

LFD VW Management Solution[UMDC]

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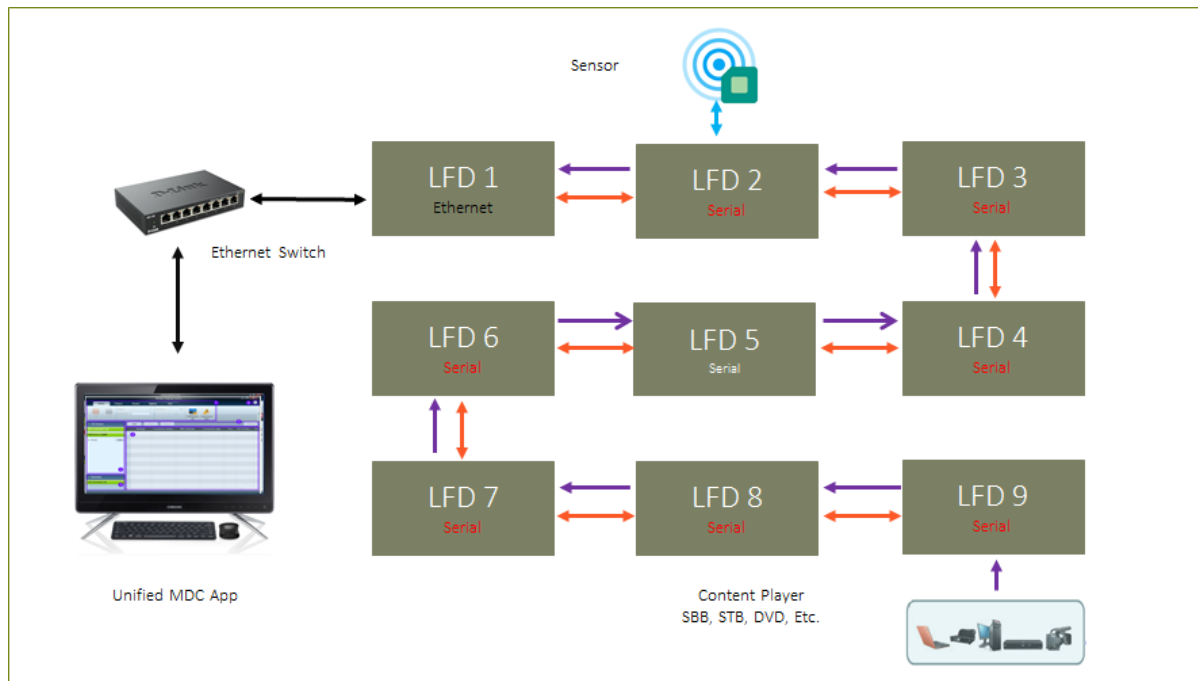
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Introduction

- Multiple Display Controller
- Device Connection Methods
- Device Connection Parameters
- Unified MDC App
- Unified MDC App Features

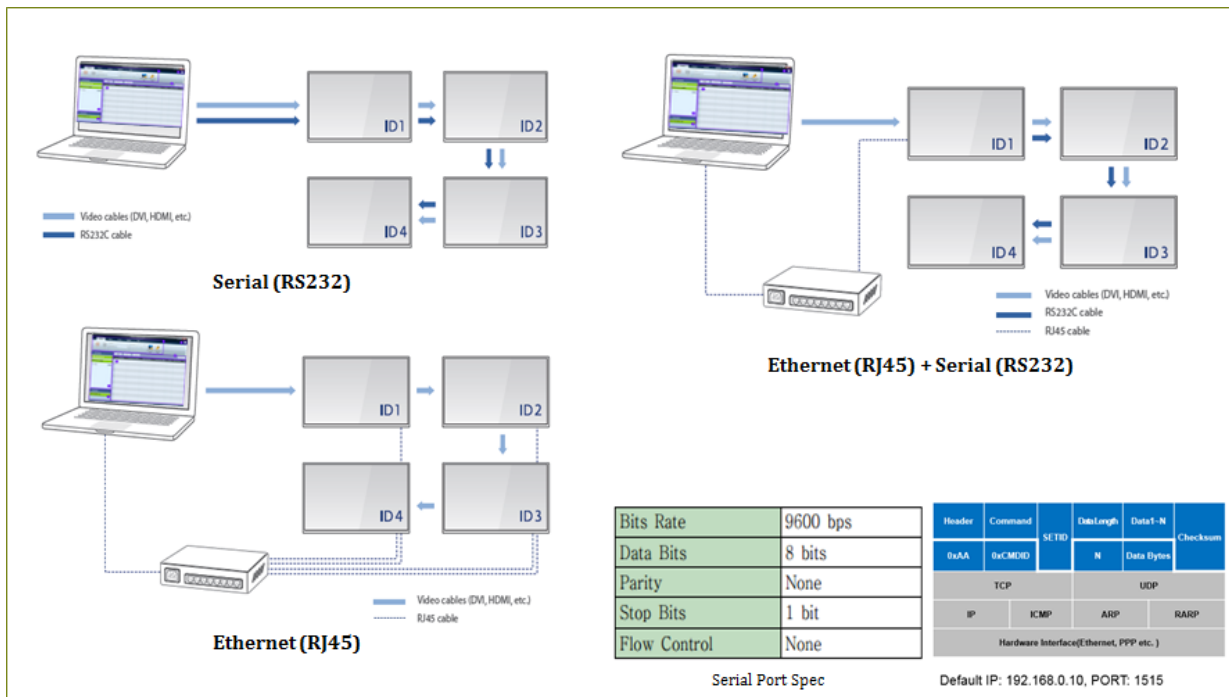
1.1 Multiple Display Controller

Multiple Display Controller (MDC) is an application layer protocol implemented by Samsung. This protocol provides a way to connect smart signage devices and Multiscreen VW from applications and configure them for appropriate use.



