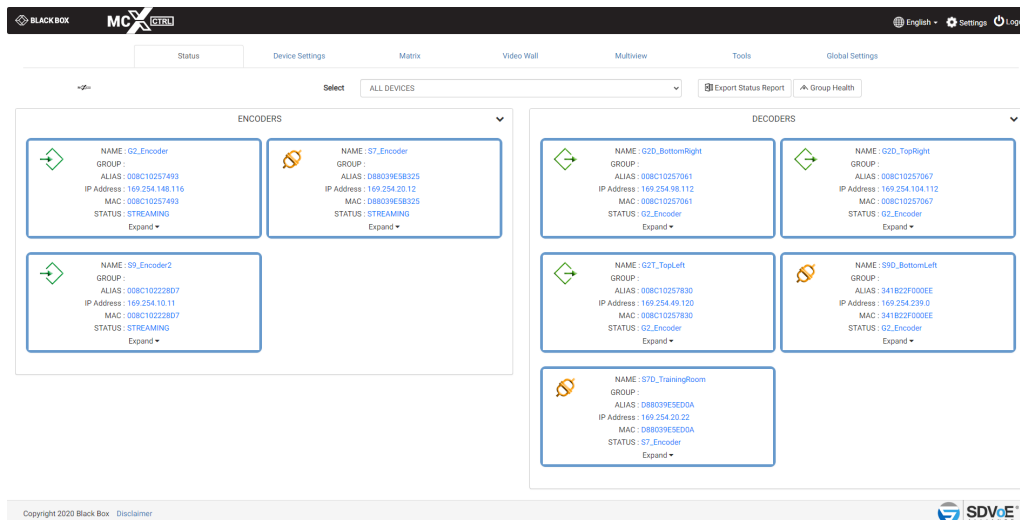


FIGURE 9-3.

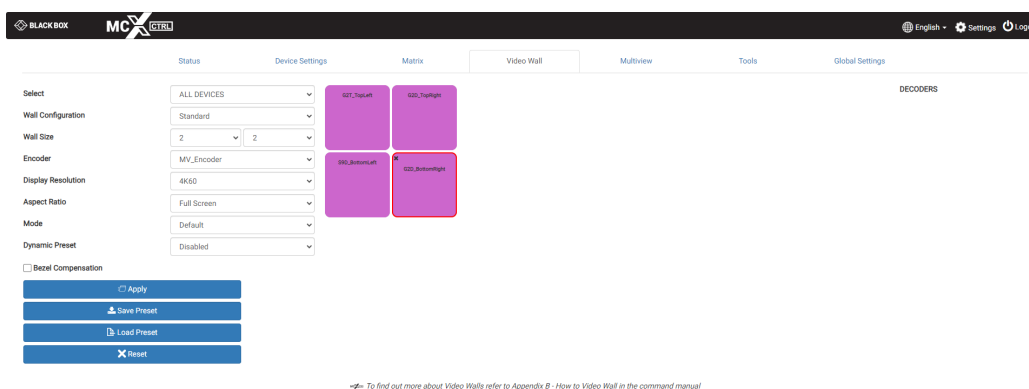


# APPENDIX A: HOW TO VIDEO WALL WITH MULTIVIEW

## APPENDIX A. HOW TO VIDEO WALL WITH MULTIVIEW

Here is an explanation on how to create a Multiview layout on a video wall. To do this there are four (4) simple steps, make a physical HDMI connection between a dedicated Decoder and Encoder, create a Video Wall preset along with Multiview presets, and lastly execute the presets. The Video Wall preset is only required to be executed once to set up the Video Wall and to select the Multiview Encoder as the video source. Multiple Multiview presets can then be executed to change the layout as required.

1. First, a dedicated Decoder is required to create an HDMI video signal containing the Multiview Layout. Let's name this Decoder MVsourceOUT. The HDMI output of this Decoder is connected to a dedicated Encoder's HDMI input which will then convert the Multiview layout video into a stream accessible on the network for any other Decoder to display. Let's name this Encoder MVsourceIN.



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FIGURE A-1.



## APPENDIX A: HOW TO VIDEO WALL WITH MULTIVIEW

- Now create a Video Wall preset using the required display layout. For this example, a 2x2 Video Wall is used and the preset is saved as sample\_VideoWall\_2x2.

