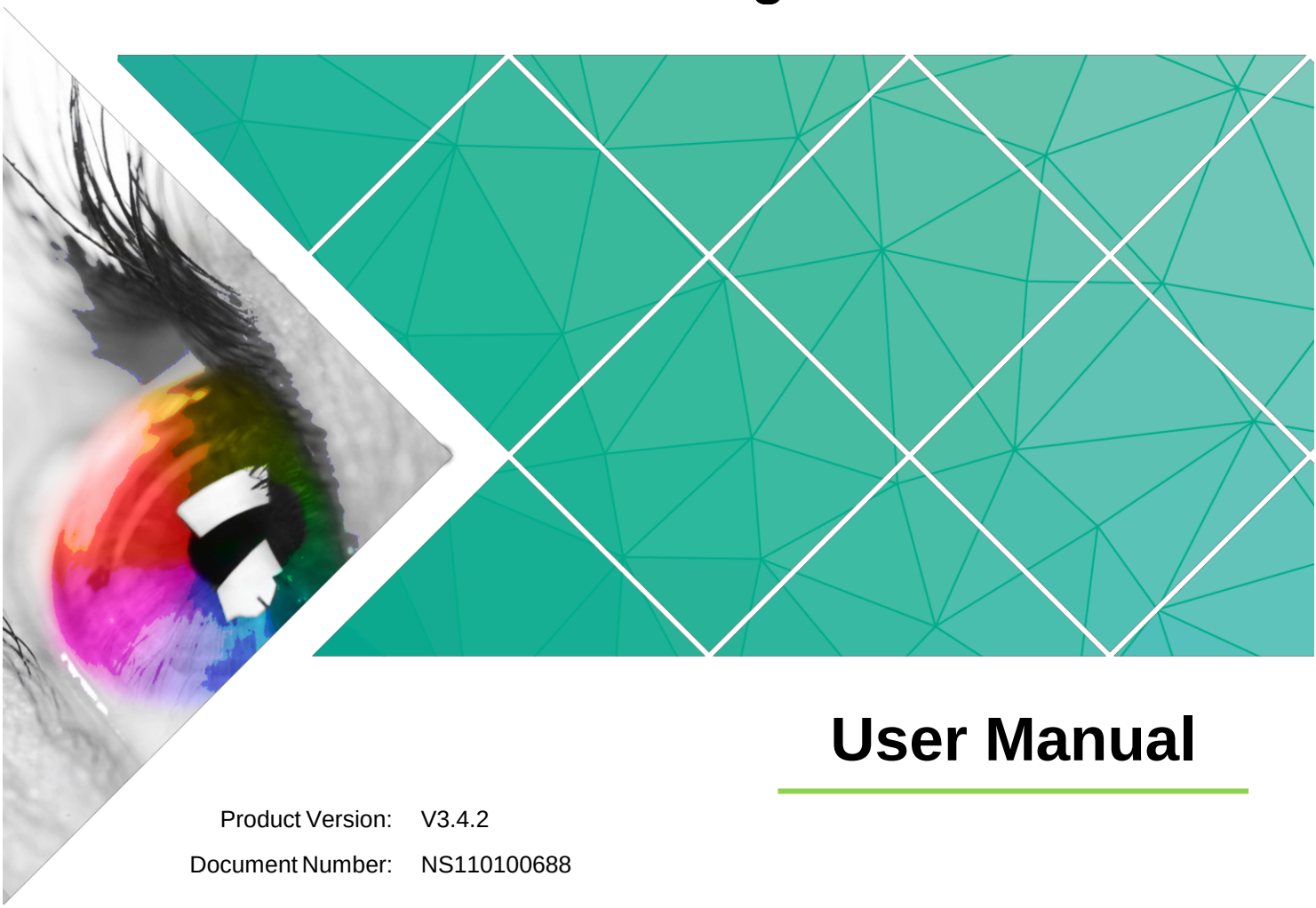
SmartLCT

Screen Configuration Software



User Manual

Product Version: V3.4.2

Document Number: NS110100688

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Change History

Version	Release Date	Description
V3.4.2	2019-01-18	Deleted the **Save** button on the seam brightness adjustment page.
V3.4.1	2018-11-21	1. Language setting is available only on the start page. 2. On the device properties page, deleted **Position** and changed **Mapping Position** to **Offset**. 3. The following functions are added in V-Sender: – Low latency (supported by the MCTRL4K and MCTRL660 PRO only) – Working as fiber converter (supported by the MCTRL660 PRO only) – 3D function (supported by the MCTRL4K only) – HDR (supported by the MCTRL4K only) 4. New cabinet connection patterns are added. 5. In the **Advanced** function on the **Edit** page, the configuration files can be sent at the same time. 6. In section 1.2 **Configuration List**, the supported driver chips are added.
V3.4.0	2018-08-03	1. Color temperature and color gamut adjustment is added. 2. The advanced mode of hot backup function is visualized. 3. Batch adjustment function is added in the Device menu. 4. The Beacon function is deleted. 5. UI language supports only Chinese and English.
V3.2.0	2017-11-30	1. Double seam brightness correction is added in **Seam Brightness Adjustment**. 2. Monitoring service and platform 3. Cabinets can rotate in 90° increments. 4. Beacon 5. Receiving card program and configuration information readback
V3.1.0	2017-05-25	1. Test Tool is added in the Tools menu. 2. When the MCTRL R5 is selected, a rotating bar appears on each of the cabinets after you add cabinets and connect them. 3. The Batch Add button is added in the tool bar. 4. The Alignment button is added in the tool bar. 5. Simple Mode is added to the Hot Backup function. 6. The Factory Reset sub-menu is added in the Settings

		menu of V-Sender. 7. Operating wizard is added to the Simple Mode of hot backup.
V3.0.0	2017-01-20	First release

Contents

XI'AN NOVASTAR TECH CO., LTD.

1 Introduction

Overview

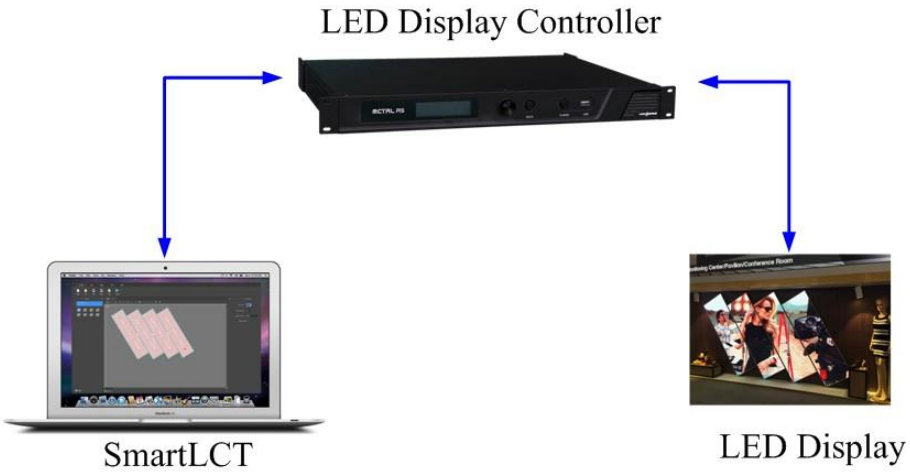
SmartLCT is the new generation of screen configuration software from NovaStar. Working with LED display controllers, it allows smart configuration of various complex LED displays, including building-block screen configuration, offline (online) design, seam brightness adjustment, cabinet rotation, etc. SmartLCT makes screen configuration much easier and further enhances user experience.

Key features:

- Screen configuration like building blocks
- Angles of image rotation supports the multiples of 90° (working with the Armor series receiving cards).
- Supports 360° free image rotation (working with the MCTRL R5).
- Supports 18bit+.
- Supports ClearView.
- Supports receiving card program and configuration information readback.
- Supports the monitoring service and platform.
- Supports seam brightness adjustment.
- The functions of video controllers can be set on V-Sender.
- Supports cabinet brightness and chroma adjustment in batches.
- Supports hot backup.
- The canvas can be exported as an image.

Operating environment: macOS 10.10 or later, Windows 7 or later

1.1 System Architecture



1.2 Configuration List

Name	Version/Model	Function	Remarks
SmartLCT	V3.4.2	Operation platform	Required
Supported LED display controllers	MCTRL300/MCTRL R5/MCTRL500/MCTRL600/ MCTRL660/MCTRL700/MCTRL4K/Thunderview_S1/MCTRL660 PRO	Send input signals to receiving cards via Gigabit Ethernet ports.	Optional
Supported all-in-one video controllers	3D HD/NovaPro HD VX2/VX2U/K2U/VX4/VX4S/VX4U/K4/K4S/K4U/VX5s/VX6s/V700/V800/V900/V900S	Process input signals.	Optional
Supported receiving cards	MRV200/MRV210/MRV220/MRV270/MRV271/MRV275/MRV281 MRV300/MRV308/MRV316/MRV320/MRV328/MRV330/MRV336/MRV340/MRV350/MRV360/MRV365/MRV366 XC100/XC150/XC200/ARN200 A4/A5/A7/A8/A4s/A5s/A7s/A8s/A9s/A10s	Drive the LED display.	Optional
Supported driver chips	MBI5036/SUM2017T/MBI5038/MY9862/TLC5929/MY9163/MBI5030/DM13H/MBI5042/SM16136/MBI5050/SM16027/SUM2018/P2510/RFT3630/SUM2030/SUM2130/MBI5034/MBI5040/MY9268/SCL8060/MBI5224/MBI5051/MBI5052/SM16158/MBI5053/MBI5153/MY9373/SM16159/MBI5252/MBI5155/MY9266/MY9366/MBI5042B/MBI5041B/MBIA043/MBI5043/SUM2028/MY9269/MBI5045/MBI5039/SUM2032/MBI5152/MBI5151	Support current gain.	Optional

1.3 Software Installation

Just like the installation of other common software, install SmartLCT V3.4.2 by following the setup wizard.

	In case that antivirus software or firewall prompts pop up during the installation, please permit them because the serial driver may need to be installed.
	The installation program will update the serial driver on the customers' computer to the version of the driver in the installation package automatically if there is no serial driver or its version is too early.

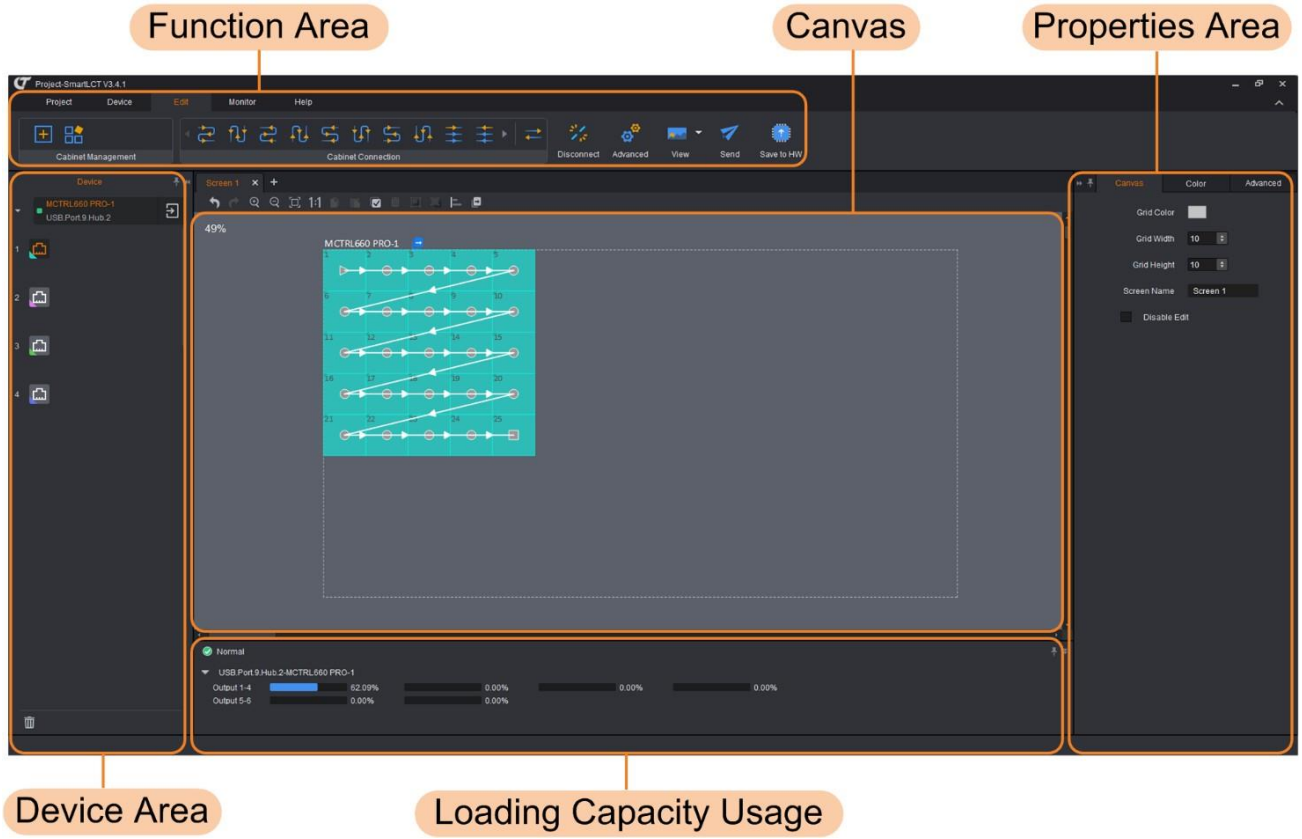
1.4 Notices

- Mac computers currently do not support MCTRL500, MCTRL700, V800, V900 or V900S.
- Do not support LED display image offset adjustment of MCTRL4K when it works in multi-card mode.
- The V-Sender module does not support the Thunderview_S1, VX5s, VX6s or MCTRL700.
- Support the cabinet configuration files (rcfgx) exported from or converted by NovaLCT V4.6.0 or later.
- The Mac computer and the sending device must be set with the same IP address and gateway when they are connected by Ethernet cable.
- Close NovaLCT before using V-Sender to update hardware program of NovaPro HD.
- Disable the auto refresh function on the monitoring configuration page before performing firmware update or factory reset operations for sending cards or receiving cards.

2 User Interface

Run SmartLCT to enter its start page.

On the start page, you can create an online or offline project, or open an existing project to enter the screen configuration page.



Function Area		Description
Project	New/Open/Save/Save As/Export	Allows you to create, save and export a project.
Device	Reconnect Device	Allows you to search for and reconnect a device, update hardware information and save it to the current file.
	Refresh Device	Reads the hardware information again.