1.2 Device Connection Methods

LFD communicates either in Serial or Ethernet mode. The communication mode can be changed from LFD Multi Control OSD menu. There are three possible ways LFD can be connected in a standalone or multiscreen environment as follows.

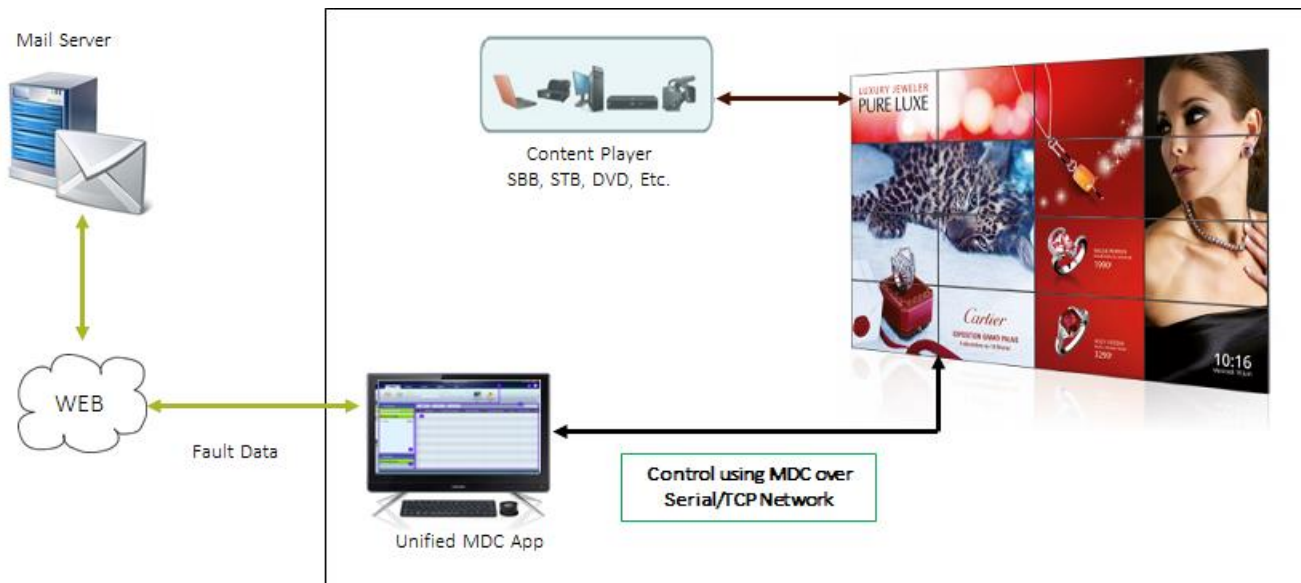


1.3 Device Connection Parameters

Connection	Serial	Ethernet
Cable	RS232	RJ45
Address	Com1,Com2, etc.	IP Address Ex: 192.168.0.10
Port No	N/A	1515
Baud Rate	9600	NA
Loop Out/ Set ID Range	0 ~ 224	0 ~ 224

1.4 Unified MDC App

Unified MDC is a management solution for Samsung Multi Screen Video wall. A Multi Screen Video wall consists of a number of normal screens (LFD) that are arranged in a way to make up one very large screen. Typically, so called “low bezel” screens are used for this in order to minimize the border (bezel) that separates the screens from each other. This application uses MDC protocol to communicate with devices and configure the settings.



1.5 Unified MDC App Features

- Discover Device/LFD Using UPnP Technology and Connect them.
- Communicate LFD over Serial and Ethernet connections.
- Automatic device ID Set for connected LFDs to unique identification.
- Logically grouping of devices and Visual VW layout design.
- Control Device using Direct Command, Scheduling & Virtual Remocon.
- LAN boot through WOL Magic Packet.
- Cloning of Device feature/settings across multiple other devices.
- Brightness Management of VW using single external Light sensor.
- Fault Monitoring and alert them through SMTP outbound mail.
- Monitoring communication and Operation Log Generation.
- Device F/W update using MDC & MI Author Protocol.
- Picture Quality Improvement by Manual White Balance.
- SLM application Update and settings data preservation.
- User Management and protection from unauthorized use.

2

Installation Guide

- Application Download
- Installation on Windows

2.1 Application Download

Please follow below steps to download Unified MDC App

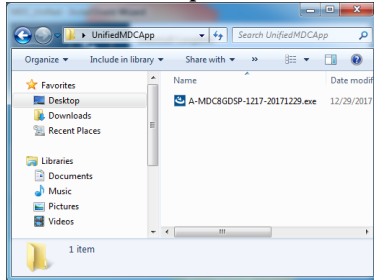
- **Unified MDC App Download Steps**
 1. Logon to <http://v3.samsunggsbn.com>
 2. Locate SLM > SW Download
 3. Search Text “A-MDC8GDSP”

- **UMDC App Compatible OS Platform:**
 - Windows 7(32/64-bit)
 - Windows 8(32/64-bit)
 - Windows 10(32/64-bit)