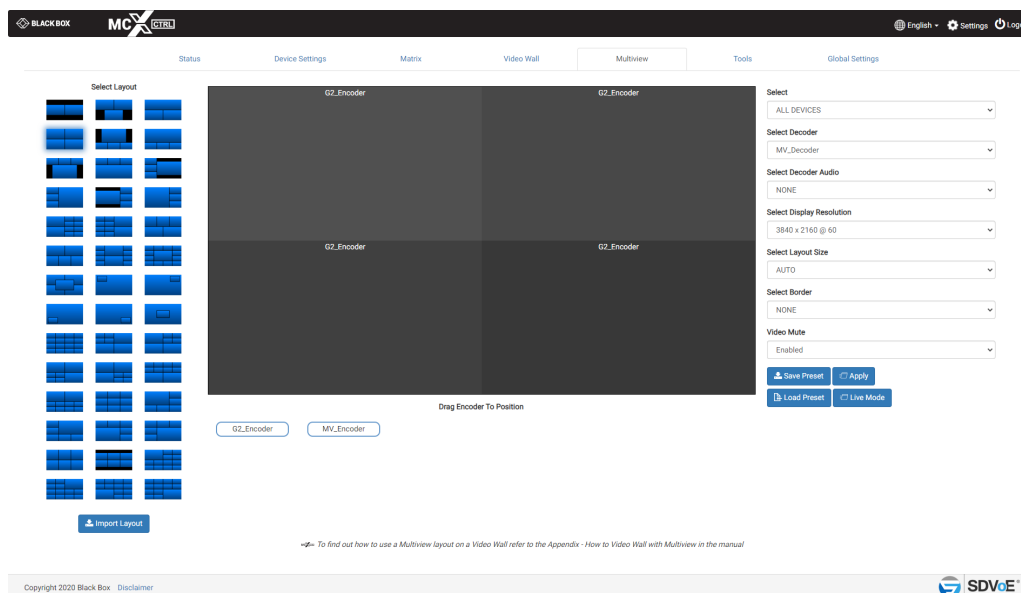


FIGURE A-2.

- Now create a Multiview layout as required using the Decoder MVsourceOUT. For this example layout #6 is used and the preset is saved as sample\_Multiview\_6.
  - Now these two presets just need to be executed. Whenever a change of the layout is required, only a different Multiview layout preset is required to be executed as the Video Wall configuration will remain the same.
- NOTE: The two presets can be combined into a single preset by editing one of them and pasting the contents of the other.

## APPENDIX B: SECURITY FEATURES

### APPENDIX B. SECURITY FEATURES

The Directory software has many security features built in which will be described in detail below. Some of these features are optional and can be enabled or disabled depending on your system security requirements.

#### 1. Required security key with all HTTP requests

The API of the system is accessible via HTTP PUT & GET requests which are protected with the addition of a security key that must be passed with each request.

The security key is accessible from the Global Settings – Security Keys tab.

#### 2. Optional security key with all TCP commands

The API of the system is accessible via TCP port 6980 which can be optionally protected with a security key that must be passed with each command.

The security key is accessible from the Global Settings – Security Keys tab.

#### 3. Leave Subscriptions on new Decoder detection

Without this feature there is a possibility that connecting a Decoder to the network could receive video and audio if already subscribed (joined) to a used Encoder's multicast address.

To eliminate this possibility any newly discovered Decoder will be issued a leave all command which will cause the Decoder to leave all video and audio subscriptions (remove joins). This feature is active only after system start and connected Encoders and Decoders are detected.

#### 4. Leave Subscriptions on Stop

This is an optional feature which can be enabled or disabled from the Settings – Advanced Settings tab.

Without this feature there is a possibility of Decoders unexpectedly receiving video and audio when an Encoder starts streaming on the same subscribed multicast address. This is optional depending on system use.

Stopping a stream can be used as a mute function for video and audio. Stop and start the stream as required and all subscribed (joined) Decoders will respond.

But on the other hand if streams are stopped because they are no longer to be used then it could be a security issue if a bunch of Decoders were left subscribed (joined) to this multicast address because even though a point-to-point join may be made between the Encoder and a single Decoder, all Decoders left subscribed to the same multicast address will receive the signal.