Function Area		Description
	Hot Backup	Backup between devices and backup between the Ethernet ports of a device
	Seam Brightness	Adjusts the seam brightness of the LED display.
	Mapping	Displays the receiving card No. and Ethernet port information on the cabinets.
	Test Pattern	Verifies the display effect of cabinets.
	Factory Reset	Resets the parameters to factory defaults.
	Brightness Adjustment	Adjusts brightness of the screen.
	Batch	Adjusts cabinet brightness and chroma in batches.
Edit	Cabinet Management	Allows you to add cabinets and set cabinet size.
	Cabinet Connection	Allows you to choose the cabinet connection type.
	Delete Connection	Removes the lines between cabinets.
	Advanced	Allows you to set cabinet parameters, snapping mode between cabinets and send the configuration file at the same time.
	View	Includes front view and rear view.
	Send	Sends the display configuration file to hardware devices.
	Save to Hardware(online operation)	Sends and saves the screen configuration file to hardware devices.
Monitor	Real-Time Monitoring	Monitors cabinet status in real time.
	BER Detection	Detects data packet loss during the communication between receiving cards.
	Version Information	Displays the Ethernet port information and program version information of the controllers and receiving cards.
	Monitoring Configuration	Allows you to configure the parameters to be monitored.
Help	Test Tool	A LED display test tool developed by NovaStar can be used for editing and testing the display window. It allows you to open the preview window on the desktop and view the result of the test.
	User Manual	User manual of SmartLCT
	About	Software information

3 Language

SmartLCT is available in Chinese and English.

In the function section of the start page, click **Language** and select the language you prefer from the dialog box that appears.

4 Offline Operation

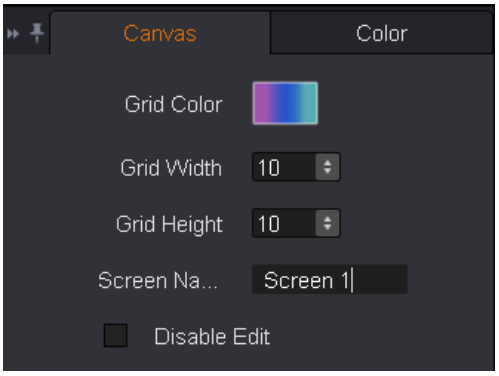
4.1 User Interface

Canvas Properties

Click a blank area of the canvas and edit the properties of the canvas in the **Canvas** tab.

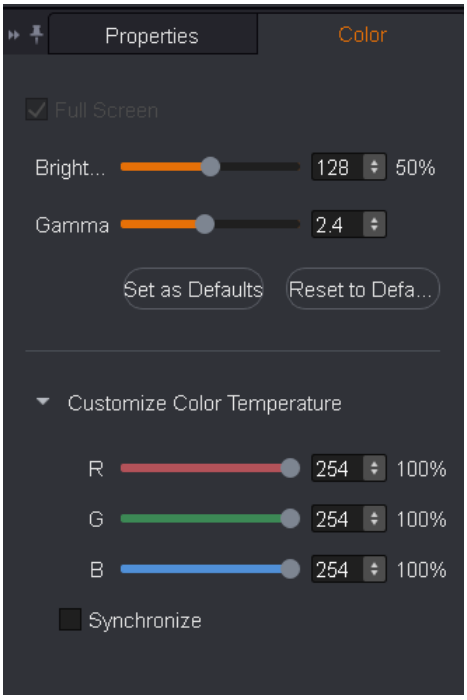
- **Grid Color**: Edit the grid color of the canvas.
- **Grid Width**: Set the grid width of the canvas (unit: pixel).
- **Grid Height**: Set the grid height of the canvas (unit: pixel).
- **Screen Name**: Set the screen name.
- **Disable Edit**: Disable all the actions in the canvas.

Figure 4-1 Canvas properties



Screen Color Settings

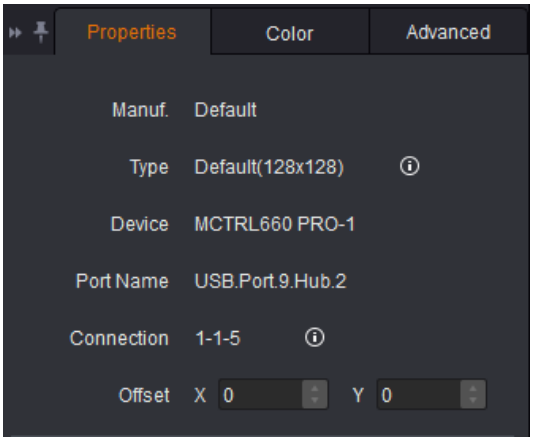
Figure 4-2 Color properties



Device Properties

Click to select a cabinet. The properties of the device and module are displayed in the **Properties** tab. In the following description, the MCTRL660 PRO is taken as an example.

Figure 4-3 Device properties



- **Connection 1-1-5**: Denotes that the sending card No. is 1, Ethernet port No. is 1, and the receiving card No. is 5.
- **Offset**: Denotes the position of the target cabinet's top-left corner on the canvas.

When the connected device supports rotation function (Currently, only the MCTRL R5 supports rotation function), the center and angle of rotation can be set in the properties of the device to achieve full rotation of the LED display.

Loading Capacity Usage

Note: If you have set the connection type to **Auto Connect**, the cabinets beyond the loading capacity of the Ethernet ports cannot be connected. If you choose to manually connect the cabinets, the cabinets beyond the loading capacity of the Ethernet ports can be connected.

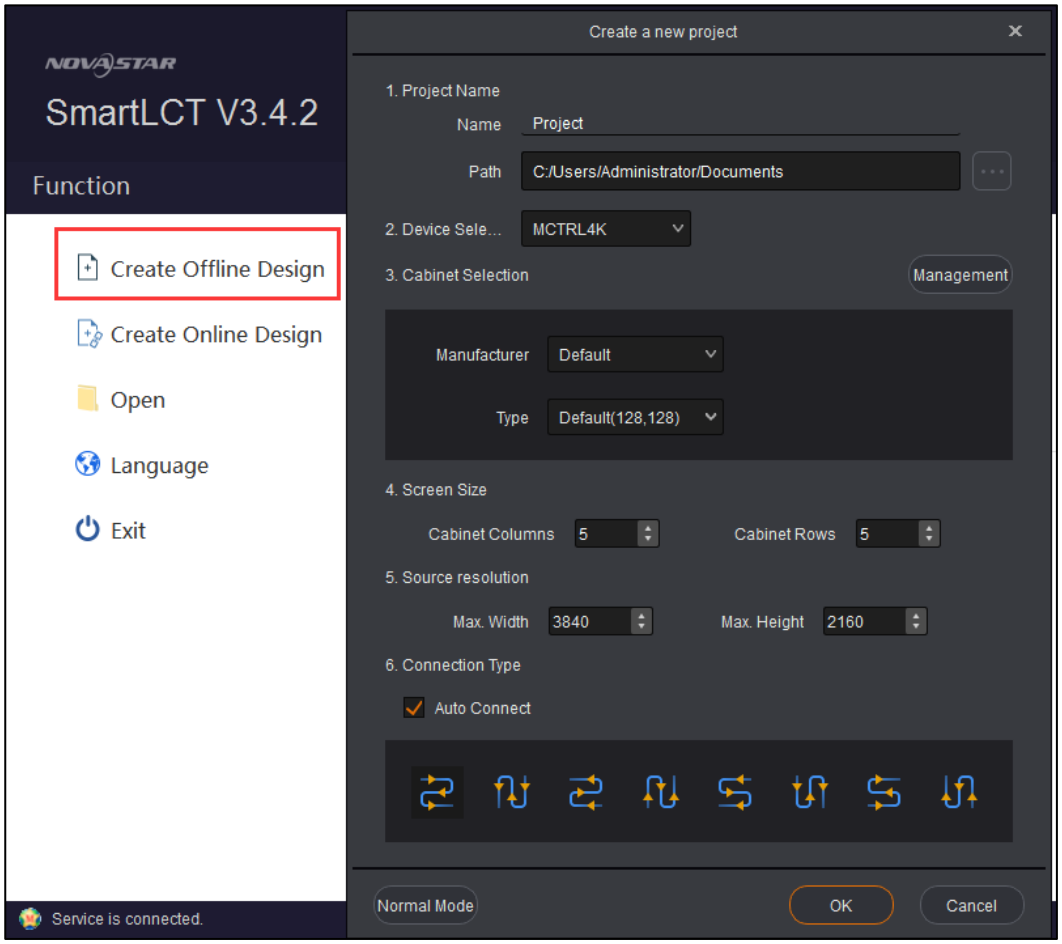
The **Loading Capacity Usage** section intuitively displays the usage of the loading capacity of Ethernet ports.

- Blue: Denotes the loading capacity is normal. When the loading capacity of the connected cabinets is within that of the Ethernet ports, the progress bar shows blue.
- Red: Denotes the loading capacity is beyond the limit. When the loading capacity of the connected cabinets exceeds that of the Ethernet ports, the progress bar shows red.

4.2 New Projects

Run SmartLCT. In the **Function** section of the start page, click **Create Offline Design** to enter the **Create a new project** page.

Figure 4-4 New project

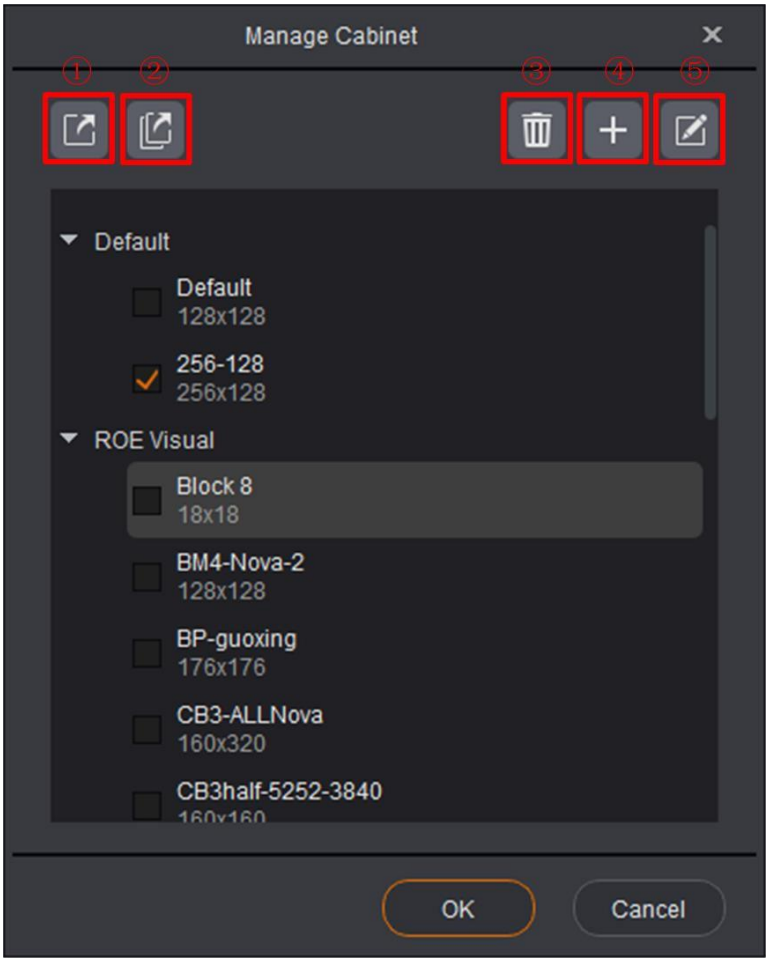


- **Project Name**: Name the project and choose a save path for the project.
- **Device Selection**: Select a video controller. Here the MCTRL4K is taken as an example.
- **Cabinet Selection**: Select the manufacturer and type of the cabinets.
- **Screen Size**: Set the columns and rows of the cabinets.
- **Source resolution**: The maximum input resolution of the device, namely the maximum screen width and height that can be loaded by the device
- **Connection Type**: Select the connection type of the cabinets. You can select **Auto Connect**.

Cabinet Management

① Export the selected cabinets: Export the cabinet file.
② Export all: Export all the cabinet files.
③ Delete: Delete cabinet files.
④ Add: Add and import cabinet files.
⑤ Edit: Edit cabinet files.

Figure 4-5 Cabinet management



Creating Modes

You can choose **Normal Mode** or **Smart Mode** when creating a new project.

- **Normal Mode**: You only need to edit the project name, choose the save path, and select the cabinet.
- **Smart Mode**: For details, see 4.2 New Projects.

4.3 Screen Configuration

After an offline project is created, you will enter the **Edit** page.

4.3.1 Adding Cabinets

Step 1 Select device type and Ethernet port type.

Step 2 In the **Cabinet Management** section, click the cabinet icons.

- : Clicking this icon allows you to add cabinets in batches.
- : Clicking this icon allows you to add a single cabinet.

Step 3 Move the mouse to the canvas, and click-and-drag to add cabinets.

4.3.2 Cabinet Connection

Connecting Cabinets

Before configuring the screen, you need to connect the cabinets. SmartLCT offers two connection methods.

Method I: Auto connect

On the **Create a new project** page, after you have selected **Auto Connect**, the cabinets will be automatically connected while you adding them in the canvas. If the loading capacity of the cabinets loaded by a single Ethernet exceeds the allowed loading capacity of that Ethernet port, auto connection will stop.

II: Manually connect

- Add cabinets in the canvas and select the target cabinets. Then, in the **Cabinet Connection** section of the tool bar, choose a cabinet connection type. If the loading capacity of the cabinets loaded by a single Ethernet exceeds the allowed loading capacity of that Ethernet port, the connection will stop.
- Add cabinets in the canvas. Then, click to select the center of the first target cabinet and then move to the center of the second cabinet, and so forth.

Note: Choose **Edit** > **Advanced** to enable or disable **Auto Connect**.

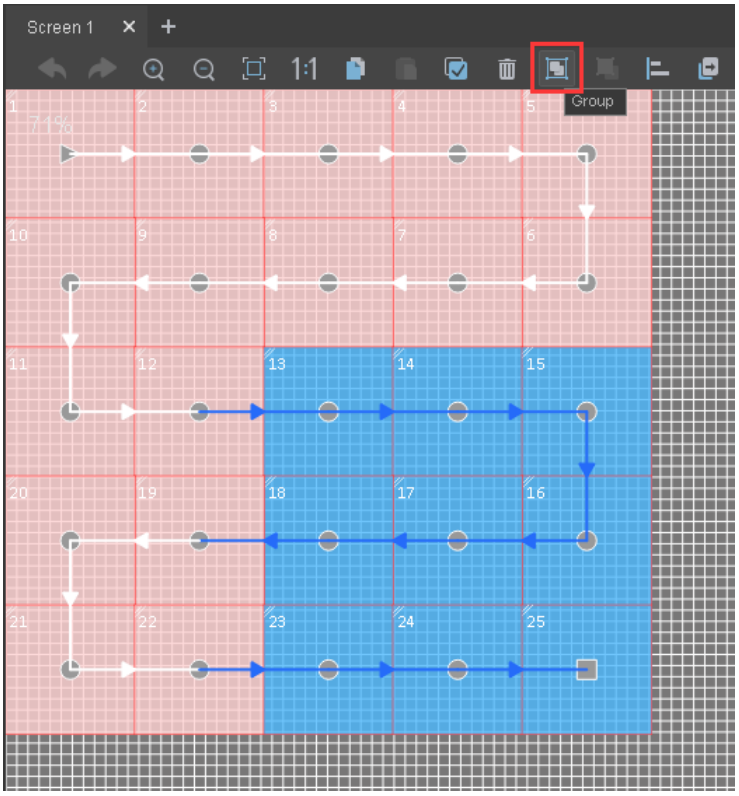
Grouping Cabinets

Step 1 In the canvas, select the target cabinets and click  (or right click to choose **Group**).