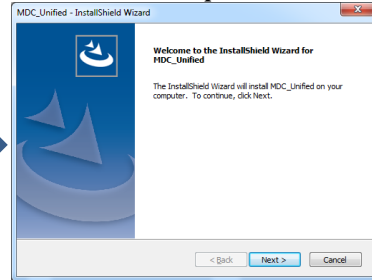
2.2 Installation on Windows

Please follow below steps to install Unified MDC App on Windows

Step-1



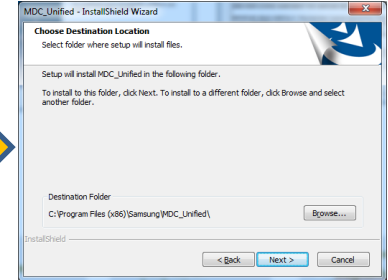
Step-2



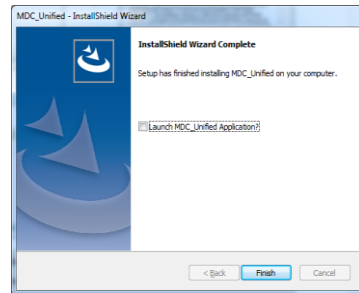
Step-3



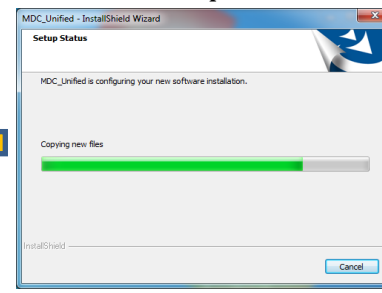
Step-4



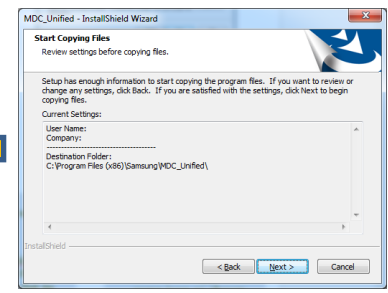
Step-7



Step-6



Step-5



1. Start installation by double click on setup file.
2. Click next on Welcome Screen.
3. Click yes on License Agreement.
4. Select Installation Folder and click Next.
5. Click next on Coping File.
6. Installation started and progress will be shown.
7. Select Launch check box and then click finish to start application.

3

Usage Guide

先要在LFD上按HOME键设置设备ID，然后在All Connection List里Add设备，之后把设备加到All Device List里，就可以控制了

- Unified MDC Main Screen Layout
- Sign In to Unified MDC App
- Connect LFD/Device
- Device Auto Discovery
- Auto assign of LFD Id
- Logically grouping of devices
- Video wall layout design
- Control Device Settings
- Cloning of Device Settings
- Fault Device Alert
- Ambient Brightness Management
- F/W update using MDC & MI Author
- Manual White Balance
- User Management and protection

3.1 Unified MDC Main Screen Layout

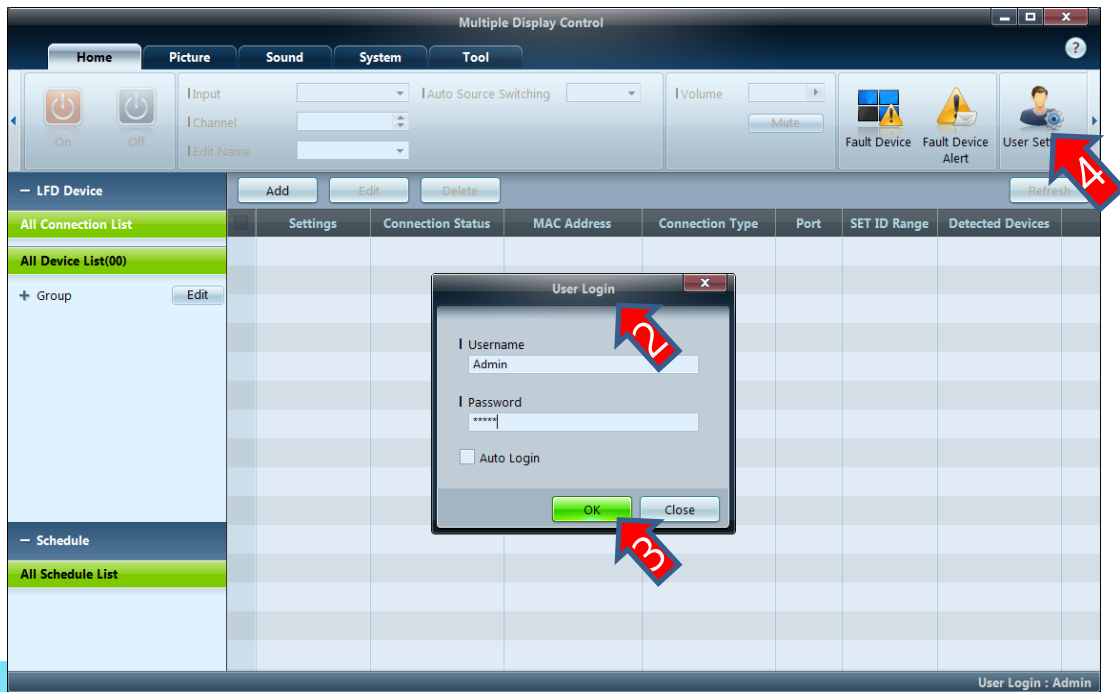
The screenshot shows the 'Multiple Display Control' application interface. It features a top menu bar with tabs for Home, Picture, Sound, System, and Tool. Below the menu bar is a control panel with various settings like Input, Channel, Auto Source Switching, and Volume. A central area contains a table with columns for Settings, Connection Status, MAC Address, Connection Type, Port, SET ID Range, and Detected Devices. On the left side, there are sections for 'LFD Device' and 'Schedule'. The bottom right corner shows the user login information: 'User Login : Admin (Auto Login)'.

Numbered callouts in the image indicate the following components:

- 1: Menu Bar
- 2: Device Category
- 3: Schedule Category
- 4: Set List
- 5: Modify the Set List
- 6: Help Topics

- 1. Menu Bar** - Change the status of a display device or the properties of the program.
- 2. Device Category** - View a list of connected display devices or device groups.
- 3. Schedule Category** - View a list of schedules for display devices.
- 4. Set List** - Select the display device you want to adjust.
- 5. Modify the Set List** - Add, edit, regroup or delete sets.
- 6. Help Topics** - Display help topics for the program.

