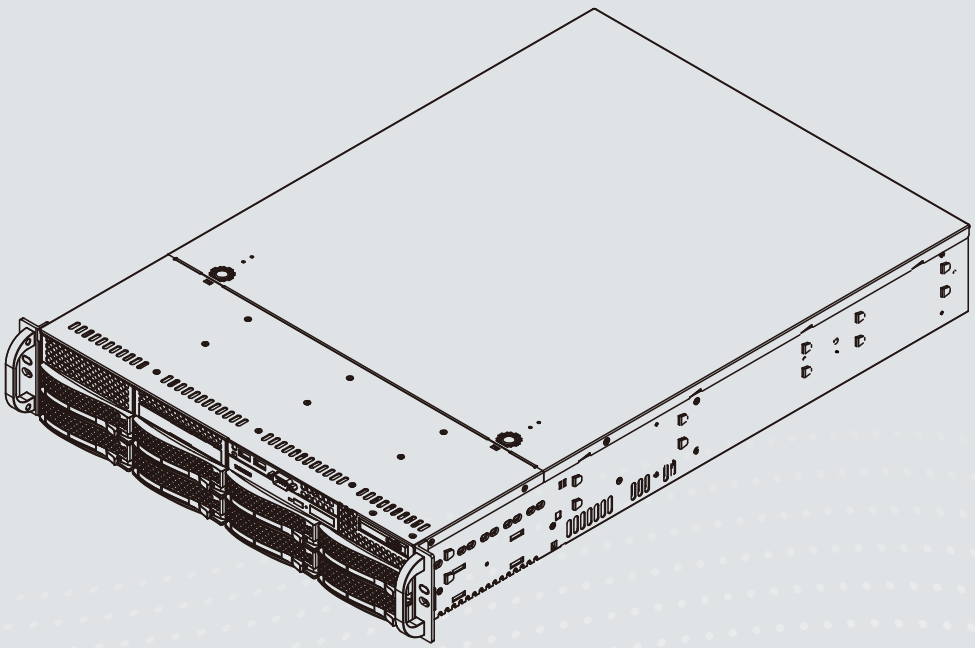
VIVOTEK

NR9681 Network Video Recorder

User's Manual

Rack-mount Enclosure • 64-channel Recording •
RAID storage • Full Integration with VIVOTEK Cameras



Rev. 1.0

Table of Contents

Revision History 8

Chapter One Hardware Installation and Initial Configuration 10

Introducing NR9681 Network Video Recorder 10

Special Features 10

Safety 11

Installation Instructions 12

Physical Description 14

Rack-mounting 17

Installing Hard Disk Drives 23

Connecting Interfaces 25

Initial Configuration 25

RAID Basics 41

VAST Server and Client Components 58

Usage Scenario 58

Technical Specifications 59

VAST Server Functionality 60

VAST LiveClient Functionality 61

VAST Playback Functionality 62

VAST Software License 63

Reminders for VAST Software License 64

VAST LiveClient Configuration 66

Activating the VAST LiveClient and Logging in to a VAST Server 66

VAST LiveClient User Interface 67

Menu Bar 67

Status Panel 68

Help Panel 69

Quick Access Bar 70

Live Video Monitoring Window 70

Hierarchical Management Tree 71

Camera Control Panel 72

Pan/Tilt/Zoom (PTZ) Control Panel 72

Two Way Audio Control Panel 74

Language Selection 74

Alarm Window 75

Alarm Filter 76

Alarm State 77

Instant Playback 78

Instant Replay 79

Audio Control 80

How to Manage Devices 81

Insert Cameras 81

Seamless Recording 85
Enable SVC 87
Insert NVR (Network Video Recorder) 90
Insert a Video Server 92
Update Devices 94
Delete Devices from the VAST Server 95
Batch Insert Devices 96
Camera Configuration 101
View Live Videos 106
Dual / Multiple Streams 106
Fisheye Display Modes 106
Refresh 111
Streaming Server 111
Output Camera List 111
Get Public IP 111
Camera Settings 112
Open Recording Folder 112
Remove Live Video from the Video Monitoring Window 113
How to Change the VAST LiveClient Layout 114
Changing the Layout of the Live Video Monitoring Window 114
Switch Video Channels 114
Configure Layout Mode 115
Configure Layout Mode 115
Rotating Video Pages 117
Edit Layout 117
Maximize/Minimize the Live Video Monitoring Window 119
View Live Video on Dual Monitors 120
Simultaneously Viewing up to 64 Channels 121
Using different layouts on each monitor 121
View Live Video with Multiple Monitors 122
How to Manage Stations 123
Relay Settings 123
Insert Sub-stations 124
Delete Sub-stations 127
Update Stations 128
How to Manage User Accounts 129
The Default User Roles and Permissions of User Accounts 129
Manage a User Account 131
Add a New User Account - Basic Account 131
Add a New User Account - Windows AD Account 132
Permission of the User Account 135
Delete the User Account 136
How to Set up Association Management 137
Association Management 137
How to Set up Alarm Management 139
Alarm Management 139

How to Manage the Virtual Matrix 147
The architecture of VAST Matrix 147
Installing VAST Matrix Program 148
Launching VAST Matrix 149
Configuration 150
View Settings 150
About 150
Exit 150
VAST Matrix Management 151
Matrix Management Settings 151
Manage VAST Matrix through VAST LiveClient 152
Matrix View Settings 153
Search VIVOCam Switches 154
How to Configure the Station General Settings 155
Server Settings 155
Log Settings 155
How to Configure Station Network Settings 156
Port Settings 156
UPnP Settings 156
Proxy Settings 156
Web Access Settings 156
How to Edit Recording Groups 157
Recording Storage Settings 157
Default Storage Group Settings 158
Add New Recording Group(s) 160
How to Edit Recording Schedules 161
Edit Schedule List 162
Add Schedules 162
Rename Schedules 162
Delete Schedules 162
Load/Save Schedule Templates 163
Edit Camera List 164
Edit Time Frame List 165
Add New Time Frames 166
Recording Settings 167
The Concept of Repeat Frequency 169
Repeat Frequency: Daily Setting 170
Repeat Frequency: Weekly Setting (Day-based) 173
Repeat Frequency: Monthly Setting (Day-based) 176
Repeat Frequency: Yearly Setting (Day-based) 178
How to Manually Begin /Stop Recording 180
How to Edit Scheduled Backup Settings 181
Select Backup Source 181
Setup Backup Schedule 182
Select Backup Target 182
Other Options 182
How to Configure Station Server Settings 183

DDNS Settings 183
Network Storage Server Settings 184
SMTP Settings 185
How to Use the Talk Panel 186
Add a Camera to the Talk Panel 186
Remove a Camera from the Talk Panel 188
How to Configure E-map Settings 189
Upload an E-map 189
User Interface of E-map Settings Page (View Mode) 190
Quick Access Bar 191
Status Panel 191
User Interface of E-map Settings Page (Edit Mode) 192
Device Management 193
Live View Dialog Settings 194
Open Live View Dialog 194
Send to Single View 194
E-map Link 195
How to Configure Client Settings 198
Snapshot Settings 198
Take a Snapshot 199
Recording Settings 200
Type 1: Record to EXE 200
Type 2: Record to 3GP 200
Type 3: Record to AVI 201
Built-in Media Player--EXE 204
View Settings 206
Display Location 206
Date and Time Format 207
Video Display Mode 207
Font Settings 208
General Settings 209
System Settings 209
Alarm Settings 210
Rotation Settings 210
Display Settings 211
Joystick Settings 213
Enable Joystick 213
Proxy Settings 219
How to Use PiP (Picture-in-Picture) 220
Enable PiP 220
Global View 220
ROI (Region of Interest) 221
Digital Zoom In 221
Snapshot & Print Zoomed In Image 221
PiP Settings 221
Multi-touch Mode 222
How to Configure Video Enhancement 223

Basic Image Adjustment....223
Defog....225
Apply a Preset Defog Profile....225
Create a New Defog Profile....226
How to Search for a Device on the Hierarchical Management Tree....228
How to Print a Video Image....229
How to Lock LiveClient for Security Concerns....229
How to Log out from the VAST Server....230
How to Exit VAST LiveClient....230
How to Configure a Logical Tree....231
VAST Playback Configuration....238
Activating VAST Playback and Logging in to a Server....238
VAST Playback User Interface....239
Menu Bar....239
Status Panel....239
Quick Access Bar....240
Recorded Video Playback Window....240
Language Selection....241
Query Panel-- Browsing Page....241
Query Panel--Time Search Page....243
Query Panel--Event Search Page....244
Query Panel--Bookmark Search Page....245
Query Panel--Alarm Search Page....246
Query Panel--Log Viewer Page....247
Video Clips List Window....248
Playback Control Panel....249
Rewind....250
How to Playback Recorded Video....251
Select a Recorded Video Clip....251
Remove Recorded Video Clips from Video Cells....253
Timeline Slider Bar and Histogram....253
Zoom in / out of the Histogram....254
Synchronous Playback....255
Audio Control....257
How to Change the Playback Layout....258
Changing the Layout of the Recorded Video Playback Window....258
Switch Video Channels....258
Configure Layout Mode....258
Maximize/Minimize the Recorded Video Playback Window....259
View Recorded Video with Multiple Monitors....260
How to Backup Recorded Video....261
How to Search for a Video Clip in a Specific Period of time....267
How to Add a Bookmark....268
How to Search for Events....269
Select Event Category....270
Event Category- All Events....270

Event Category- All Motion Events....270
Event Category- All IVA events....271
Event Category- All DI Events....271
Event Category- Named DI Events....272
Start Event Search....273
Backup the Event Videos....274
How to Search for a Bookmark....275
How to Search Logs....276
Select Log Category/Log Type/Log Level....277
Search All Local Logs....278
Search Login History....278
Search Login Activities....279
How to Configure Client Settings....281
Snapshot Settings....281
Export Settings....281
View Settings....283
Proxy Settings....283
General Settings....283
System Settings....283
Display Settings....283
How to Configure Video Enhancement....283
How to Search for a Device on the Hierarchical Management Tree....283
How to Print a Video Image....283
How to Lock VAST Playback for Security Concerns....284
How to Log out from the VAST Server....284
How to Exit VAST Playback....284

Import and Export Utility....285
Export Utility....285
Import Utility....285

VAST Service Control Tool....287

Appendix A Panoramic PTZ (P-PTZ) Configuration....288
Enable Panoramic PTZ on VAST....288
Panoramic PTZ - Event Trigger....291
Enable or Disable the Panoramic PTZ Functions....293

Appendix B ONVIF Support....294

Appendix C Support for Digital I/O Modbus TCP Modules....296

Appendix D Other Parameters....301

Revision History

Rev. 1.0:

Initial release.

⚠ WARNING:

1. No storage system is completely fail-safe. Damage to data might occur due to file system corruption, operating system malfunction, virus infection, HDD component failures, and so on. Therefore, it is highly recommended to regularly back up your data, and VIVOTEK disclaims responsibilities of data loss or recovery.
2. Always power off the system using the power down button on system desktop. Do not disconnect the power cord while the system is still operating. Doing so will result in data inconsistencies. The normal power-off procedure allows cached data to be written to disks.

Read Before Use

The use of surveillance devices may be prohibited by law in your country. The Network Camera is not only a high-performance web-ready camera but can also be part of a flexible surveillance system. It is the user's responsibility to ensure that the operation of such devices is legal before installing this unit for its intended use.

It is important to first verify that all contents received are complete according to the Package Contents listed below. Take note of the warnings in the Quick Installation Guide before the Network Camera is installed; then carefully read and follow the instructions in the Installation chapter to avoid damage due to faulty assembly and installation. This also ensures the product is used properly as intended.

The Network Camera is a network device and its use should be straightforward for those who have basic networking knowledge. It is designed for various applications including video sharing, general security/surveillance, etc. The Configuration chapter suggests ways to best utilize the Network Camera and ensure proper operations. For creative and professional developers, the URL Commands of the Network Camera section serves as a helpful reference to customizing existing homepages or integrating with the current web server.

NOTE:

The operating system and management software are installed on a flash memory mounted on the main board. Except for the plug-ins for onscreen display, there is no need to install software.

Package Contents

- NR9681
- Power cords
- Software CD
- Warranty Card
- Quick Installation Guide
- Screws and slide rails

Symbols and Statements in this Document

INFORMATION: provides important messages or advices that might help prevent inconvenient or problem situations.

NOTE: Notices provide guidance or advices that are related to the functional integrity of the machine.

Tips: Tips are useful information that helps enhance or facilitae an installation, function, or process.

WARNING! or **IMPORTANT**: These statements indicate situations that can be dangerous or hazardous to the machine or you.

Electrical Hazard: This statement appears when high voltage electrical hazards might occur to an operator.

Chapter One Hardware Installation and Initial Configuration

Introducing NR9681 Network Video Recorder

NR9681 is the latest 64-channel H.265, RAID-protected NVR from VIVOTEK, bringing stable and efficient system operation under a wide range of recording/network management/system settings. The unit supports all VIVOTEK camera models, including the latest 5-Megapixel and fisheye cameras. The support for RAID 1/6/6/10 provides data security in the event of disk drive failure.

The unit is equipped with two gigabit Ethernet RJ45 ports which provide network failover functionality to avoid the risk of recording loss. When one network line is disconnected, the system will shift to the other network automatically, providing continuous access for video data. Up to 8 HDDs can be installed in the NR9681 for a total storage capacity of up to 48TB (6TB max. each). Eight removable HDD trays are available in the front of the unit, with hot-swap functionality for easy replacement.

A VAST CMS server runs on the machine that manages surveillance recording and playback. The compatibility with the iViewer application allows for remote access to the NR9681 on handheld devices. By integrating all of the components together using VIVOTEK's NR9681, network cameras, VAST, and iViewer software, users can realize a fully-featured and robust next-generation surveillance system. This ingenious NVR also features the remote management capability with a full range of server/client structures and thus is capable for robust and diverse applications.

Special Features

- Runs on embedded Windows
- 2U Rack Mount Design
- RAID 0, 1, 5, 6, 10, 50, 60 in virtual drive storage configurations
- 8 x HDD Tray, for a max. capacity of 48TB
- 2 x Gigabit RJ45 Ethernet ports
- 8 x USB Port (2 x Front / 6 x Back)
- Size: 437 mm (W) x 648 mm (D) x 89 mm (H)
- 64-CH Live View & 16-CH Synchronous Playback
- H.265/H.264/ MPEG-4
- PTZ Support
- Snapshot / Export Media
- PiP Video Control
- Bookmark Design
- Fast Configuration Backup / Restore
- Pre-installed VIVOTEK VAST Central Management Software*
- Full Integration with VIVOTEK Network Cameras
- VIVOTEK iViewer Support (iOS/Android)

Safety

- Connect the system to an earthed main power outlet.
- Never open the housing of the power supply unit.
- Install and operate the system only in a dry, weather-proof location.
- Observe the following safety factors:
  - Is there visible damage to the system or power cord
  - Is the system operating correctly.
  - Has the system been exposed to rain or moisture
  - Has the system been in a long storage under harsh conditions or exposed to unconforming stress.
- The relevant electrical engineering regulations must be complied with at all times during installation.
- Ensure that all maintenance and repair work is handled by qualified personnel such as electrical engineers or network specialists.
- Read this manual before installing or operating the system. The documentation contains important safety instructions about permitted uses.
- The rated AC input is: **100-240V, 11-3.5A, 60-50Hz**; the max. output power: **740W.**
- If a fault occurs, disconnect the power cord from the power supply.
- Do not install the system close to heaters or other heat sources. Avoid locations with direct sunlight.
- All ventilation openings must be not be blocked.
- Use only the cables shipped with system or use appropriate cables that can withstand electromagnetic interference.

Installation Instructions

Warning:
Read the installation instructions before connecting the system to the power source.

Warning:
This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 250V, 20 A.

Warning:
The system must be disconnected from all sources of power and the power cord.removed from the power supply module(s) before accessing the chassis interior to install or remove system components.

Warning:
Only trained and qualifiedpersonnel should be allowed to install, replace, or service this equipment.

Warning:
This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. (This warning does not apply to workstations).

Warning:
There is the danger of explosion if the battery is replaced incorrectly. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Warning:
This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.

Warning:
Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.

Warning:
Installation of the equipment must comply with local and national electrical codes.

Warning:
Ultimate disposal of this product should be handled according to all national laws and regulations.