Step 2 In the **Properties** section, set the name, color and position for the grouped cabinets.

The grouped cabinets will be edited as a whole.

Figure 4-6 Grouping cabinets



Deleting Cabinet Connection

Select the target cabinets and click  in the tool bar (or right click to choose **Delete Connection**) to remove the connection between the cabinets.

Setting Cabinet Offset

After you have added cabinets and connected them, a dotted rectangle surrounding the cabinets will appear. The size of the dotted rectangle denotes the loading capacity of the currently connected device.

Coordinate system will be generated in the canvas.

Step 1 Click  , and you can drag a cabinet to change its position relative to the dashed box.

Step 2 Click  to quit the edit.

Figure 4-7 Setting cabinet offset

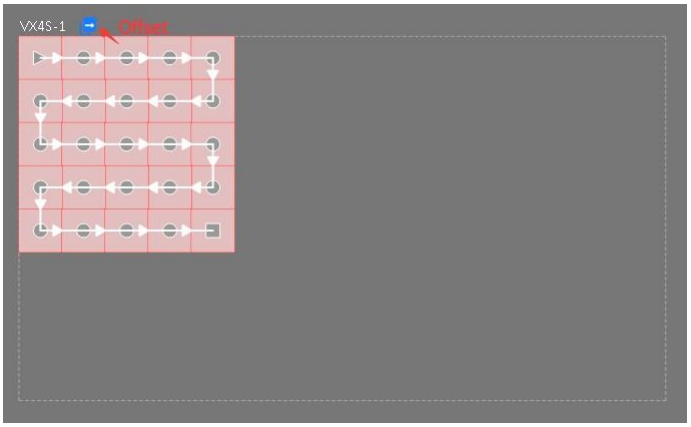
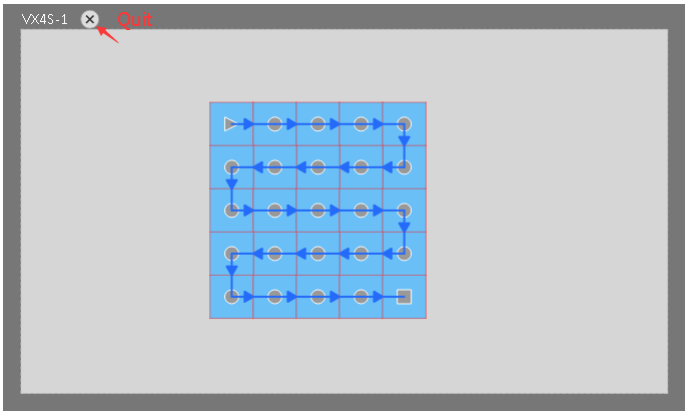


Figure 4-8 Quitting editing



Rotating Cabinets

When the added device supports rotation function, rotate the cabinets according to the following steps. The MCTRL R5 is taken as an example.

Step 1 Click . Click and rotate the rotation bar (or set the angle of rotation) to rotate the cabinets to the target position.

Step 2 Click to quit the edit.

Figure 4-9 Rotating cabinets

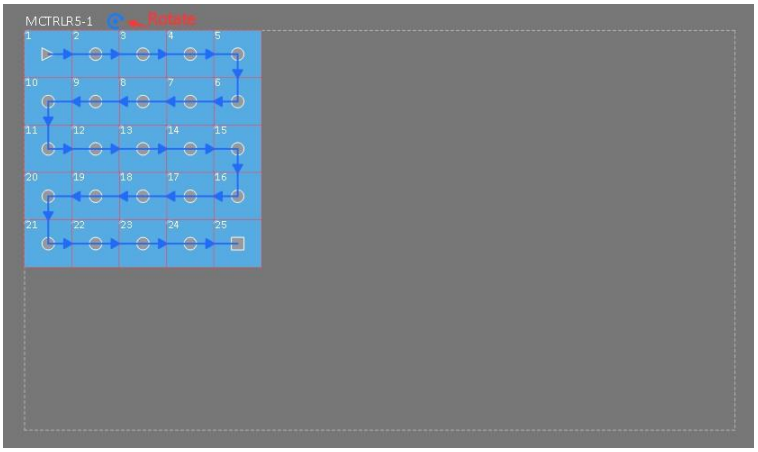
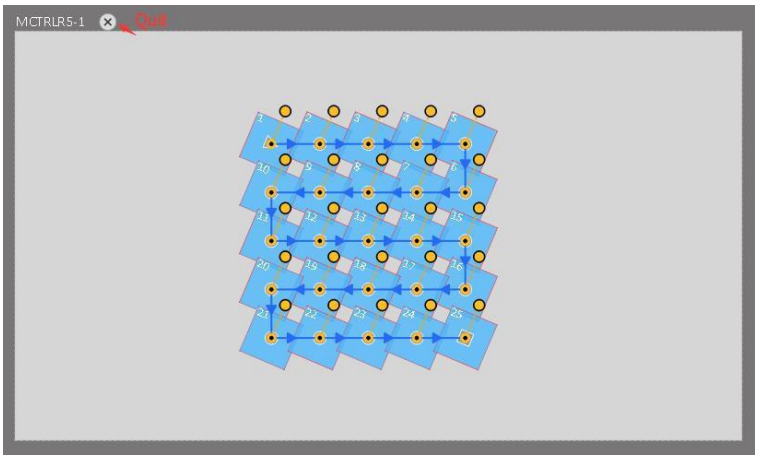


Figure 4-10 Quit editing

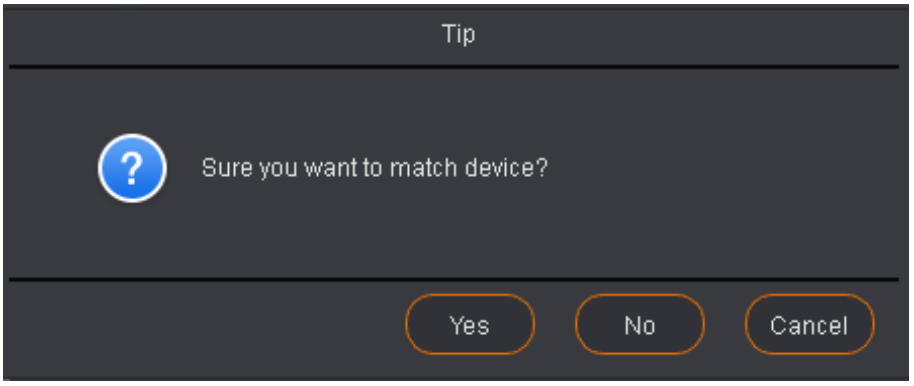


4.4 Sending Configuration Information

Step 1 In the tool bar, click  .

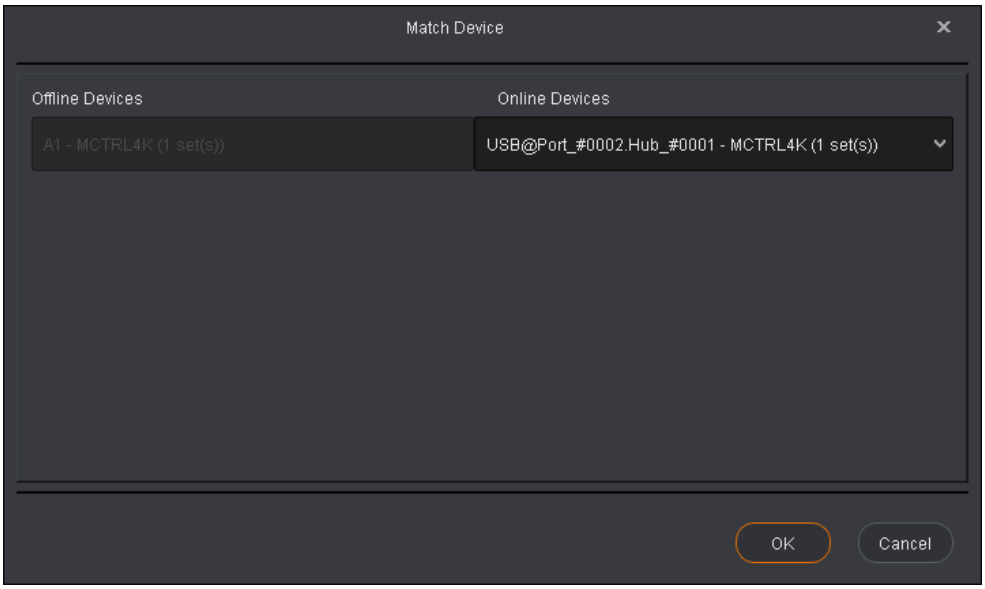
Step 2 Click **Yes** in the prompt box that appears.

Figure 4-11 Prompt box



Step 3 In the **Match Device** dialog box that appears, select the matched online device.

Figure 4-12 Matching device



Step 4 Click **OK**.

4.5 Other Operations

4.5.1 Adding Devices

Step 1 At the bottom left of the **Device** section, click . The **Add Devices** dialog box appears.

Step 2 Select device type, enter the number of the devices to be cascaded, and then click **Add**.

Step 3 Click **OK**.

4.5.2 Hot Backup

Choose **Device** > **Hot Backup**. The **Hot Backup** page appears. For detailed operation, see the page navigation.

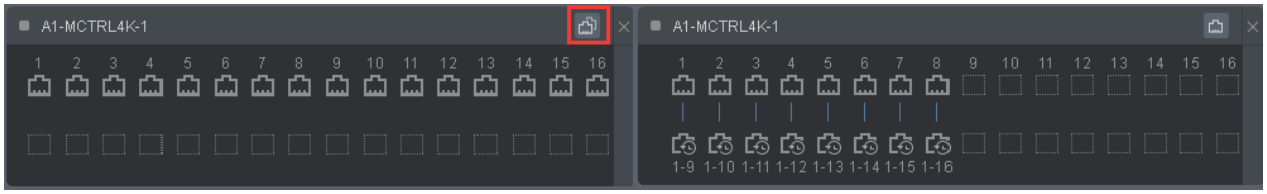
The hot backup includes backup with the device (Ethernet port backup) and backup between devices.

- Hot backup is only available for the devices with the same communication ports.
- After device backup is set, the Ethernet ports of the backup device will be the backup of the corresponding ports of the master device. The backup relations cannot be crossed and removed.

Backup Within the Device

Step 1 Add a device to the editing area.

Step 2 Click , as shown in the figure below.



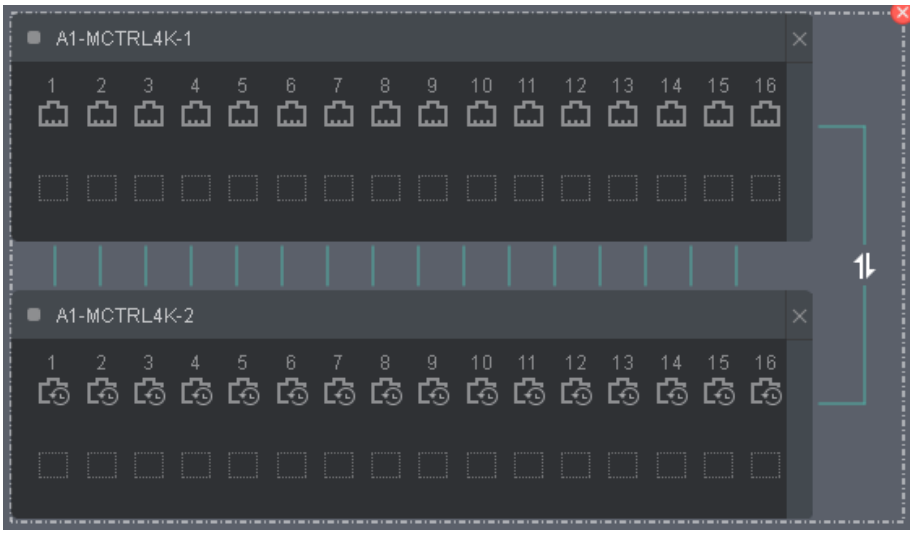
Note:

- When the Ethernet ports are backed up, click at the top right of the device to remove the backup.
- Click between two Ethernet ports to delete the line. Click at the top right of the device to delete the device.

Backup Between Devices

Step 1 Add devices that requires backup to the editing area.

Step 2 Drag a device onto another device, and the backup can be done automatically. Or click the small triangle in the right side of the device, drag to the small triangle of the other device and click to complete the backup.



Note:

- When the backup is done, the icon appears on the line between the two devices. Click this icon to switch between master and backup.
- Click at the top right of a device to delete the device.
- Click at the top right of the dashed box to remove the backup.
- The slave device cannot be used for screen configuration.

Switch Between Master and Slave Devices

Before backup, click the toggle button on the right of a device to set it as the master device or backup device.

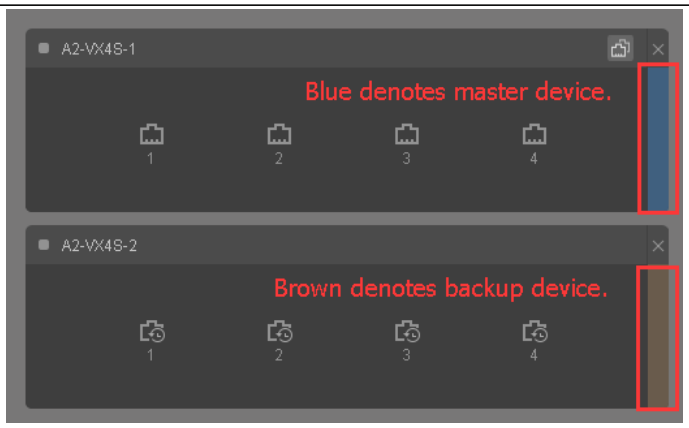


Table 4-1 Ethernet port description

Icon	Description	Icon	Description
	Connection of the primary port is not available.		Connection of the primary port is available.
	The backup port is enabled.		The port is not backed up.
	The backup port is not enabled.		The port is backed up.
	Backup device		Master device

5 Online Operation

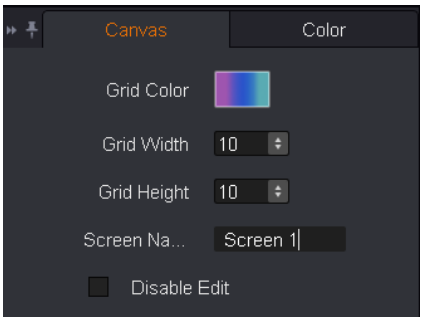
5.1 User Interface

Canvas Properties

Click a blank area of the canvas and edit canvas properties in the **Canvas** section.

- **Grid Color**: Edit the grid color of the canvas.
- **Grid Width**: Set the grid width of the canvas (unit: pixel).
- **Grid Height**: Set the grid height of the canvas (unit: pixel).
- **Screen Name**: Set the screen name.
- **Disable Edit**: Disable all the actions in the canvas.

Figure 5-1 Canvas properties



Screen Color Settings

This is used to set color parameters of the screen.