3.2 Sign In to Unified MDC App

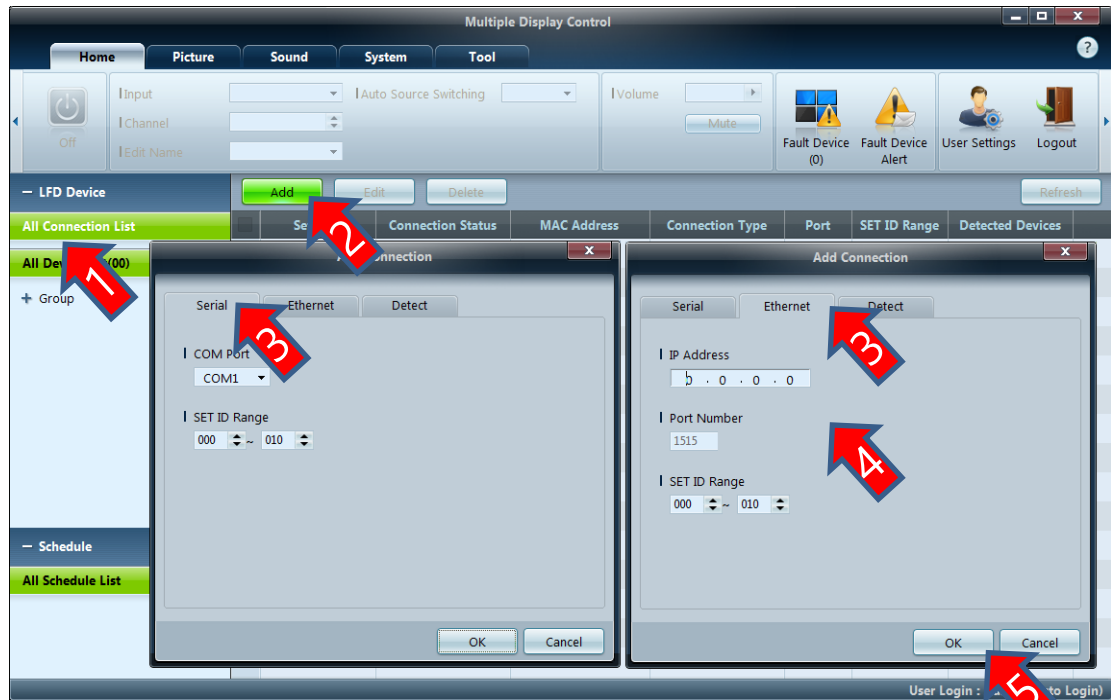


1. Run Unified MDC From Desktop Short Cut.
2. User Login Window Appear.
3. Put Default user & password as **admin**, admin and Click Ok.
4. Once Login Successfull, Change the admin password.



3.3 Connect LFD/ Device

A connection is an active network link to video wall or a standalone LFD. It is the primary/master entity th at application use for further operation on devices present in that connection. A connection can be of type S erial(RS232) or TCP(RJ45).



1. Click on All Connection List.
2. Click on Add Button, Add connection Dialog will be appeared.
3. Select Serial/Ethernet tab as per requirement.
4. Specify the Parameters of connection.
5. Click on Ok button.

3.4 Device Auto Discovery

Discovery feature finds the Signage display devices available within the Local Area Network (LAN) and provides the way to add those devices easily.

The screenshot shows the 'Multiple Display Control' software interface. The 'Add Connection' dialog box is open, displaying a list of detected devices. The dialog box has tabs for 'Serial', 'Ethernet', and 'Detect'. The 'Detect' tab is selected, showing a table of detected devices. The table has columns for 'IP /', 'Device Name', and 'Manufacturer'. The detected devices are:

IP /	Device Name	Manufacturer
107.109.204.134	[Signage] Displa...	Samsung Electronics
107.109.204.134	[Signage] Displa...	Samsung Electronics
107.109.204.114	[Signage] Samsu...	Samsung Electronics

The dialog box also has a 'Port Number' field set to 1515 and a 'SET ID Range' field set to 000 ~ 010. The 'OK' button is highlighted with a red arrow.

1. Click on All Connection List.
2. Click on Add Button, Add connection Dialog will be appeared.
3. Select Detect Tab.
4. Click on search and wait until search completed.
5. Specify the Set ID range
6. Click Ok to add the devices.

3.5 Assign of LFD Id

A LFD identified inside a video wall using 2 entities. 1 the connection i.e. the IP address or the COM port. 2 the SetId of a device. Value of SetId can be 1~224 and should be unique inside a connection. Default value of LFD SetId is 0 (ZERO). When LFDs are unboxed and installed in a video wall, the SetId should be different in each device to be detected by application. It is tedious job to assign id to LFD using Remocon. Auto assignment SetId app feature can be used to assign Id easily.

The screenshot shows the 'Multiple Display Control' software interface. The 'System' menu is selected, and the 'Auto Set ID' button is highlighted. A table of LFD devices is displayed with the following data:

Settings	Connection Status	MAC Address	Connection Type	Port	SET ID Range	Detected Devices
107.109.201.123	<input type="radio"/>	24-F5-AA-EA-19-C6	Ethernet	1515	0 ~ 10	11