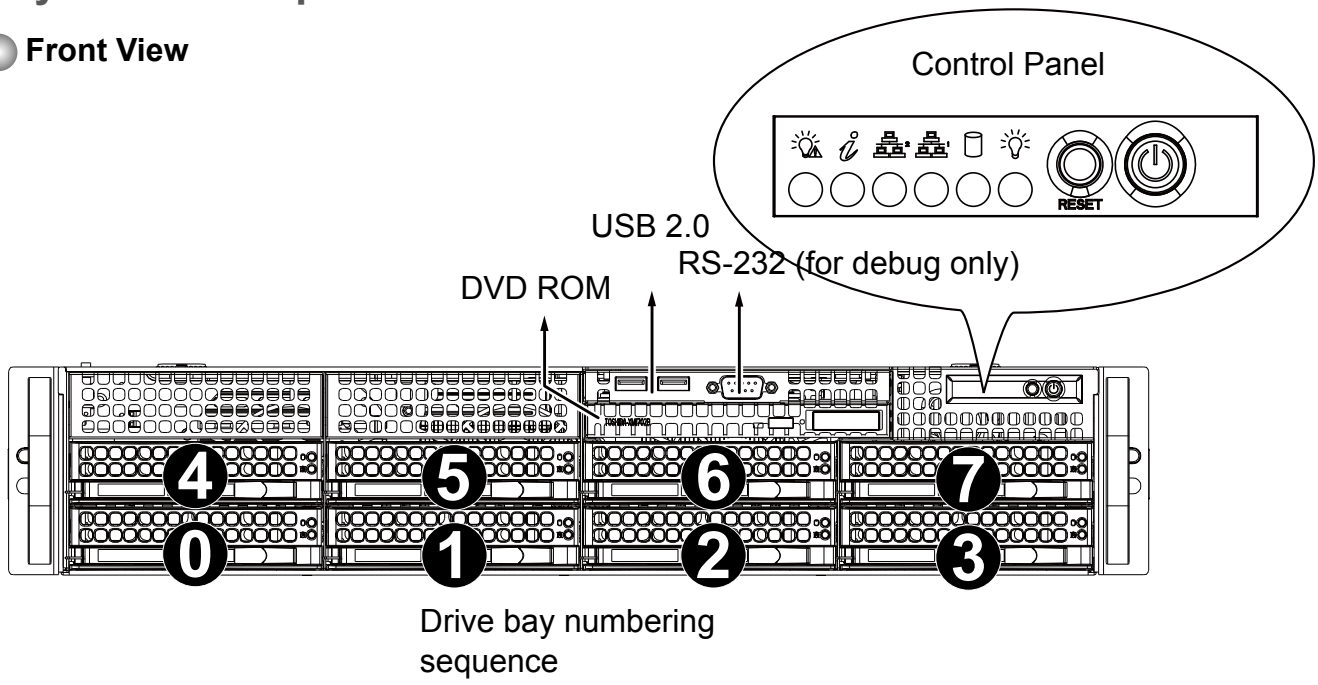
Warning:
The fans might still be turning when you remove the fan assembly from the chassis. Keep fingers,screwdrivers, and other objects away from the openings in the fan assembly's housing.

Warning:

When installing the product, use the provided or designated connection cables, power cables and AC adaptors. Using any other cables and adaptors could cause a malfunction or a fire.Electrical Appliance and Material Safety Law prohibits the use of UL or CSA -certified cables (that have UL/CSA shown on the code) for any other electrical devices than products designated by the manufacturer only.

Physical Description

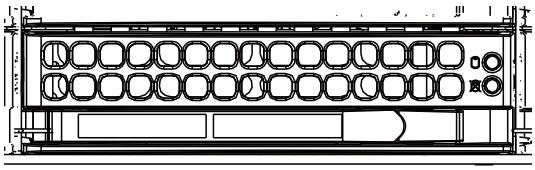
Front View



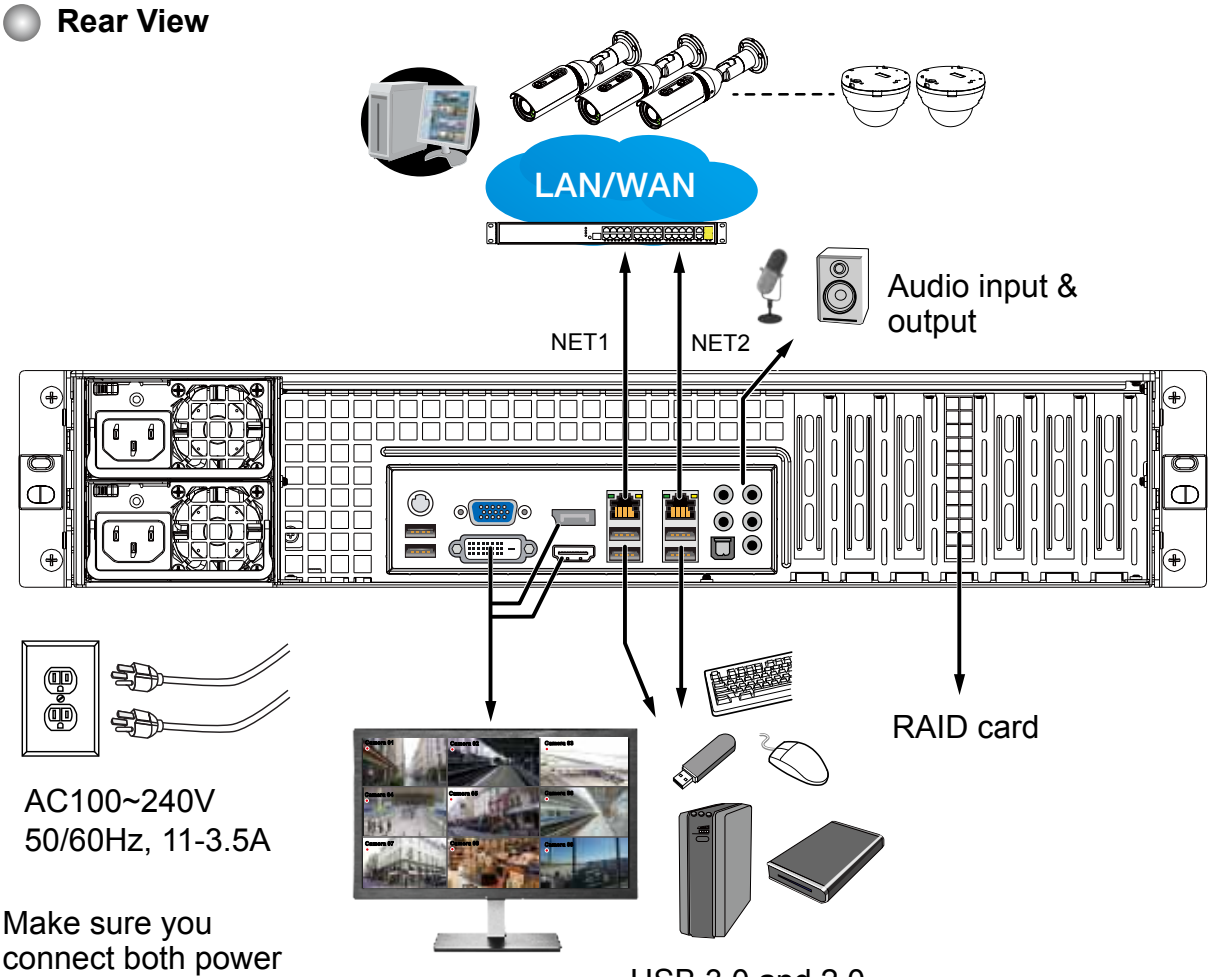
Control Panel buttons and LEDs			
	Power failure LED	Flashes to indicate a power failure.	
	Status LED	Status	Description
		Constant on and red	An overheat condition. (e.g., by cable congestion)
		Blinking red (1 Hz)	Fan failure: check for an inoperable fan.
		Blinking red (0.25 Hz)	Power failure: check for an inoperative power supply.
		Solide blue	Local UID has been activated. Use this button to locate the server in a rack environment.
		Blinking blue (300 msec)	Remote UID has been activated. Use this button to locate the server from a remote site.
	NIC2	Indicates network activity on GLAN2 when flashing.	
	NIC1	Indicates network activity on GLAN1 when flashing.	
	HDD	Indicates activity on the SAS/SATA drives, and/or DVD-ROM activity when flashing.	
	Power	Indicates power is being supplied to the system power supply units. This LED should normally be lit when the system is operating.	

Control Panel buttons and LEDs		
RESET	Reset	This button is used to reboot the system.
	Power	The main power switch is used to apply or remove power from the power supplies to the server. Turning off system power using this button removes the main power but keeps standby power supplied to the system. You must unplug the system before servicing components inside the chassis.

Drive Tray LEDs	
Green	When lit, indicates drive activity. Blinking indicates the drive is being accessed.
Red	Red indicates a SAS/SATA drive failure.



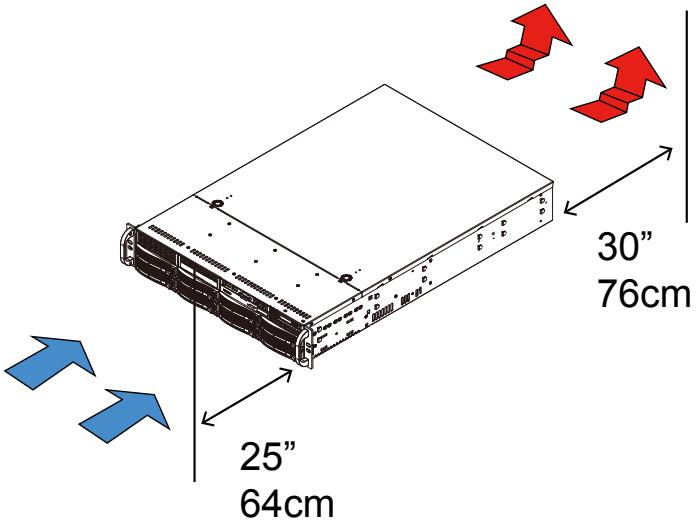
Rear View



IMPORTANT:

It is important to leave a clearance of 76cm to the rear side of the chassis. The clearance is required to ensure an adequate airflow through the chassis to ventilate heat. A 64cm clearance is also required on the front of the chassis.

To ensure normal operation, maintain ambient airflow. Do not block the airflow around chassis such as placing the system in a closed cabinet.



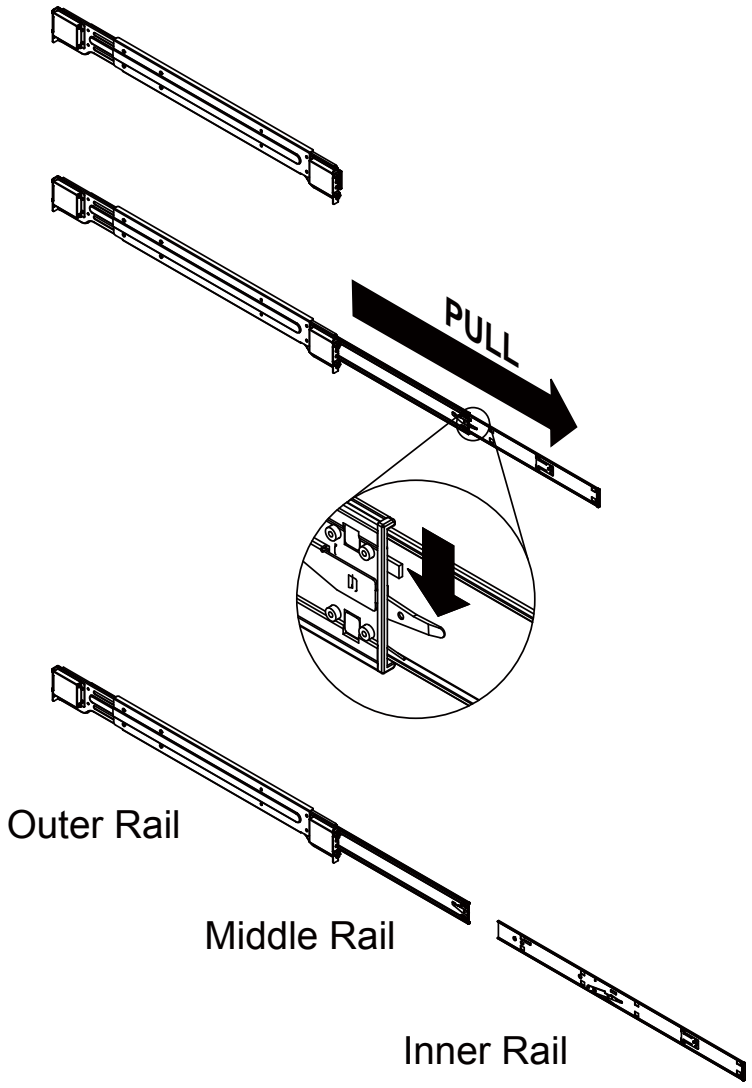
Rack-mounting

IMPORTANT:

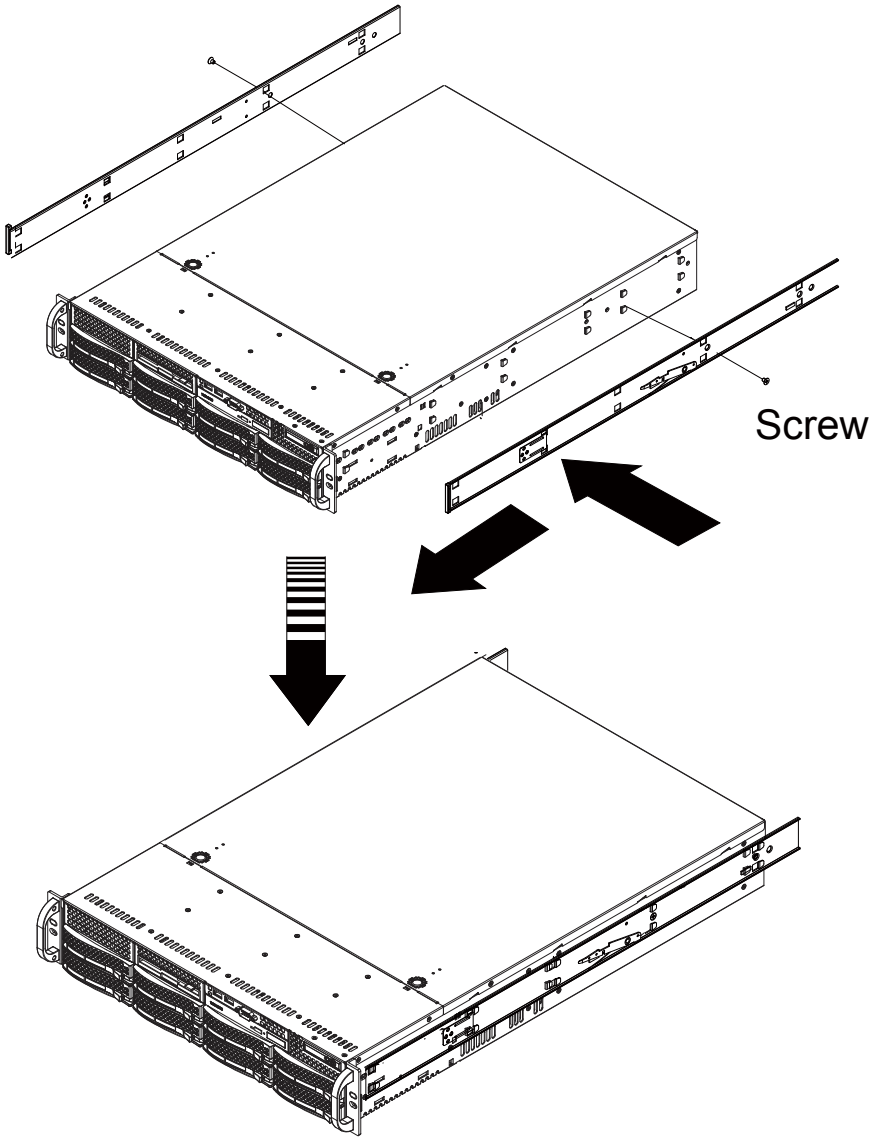
If you have either a round-holed or square-holed rack, install cage nuts or clip nuts to the desired positions on the rack posts.

The instructions below are based on the installation to a 4-post equipment rack.