- Supports custom brightness, Gamma and color temperature.
- Supports 18 bit grayscale mode.
- Supports ClearView.
- Supports calibration type selection.
- Supports custom color gamut.
- Supports PAL or NTSC.

Figure 5-2 Color properties

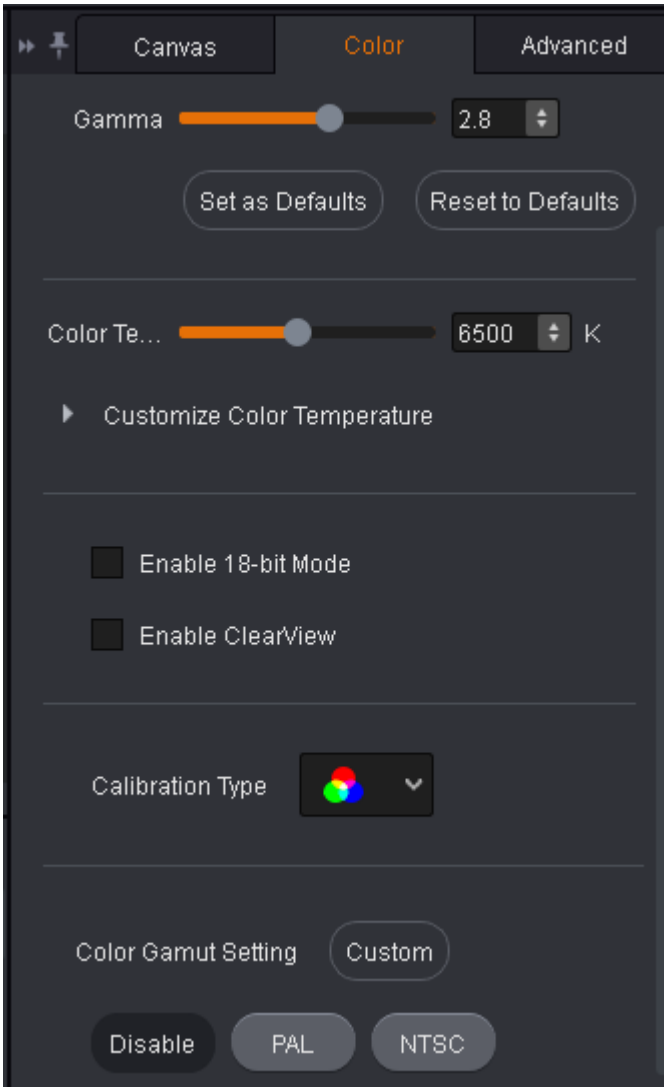


Figure 5-3 Color gamut settings

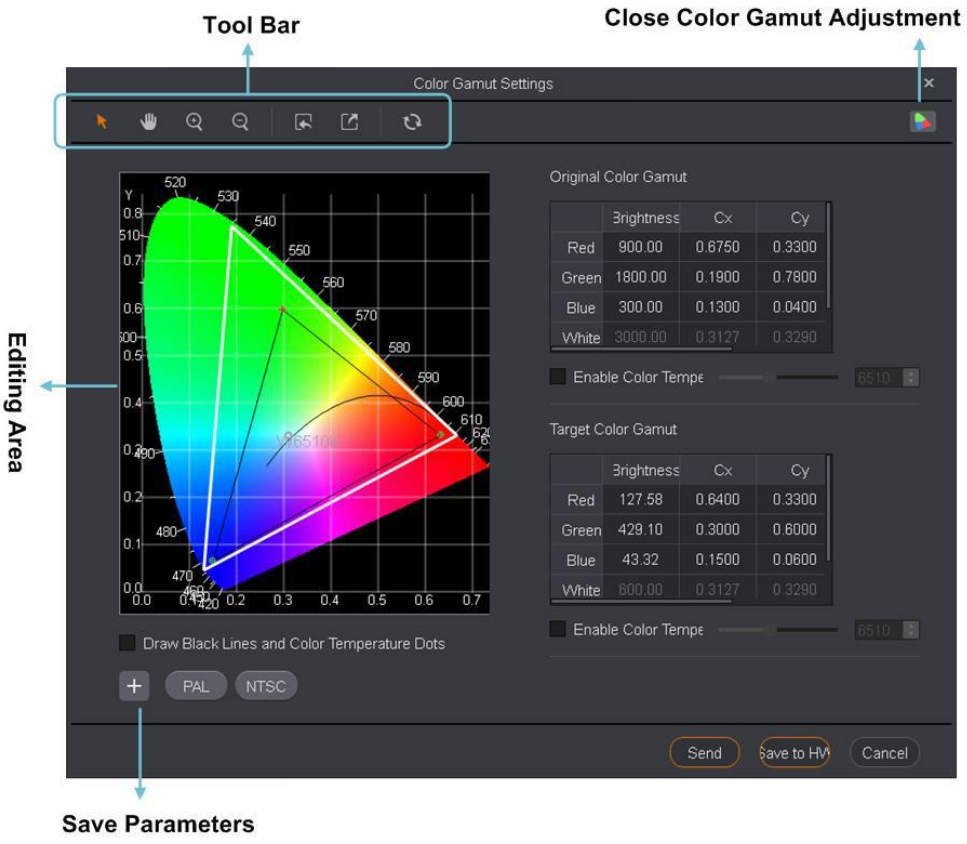


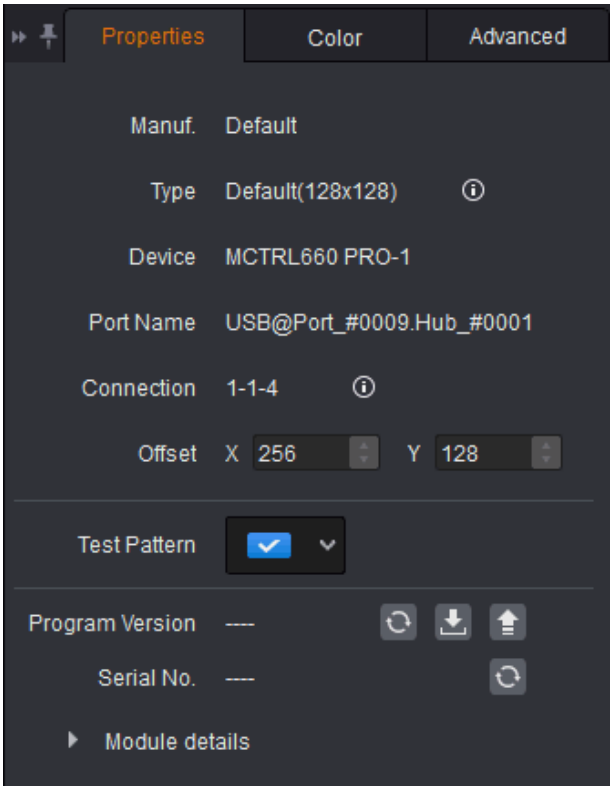
Table 5-1 Description of color gamut settings page

Name		Description
Tool bar		Enable editing.
		Disable editing.
		Zoom in editing area.
		Zoom out editing area.
		Import configuration files.
		Export the parameters as a configuration file.
		Reset the color information.
Editing area		Click-and-drag the enabling point to set target color gamut.
		Close the color gamut adjustment.
		Save the color gamut parameters.
		Analog television color system

Send	Send color gamut parameters to user terminals.
Send to HW	Save color gamut parameters to the sending device.

Device Properties

Click to select a cabinet. The properties of the device is displayed under the **Properties** tab. In the following description, the MCTRL660 PRO is taken as an example.



- **Connection 1-1-4**: Denotes that the sending card No. is 1, Ethernet port No. is 1, and the receiving card No. is 4.
- **Position**: Position of the selected cabinet's top-left corner on the canvas
- **Test Pattern**: This is used for verifying the display effect of the screen.
- **Program Version**: This is used to refresh, download or upgrade the version of the receiving card program.
  - : Read back the version of the receiving card firmware for a single cabinet.
  - : Read back the firmware program of the receiving card for a single cabinet.
  - : Upgrade receiving card firmware program for a single or multiple cabinets.
- **Module details**: This is used to show operating status of the module.

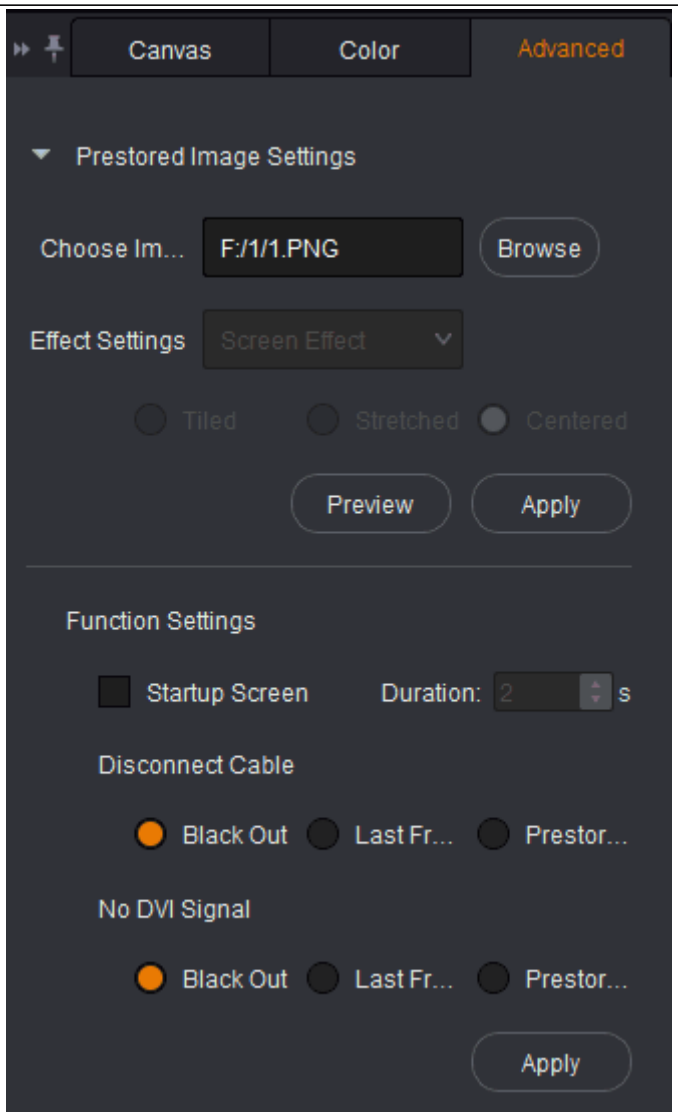
Note:

When the connected device supports rotation function (Currently, only the MCTRL R5 supports rotation function), the center and angle of rotation can be set in the properties of the device to achieve full rotation of the LED display.

Advanced Settings

On the **Advanced** tab page, you can set the prestored image and the startup screen status.

- Prestored image settings
  a. Click **Browse** to add an image.
  b. Click **Preview** and select a display effect for the image from the **Effect Settings** drop-down list. The effect is shown in real-time on the left of screen.
  c. Click **Apply** to save the settings to the connected device.
- Function settings
  - Enable/Disable the startup screen function.
  - Set the duration to play the startup screen image.
  - Set the LED display playback status on startup for the situation where the Ethernet cable is disconnected.
  - Set the LED display playback status on startup for the situation where there are no DVI signals.



Loading Capacity Usage

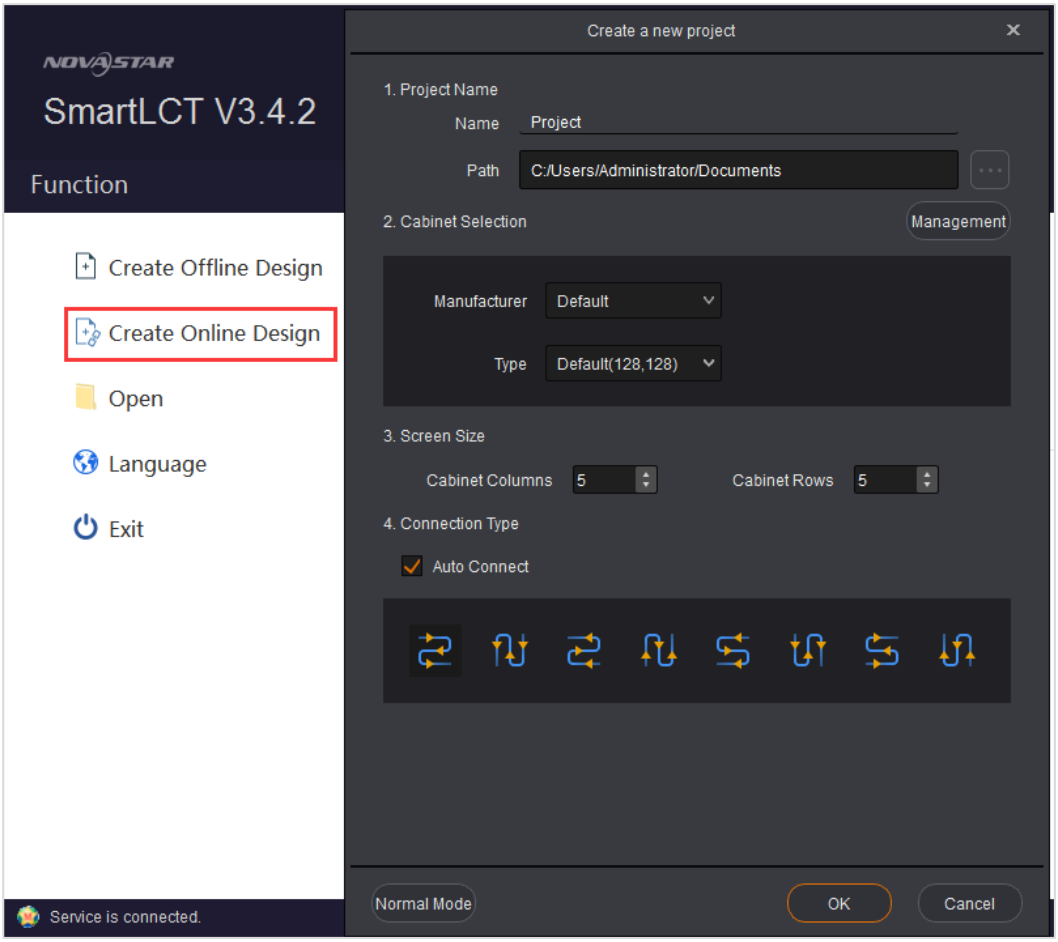
The **Loading Capacity Usage** section displays the usage of the loading capacity of Ethernet ports.

- Blue: Denotes the loading capacity is normal. The length of the blue bar indicates the used capacity of the Ethernet port.
- Red: Beyond the loading capacity. Cabinets exceeding the loading capacity cannot be connected.

5.2 New Projects

Step 1 Run SmartLCT. On the start page, click next to **Device List** to refresh the device list and screen list.

Step 2 In the **Function** section, click **Create Online Design** to enter the **Create a new project** page.



- **Project Name**: Name the project and choose a save path for the project.
- **Cabinet Selection**: Select the manufacturer and type of the cabinets.
- **Screen Size**: Set the columns and rows of the cabinets.
- **Connection Type**: Select the connection type of the cabinets.