To eliminate this possibility when the feature is enabled a leave command will be sent to all Decoders automatically on a stop command.

#### 5. Leave Subscriptions on System Start

This is an optional feature which can be enabled or disabled from the Settings – Advanced Settings tab.

Without this feature all Decoders will still be subscribed (joined) to the same Encoders as before the system was powered off.

Some systems will be required to power on in the same state with the same joins as when powered off, while other situations this could be a security risk.

To eliminate this possibility when the feature is enabled a leave all command will be sent to all Decoders automatically on system start.

## APPENDIX B: SECURITY FEATURES

### 6. Permissions

Permissions has the ability to only allow certain Encoders to be joined with certain Decoders. Example: Encoder1 is only allowed to be joined with Decoder1, and Encoder2 can be joined with any Decoder except for Decoder2. Multiple conditions can be applied.

### 7. Encryption

Encryption can be applied to an Encoder's HDMI AV network data. A user defined key is set and only Decoders with the same key will be able to decrypt the HDMI AV network data.

### 8. User Login Failure

This is an optional feature that is part of the system Notifications functions available from the Global Settings – Notifications tab. An email can be sent after three (3) failed login attempts to the system.

### 9. Limiting simultaneous TCP connections to control port 6980

By default there is no limitation to the number of simultaneous TCP connections to control port 6980.

The number of simultaneous TCP connections can be limited between 1 and 10 from the UI Settings Advanced tab Connections Limit.



# APPENDIX C: MULTICAST MANAGEMENT

## APPENDIX C. MULTICAST MANAGEMENT

Using the default MCX allocation of multicast addresses can lead to many issues which are all managed by the software when in multicast manual mode.

All SDVoE systems work with IGMP multicast. An Encoder sends a stream on a given multicast address.

HDMI video, HDMI audio and analog audio all have separate streams with a unique multicast address assigned to each of them. Then any given Decoder on the network subscribes to these multicast addresses to receive the streams. Due to IGMP only Decoders subscribed to these streams will receive the network data.

If multicast addresses are not properly managed then it can lead to issues like mixed subscriptions whereby a Decoder expecting an audio stream can in fact start receiving a video stream and vice versa.

Why? For example, let's say a Decoder is subscribed to an audio multicast address 224.1.1.10, so we also have an Encoder streaming audio on the same multicast address. If the Encoder is stopped and freed of its multicast address, the next stream to start is then allocated by MCX that very same address because the next available address is used. So if a video stream is started it would be using the same multicast address. Any Decoders still subscribed to this address expecting an audio stream will now be receiving a video stream incorrectly.

Setting the software to Multicast Manual mode will ensure these types of mixed subscriptions can never occur by assigning a static multicast address to each stream and keeping the allocation of multicast addresses for the different stream types in different ranges.

BLACK BOX MCX CONTROL

English Settings Logout

Status Device Settings Matrix Video Wall Multiview Tools Global Settings

Users Groups Multicast Security Keys Encryption Analytics Notifications Presets Scheduler

All Multicast addresses must be between 224.0.0.0 - 239.255.255.255

IP Mode: MANUAL

Video Multicast Range Start: 224.2.1.1

Digital Audio Multicast Range Start: 224.3.1.1

Analog Audio Multicast Range Start: 224.4.1.1

RS232 & IR Multicast all Tx: 224.1.1.253

RS232 & IR Multicast all Rx: 224.1.1.254

Default Save & Restart

Manual mode is only to be used with a single controller on the network.

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SDVoE

FIGURE C-1.

## APPENDIX D: USING CUSTOM RESOLUTIONS

### APPENDIX D. USING CUSTOM RESOLUTIONS

While the UI mainly uses standard VESA resolutions, it is possible to use virtually any custom resolution required within the limits of the scaler. The scaler has a scaling limit of a factor of eight (8), and the resolution must be even. So the source resolution will be the determining factor as to what resolution the Decoder can output.

The following table indicates the scaler limits for some common resolutions:

TABLE D1

SOURCE RESOLUTION	SCALE UP MAX	SCALE DOWN MAX
1280 x 720	4096 x 2160	160 x 90
1920 x 1080	4096 x 2160	240 x 136
3840 x 2160	4096 x 2160	480 x 270

The Multiview Tab provides a custom resolution for the display, but, for anything else, a preset will need to be created and manipulated. Look for the keyword "size" in a join command.