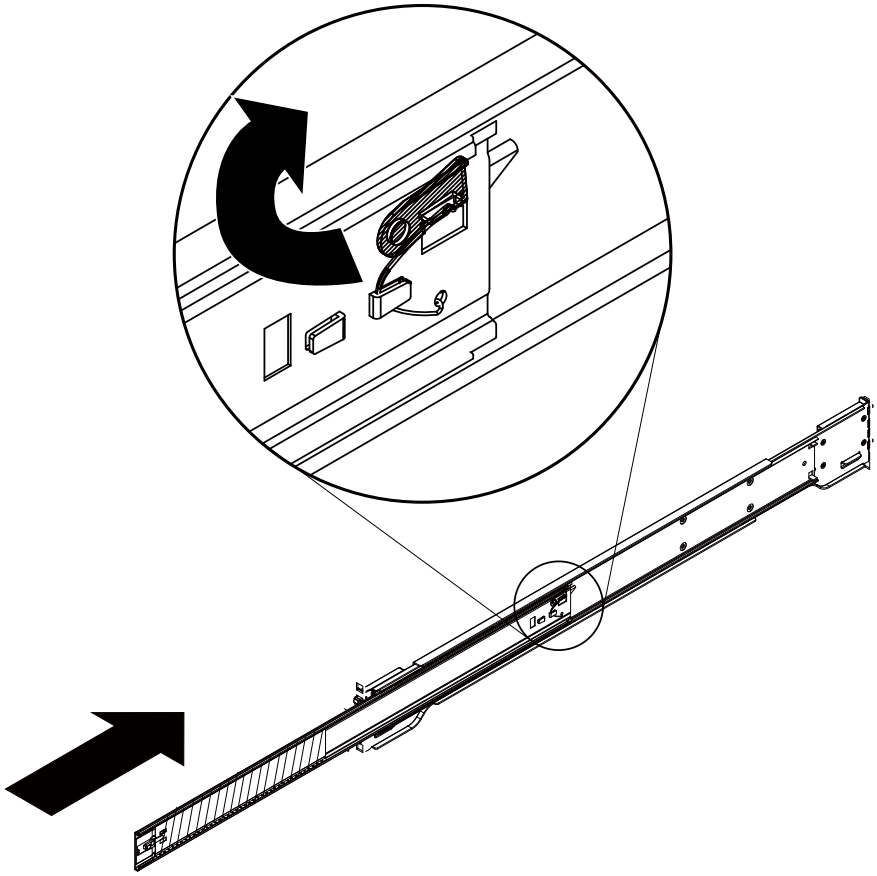
1. Remove the inner rails from the slide rail assembly. Pull the inner rail out of the assembly untill it is fully extended and press the retention tab to release the inner rail.



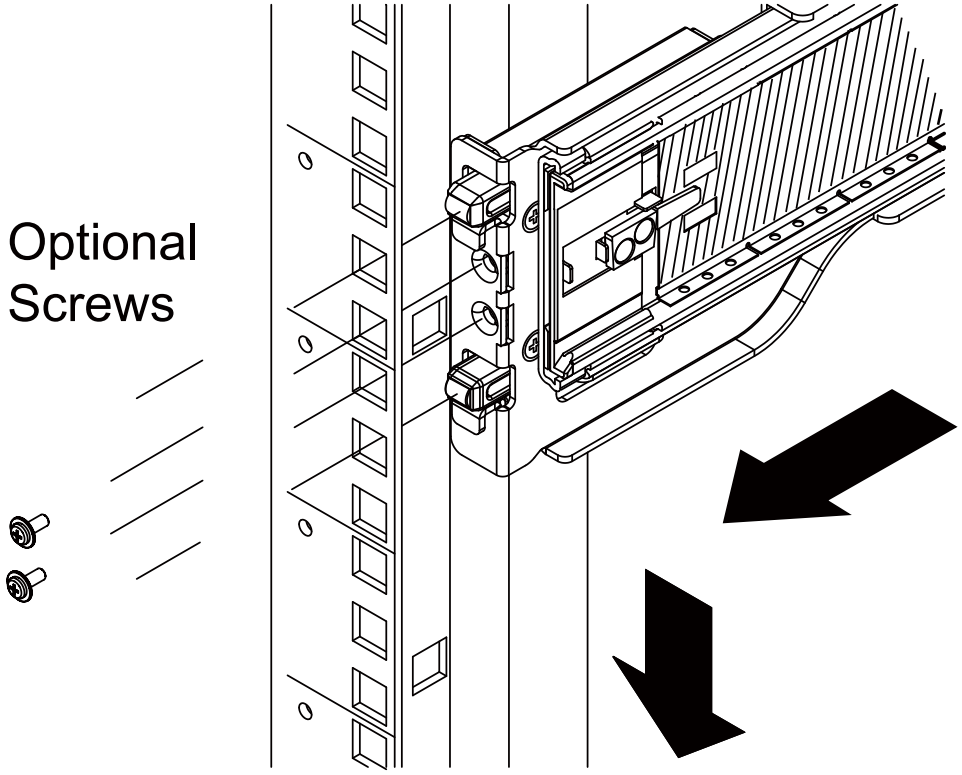
2. Secure the inner rails to the sides of the chassis using the included screws. Slide the inner rails forward until they are locked into position. Secure the inner rails each with a screw.



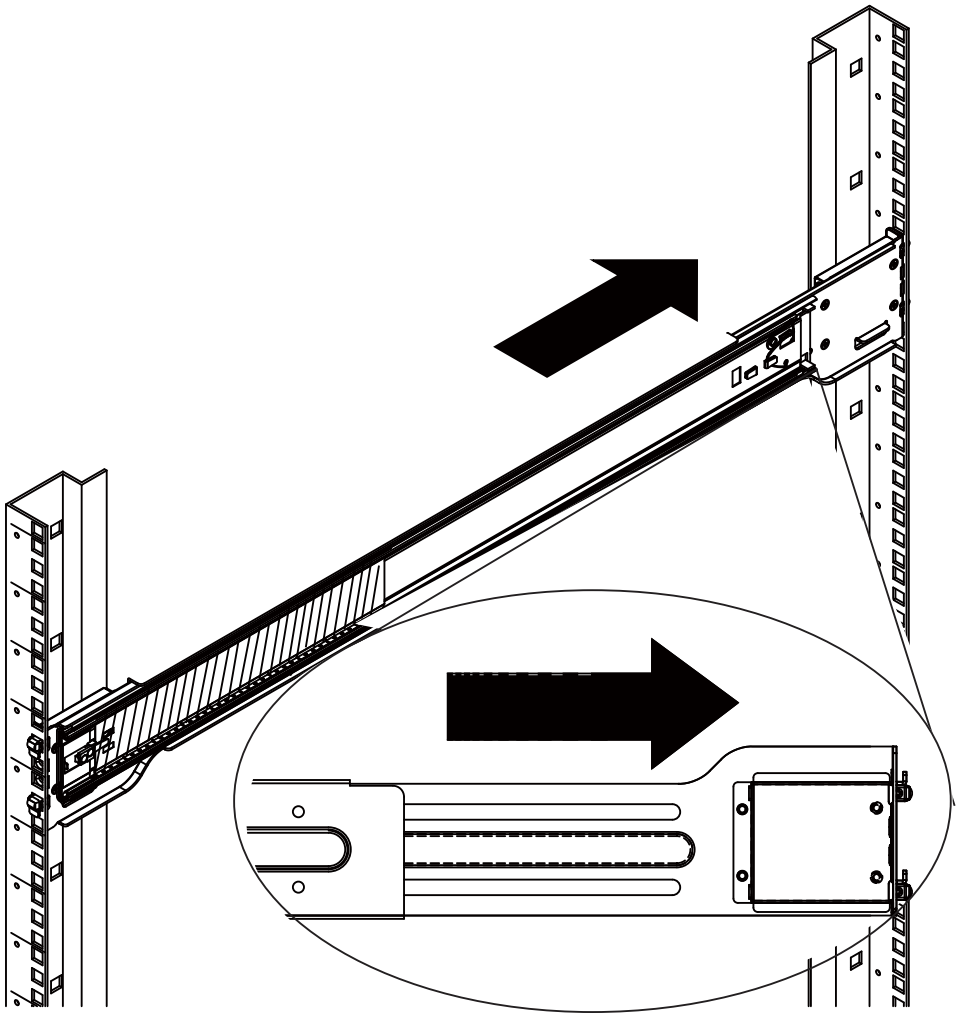
3. Press the locking tab and push the middle rail back into the slide rail assembly.



4. Attach the slide rails to the front rack post by hanging them to the rack holes. You may secure them with screws.

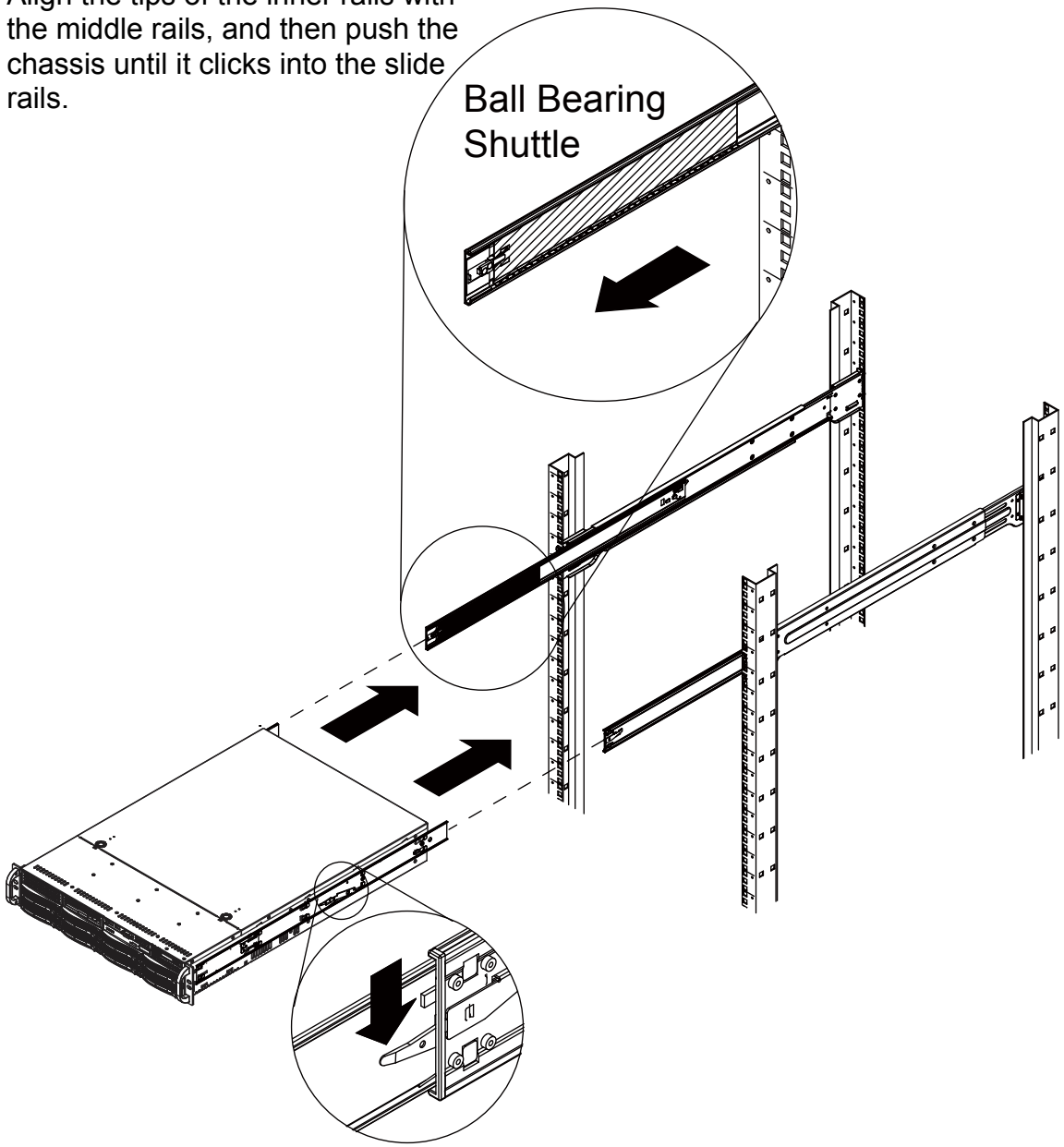


5. Extend the rails as necessary, and repeat the previous step to hang the slide rails to four rack posts.



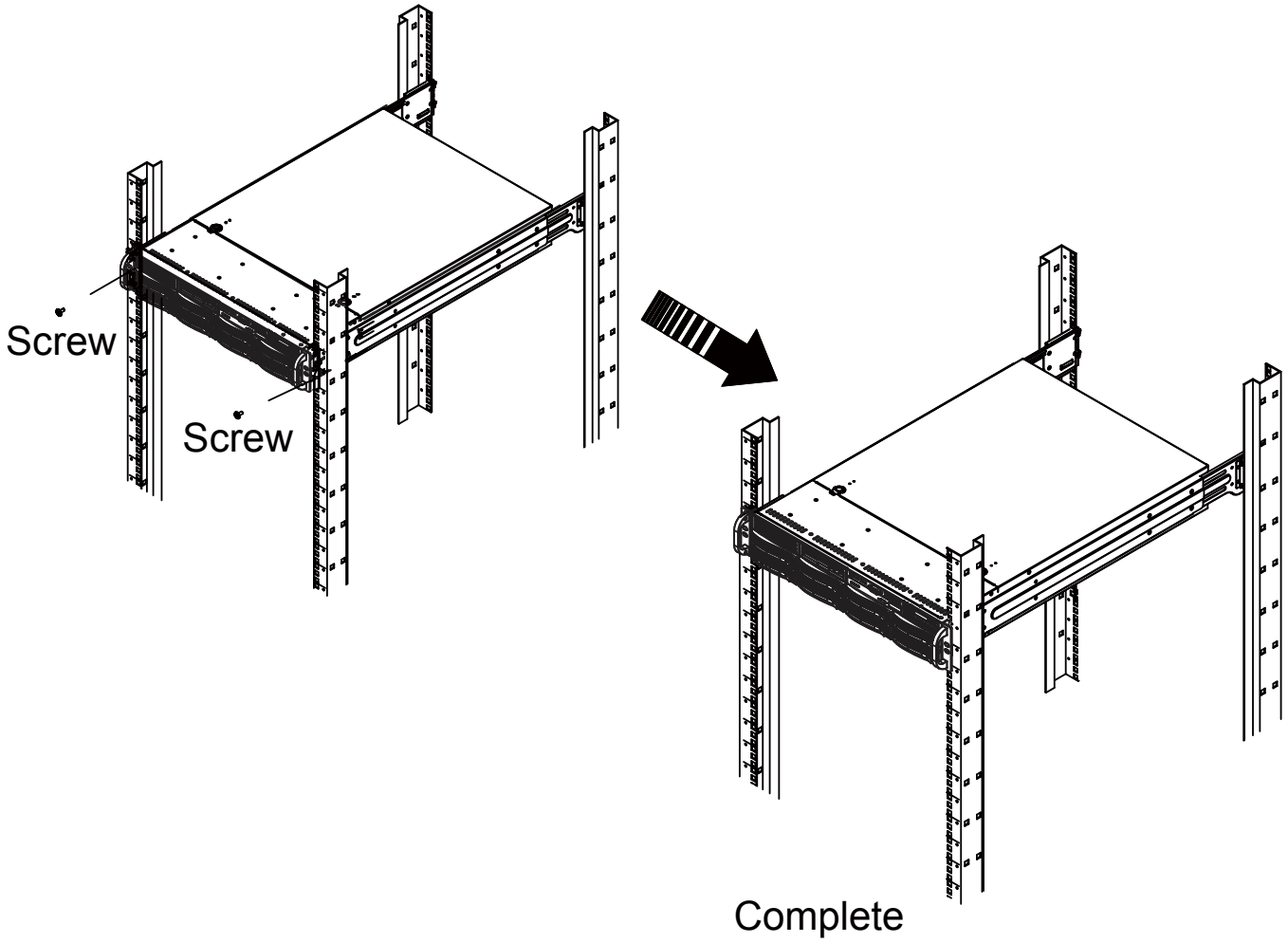
6. Pull the middle rail out of the front end, and make sure the ball bearing shuttle is locked at the front of the middle rail.

   Align the tips of the inner rails with the middle rails, and then push the chassis until it clicks into the slide rails.



Press the locking tabs on both sides of the chassis simultaneously and push the chassis into the rack cabinet.