5.3 Screen Configuration

After an online design is created, the edit page will be displayed.

5.3.1 Adding Cabinets

If the system is connected with receiving cards, it can read the cabinet size automatically.

Step 1 Select an Ethernet port type.

Step 2 In the **Cabinet Management** section, click the cabinet icons.

- : Clicking this icon allows you to add cabinets in batches.
- : Clicking this icon allows you to add a single cabinet.

Step 3 Move the mouse to the canvas, and click-and-drag to add cabinets.

5.3.2 Cabinet Connection

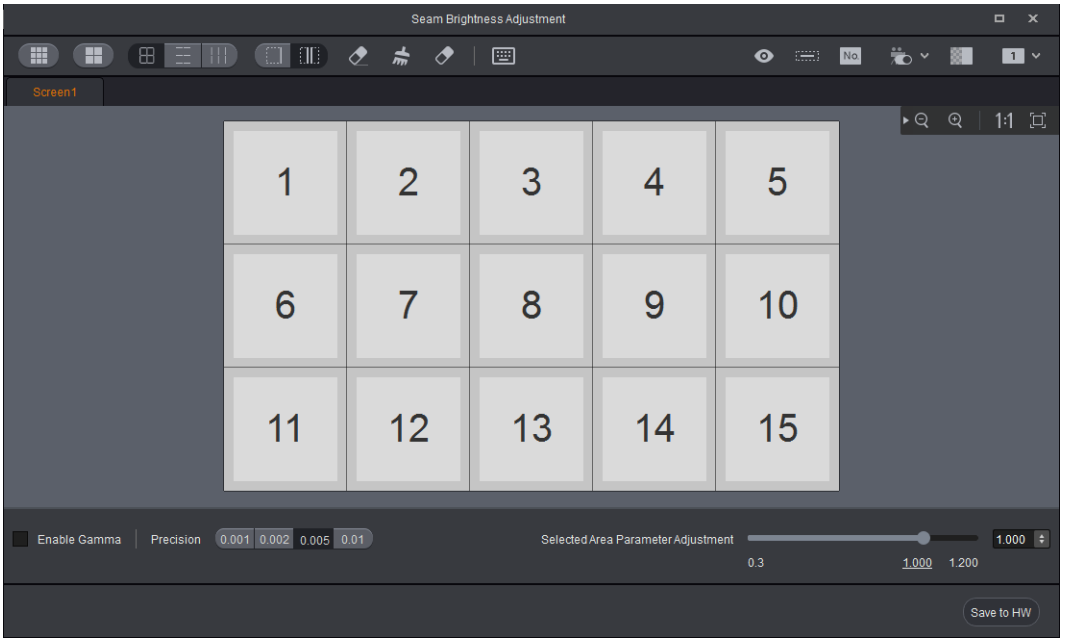
For detailed operation of cabinet configuration, see 4.3.2 Cabinet Connection.

5.4 Seam Brightness Adjustment

Before you begin: Configure the LED display (that is, add cabinets and connect them).

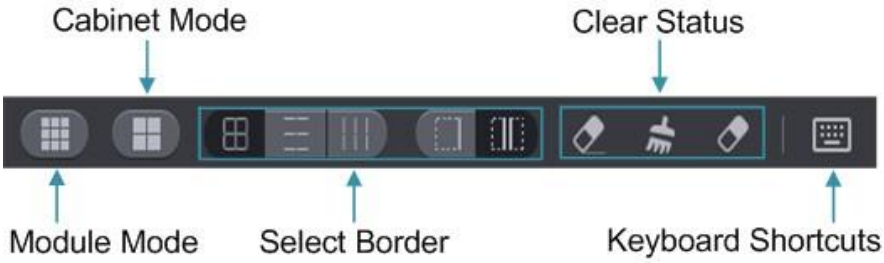
5.4.1 User Interface

Figure 5-4 Seam brightness adjustment page



- **Save to HW**: Save seam brightness adjustment parameters to the sending device.

Figure 5-5 Tool bar introduction



Tools	Description
Module mode	Split the added cabinet into different areas by module.

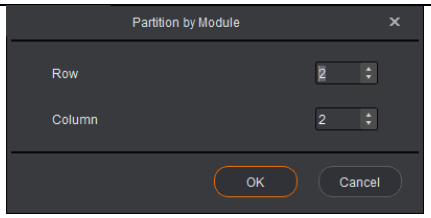
	
Cabinet mode	Recover the split cabinet.
Select border	Select row and column/Select row/Select column/Select single border/double borders Demonstration: Choose **Row Selection**, then click-and-drag to choose the cabinet or click to choose horizontal borders of the cabinet.
Clear status	Clear selected status/Clear effect of all borders /Clear effect of selected borders
Keyboard Shortcuts	Set keyboard shortcuts Set keyboard shortcuts and use them for cabinet mode selection and borders settings.

Figure 5-6 Setting of shortcuts

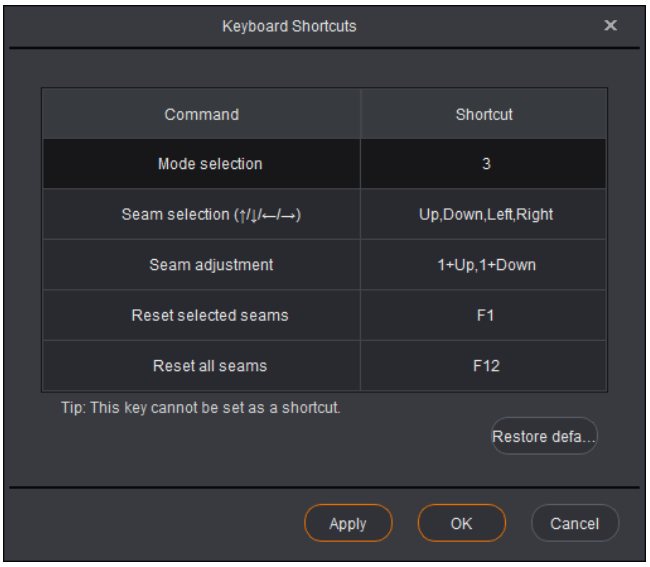
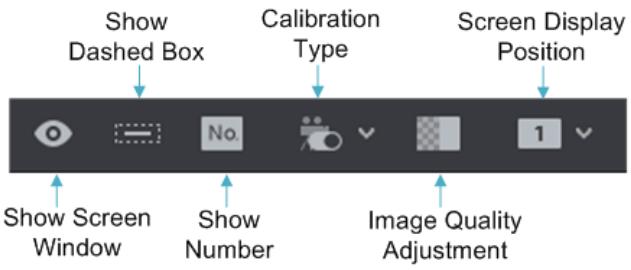


Figure 5-7 Tool bar introduction



Tools	Description

Show screen Window	Show (or hide) display window.
Show Dashed Box	Show (or hide) dashed box of the selected borders.
Show Number	Show (or hide) serial number of the display window.
Calibration Type	Close calibration/Chroma calibration/Brightness calibration Close calibration: The effect of seam brightness adjustment is not shown on the screen. Chroma calibration/Brightness calibration: Screen calibration modes.
Image Quality Adjustment	Red/Green/Blue/White Testing color on the display window (or LED screen)
Screen Display Position	Switch position of the display window.

Description of Border Colors

Gray	Indicates the LED is not selected and the parameter is not adjusted.	Blue	Indicates the LED is selected and the parameter is not adjusted.
Light green	Indicates the LED is not selected and the parameter is already adjusted.	Dark green	Indicates the LED is selected and the parameter is already adjusted.

5.4.2 Seam Brightness Parameter Adjustment

Step 1 Choose **Device** > **Seam Brightness** to enter the seam brightness adjustment page.

Step 2 Select the target border, and the border will become blue.

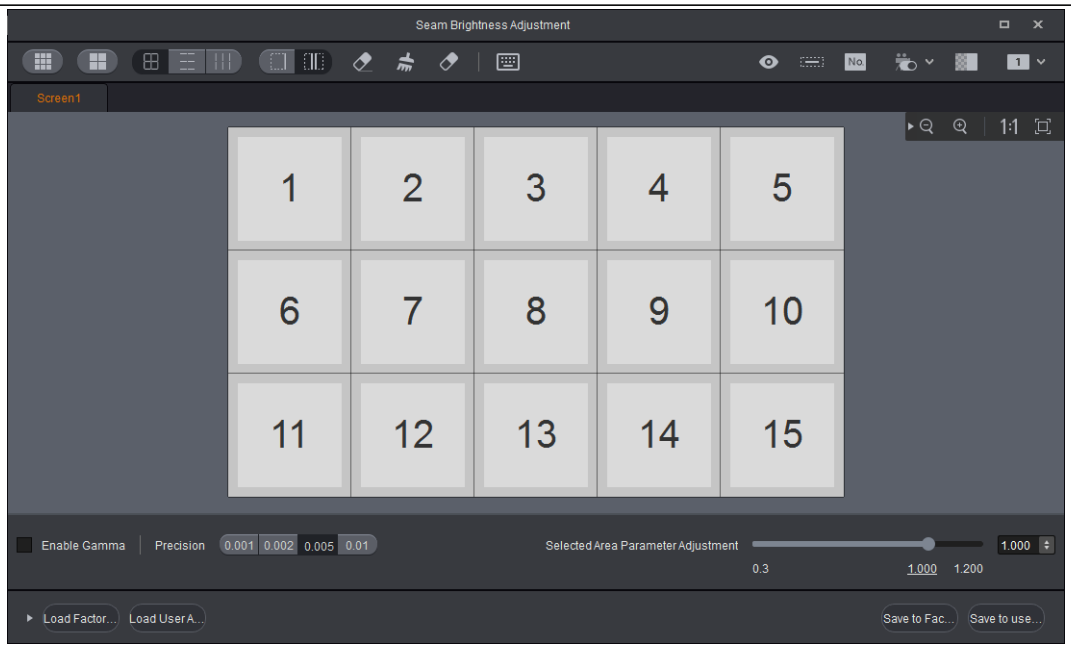
Step 3 (Optional) Choose precision of the adjustment.

Step 4 Drag the slider next to the **Selected Area Parameter Adjustment** to adjust seam brightness parameters, and the borders will become green.

Step 5 Type “**admin**” to access the factory area and user area settings page.

- **Save to Factory Area**: Save seam brightness adjustment parameters to the factory area of the receiving card. These parameters will be used for maintenance after the cabinet is returned to factory.
- **Save to User Area**: Save seam brightness adjustment parameters to the user area of the receiving card. These parameters will be used for on-site screen adjustment.
- **Load Factory Area**: Restore seam brightness adjustment parameters to the parameters last saved in the factory area.
- **Load User Area**: Restore seam brightness adjustment parameters to the parameters last saved in the user area.

Step 6 Save seam brightness adjustment parameters to the sending device.



5.5 Batch Adjustment

This function is used to adjust the brightness and chroma of cabinets of different batches in order to ensure the images are displayed uniformly on LED screen.

Before you begin: Configure the LED display and save the configuration parameters to hardware.

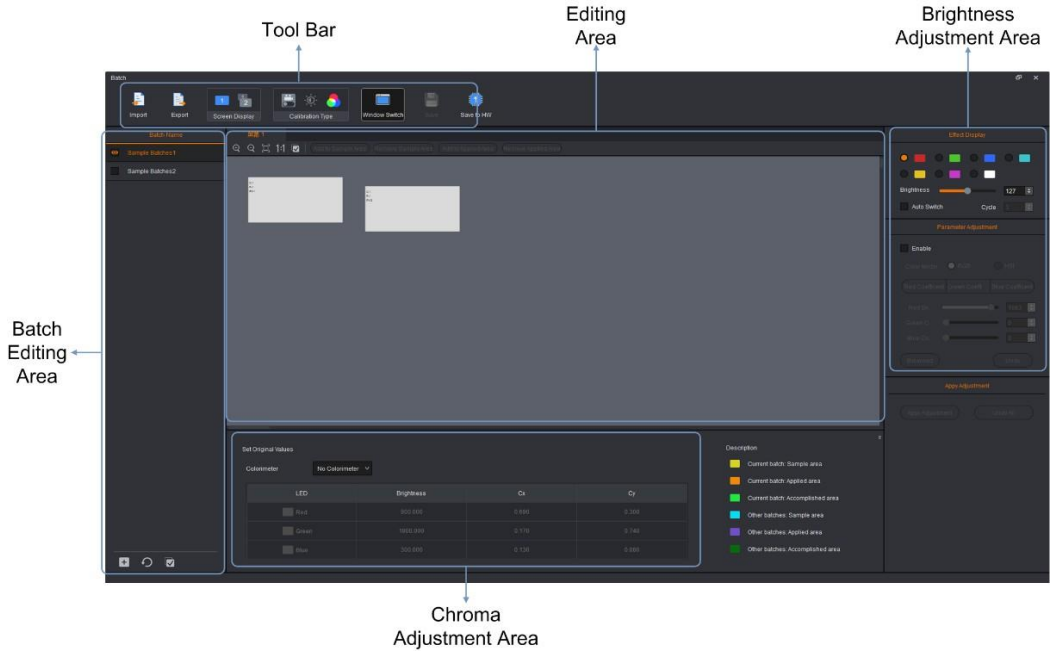


Table 5-2 Batch adjustment description

Area	Description
Tool Bar	**Import**: Import the batch adjustment parameter file. **Export**: Save the adjustment parameters of current batch to local PC. **Screen Display**: Set the window to display on the main display or extended display. **Calibration Type**: Choose the type of display calibration. **Window Switch**: Show/Hide the display window. **Save**: Save the batch adjustment parameters as a file. **Save to HW**: Save the batch adjustment parameters to hardware.
Editing Area	Edit the status of cabinets or modules (double-click on the cabinet to enter the module view) displayed in the area.
Batch Editing Area	Two batches are added in this area by default when you perform batch adjustment for the first time. Click  to add a batch. Click  to select all batches. The statuses of cabinets in each batch are displayed on the display window.
Brightness Adjustment Area	Adjust cabinet brightness parameters.
Chroma Adjustment Area	Adjust cabinet chroma parameters.

Procedures

Step 1 Select a target batch.

Step 2 In the editing area, select the target cabinets or modules, and then click **Add to Sample Area**.

Step 3 Adjust chroma and brightness.

Step 4 Click **Apply Adjustment**.

Step 5 Click **Save to HW**.

Note: Each batch must have the sample area information.