1. Select All Connection
2. Select one or more Connection
3. Select System Menu Tab
4. Click Id Set Button

3.6.1 Create Device Group

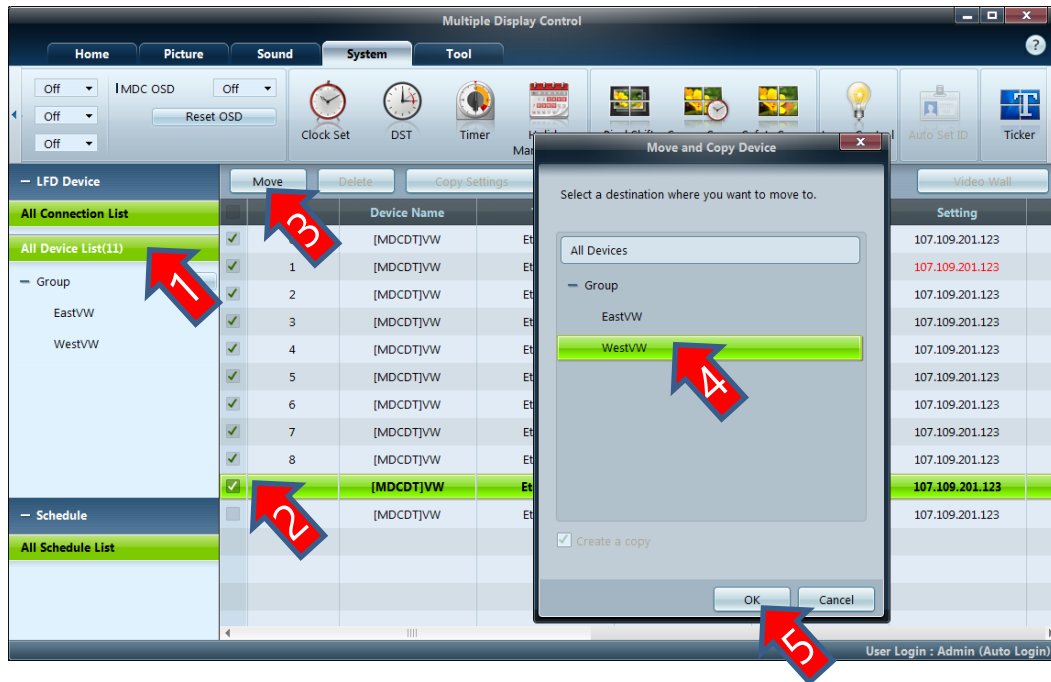
A group is a logical collection of devices/LFDs used for design VW layout, apply settings together, and schedule command on it. Any number of groups can be created as per requirement. A group can be created as follows.

The screenshot shows the 'Multiple Display Control' software interface. The 'System' tab is active, and the 'All Device List(11)' section is expanded. A group named 'WestVW' is selected. An 'Edit Group' dialog box is open, showing the 'Add on the sub level' option selected. Red arrows with numbers 1 through 5 indicate the steps for creating a device group.

1. Select All Device List
2. Select Parent Group
3. Click Edit Button
4. Select Add Sub Level
5. Type New Group Name

3.6.2 Add Device to Group

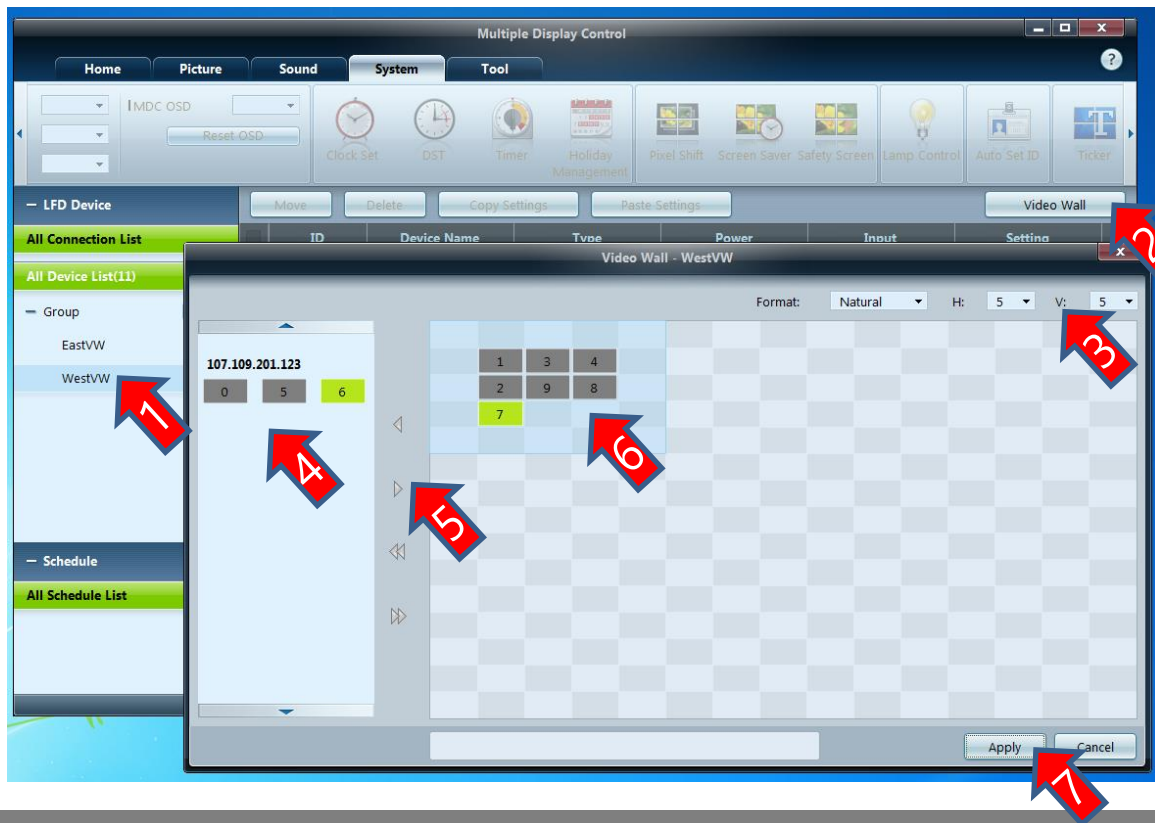
Once Group is created, Device can be added to group as follows.



1. Select All Device/Source Group
2. Select Devices To be added
3. Click Move Button
4. Select Destination Group
5. Ok to Move/Copy

3.7 Video wall layout design

Once Devices added to group, Layout of display can be configured as follows.