7. If additional security is required, secure the chassis handles to the front rack posts (optional).

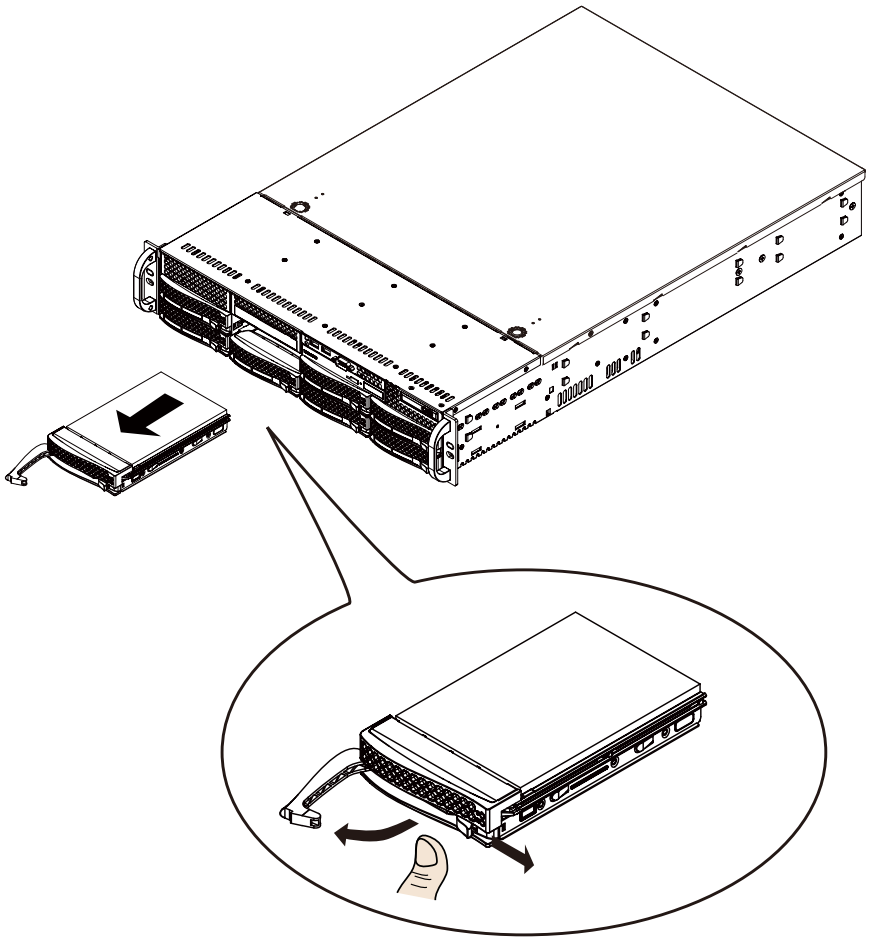


Installing Hard Disk Drives

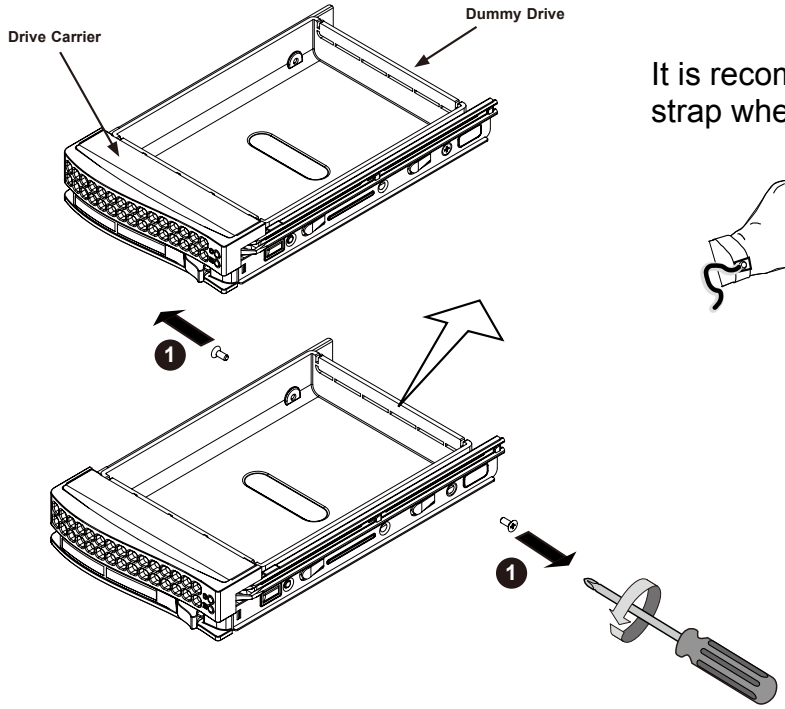
IMPORTANT:

- Refer to VIVOTEK's website for the hard disk compatibility information.
- Avoid touching the hard drive's circuit board or connector pins. Doing so can damage the hard drive by electro-static discharge.

1. Remove drive trays from the chassis. Push the release tab to the side, the tray lever will pop out. Pull the lever to remove drive trays.

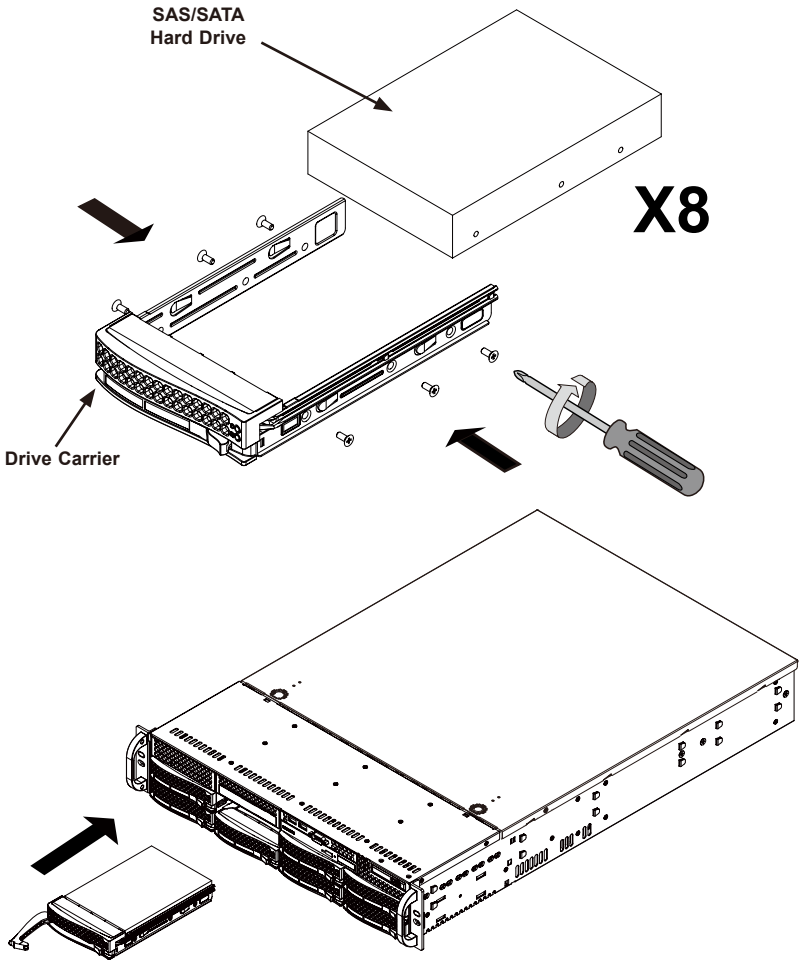


2. Use a Phillips screwdriver to remove screws from the side and then remove the plastic Dummy Drive.



It is recommended to wear an anti-static wrist strap when handling hard drives.

3. Install hard drives by driving screws from the sides. When done, gently install the drive trays into the chassis.



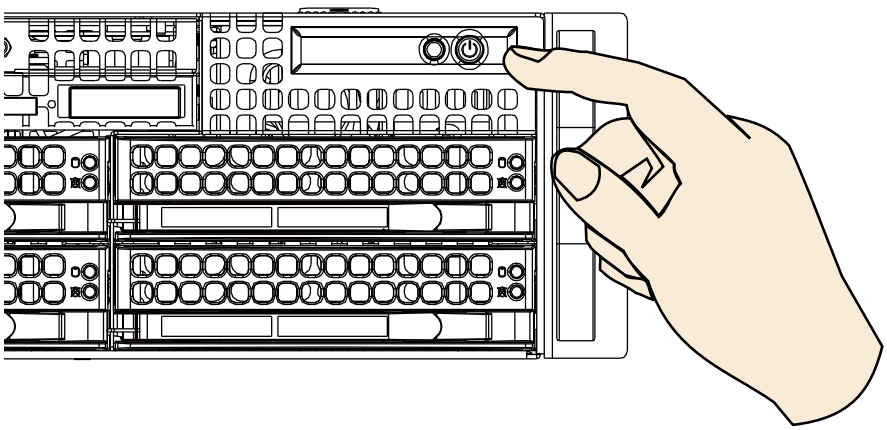
Connecting Interfaces

Refer to page 15 for the interface connections.

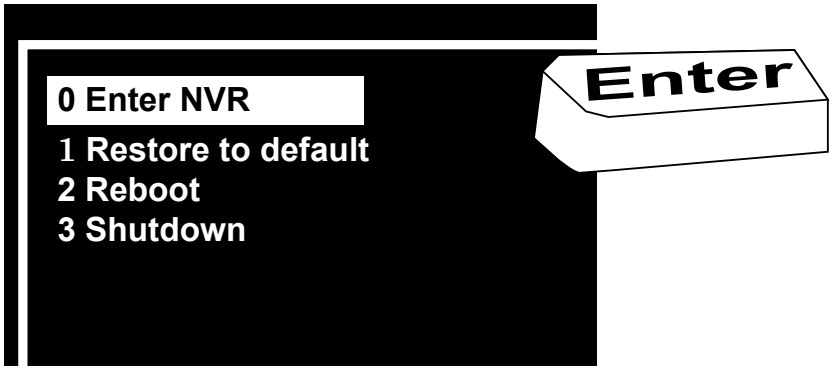
1. Make sure all cameras have been properly installed, either they are powered by 12V power lines or using one or several PoE switches. Refer to the cameras' documentation for details.
2. Connect all other interfaces to USB mouse/keyboard, one or two monitors, and audio input/ output devices.
3. Make sure you connect both power supplies to power mains.

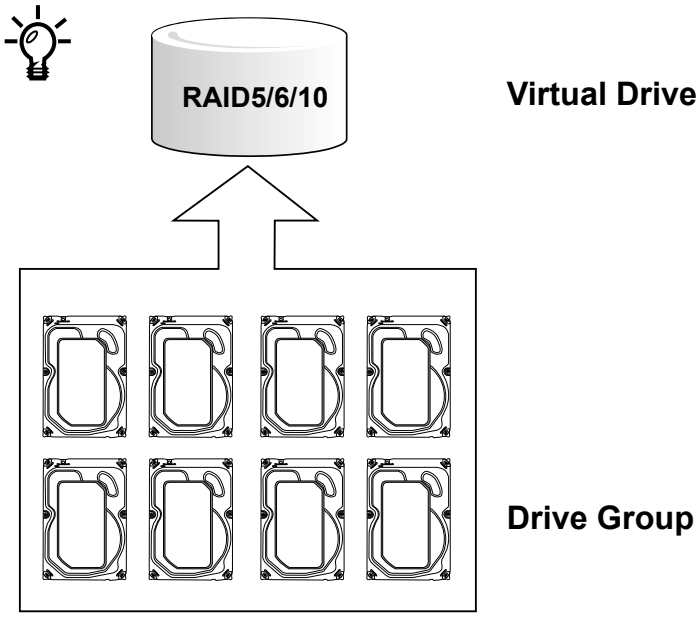
Initial Configuration

1. Power up the system by pressing the power on button.



2. Skip the BIOS screens and select **Enter NVR** at the selection screen. The system will start. Wait for the start-up process to complete.

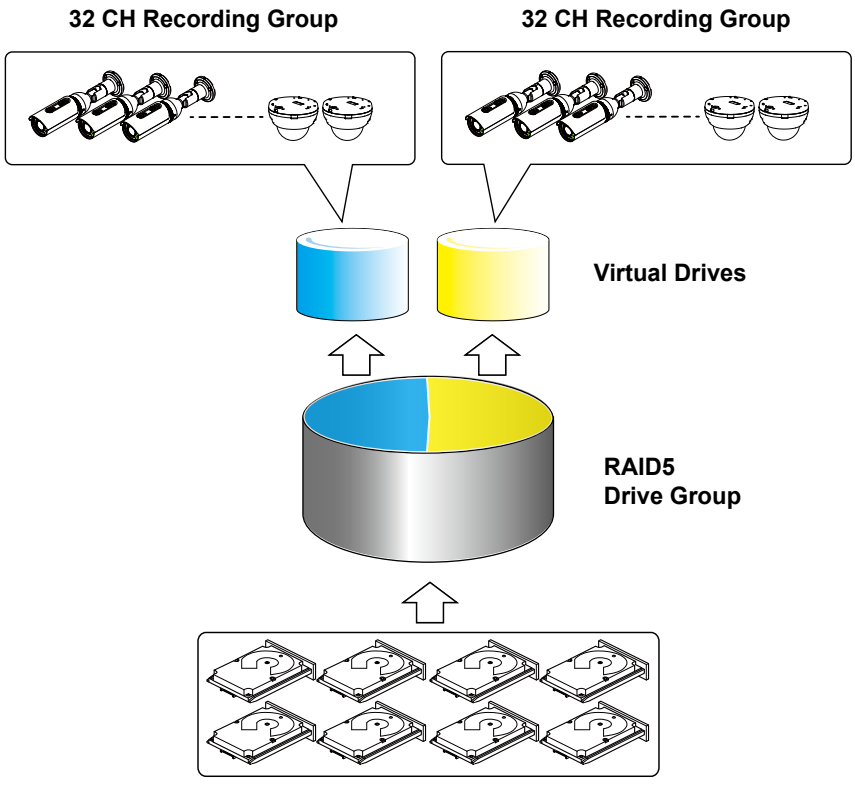




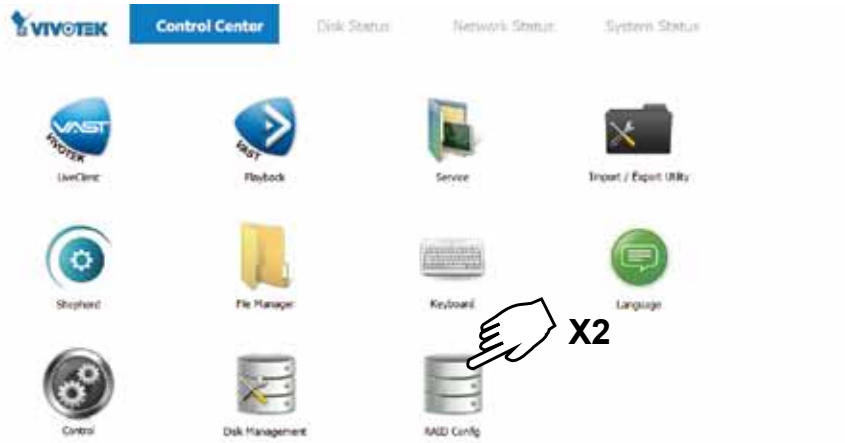
All hard drives will be combined into one or more drive groups, and the capacities of these drive drive will be utilized to form one or more virtual drives. The video feeds from the network cameras will be recorded to the virtual drive(s).

Recording will not take place unless you create a virtual drive first. You can select RAID5, RAID6, or RAID10 as the RAID level during the configuration process.

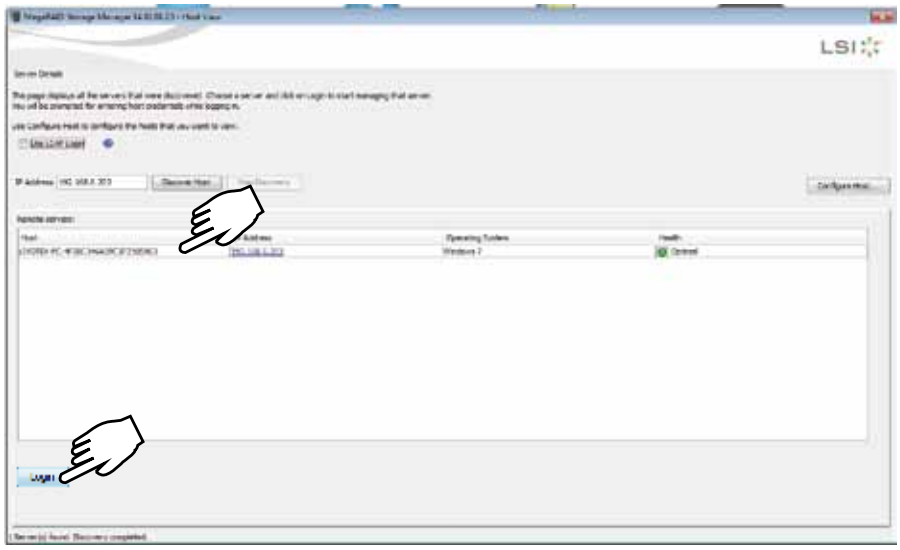
If you have the maximum of 64 channels, it is recommended you create a RAID5 drive group consisting of 8 hard drives. You then create two Virtual Drives, with 32 cameras configured into a Recording Group and a Virtual Drive assigned to each Recording Group. As shown below, try divide the work load into two Virtual Drives when you have more than 32 channels.