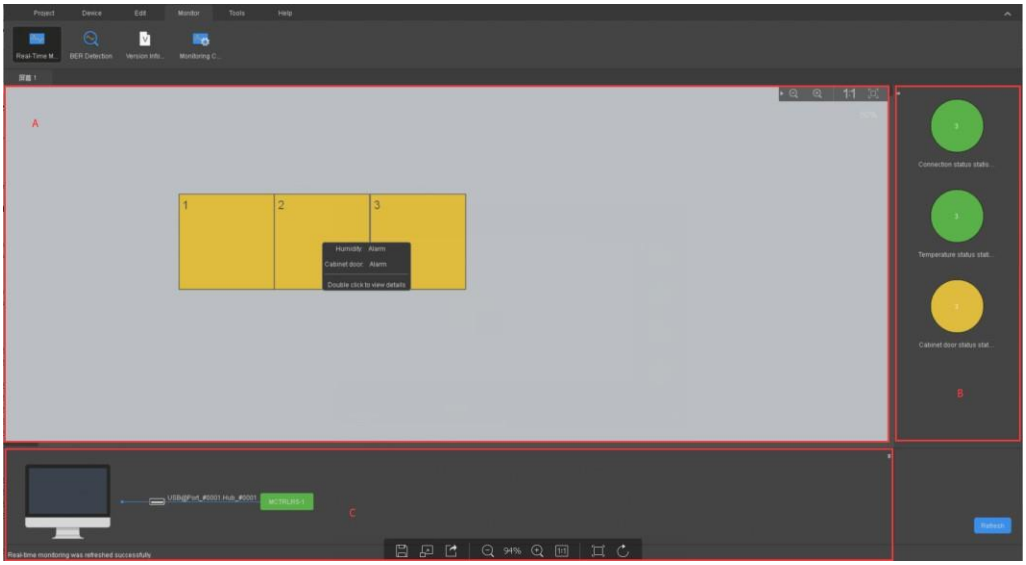
5.6 Monitoring

Click **Refresh** to refresh the monitoring information of current system.

Real-Time	Monitors the real-time status of the hardware devices such as

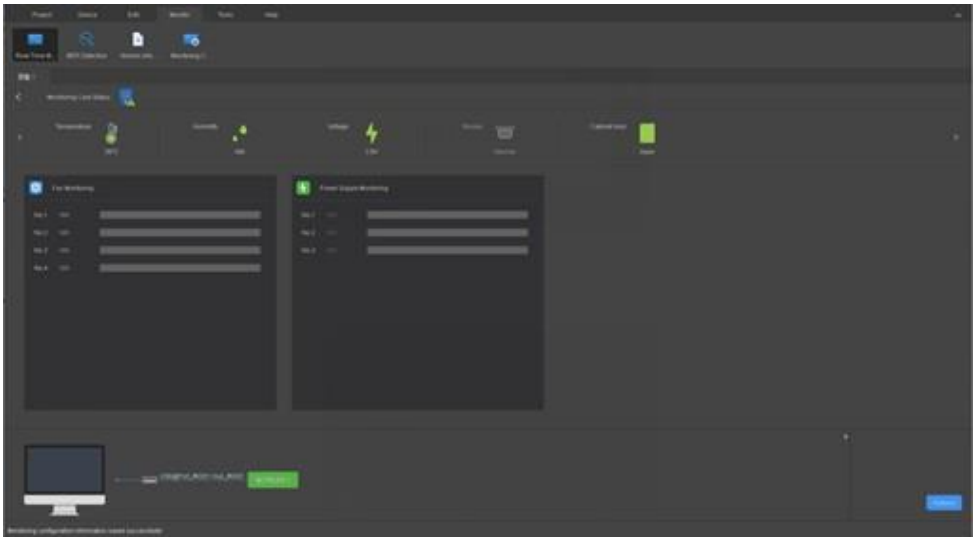
Monitoring	receiving cards, multifunction cards.
BER Detection	Detects data packet loss during the communication between receiving cards.
Version Information	Displays the device type, communication port status major version and other versions of the controllers and receiving cards.
Monitoring Configuration	Allows you to configure the information to be monitored.

5.6.1 Real-Time Monitoring



A: Canvas, where the real-time statuses of cabinets are displayed.

In the canvas, move the mouse and point to a cabinet. The current status of the cabinet will be displayed. Double clicking the target cabinet allows you to view the real-time status of the device and parameters, as shown in the figure below.



B: Monitoring area, where the status statistics of the parameters are displayed.

C: Device area, where the real-time connection status of the device being monitored is displayed.

In the device area, move the mouse and point to the device icon. The working status of the device is displayed. Clicking the device icon allows you to view the hot backup status of the device and Ethernet ports and the working status of the signal sources.

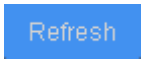
5.6.2 BER Detection

The statistics of data packet loss during communication between receiving cards is called Bit Error Rate (BER), which is shown by a line chart in the canvas.

Clicking **Refresh** will refresh the BER of current period so that users can observe the stability of network communication.

5.6.3 Version Information

Clicking  on the right of **Controller** or **Receiving Card** will refresh the version information.

Clicking 

will refresh the version information of the **Controller** and **Receiving Card** simultaneously.

5.6.4 Monitoring Configuration

Basic Information

You can configure the refresh rules for the real-time monitoring.

Select **Auto refresh**, and the monitoring information will be automatically refreshed based on the **Refresh cycle** and the times of **Retry** you set.

When the **Auto refresh** is not selected, you need to refresh the monitoring information manually.

Device Configuration

Device configuration allows you to configure the **Hot backup status** and **Signal source status** of the device for real-time monitoring.

- If **Hot backup status** is selected, the hot backup status of the device will be monitored in real time.
- If **Signal source status** is selected, clicking **Configuration** allows you to select the signal source to be monitored.

Screen Configuration

Step 1 Select the target devices (monitoring card, smart module and HUB).

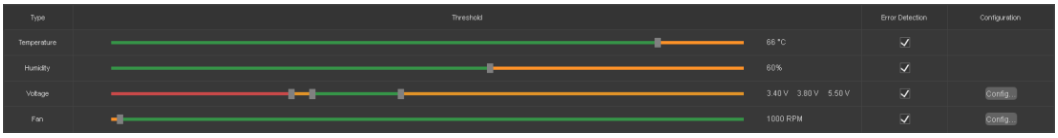
Step 2 Click **Configuration** to configure the corresponding parameter.

Step 3 Adjust monitoring parameters.

- In the **Threshold** column, drag the slider to adjust the threshold.

- In the **Error Detection** column, selected parameters are added to **Real-Time Monitoring**.

Step 4 Click **Save**.



Threshold description: Green denotes normal, yellow denotes alarm, and red denotes error.

Type	Threshold Description
Temperature	When the temperature is higher than 66°C, you will see a temperature alarm in the real-time monitoring.
Humidity	When the temperature is higher than 60%, you will see a humidity alarm in the real-time monitoring.
Voltage	When the voltage is lower than 3.40 V, you will see a voltage error in the real-time monitoring. When the voltage is higher than 3.40 V and lower than 3.80 V, or higher than 5.50 V, you will see a voltage alarm in the real-time monitoring.
Fan	When the fan speed is lower than 1000 r/m, you will see a fan alarm in the real-time monitoring.

Note: The figure above only shows some of the monitoring types. The meanings of the thresholds of other types are similar.

5.7 Sending Configuration Information

Step 1 In the tool bar, click  .

Step 2 In the prompt box that appears, click **OK**.

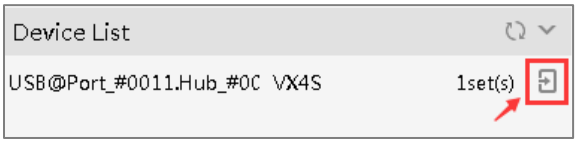
5.8 V-Sender

V-Sender allows you to set the status of the current device and operate the device on PC.

5.8.1 Accessing V-Sender

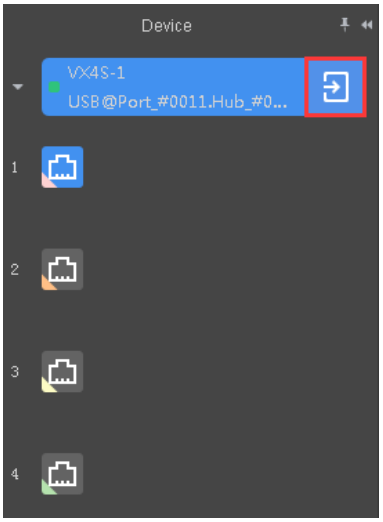
Method I

On the start page, click  in the **Device List** section to access V-Sender, as shown in the figure below.



Method II

In the **Device** section of the editing page, click  to access V-Sender, as shown in the figure below.



5.8.2 Introduction to Tool Bar

General functions:

- **Reconnect**: Reconnect the device after the device went offline.
- **Refresh**: Refresh the device information
- **Reset**: Reset to factory settings.
- **Save**: Send current device information to the hardware device and save it.
- **Update**: Update the firmware version of current controller device.
- **Seft-Test**: Test the display effect of the images displayed on LED screen.

- **Monitoring Threshold**: Set the temperature and voltage ranges for normal operating of current controller device.

Dedicated functions for different devices (Take the MCTRL660 PRO for example.)

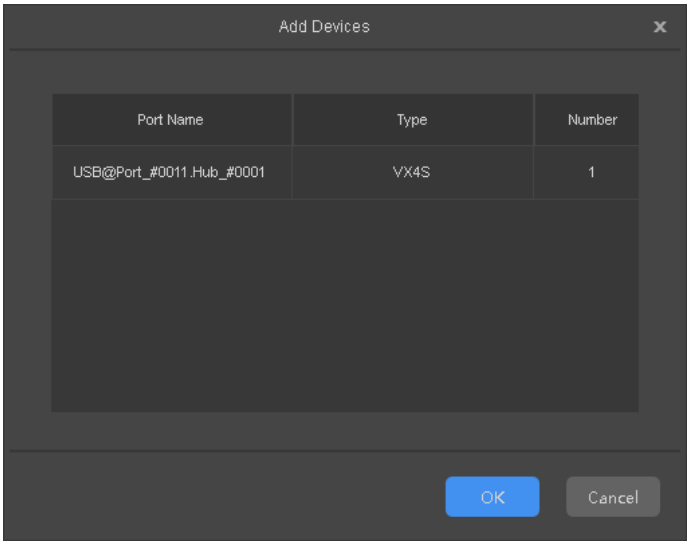
- **Mirror**: Set the display effect of the output image.
- **Backup**: Back up the system configurations of current device.
- **Restore**: Restore configurations of the system, receiving card and sending card.

5.8.3 Adding Devices

Step 1 At the bottom of the device list, click 

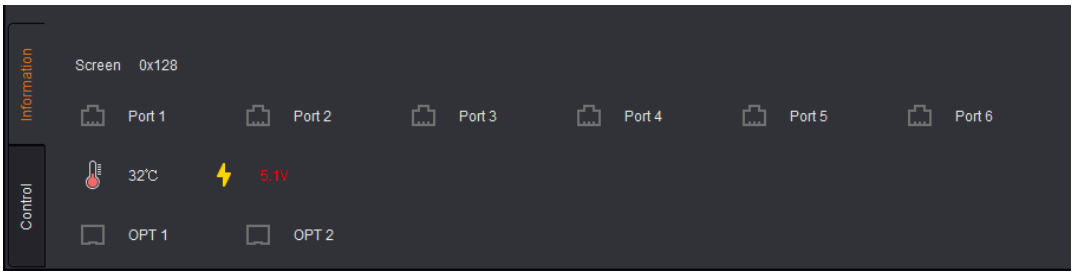
. The **Add Devices** page appears.

Step 2 Select the devices you want to add and click **OK**.



5.8.4 Information

At the bottom of the V-Sender page, the **Information** tab displays the port status, temperature and voltage alarms.



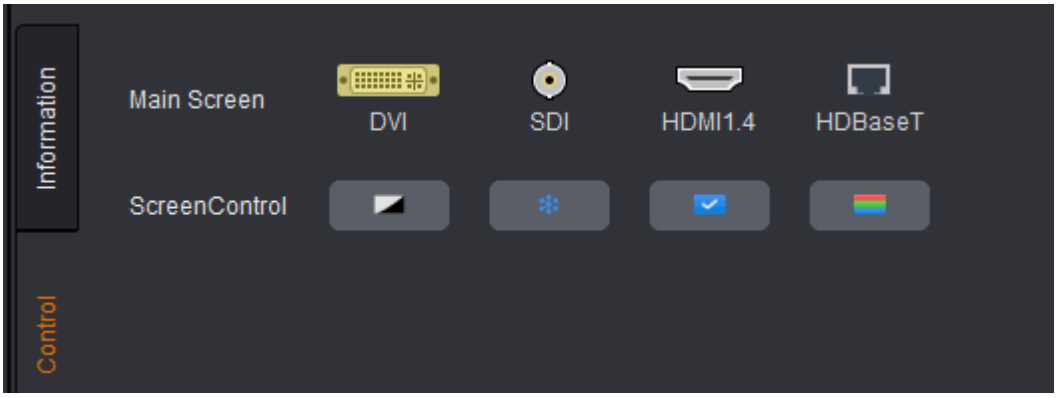
The working statuses of Ethernet ports:

Icon	Description
	This Ethernet port is the primary port and it is connected.
	This Ethernet port is the backup port, but it is not connected.

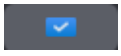
	This Ethernet port is the backup port and it is connected, but the backup has not taken effect.
	This Ethernet port is the backup port, but it is not connected.
	This Ethernet port is the backup port and it is connected. The backup has taken effect.

5.8.5 Control

Under the **Control** tab at the bottom of the V-Sender page, you can switch the input source type and set the screen control mode.



Screen control modes:

-  (**Black Out**): The screen goes black and does not display images.
-  (**Freeze**): Freeze current image being displayed.
-  (**Normal**): The screen displays images normally.
-  (**Test Pattern**): Use different test patterns to verify the display effect of current screen.

5.8.6 Template Settings

Select a template on the **Template** tab below the canvas and click  to save current configuration parameters as a template. You can save up to 10 templates by default.

- Clicking  will save current configuration parameters to any of the templates.
- Clicking  will delete the selected template.

5.8.7 Device Properties

After you set the **Input**, **Color** and **Output**, clicking **Apply** will complete the settings.