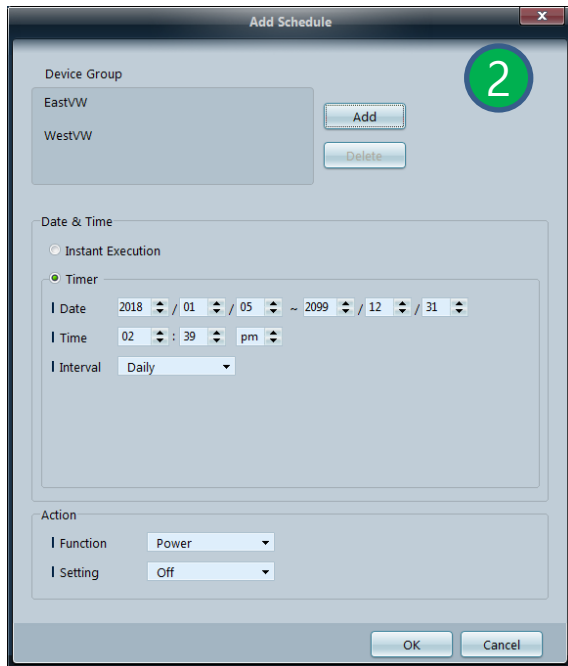


1. Select any Group.
2. Click Button Video wall.
3. Specify Video wall Size.
4. Select device from available list.
5. Move device to VW layout area.
6. Arrange the devices using Drag-n-Drop.
7. Click on Apply button to apply the settings.

3.8 Control Device Settings

Settings of devices of video wall can be changed from application in following 3 ways.

1. From Application Menu Tab.
2. Using Command Scheduling.
3. Virtual Remote Control.



App Menu Tab Options:

1

Home - Power, Source, Edit Source Name, Auto Source Switch, Volume, Fault Device Alert, User Settings

Picture - Picture Mode, Contrast, Brightness, Color, Tint, Color or Tone, Color Temp, HDMI black Level, Automation Plus, Eco Sensor, MPEG Noise Filter, Smart LED, Cinema Black, Picture Size, Screen Adjustment, 3D Control, and Advanced Settings.

Sound - Bass, Treble, Balance (L/R), SRS TS XT.

System - Video wall Division, Screen Position, DP Daisy Chain, Frame Alignment, Multi Screen, Custom PIP, PIP Source, PIP Size, Auto Color, Auto Power, Auto Power Off, Stand By Control, Network Stand by, Fan Control. Fan Speed, Temperature Settings. Softy Lock, Button Lock, OSD, Clock Set, DTS, Timer, Holiday Management, Screen Burn Protection, Lamp Control, Auto Id Set, Ticker.

Tool - Panel Control, Remote Control, Virtual Remote Control, Picture, sound, System Reset, App Options, List Edit Column, SW update.

3.9 Cloning of Device Settings

Using the “Cloning” feature, user can copy the settings of one LFD and apply it to multiple selected LFDs. User can select specific tab categories or all tab categories for copying, using the copy setting option window.

The screenshot shows the 'Multiple Display Control' application window. The main interface has tabs for Home, Picture, Sound, System, and Tool. Below these are controls for Input, Channel, Edit Name, Volume, and Mute. A table lists LFD devices with columns: ID, Device Name, Type, Input, and Setting. A 'Copy Settings' dialog box is open in the foreground, showing a list of settings to copy: All Settings, Settings in Home Tab, Settings in Picture Tab, Settings in Sound Tab, Settings in System Tab, Video Wall, Time, Others, and Settings in Tool Tab. Red arrows numbered 1 through 5 indicate the steps: 1. Select a device in the table, 2. Click the 'Copy Settings' button, 3. Select the 'Settings in System Tab' option in the dialog, 4. Select a destination device in the table, and 5. Click the 'Paste Settings' button.

ID	Device Name	Type	Input	Setting
0	[MDCDT]VW	Ethernet	PC	107.109.201.123
1	[MDCDT]VW	Ethernet	PC	107.109.201.123
2	[MDCDT]VW	Ethernet	PC	107.109.201.123
3	[MDCDT]VW	Ethernet	PC	107.109.201.123
4	[MDCDT]VW	Ethernet	PC	107.109.201.123
5	[MDCDT]VW	Ethernet	PC	107.109.201.123
6	[MDCDT]VW	Ethernet	PC	107.109.201.123
7	[MDCDT]VW	Ethernet	PC	107.109.201.123
8	[MDCDT]VW	Ethernet	PC	107.109.201.123
9	[MDCDT]VW	Ethernet	PC	107.109.201.123
10	[MDCDT]VW	Ethernet	PC	107.109.201.123

1. Select any device
2. Click Copy Settings
3. Select Copy Options
4. Select One/More destination device
5. Click Paste Settings

3.10 Fault Device Alert

This feature is provided by UMDc application to let the administrator aware of the fault in the devices connected to UMDc. This is an automated mail service. Once a user is registered with this service, UMDc will send emails to the recipients at regular interval informing them about faulty devices in the connections.

The screenshot shows the 'Multiple Display Control' application window. A 'Fault Device Alert' dialog box is open in the foreground. The dialog has a 'Mail Alert' dropdown set to 'Off'. Below it are fields for 'SMTP Server', 'Server Port No.' (set to 25), 'E-Mail Address', and 'Auth Password'. There are also three fields for 'Recipients' (E-Mail Address 1, 2, and 3). At the bottom of the dialog are 'Test', 'OK', and 'Cancel' buttons. Red arrows with numbers 1 through 5 point to the Home menu tab, the Fault Device Alert button, the SMTP settings fields, the Mail Alert dropdown, and the OK button respectively.

SET ID Range	Detected Devices
0 ~ 10	11

User Login : Admin (Auto Login)

1. Select App Home Menu Tab
2. Click Button Fault Device Alert
3. Fill SMTP Settings
4. Set Mail Alert On
5. Click OK To apply

3.11 Ambient Brightness Management

Ambient Lamp mode is an application driven feature, in which a single Light sensor used to control the brightness level of all the devices connected in a single video wall. Light sensor are external to devices. There can have multiple Light sensors in a video wall. Out of all the Light sensors, only one sensor take part in operation called the reference sensor. A Light sensor identified by the SetId of device to which it is connected. If Ambient Lamp mode is enabled - At particular e interval of time, application read the environment brightness through selected/reference Light sensor and apply picture brightness value to all the devices of video wall.