1. The system will boot up to the system main screen. Double-click on the **RAID Config** shortcut to start the MegaRAID storage configuration utility.

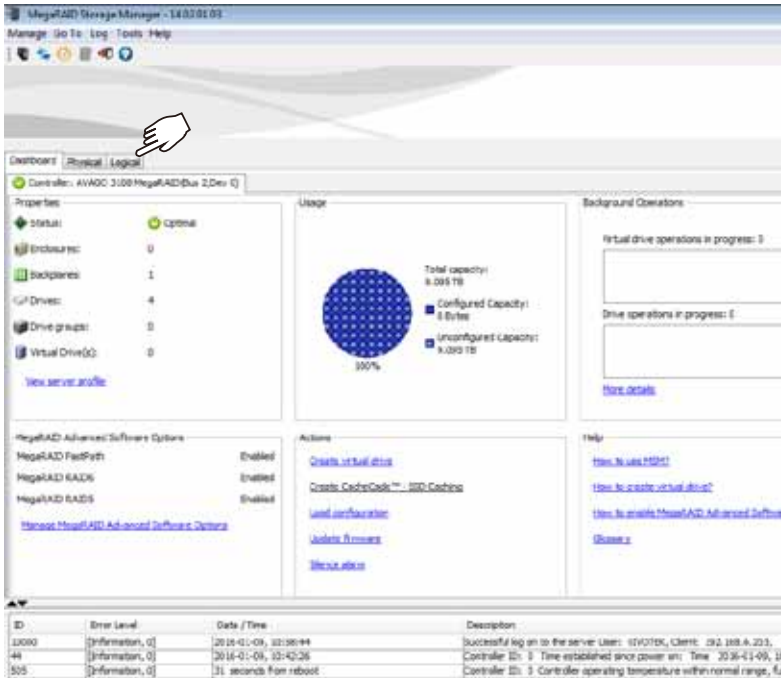


2. Select the default server, namely, the Windows 7 server running on this machine. Click Login to begin your configuration.

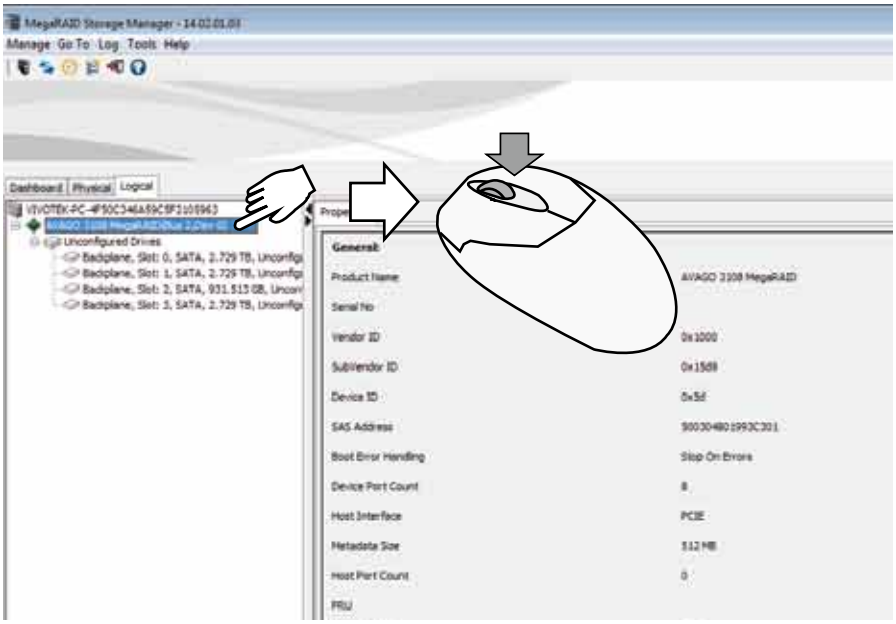


3. Enter **VIVOTEK** as the User Name. By default, there is no preset password. Click Login to proceed.

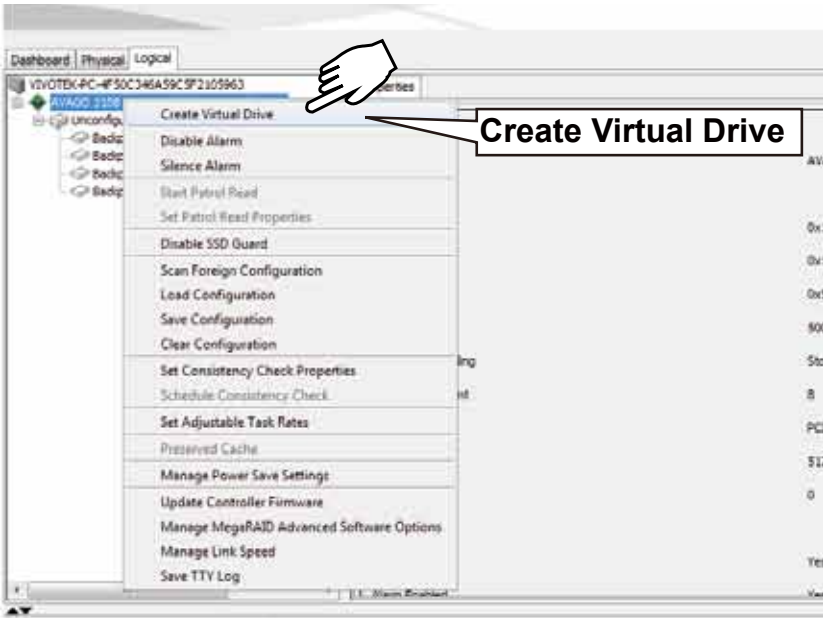
4. A Dashboard view will appear. Click the **Logical** tab.



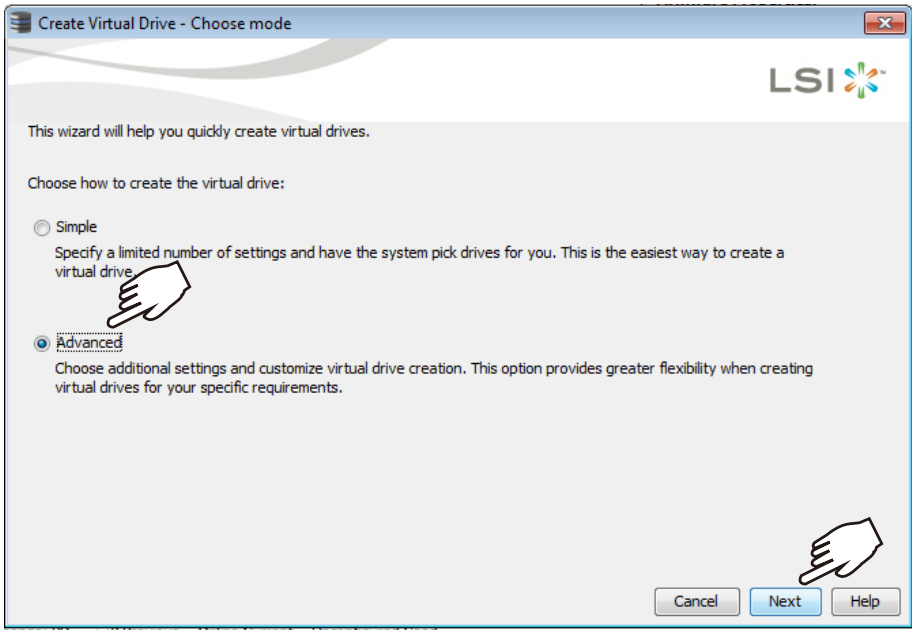
5. Left-click to select the AVAGO MegaRAID controller, and then right-click to display a command menu.



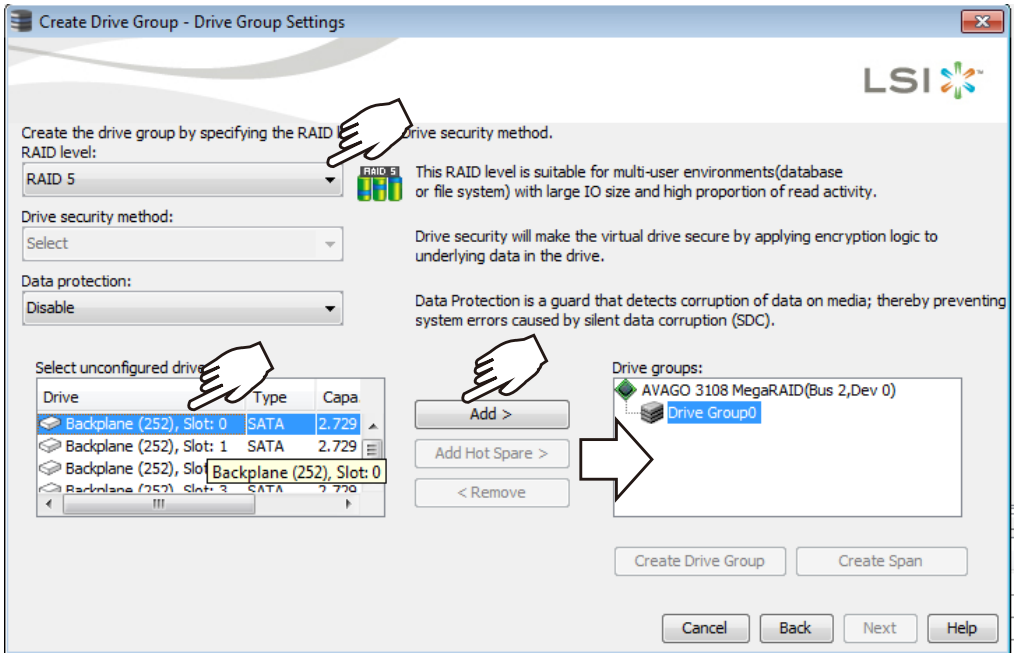
6. Click on **Create Virtual Drive**.



7. The **Create Virtual Drive** wizard will start. Click to select the **Advanced** mode. Then click the Next button to proceed.

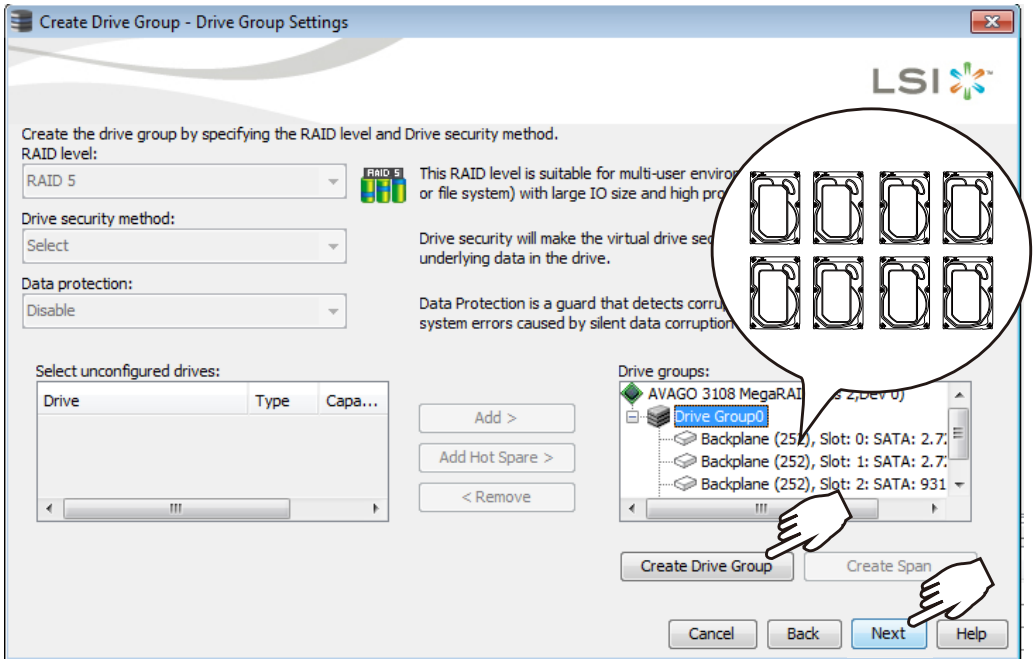


8. Select a **RAID level**, and then select multiple disk drives as the members of your drive group. Left-click to select a disk drive, and click **Add** to add it to group. You do not need to select the Data protection option.



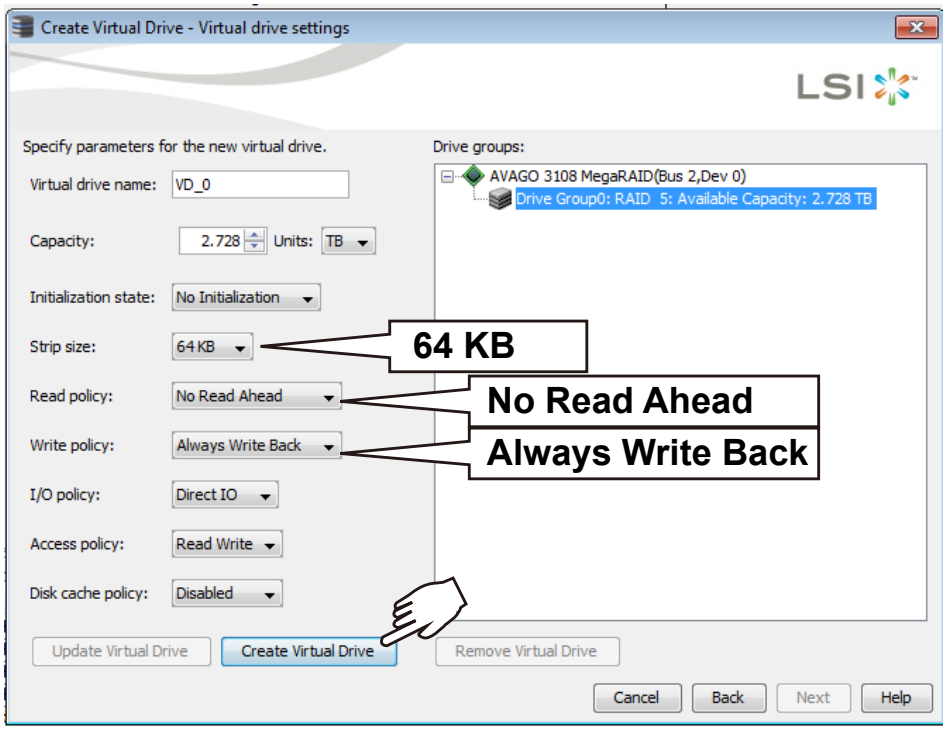
Refer to the next section: **RAID Basics** on page 41, for details about RAID levels.

9. Click on the Drive Group 0 entry you have just configured. The **Create Drive Group** button will become available. Click Next to proceed.

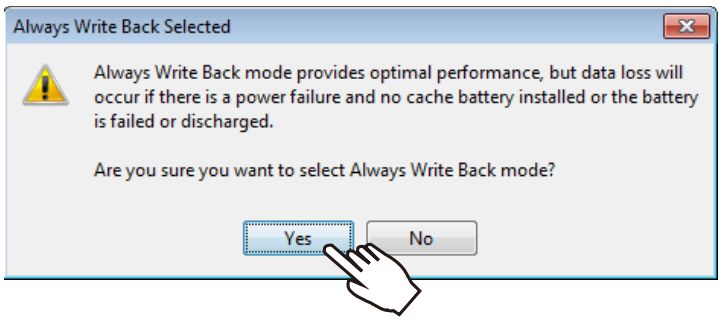


9. Select the following key parameters:
   Strip size: **64KB**, RAID policy: **No Read Ahead**, Write policy: **Always Write Back**.

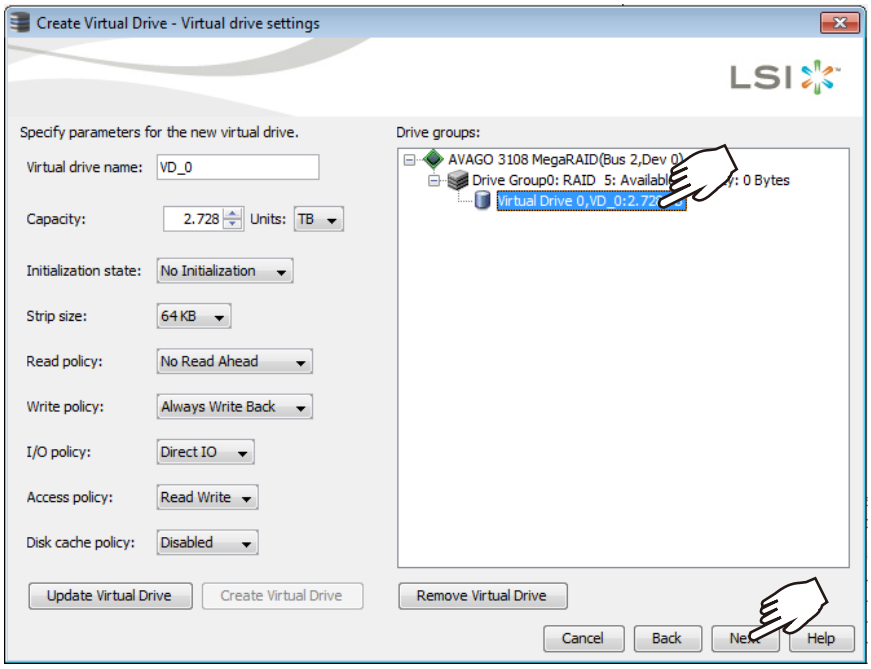
   These are important parameters to the disk array performance, and have to be correctly configured. Click **Create Virtual Drive**.