Option	Description
Properties	Displays the device's type, communication port, ID, hardware program version. Change the device name and upgrade the firmware version of currently connected controller device.
Input	Set the type, data bits and resolution of the input source.
Color	Adjust the contrast, saturation, hue and sharpness of the displayed image.
Output	**Mosaic**: If the number of the pixels of the LED display exceeds the loading capacity of the device, the mosaic function is required. For detailed operation, see 5.8.9 Mosaic. Note: When **Mosaic** is selected, the **Disable Zoom** and **Auo Fit** functions under **Main Screen** are disabled, and the **Video Source Synchronization** option under **Main Screen** is hidden.
	Main Screen: Used for setting the parameters of the main screen, such as capture, output size, output position
	Minor Screen: Used for setting **Capture** parameters of the minor screen, such as size, position and transparency
	Video Source Synchronization: Syncs the parameters of input and output video sources.
System	Used for system parameter settings Meanings of the parameters: • **LCD Lock**: Locks the operation screen of the device. After the operation screen is locked, buttons on the device are disabled. • **Smart Gray Scale**: Adjusts the grayscale of the LED display. • **Genlock**: Generator locking • **Deinterlace**: Restores the interlaced video signal to progressive signal. • **VGA Auto Adjusting**: Adjusts the sampling parameters of VGA input signal automatically. • **ADC Auto Calibration**: Adjusts color cast, dimming and other display problems. • **Low Latency**: Reduce the latency of image output. (Supported by the MCTRL4K and MCTRL660 PRO only) • **Fiber Converter**: Convert optical signals into electric signals. (Supported by the MCTRL660 PRO only) • **3D**: Set 3D function parameters. (Supported by the MCTRL4K only) • **HDR**: Improve the display effect. (Supported by the MCTRL4K only)
Audio	Used for enabling and disabling audio output and adjusting audio output parameters Audio types:

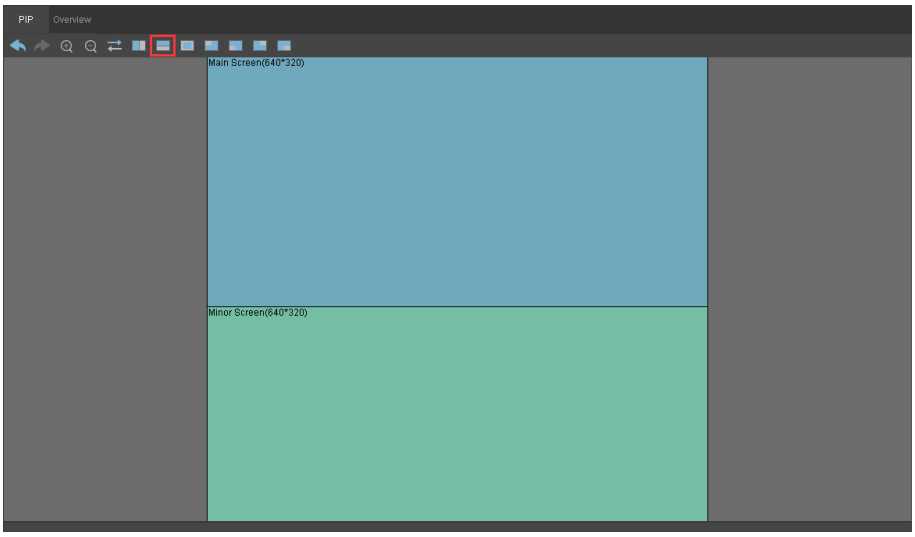
	• **Following Mode**: Uses the audio source of HDMI. • **Constant Mode**: Uses the external audio source.

5.8.8 Picture in Picture (PIP)

Connect a video controller which supports PIP function. Then, enter the V-Sender page and select the **PIP** tab in the canvas.

Click the different icons in the tool bar to adjust the layout of the main screen and minor screen, as shown in the figure below.

Note: Move the mouse to the canvas. When the mouse pointer changes into a double arrow, click and drag to change the size of the main screen or minor screen.



Tool Bar	Icon	Description
Cancel		Cancels the results of a previous action.
Revert		Restores the results of a previous action that was canceled.
Zoom in		Zooms in view.
Zoom out		Zooms out view.
Main and Minor Screens Switching		Switches between main and minor screens.
Horizontal Layout		N/C
Vertical Layout		N/C
In the Middle		N/C
Upper Left Layout		N/C
Lower Left Layout		N/C
Upper Right Layout		N/C
Lower Right Layout		N/C

Main Screen Settings

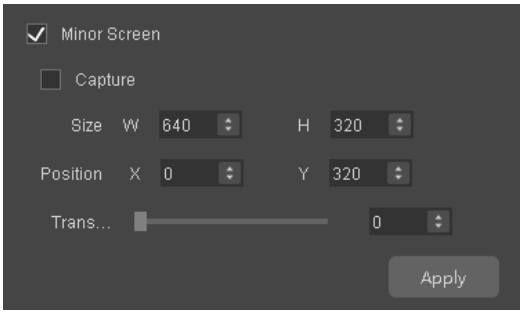
You can set the zoom status of the main screen. Three options are provided: **Disable Zoom**, **Customize Zoom** and **Auto Fit**.

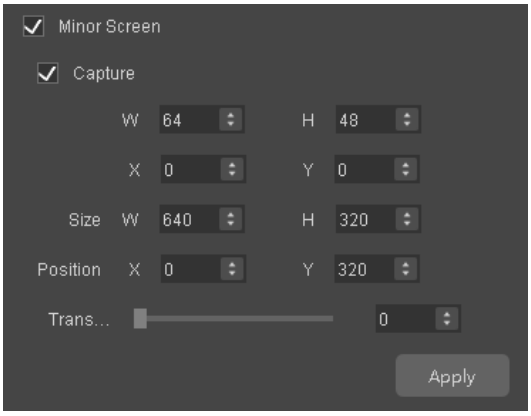
- **Disable Zoom**: The size of input image is the same as the size of the output image and only the image offset position is settable.
- **Customize Zoom**: Allows you to set the start position and size for **Capture**. The captured content will be displayed on the LED display. **Output Size** is the size of the main screen in the canvas. **Output Position** is the start position of the current main screen in the canvas.
- **Auto Fit**: The input image is zoomed to fit the main screen automatically. This mode is suitable for full screen display.
- Selecting **Apply to All** will apply the settings to all the input sources.

After the settings are done, clicking **Apply** will send the current configuration information to the input source.

Minor Screen Settings

The size and position of the minor screen are editable. Selecting **Capture** allows you to set the size and start position of the content to be captured. The captured content will be displayed on the LED display.





After the settings are done, clicking **Apply** will send the current configuration information to the signal source.

Video Source Synchronization

Video source synchronization allows you to sync the input video source with the output video source.

5.8.9 Mosaic

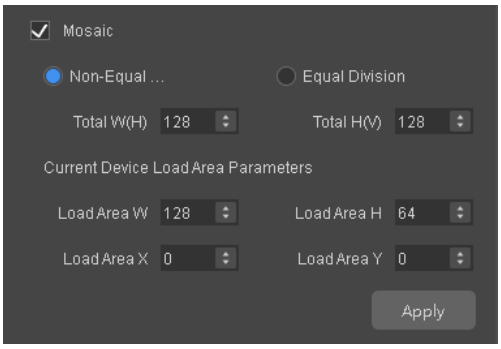
Before you begin: When the pixels of the output image exceeds the loading capacity of a single device, the mosaic function will be required.

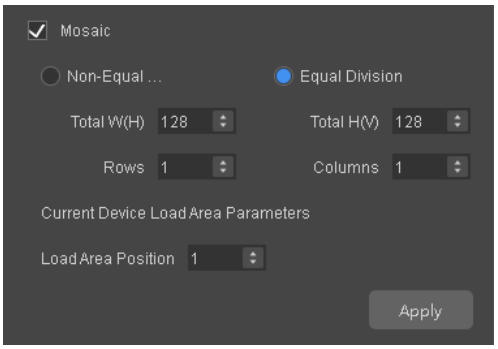
Step 1 Access V-Sender. On the **Output** tab, select **Mosaic**.

Step 2 Set parameters through any of the following methods.

- **Non-Equal Division**: When the loading capacities of each of the VX4S units are different, set the total number of pixels of the LED display, the loading area of current device and the start position.
- **Equal Division**: When the loading capacities of each of the VX4S units are the same, set the total number of pixels of the LED display, the number of mosaic rows and columns, and the start position of the loading area of the current device.

Step 3 After the parameter settings are done, click **Apply** to send the settings to hardware.





5.9 Other Operations

5.9.1 Hot Backup

For the detailed operation of hot backup, see 4.5.2 Hot Backup.

5.9.2 Mapping

SmartLCT supports the Mapping function.

Choose **Device** > **Mapping**. The receiving card numbers and Ethernet port information are displayed on the cabinets of the screen.

5.9.3 3D Function

This function works with the independent controller that supports 3D function, the 3D emitter EMT200 and 3D glasses to allow users to experience 3D effects on LED screen. For detailed usage, see *3D Emitter EMT200 Quick Start Guide*.

Notes:

- Only the MCTRL4K supports 3D function.
- Using 3D function requires a 3D video source.
- After 3D function is enabled, if you re-assign the Ethernet ports to the DVI sources and re-configure the screen, you must adjust the right eye start position of current DVI source in V-Sender.
- When multiple devices are cascaded, if you click **Apply to All**, the current settings will be applied to all the cascaded devices.

Constraints

This function cannot be enabled with any of the following functions at the same time.

- Calibration function of bundled software
- Low latency
- Genlock

Operating Procedure

Step 1 Connect the hardware. See *3D Emitter EMT200 Quick Start Guide*.

Step 2 Run SmartLCT.

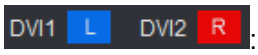
Step 3 Enter the V-Sender page. See 5.8.1 Accessing V-Sender.

Step 4 On the **System** tab page, select **Enable 3D**.

Step 5 Click  to display the 3D function settings.

Step 6 Set the video source format, eye priority, DVI mode, right eye start, and signal delay time.

- **Video Source Format**: Includes side-by-side, top-and-bottom, and frame sequential. (Set the format same as that of the video source.)
- **Eye priority**: Includes right eye first and left eye first. (Set the priority according to the 3D glasses.)
- **DVI Mode Selection**
  - 

: The left and right eye images of each DVI source are displayed at the same time.
  - 

: DVI1 displays the left eye image and DVI2 displays the right eye image. When the input source is Dual DVI, you must set the DVI mode. When the input source is HDMI 2.0 or DP 1.2, there is no need to set the DVI mode.
- **Right Eye Star**: When you set the video source format as side-by-side or top-and-bottom, you must set the right eye start position. When you set it as frame sequential, you do not need to set the DVI mode or the right eye start position.
- **Signal Delay Time**: Set this time as required to make sure that the left and right eye image switching of the 3D glasses is in sync with the image switching on the display.

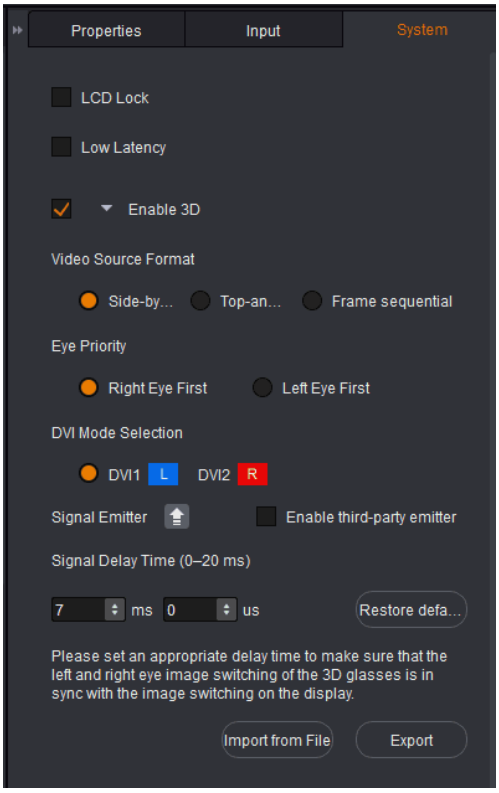
Step 7 (Optional) Click  to display the **Update Firmware of Signal Emitter** dialog box. Then, click  to select the firmware program path. At last, Click **Update**.

Step 8 (Optional) If you are using a third-party 3D emitter, select **Enable third-party emitter**.

Step 9 (Optional) Click **Import from File** to load a 3D configuration file (*.3DConfig) saved in PC.

Step 10 Click **Export** to export current configured 3D parameters as a file (*.3DConfig) to PC.

Figure 5-8 3D parameter settings



5.9.4 Working Mode

This function is used to set the working mode for the connected device as sending card or fiber converter.

Note:

- Only the MCTRL660 PRO supports the fiber converter mode.
- When multiple devices are cascaded, if you click **Apply to All**, the current settings will be applied to all the cascaded devices.

Operating Procedure

Step 1 Connect the hardware. See the user manual of the connected device.

Step 2 Run SmartLCT.

Step 3 Enter the V-Sender page. See 5.8.1 Accessing V-Sender.

Step 4 On the **System** tab page, select the target working mode under **Working Mode**.

5.9.5 HDR

This function works with the MCTRL4K independent controller and the A8s receiving card to greatly enhance the image quality of the display, presenting images with more vivid colors and clearer details.

Note:

- Only the MCTRL4K supports the HDR function.
- Using the HDR function requires an HDMI 2.0 10-bit video source.
- When multiple devices are cascaded, if you click **Apply to All**, the current settings will be applied to all the cascaded devices.

Constrains

This function cannot be enabled with any of the following functions at the same time.

- Calibration function of bundled software
- Low latency

Operating Procedure

Step 1 Connect the hardware. See *MCTRL4K Independent Controller User Manual*.

Step 2 Run SmartLCT.

Step 3 Enter the V-Sender page. See 5.8.1 Accessing V-Sender.

Step 4 On the **System** tab page, select **Enable HDR**.

Step 5 Set the HDR standard (including HDR10 and HLG) and its parameters.

Figure 5-9 HDR10

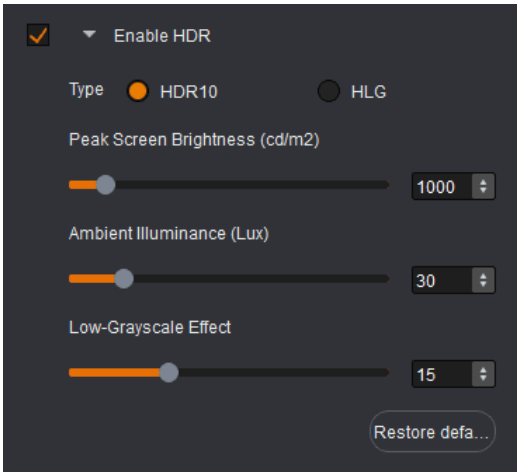
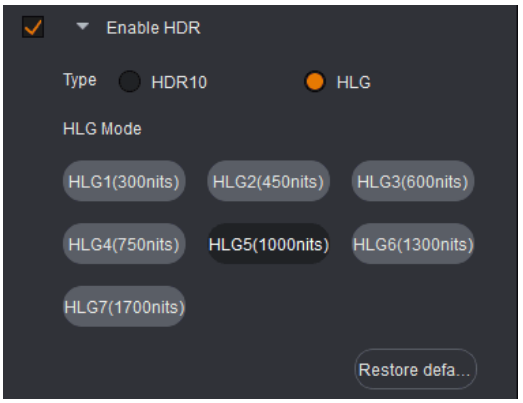


Figure 5-10 HLG mode



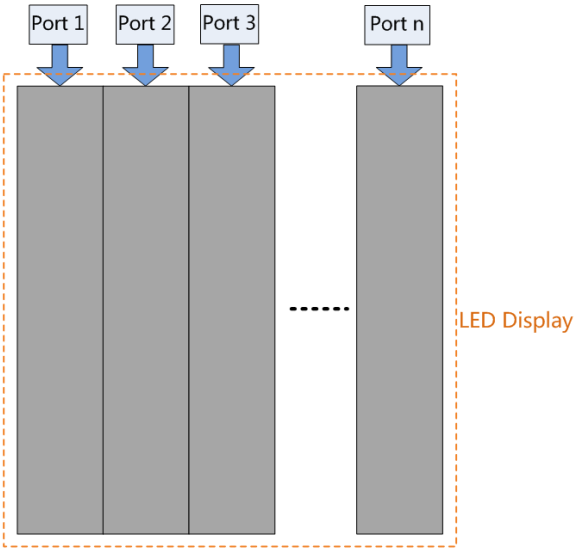
5.9.6 Low Latency

This function is used to reduce the latency from input to output of the video signal.