The screenshot shows the 'Multiple Display Control' software interface. The 'System' tab is selected, and the 'Lamp Control' dialog box is open. The 'Ambient Light' option is selected, and a dropdown menu is open showing device IDs (1, 4, 7). Red arrows numbered 1 through 6 indicate the steps: 1. Select any device (arrow 1 points to device ID 1 in the device list), 2. Move to App System Tab (arrow 2 points to the System tab), 3. Click Lamp Control Button (arrow 3 points to the Lamp Control button), 4. Set Ambient Lamp (arrow 4 points to the Ambient Light radio button), 5. Select Light Sensor Id (arrow 5 points to the selected device ID 1 in the dropdown), and 6. Click Ok to apply (arrow 6 points to the OK button).

1. Select any device
2. Move to App System Tab
3. Click Lamp Control Button
4. Set Ambient Lamp
5. Select Light Sensor Id
6. Click Ok to apply

3.12 F/W update using MDC & MI Author Protocol

Unified F/W Update system implemented to upgrade Firmware of every kind of Samsung devices through LAN and RS232 serial line. This software feature currently support LFD such as Legacy Orcey, Latest Tizen and Non Smart platforms. LFD R release by Samsung since year 2014 can be updated using this feature.

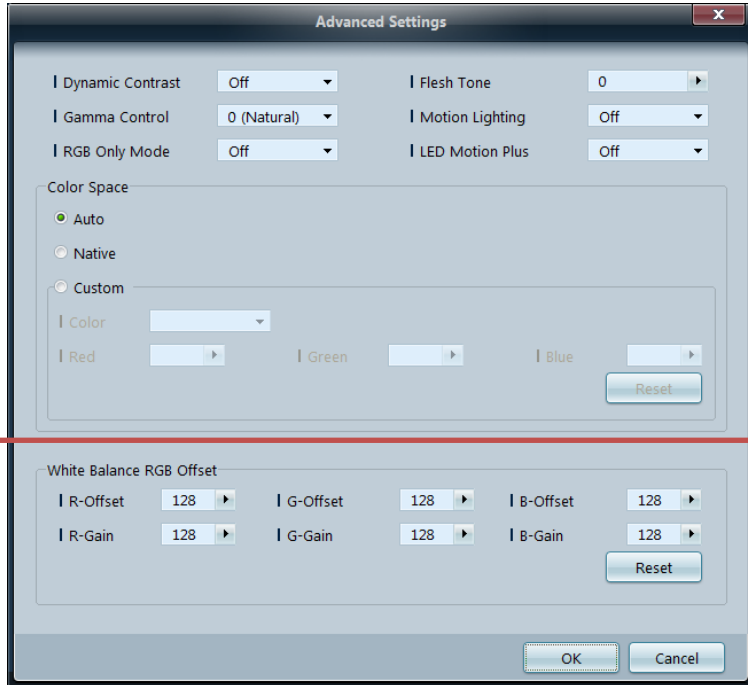
The screenshot displays the MDC software interface. The 'Tool' tab is active, and the 'Software Update' button is highlighted with a red arrow labeled '3'. A 'Software Update' dialog box is open, showing a file path and a table of target devices. The 'Start Update' button is highlighted with a red arrow labeled '5'. A list of devices is shown on the left, with the first device selected, highlighted with a red arrow labeled '1'. The 'Target Devices' table shows the device IP, current version, and status.

Device IP	Current Version	Status
107.109.201.123	TB-GSSBEDWWC-1004.0	25%

1. Select any device
2. Move to Tool Tab
3. Click S/W Update Button
4. Select Latest F/W File
5. Click Start Update to proceed