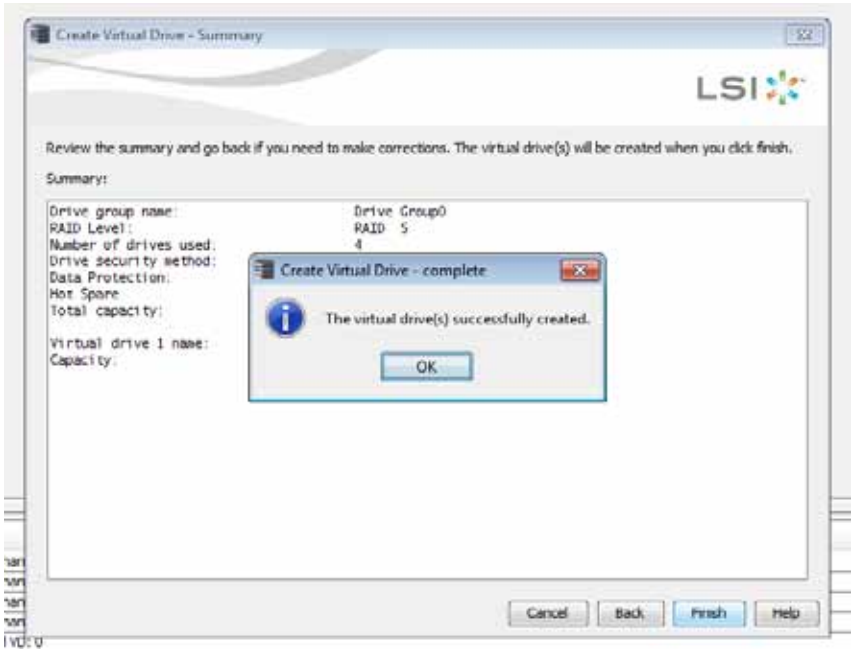
10. Click **Yes** to leave the Write Back concern message.



11. The wizard may prompt for another virtual drive. Multiple virtual drives can be created from a physical drive group. Since we only need one virtual drive in this configuration, click to select the **Virtual Drive 0,VD_0**, and then click Next to proceed.

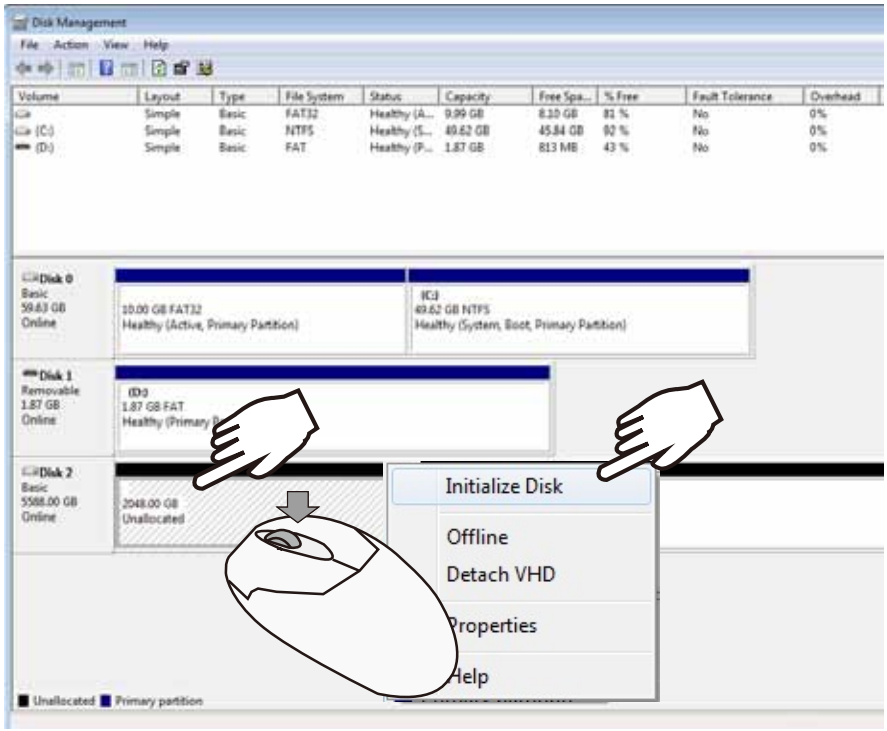


12. The virtual drive is instantly created. Click **OK**, and then click **Finish** to close the wizard. You can then terminate the MegaRAID utility.

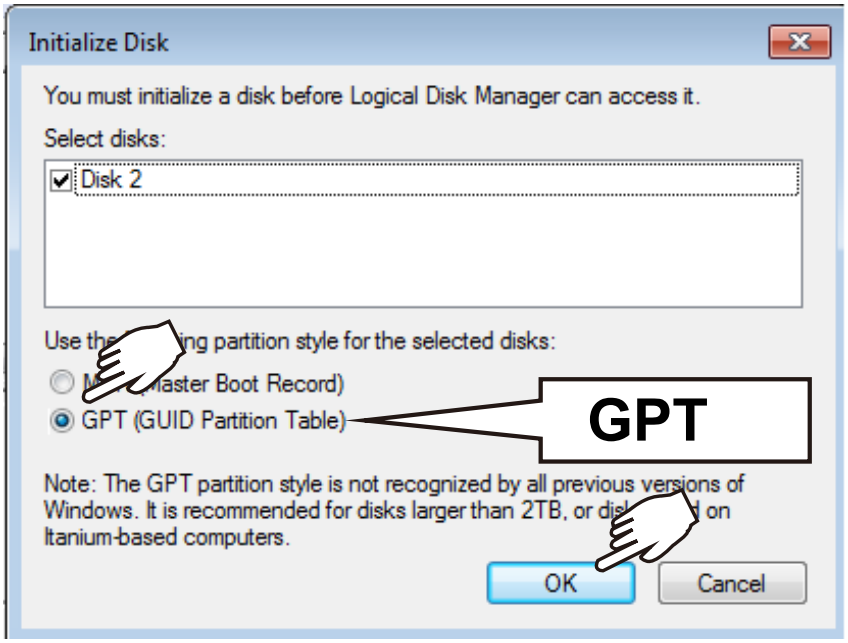


13. Double-click on the **Disk Management** shortcut on the desktop to open the utility.

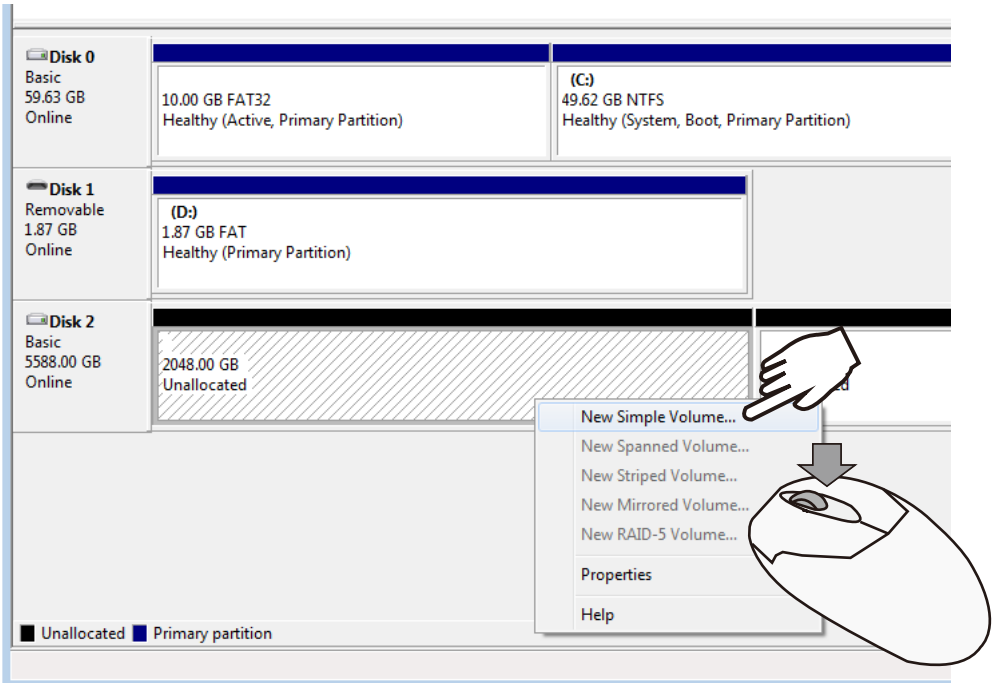
14. The virtual drive you created should appear as a new disk partition. You need to initialize and format the partition before using the disk capacity. Left-click to select and then right-click to display the command menu. Click **Initialize Disk** to proceed.



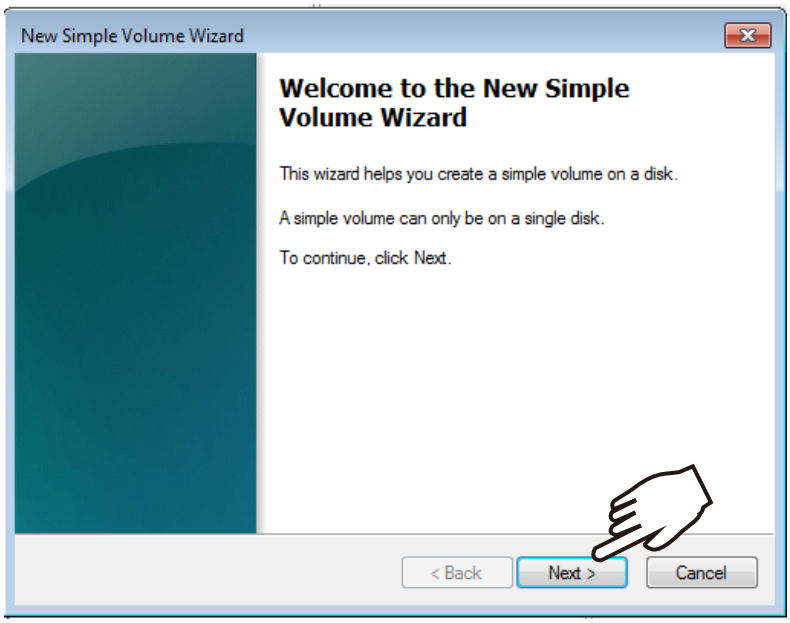
15. Select **GPT** (GUID Partition Table), and then click **OK** to proceed. This window may automatically pop up when Disk Management is started.



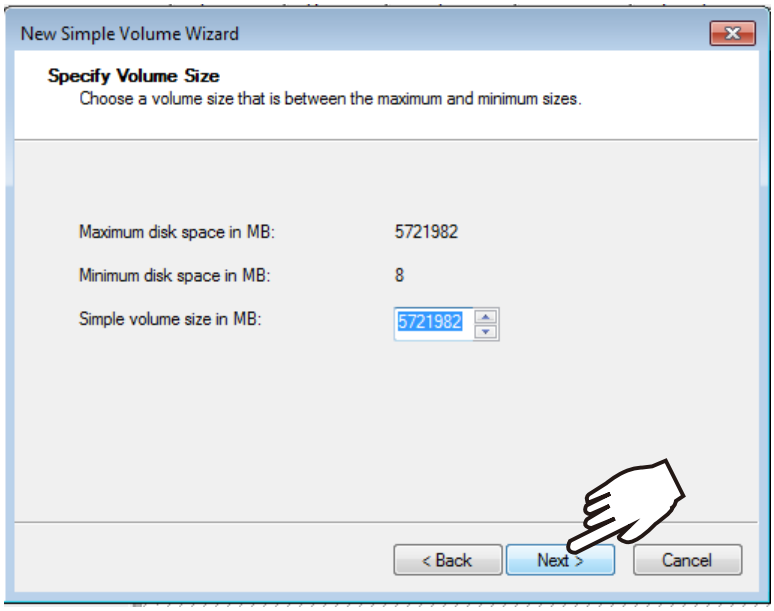
16. Once initialized, you can create a new volume**.** Right-click to display the **New Simple Volume** command. Click to proceed.



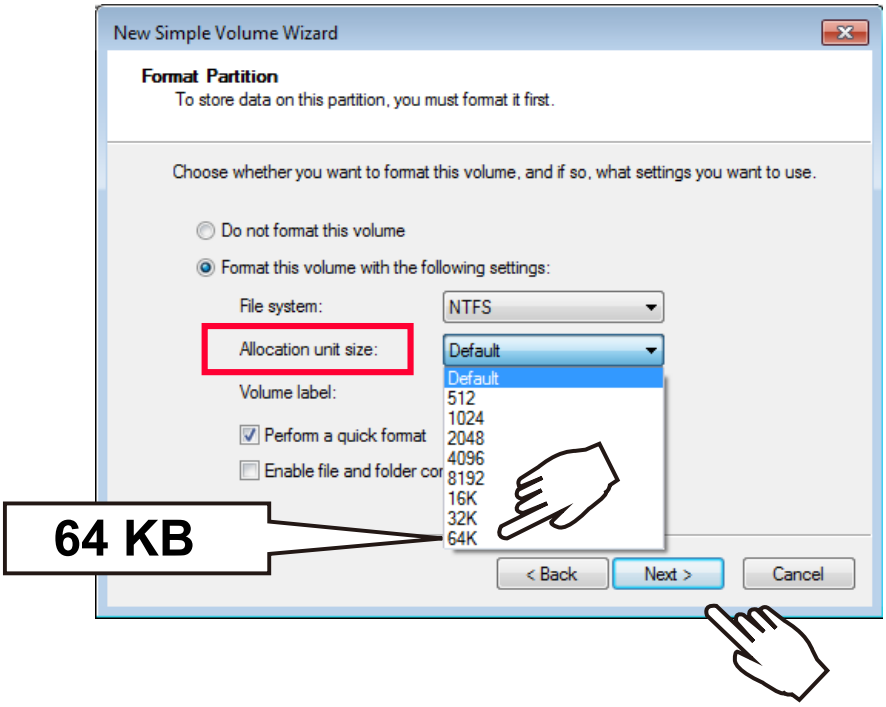
17. The **New Simple Volume** Wizard will prompt**.** Click Next to proceed.



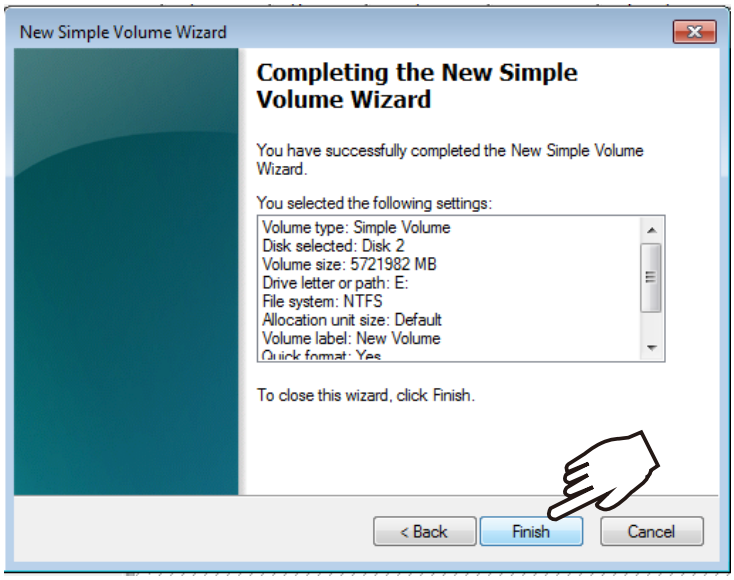
18. Leave the volume size unchanged. Click Next to proceed.