*join fast Encoder1 Decoder1 size 1280 720 50*

Following the keyword "size" is the width, then height, then frame rate of the Decoder output resolution. Change these values as required within the limits of the scaler.

*join fast Encoder1 Decoder1 size 480 756 50*



## APPENDIX E: FREQUENTLY ASKED QUESTIONS (FAQS)

### APPENDIX E. FREQUENTLY-ASKED QUESTIONS (FAQS)

#1 Q: In Video Wall mode why do I see the video as a small image over a larger image?

A: The source resolution has reduced since the crop settings were applied.

Cropping of the source video is based on the video resolution when the source is switched to a wall layout. So when the source resolution changes, the previous crop settings are no longer valid. Re-apply the Video Wall preset so the crop settings can be applied for the current source resolution, or select Dynamic Preset which will automatically apply the correct crop settings on a change of source resolution for a standard Video Wall preset.

#2 Q: Why do I see video scrolling and or tearing in Multiview mode?

A: The network bandwidth of the Encoder and / or Decoder has been exceeded.

Check the bandwidth indicated on the Status page. Try reducing the Frame Rates of the multiview and /or main streams, or turn off the main video stream completely.

A: Incorrect layout window size.

Check the layout configuration and make sure all the windows are inline and the actual window sizes match the area available. Also check that all windows are of an even size.

#3 Q: How does an 18Gbps 4K60 4:4:4 video signal fit down a 10Gbps network?

A: The 17.82Gbps bandwidth noted for 4K60 is the bandwidth of the total HDMI signals sent down a HDMI cable, but we don't need to send the same data via the network.

A 4K60 video signal has active 3840x2160 visual pixels and actually has a total of 4400x2250 pixels including timing information. We do not need to send any of this extra information via the network as timing and other data is re-established at the Decoder before being sent to the display. So basically we don't need to send as much data over the network as there is in the HDMI cable itself. A 4K60 stream becomes about 12Gbps of video data.

Video streams are limited to around 9Gbps to allow room for 1Gbps general purpose network data. All but a few resolutions will fit down this 9Gbps pipe uncompressed and when exceeded low-latency light compression of 1.4:1 is applied for the following resolutions:

4K50-60 8-bit RGB / YCbCr 4:4:4

4K50-60 10-bit YCbCr 4:2:2

4K50-60 12-bit YCbCr 4:2:2

4K50-60 12-bit YCbCr 4:2:0

4K30 12-bit RGB / YCbCr 4:4:4

A unique compression algorithm was specifically developed with a compression ratio of just 1.4:1. When enabled, this lightweight compression ratio results in visually indistinguishable image quality. The compression codec functions in-line with the rest of the various MCX AV processing and adds only seven (7) lines of latency (<15µs for 4K60Hz). The resulting algorithm provides the industry's best results – video quality that is indistinguishable from native video, and with imperceptible latency.

#4 Q: Why are video walls limited to 8x5?

A: This is a simple matter of the number of pixels available from the original source to be displayed full screen on a given display. With a source video resolution of 3840x2160 on an 8x5 video wall results in each display rendering only 480x432 of the original video. Any less than this would result in poor picture quality with a very pixelated image. A 1920x1080 video source is worst as this only leaves 240x216 of the original video. This 480x432 / 240x216 pixel area of the original video content is then scaled up the monitor resolution of 1920x1080 or 3840x2160.

display pixel width = resolution width / number of horizontal displays display pixel height = resolution height / number of vertical displays

## APPENDIX E: FREQUENTLY ASKED QUESTIONS (FAQS)

#5 Q: What are the resolution limits of the scaler?

A: The scaler can multiply or divide by eight (8). This applies horizontally and vertically. So for example a 480x270 image can be scaled up to 3840x2160 and a 240x135 image can be scaled up to 1920x1080. Or, a 3840x2160 image can be scaled down to 480x270 and a 1920x1080 image can be scaled down to 240x136 (must be even numbers).

#6 Q: Is there a limit to the number of Encoders or Decoders I can use on the system?

A: The simple answer is no. Limiting factors will be:

- ♦ Number of licenced devices
- ♦ Network capabilities
- ♦ Multicast IP allocations

#7 Q: Why can I only have 2 or 3 video streams enabled before I loose video on the displays?