Note:

- Only the MCTRL4K and MCTRL660 PRO support low latency.
- During screen configuration, ensure that each Ethernet port loads the cabinets vertically, as illustrated in Figure 5-11.
- When multiple devices are cascaded, if you click **Apply to All**, the current settings will be applied to all the cascaded devices.

Figure 5-11 Cabinet loading by Ethernet ports in low latency mode



6 Features

6.1 Building Screens like Building Blocks

Step 1 In the **Device** section, select a device and Ethernet port.

Step 2 In the tool bar, choose **Edit** > **Cabinet Management** >  or  .

Step 3 Move the mouse to the canvas and click to add cabinets.

Step 4 Select one or multiple cabinets and move the mouse to change the position of the cabinet(s). Build different shapes of screens as required.

6.2 Rotating in 90° Increments

Before you begin: Connect the receiving cards or controllers that support rotation to SmartLCT, for example, A8s.

Step 1 In the canvas, select the target cabinet.

Step 2 In the property area, click **Reorient** to select the angle of cabinet rotation (0°, 90°, 180°, 270°).

6.3 Full 360° Rotation

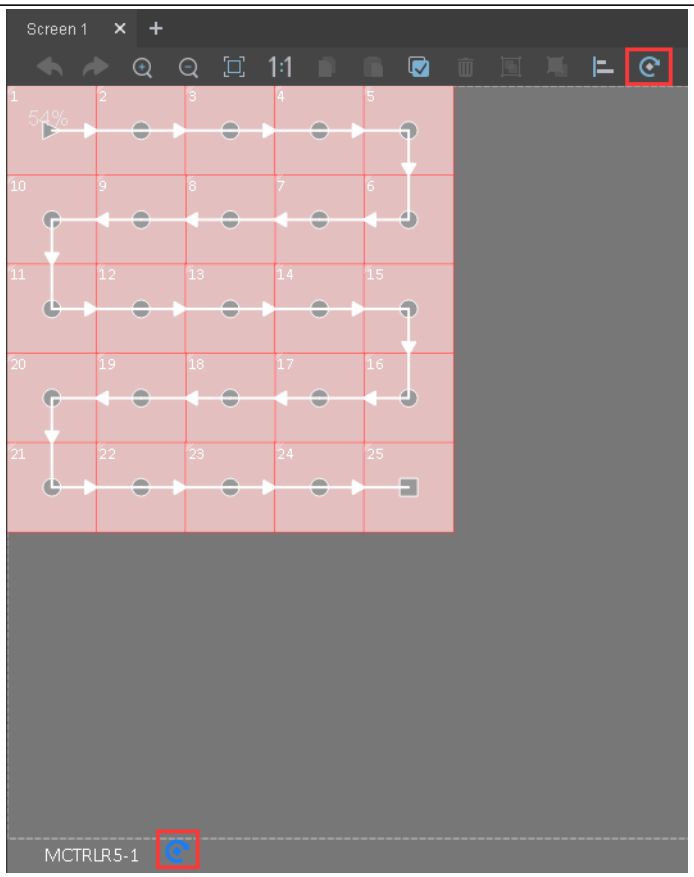
Before you begin: Connect the controller MCTRL R5 to SmartLCT, and the rotation function can be enabled.

Rotation of a Single Cabinet

Step 1 Click  and select the cabinets. A rotating bar appears on each of the cabinets.

Step 2 Select any of the rotating bars and drag the mouse. The cabinet rotates around its rotation center.

Step 3 (Optional) Set the rotation center and angles of rotation in the property section on the right.



Rotation of Grouped Cabinets

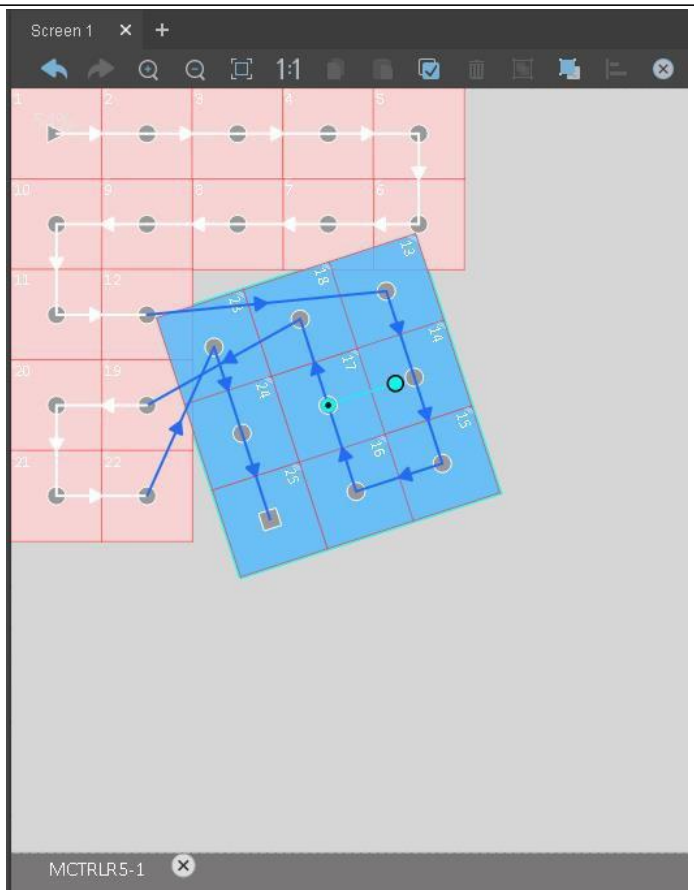
Step 1 Click  and select the target cabinets.

Step 2 Right click the cabinets and choose **Group**.

Step 3 Click to select the grouped cabinets. A rotation bar appears on the rotation center of the grouped cabinets.

Step 4 Click the rotation bar and drag the cabinets. The group of cabinets rotates around the rotation center.

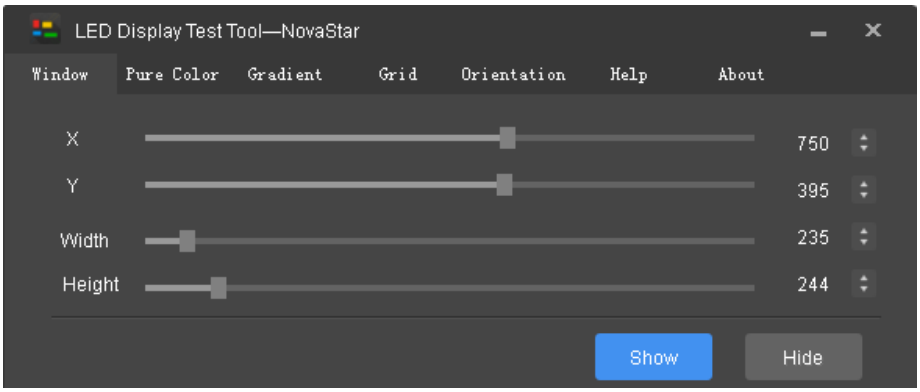
Step 5 (Optional) Set the rotation center and angles of rotation in the property section on the right.



6.4 LED Display Test

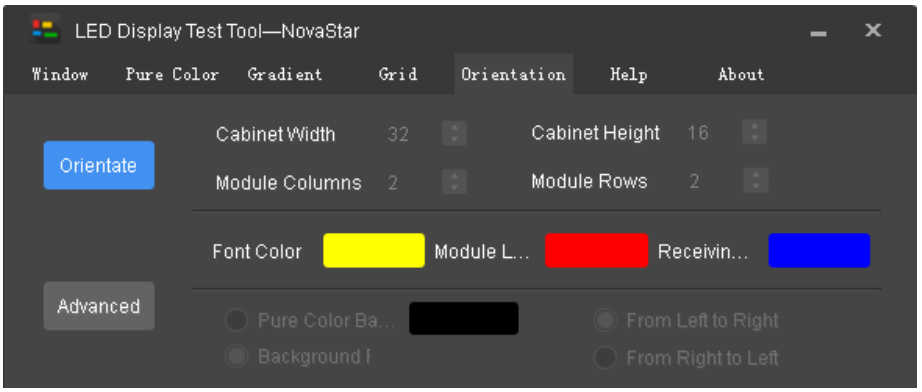
Choose **Tools** > **Test Tool** to enter the display test tool page (that is, receiving card test page).

Note: Display test is only available for Windows.

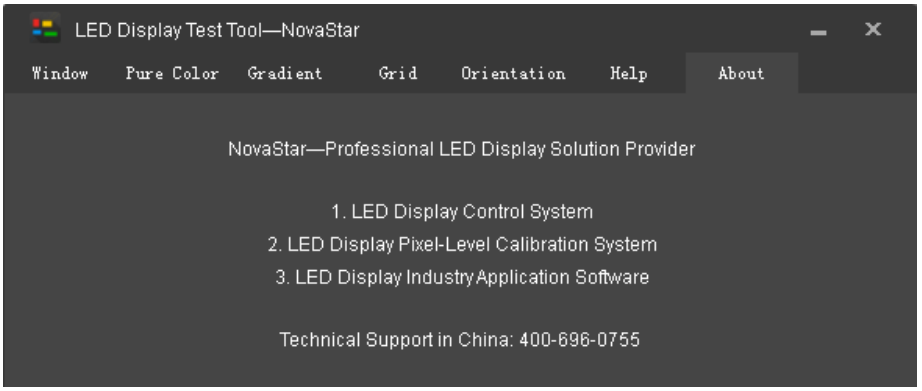


- **Window**: Set window position and size, or hide the window.
- **Pure Color**: Set window color (pure color), grayscale and refresh rate.
- **Gradient**: Set the gradient color and levels of the window.
- **Grid**: Set grid and color and other parameters of the window.

- **Orientation**: Set module size and the number of modules loaded by the scanning board. Detailed settings are shown in the figure below.



- **Help**: Keyboard shortcus for quick operations.
- **About**: LED display solutions. See detials in the figure below.



6.5 Update and Readback of Receiving Card Configuration Parameters

Save receiving card parameter configuration files to the local PC.

Step 1 In the canvas, select the target cabinet(s).

Step 2 Right-click to select **Read back parameters/Update receiving card parameters** to read back or update local receiving card configuration parameters.

6.6 Readback of Controller and Receiving Card Inforamtion

Choose **Monitor** > **Version**. Click  next to the corresponding controller or receiving card to read back the model, communication port and hardware version of the current controller or receiving card.

6.7 Receiving Card Program Upgrade

Before you begin: Save the upgrade package of receiving card firmware program to the local PC.

Step 1 In the canvas, select the target cabinet(s) to enter the **Properties** tab page on the right.

Step 2 Click  next to **Program Version**.

Step 3 Select the path of the upgrade package to upgrade the firmware program.

6.8 Controller Program Upgrade

Before you begin: Save the upgrade package of the controller firmware program to the local PC.

Step 1 Enter V-Sender.

Step 2 Click **Update**, or select the **Properties** tab and click  next to **Program Version**.

Step 3 On the **Firmware Upgrade** window that appears, click  to select the path of the upgrade package.

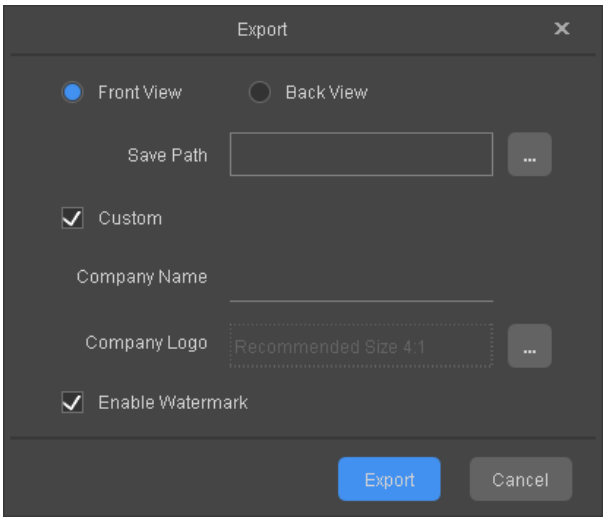
Step 4 Click **Update**.

6.9 Exporting Screen Configuration Information as Image

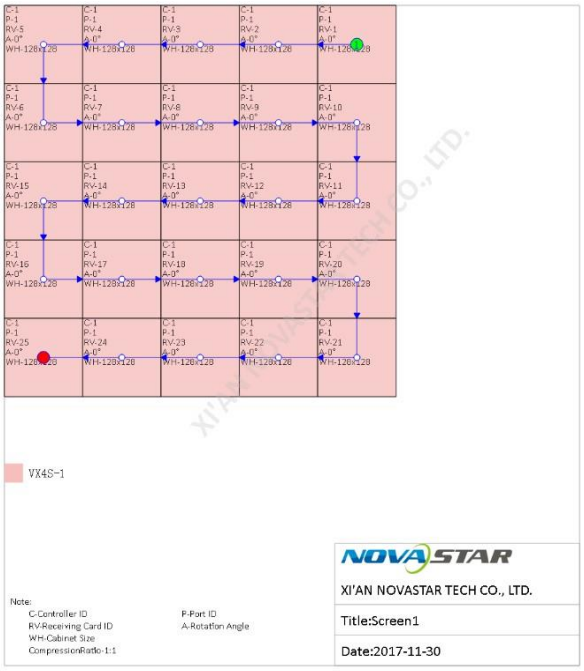
The screen configuration information can be exported as an image,

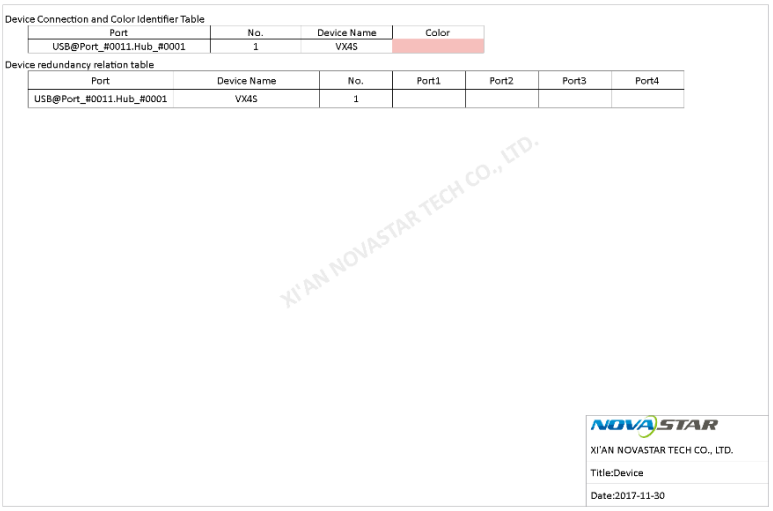
Step 1 Choose **Project** > **Export**. The **Export** page appears.

Step 2 Set export parameters and information.



Step 3 Click **Export** to export the image to the local PC.





Note:

When both the cabinet width and height are 104 px or greater, detailed cabinet information can be shown in the exported image.