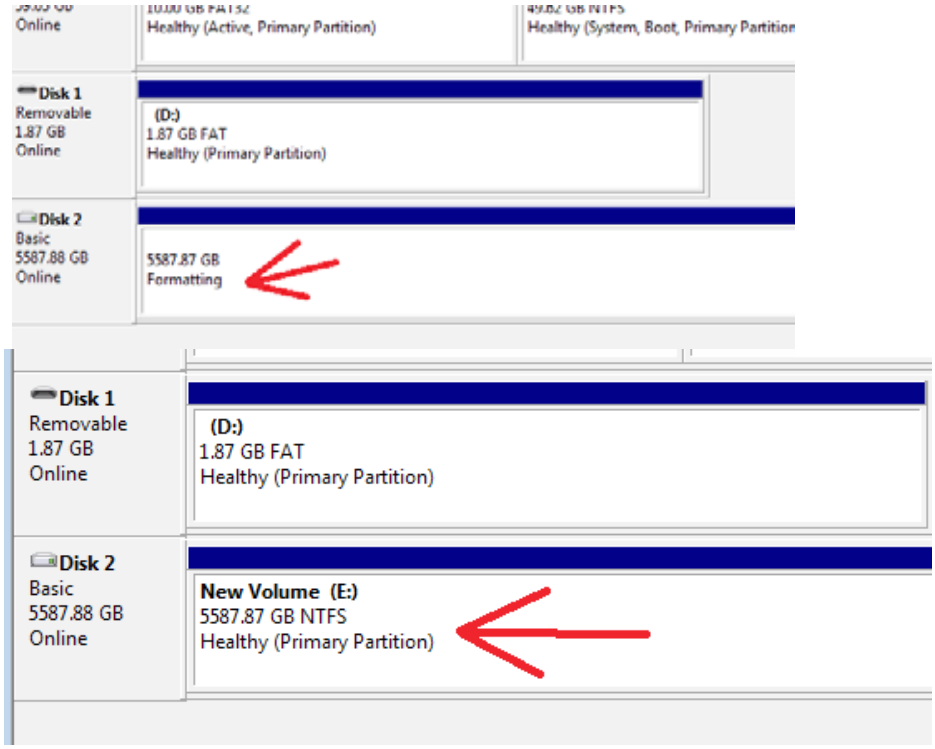
19. On the **Format Partition** page, select the **Allocation unit size** as **64KB**. When done, click Next to proceed.



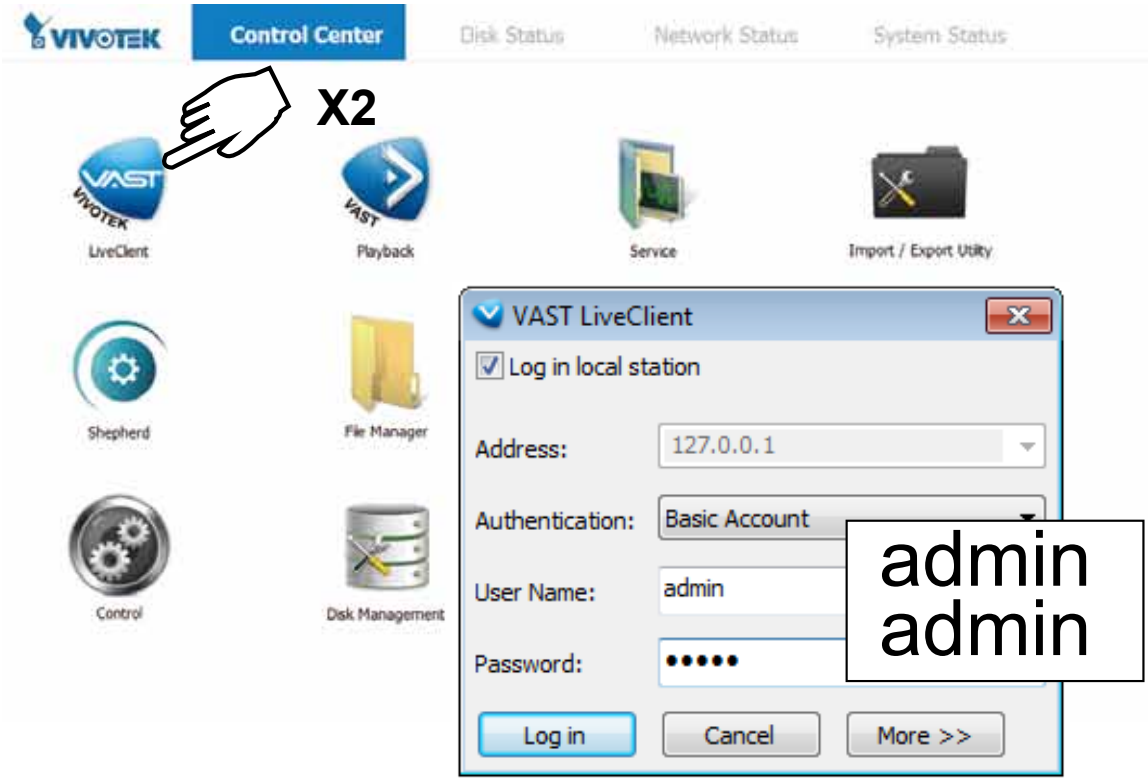
20. Click Finish to end the wizard.



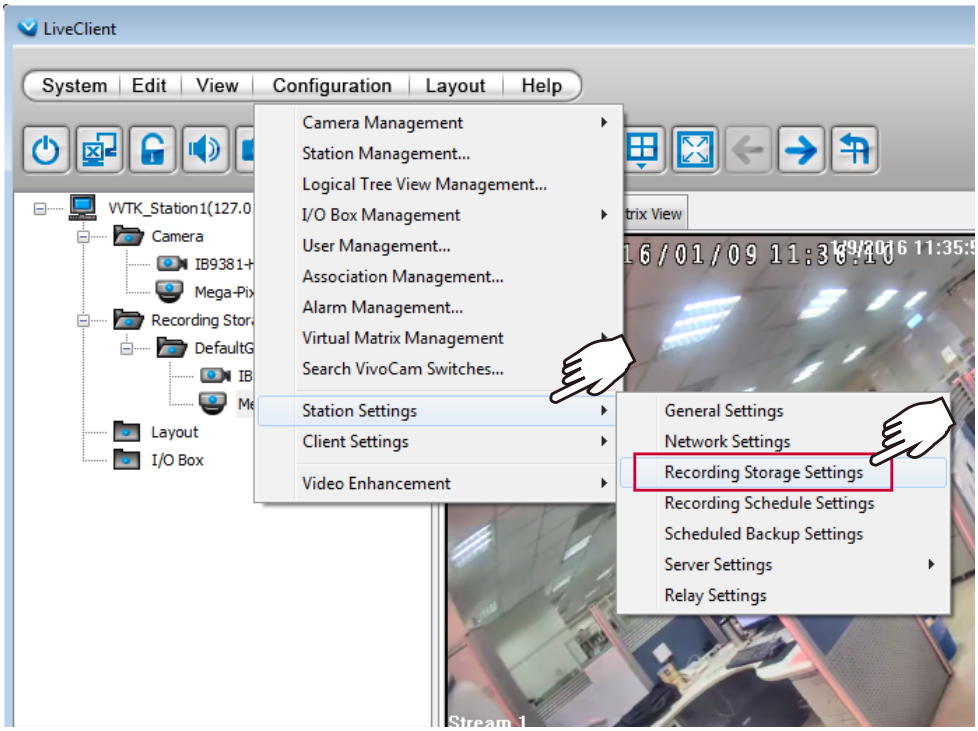
21. The formatting process will run in the background. When done, the new volume shall be indicated as a healthy new volume. Close the Disk Management window.



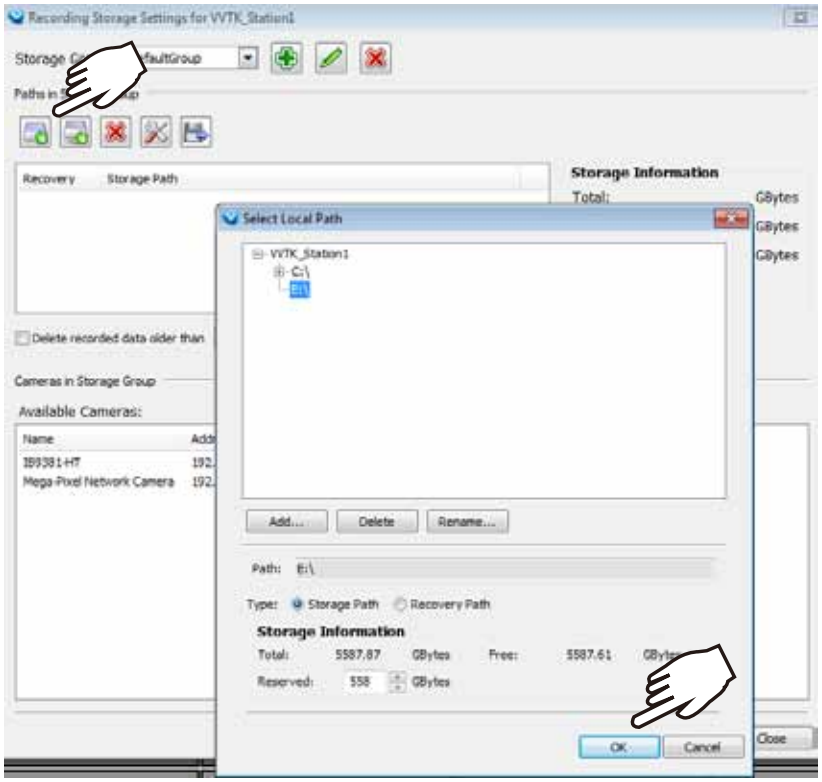
22. Start VIVOTEK **LiveClient** utility by double-clicking its shortbut. Enter **admin** and **admin** as the User Name and default Password. You can change the password later in the utility. Click Log in to proceed.



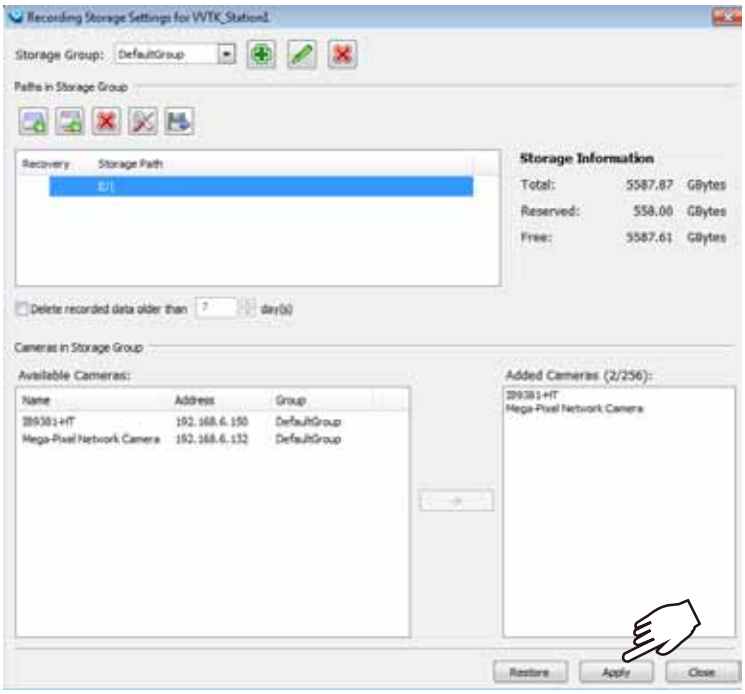
23. Click **Configuration** > **Station Settings** > **Recording Storage Settings**.



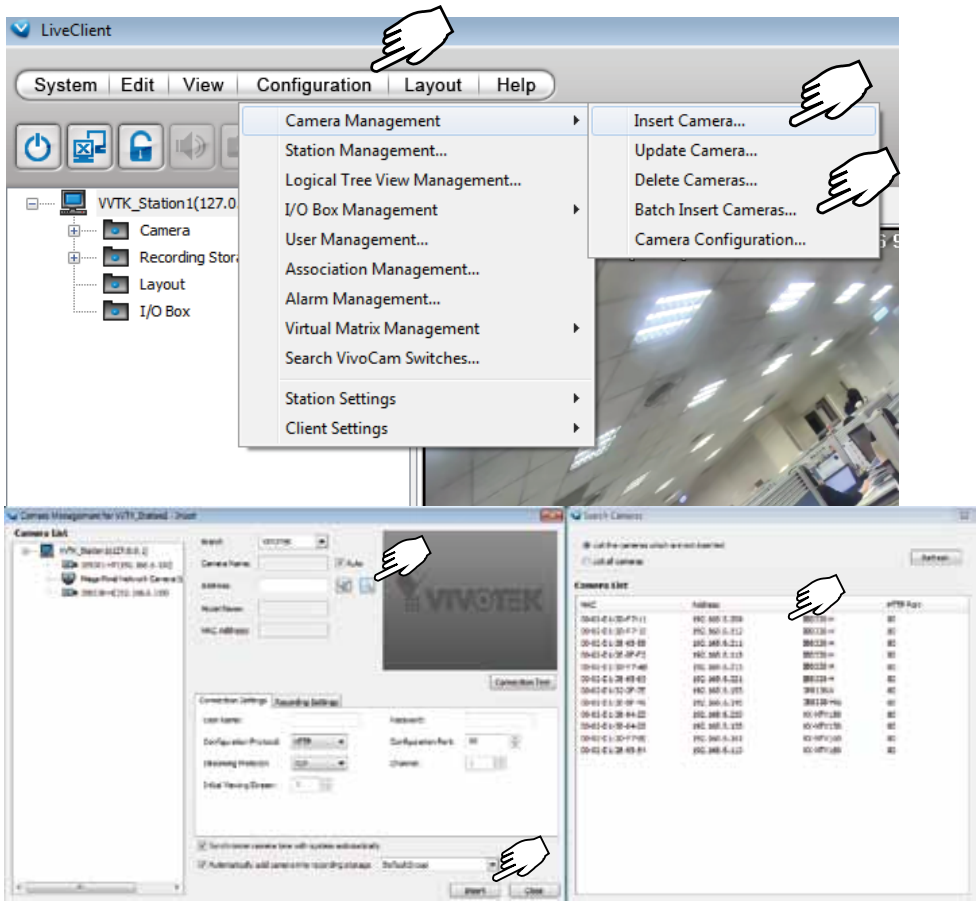
24. Click on the **Add Local Path** button**.** Select the new local path displayed as D:/ or E:/ drive (your new volume). Click OK to proceed.



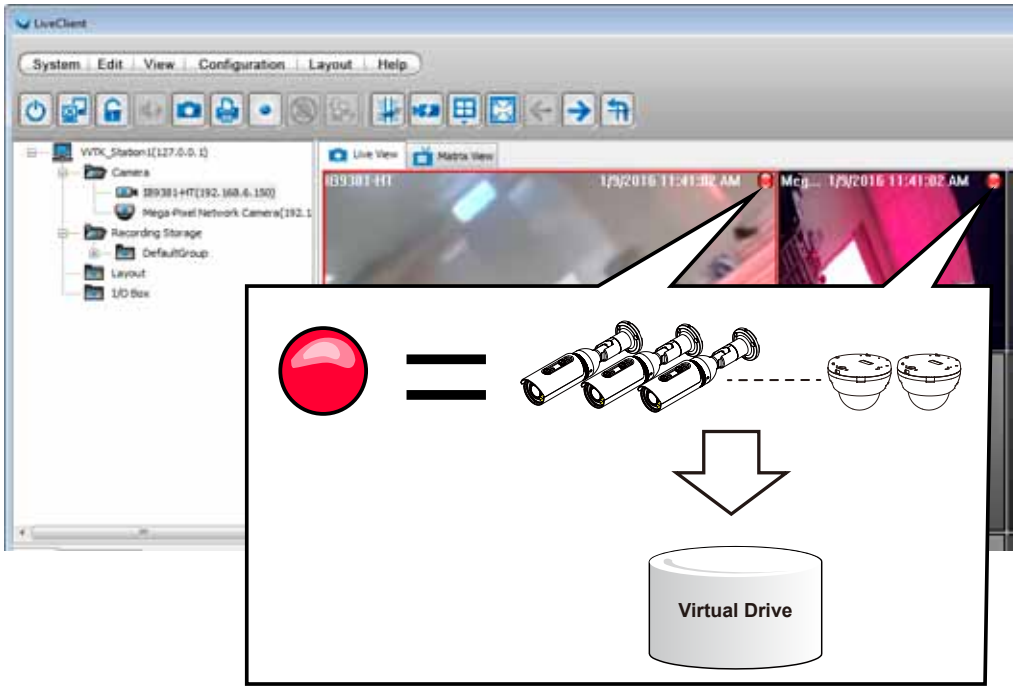
25. The selected **Storage path** will appear on the list along with its total, reserved, and Free storage spaces information. Click Apply.



26. Open the **Camera Management > Insert Camera** or **Batch Insert Cameras** window. Use the **Search** button to locate cameras in your local area network. Select and click **Insert**. Select and insert all cameras of your choice in your deployment, and then close the Camera Management window.