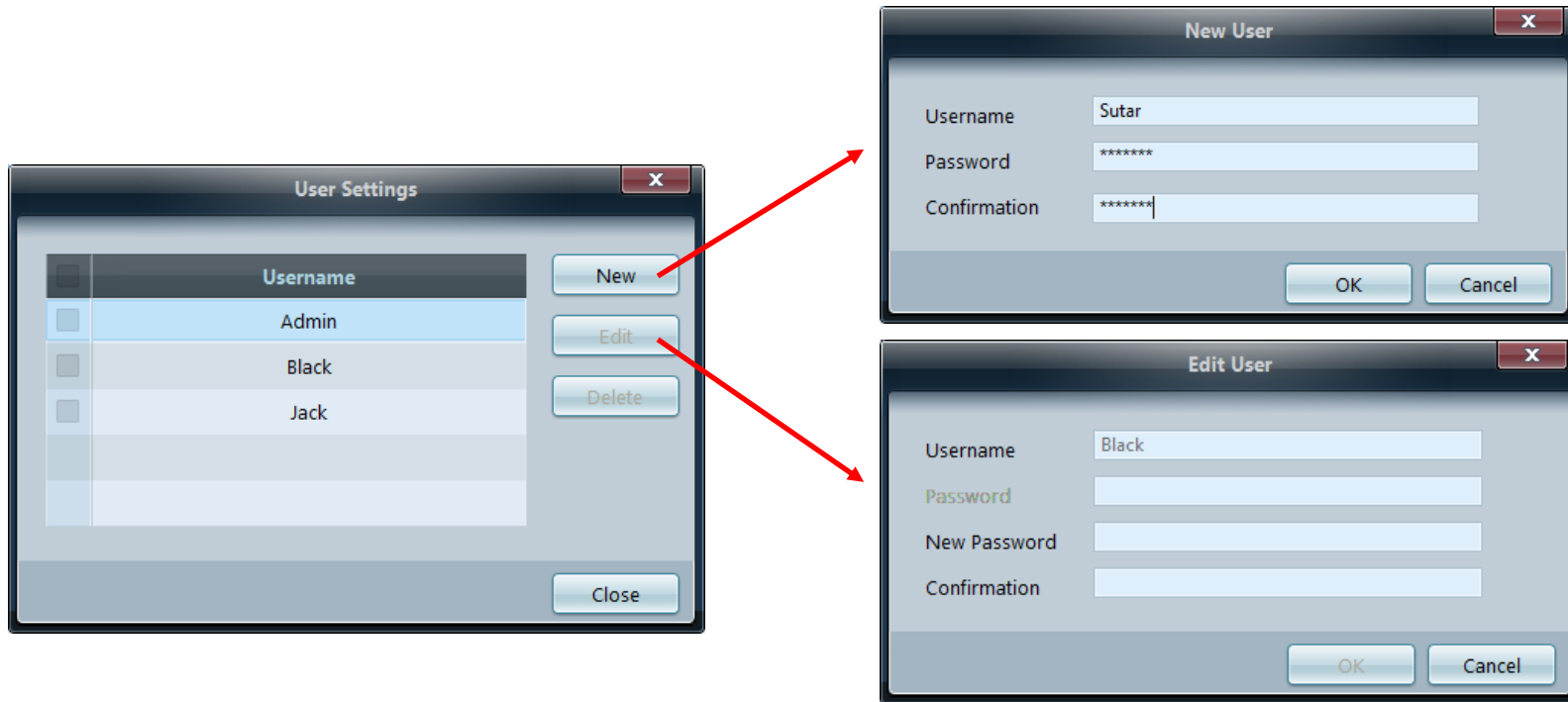
3.13 Manual White Balance

White balance Calibration setting can be applied manually to fine tune display picture quality. Using this feature user can operate White balance Gain and Offset Values interactively to get better quality picture.



3.14 User Management and protection

Only authorized users can access and control video wall. Using user management feature, Admin user can create more users and grant them access permission. The admin user is the default user of the application. This user can not be deleted, but it can delete or change password of other user to protect video wall access.



4

Miscellaneous

- Troubleshooting
- MDC Protocol Format
- Monitoring Communication
- Terminology
- References

4.1 Troubleshooting

Issue	Solution
<p>The display you want to control does not appear on the system information chart.</p>	<p>Check the connection of the RS232C or RJ45 cable (check that the cable is properly connected to appropriate port).</p> <p>Check that another display with a duplicate ID is not connected. Connecting displays with a duplicate ID can cause the displays not to be shown due to data collision.</p> <p>Check that the display ID is within the range of 0 and 224. (Change the ID using the Display menu.)</p>
<p>The display you want to control does not appear on the other Control Info Grids.</p>	<p>Check that the display is powered on. (See the power status in the system information chart.)</p> <p>Ensure you select the input source the display is connected to.</p>
<p>Displays power on or off at different time from one another even though On Time or Off Time is set.</p>	<p>Adjust the time on the PC to synchronize the time between the connected displays.</p>
<p>The remote control does not work.</p>	<p>The remote control may not work if the RS-232C cable is removed or the program is closed abnormally while the Remote Control function is Disable. To resolve this, run the program again and set Remote Control to Enable.</p>

4.2 User Management and protection

MDC is the protocol implemented inside firmware of Samsung LFD. Applications can use this protocol to communicate to LFD to change various settings as required. The format of the protocol is as follows. The complete range of commands supported are available as part of specification document.

Packet Format

Header	Command	Set ID	Data Length	Data 1	...	Data n	Check Sum
0xAA	Command ID		n	data1	...	Data n	

EX: Set LFD Power On or Off

Header	Command	Set ID	Data Length	Data 1	Check Sum
0xAA	0x11		1	Power	

4.3 Monitoring Communication

Communication between UMDC Application and Video wall Devices can be monitored for analysis and identification of failure cases.

The screenshot shows the 'Multiple Display Control' application interface. The 'Tool' menu is selected, and the 'Monitor Window' button is highlighted. The 'Refresh' button is also highlighted. The 'Filter' button is highlighted. The interface displays a table of connection status and detected devices, and a log window showing communication details.

Settings	Connection Status	MAC Address	Connection Type	Port	SET ID Range	Detected Devices
127.0.0.1	●		Ethernet	1515	0 ~ 10	11

```

Sent : 20:58:19 (47 milli seconds)
127.0.0.1 : AA AE 09 0D B7

Received : 20:58:19 (62 milli seconds)
127.0.0.1 : AA FF 09 11 41 AE 0C 00 01 00 0C 00 01 00 00 61 00 61 0A 0C 00 FA

Sent : 20:58:19 (47 milli seconds)
127.0.0.1 : AA AE 0A 00 BB

Received : 20:58:19 (47 milli seconds)
127.0.0.1 : AA FF 0A 11 41 AE 0C 00 01 00 0C 00 01 00 00 61 00 61 0A 0C 00 FB
  
```

1. Go to Application Tools Menu.
2. Click on monitor window.
3. Do some operation to send command to LFD. For Example do Refresh.
4. Export the log to word(.rtf) file if required

4.4 Terminology

Abbreviations	Description
MDC	Multiple Display Controller protocol
LFD	Large Format Display
DVD	Digital Versatile Disk
STB	Set Top Box
SBB	Set Back Box
SIM	Slide In Module
PIM	Plug In Module
WB	White Balance
TCP	Transport Control Protocol
UDP	User Datagram Protocol
SMTP	Simple Mail Transfer Protocol
WOL	Wake-on-LAN
UPnP	Universal Plug and Play

4.5 References

A] MDC Protocol Documents:
mdc_ppmxxm6x_protocol_v14.2.docx

B] Unified MDC App User Manual:
MDC_User_Manual_English.pdf

Thank you