A: Flooding of the network switch, most likely due to IGMP (Internet Group Management Protocol) not being implemented or set-up incorrectly on the network switch. Without correctly configured IGMP all network switch ports will receive the multicast data from all Encoders. Once the bandwidth of a network switch port is exceed undesirable affects will occur, such as total loss or corrupted video. IGMP insures that a given network port connected to a Decoder only receives multicast data from its subscribed Encoder.

#8 Q: How many simultaneous TCP connections are allowed on control port 6980?

A: Unlimited by default but this can be limited in the UI Advanced Settings section from 1 to 10 connections.

#9 Q: Is there a limit to the number of users that can access the system at any given time?

A: There are no built-in limits to the number of users that can access the system.

#10 Q: How do I find the MCX Network Management Controller on the network?

A: The default IP of the MCX Network Management Controller will be 169.254.1.1. You can also connect a monitor to the HDMI output, and you will see the controller's IP address.

#11 Q: What can I do if I forget the admin password?

A: Prepare one USB drive formatted with FAT or FAT32, and create one file called "passwordreset.txt" on the root folder of the USB drive. Then plug the USB drive into controller. After about 10 seconds, the password will reset to default, and a file called "OK.txt" with content "password reset" will be created in the root folder.

#12 Q: How do I reset the MCX Network Management Controller to factory default without administrative credentials?

A: Prepare one USB drive formatted with FAT or FAT32, and create an empty file called "factoryreset.txt" on the root folder. Then plug the USB drive into the controller. The controller will perform the factory reset and reboot automatically, and a file called "OK.txt" with content "factory reset" will be created on the root folder. Before the system reboot is complete, do not remove the USB drive.

#13 Q: What is the actual video latency of the system?

A: This depends on the mode of operation as follows:

- ♦ Latency for unscaled video transport 12 lines without compression ( < 3840x2160@50 ) 17 lines with compression ( > 3840x2160@30 )
- ♦ Latency for scaled video transport Sync scaling: Approximately 200 lines (this varies by input and output formats) Fast scaling: 1 to 2 frames
- ♦ Latency for incorporating Multiview functionality 1 to 2 frames



## APPENDIX E: FREQUENTLY ASKED QUESTIONS (FAQS)

#14 Q: Why do I just see noise as the image?

A: This is the result of a Decoder in fast mode with an invalid encryption key.

#15 Q: Why does an Encoder not detect a video signal higher than 4K30?

A: The Encoder EDID is most likely missing the SCDC\_present bit so it is not compliant with HDMI 2.0 for resolutions greater than 4K 30Hz. Load the default 4K60 EDID into the Encoder.

#16 Q: What can cause a displays image to flicker?

A: Video signals at 30Hz in sync modes with the frame rate set to half will cause the image to flicker. Make sure all 30Hz signals do not have the frame rate set to half.

#17 Q: Can there be a redundant MCX Network Management Controller on the system?

A: As long as Multicast IP Mode is kept in "AUTO" mode more than one MCX Network Management Controller can be safely connected to the network on different IP addresses. If "MANUAL" multicast is required then both controllers must have the same multicast addresses applied for all streams.

#18 Q: What causes the image to break up?

A: This is the result of the Encoder exceeding the network bandwidth. If using the main stream, turn off the sub stream or reduce the Frame Rate to HALF.

#19 Q: Why is there video from an Encoder's HDMI port but not the DisplayPort™ input?

A: The Encoder's EDID is no compatible for the DisplayPort source. Set the Encoder's EDID to either the displays EDID or use the default 4K30 or 4K60 EDID.

## APPENDIX F: DISCLAIMER/TRADEMARKS

### F.1 DISCLAIMER

Black Box Corporation shall not be liable for damages of any kind, including, but not limited to, punitive, consequential or cost of cover damages, resulting from any errors in the product information or specifications set forth in this document and Black Box Corporation may revise this document at any time without notice.

### F.2 TRADEMARKS USED IN THIS MANUAL

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NOTES

NEED HELP?  
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SUPPORT

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**NEED HELP?  
LEAVE THE TECH TO US**

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**LIVE 24/7  
TECHNICAL  
SUPPORT**

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