27. You will return to the **Live View** window. By default, once cameras have been inserted and the storage path is ready, the NVR starts recording the video streams. Note the red light icons on the view cells. If red icons appear on the view cells, recording is taking place.



28. You are done with the initial configuration. Refer to the rest of the manual for the configurable options in the VAST management software.

NOTE:

1. Cameras and the NVR must reside in the same subnet. Otherwise, the NVR will not be able to recruit them into a recording configuration.
2. It is recommended all network cameras use static IPs. If you let a DHCP server assign IPs to these cameras, IPs may be changed later and the NVR may not recognize them.

RAID Basics

IMPORTANT:

For a RAID volume configuration, it is recommended you use hard drives of the same model featuring the same capacity and rotation speed. It is also preferred that these drives are running the same version of firmware.

A Redundant Array of Independent Disks is an array, or group, of multiple independent physical drives that provide high performance and fault tolerance. A RAID drive group improves I/O performance and reliability. The RAID drive group appears to the host computer as a single storage volume or as multiple virtual units. An I/O transaction is expedited because several drives can be accessed simultaneously.

A RAID drive group improves data storage reliability and fault tolerance compared to single drive storage. Data loss resulting from a drive failure can be prevented by reconstructing missing data from the remaining drives. The benefits of RAID come from the improvement of I/O performance and the increased reliability.

What are the Virtual drives?

Virtual drives are drive groups that are available to the operating systems. The storage space in a virrtual drive comes from all the members in the drive group.

The RAID functions available for virtual drives include:

- Hot spare drives.
- Drive group and virtual drive configurations.
- Initializing one or more virtual drives.
- Individual access to controllers, virtual drives, and disk drives.
- Failed drive rebuild.
- Verification of redundancy data in virtual drives using RAID levels 1, 5, 6, 10, 50, and 60.
- Reconstructing virtual drives after the RAID levels or adding a drive to a drive group.
- Indepently selecting a host controller to work for.

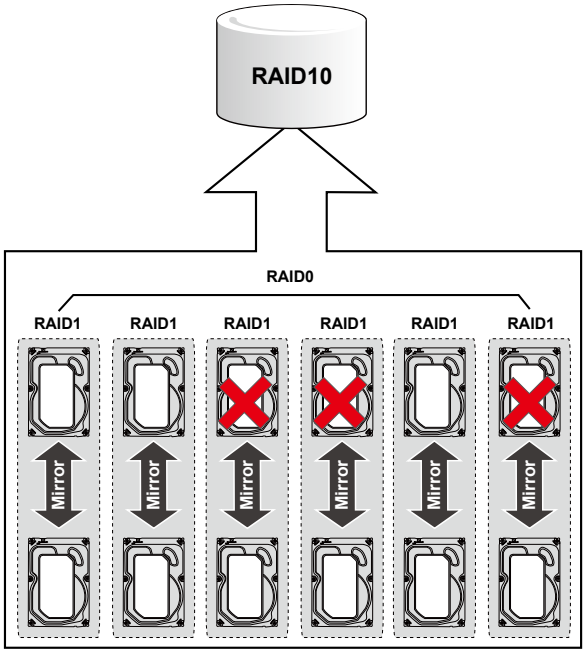
RAID configuration components

- Drive group: a group of physical drives. These drives will be managed in partitions known as virtual drives.
- Virtual drive: a partition in a drive group made of continguous data segments from the individual disk drives. A virtual drive can consist of the following components:
  - An entire drive group.
  - More than one entire drive group.
  - A part of drive group.
  - Parts of more than one drive group.
  - A combination of any two of the conditions above.

RAID Fault Tolerance

RAID level	No. of tolerable drive failure
0	No fault tolerance
1	1, each drive group
5	1
6	2
10	multiple, as long as each failure is in a separate drive group
50	1 in each drive group
60	2 in each drive group

For example, if disk failure occurs in different drive groups, a RAID10 configuration can tolerate multiple drive failures. In each RAID1 drive group, data is mirrored to a counterpart disk drive. Data remains intact if one disk drive should fail in each drive group.



Consistency Check

The consistency check operation verifies the correctness of the data in virtual drives that use RAID levels 1, 5, 6, 10, 50, and 60. RAID0 does not provide data redundancy. In a system with parity, check consistency means calculating the data on one drive and comparing the results to the contents of the parity drive.

Background Initialization

Background initialization is a check for media errors on the drives when you create a virtual drive. It is an automatic operation that starts five minutes after you create a virtual drive. This check ensures that striped data segments are the same on all of the drives in the drive group.

Background initialization is similar to a consistency check. The difference between the two is that a background initialization is forced on new virtual drives and a consistency check is not.

New RAID 5 virtual drives and new RAID 6 virtual drives require a minimum number of drives for a background initialization to start. If fewer drives exist, the background initialization does not start. The background initialization needs to be started manually. The following number of drives are required:

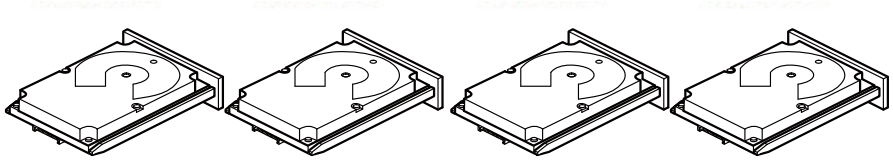
- New RAID 5 virtual drives must have at least five drives for background initialization to start.
- New RAID 6 virtual drives must have at least seven drives for background initialization to start.

The default and recommended background initialization rate is 30 percent. Before you change the rebuild rate, you must stop the background initialization or the rate change will not affect the background initialization rate. After you stop background initialization and change the rebuild rate, the rate change takes effect when you restart background initialization.2.1.7Patrol Read

Disk Striping

Disk striping lets you write data across multiple drives instead of just one drive. Disk striping involves partitioning each drive storage space into stripes that can vary in size from a minimum of 64 KB to 1 MB for MegaRAID controllers and 64 KB for Integrated MegaRAID controllers. The LSISAS2108 controller allows stripe size from 8 KB to 1 MB. These stripes are interleaved in a repeated sequential manner. The combined storage space is composed of stripes from each drive. It is recommended that you keep stripe sizes the same across RAID drive groups.

For example, in a four-disk system using only disk striping (used in RAID level 0), segment 1 is written to disk 1, segment 2 is written to disk 2, and so on. Disk striping enhances performance because multiple drives are accessed simultaneously, but disk striping does not provide data redundancy.



Segment 1	Segment 2	Segment 3	Segment 4
Segment 5	Segment 6	Segment 7	Segment 8
Segment 9	Segment 10	Segment 11	Segment 12

Stripe Width
Stripe width is the number of drives involved in a drive group where striping is implemented. For example, a four-disk drive group with disk striping has a stripe width of four.

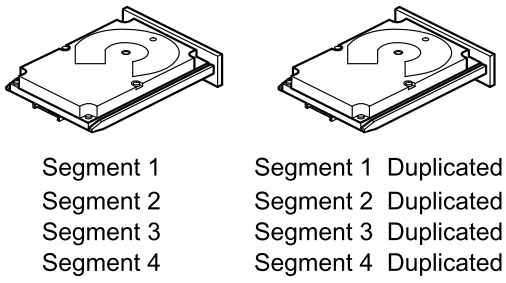
Stripe Size
The stripe size is the length of the interleaved data segments that the RAID controller writes across multiple drives, not including parity drives. For example, consider a stripe that contains 1 MB of drive space and has 64 KB of data residing on each drive in the stripe. In this case, the stripe size is 1 MB and the strip size is 64 KB.

Strip Size
The strip size is the portion of a stripe that resides on a single drive.

Disk Mirroring

With disk mirroring (used in RAID 1 and RAID 10), data written to one drive is simultaneously written to another drive. The primary advantage of disk mirroring is that it provides 100 percent data redundancy. Because the contents of the disk are completely written to a second disk, data is not lost if one disk fails. In addition, both drives contain the same data at all times, so either disk can act as the operational disk. If one disk fails, the contents of the other disk can run the system and reconstruct the failed disk.

Disk mirroring provides 100 percent redundancy, but it is expensive because each drive in the system must be duplicated. The following figure shows an example of disk mirroring.

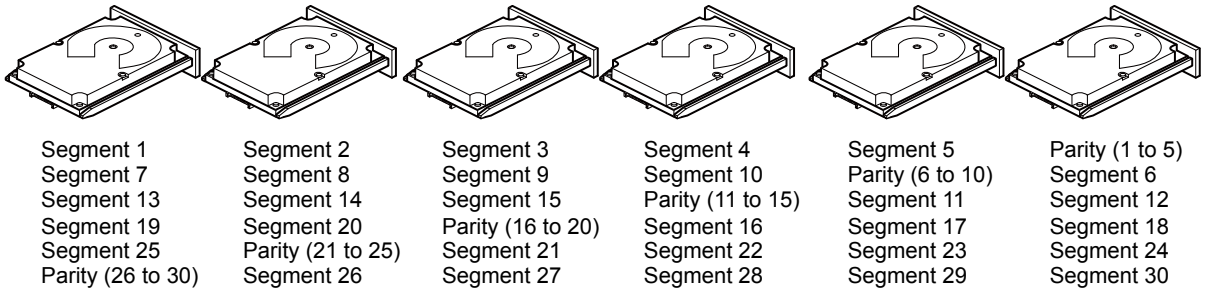


Parity

Parity generates a set of redundancy data from two or more parent data sets. The redundancy data can be used to reconstruct one of the parent data sets in the event of a drive failure. Parity data does not fully duplicate the parent data sets, but parity generation can slow the write process. In a RAID drive group, this method is applied to entire drives or stripes across all of the drives in a drive group. The types of parity are described in the following table.

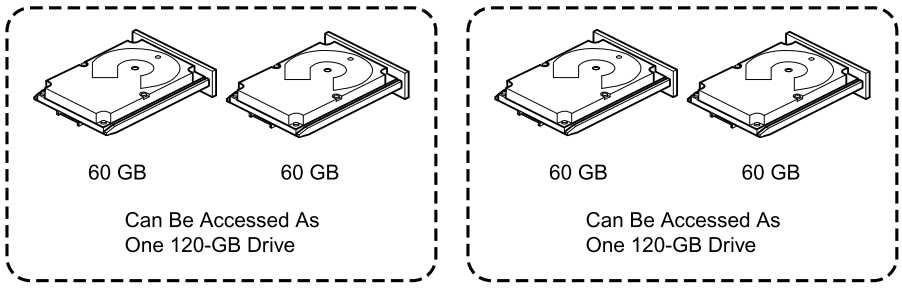
Parity Type	Description
Dedicated	The parity data on two or more drives is stored on an additional disk.
Distributed	The parity data is distributed across more than one drive in the system.

A RAID 5 drive group combines distributed parity with disk striping. If a single drive fails, it can be rebuilt from the parity and the data on the remaining drives. An example of a RAID 5 drive group is shown in the following figure. A RAID 5 drive group uses parity to provide redundancy for one drive failure without duplicating the contents of entire drives. A RAID 6 drive group also uses distributed parity and disk striping, but adds a second set of parity data so that it can survive up to two drive failures.



Disk Spanning

Disk spanning allows multiple drives to function like one big drive. Spanning overcomes lack of disk space and simplifies storage management by combining existing resources or adding relatively inexpensive resources. For example, four 20-GB drives can be combined to appear to the operating system as a single 80-GB drive.Spanning alone does not provide reliability or performance enhancements. Spanned virtual drives must have the same stripe size and must be contiguous. In the following figure, RAID 1 drive groups are turned into a RAID 10 drive group.



Spanning two contiguous RAID 0 virtual drives does not produce a new RAID level or add fault tolerance. It does increase the capacity of the virtual drive and improves performance by doubling the number of spindles.

Spanning for RAID 00, RAID 10, RAID 50, and RAID 60 Drive Groups

The following table describes how to configure RAID 00, RAID 10, RAID 50, and RAID 60 drive groups by spanning. The virtual drives must have the same stripe size and the maximum number of spans is 8. The full drive capacity is used when you span virtual drives; you cannot specify a smaller drive capacity.

Level	Description
00	Configure a RAID 00 by spanning two or more contiguous RAID 0 virtual drives, up to the maximum number of supported devices for the controller.
10	Configure RAID 10 by spanning two or more contiguous RAID 1 virtual drives, up to the maximum number of supported devices for the controller. A RAID 10 drive group supports a maximum of 8 spans. You must use an even number of drives in each RAID virtual drive in the span. The RAID 1 virtual drives must have the same stripe size.
50	Configure a RAID 50 drive group by spanning two or more contiguous RAID 5 virtual drives. The RAID 5 virtual drives must have the same stripe size.
60	Configure a RAID 60 drive group by spanning two or more contiguous RAID 6 virtual drives. The RAID 6 virtual drives must have the same stripe size.

Hot Spares

A hot spare is an extra, unused drive that is part of the disk subsystem. It is usually in Standby mode, ready for service if a drive fails. Hot spares let you replace failed drives without system shutdown or user intervention. The MegaRAID SAS RAID controllers can implement automatic and transparent rebuilds of failed drives using hot spare drives, which provide a high degree of fault tolerance and zero downtime.

The RAID management software lets you specify drives as hot spares. When a hot spare is needed, the RAID controller assigns the hot spare that has a capacity closest to and at least as great as that of the failed drive to take the place of the failed drive. The failed drive is removed from the virtual drive and marked ready awaiting removal after the rebuild to a hot spare begins. You can make hot spares of the drives that are not in a RAID virtual drive.

You can use the RAID management software to designate the hot spare to have enclosure affinity, which means that if drive failures are present on a split backplane configuration, the hot spare will be used first on the backplane side in which it resides.If the hot spare is designated as having enclosure affinity, it tries to rebuild any failed drives on the backplane in which it resides before rebuilding any other drives on other backplanes.

The hot spare can be of two types:
- Global hot spare
- Dedicated hot spare

Global Hot Spare
Use a global hot spare drive to replace any failed drive in a redundant drive group as long as its capacity is equal to or larger than the coerced capacity of the failed drive. A global hot spare defined on any channel should be available to replace a failed drive on both channels.

Dedicated Hot Spare
Use a dedicated hot spare to replace a failed drive only in a selected drive group. One or more drives can be designated as a member of a spare drive pool. The most suitable drive from the pool is selected for failover. A dedicated hot spare is used before one from the global hot spare pool.

Hot spare drives can be located on any RAID channel. Standby hot spares (not being used in RAID drive group) are polled every 60 seconds at a minimum, and their status made available in the drive group management software. RAID controllers offer the ability to rebuild with a disk that is in a system but not initially set to be a hot spare.

Observe the following parameters when using hot spares:

- Hot spares are used only in drive groups with redundancy: RAID levels 1, 5, 6, 10, 50, and 60.
- A hot spare connected to a specific RAID controller can be used to rebuild a drive that is connected only to the same controller.
- You must assign the hot spare to one or more drives through the controller BIOS or use drive group management software to place it in the hot spare pool.
- A hot spare must have free space equal to or greater than the drive it replaces. For example, to replace a 500-GB drive, the hot spare must be 500-GB or larger.

Disk Rebuilds

When a drive in a RAID drive group fails, you can rebuild the drive by re-creating the data that was stored on the drive before it failed. The RAID controller re-creates the data using the data stored on the other drives in the drive group. Rebuilding can be performed only in drive groups with data redundancy, which includes RAID 1, 5, 6, 10, 50, and 60 drive groups.

The RAID controller uses hot spares to rebuild failed drives automatically and transparently, at user-defined rebuild rates. If a hot spare is available, the Rebuild operation can start automatically when a drive fails. If a hot spare is not available, the failed drive must be replaced with a new drive so that the data on the failed drive can be rebuilt.

The failed drive is removed from the virtual drive and marked ready awaiting removal when the Rebuild operation to a hot spare begins. If the system goes down during a Rebuild operation, the RAID controller automatically resumes the rebuild after the system reboots.

NOTE:

When the Rebuild operation to a hot spare begins, the failed drive is often removed from the virtual drive before management applications detect the failed drive. When this removal occurs, the event logs show the drive rebuilding to the hot spare without showing the failed drive. The formerly failed drive will be marked as ready after a Rebuild operation begins to a hot spare. If a source drive fails during a rebuild to a hot spare, the Rebuild operation fails, and the failed source drive is marked as offline. In addition, the rebuilding hot spare drive is changed back to a hot spare. After a Rebuild operation fails because of a source drive failure, the dedicated hot spare is still dedicated and assigned to the correct drive group, and the global hot spare is still global.

An automatic drive Rebuild operation will not start if you replace a drive during a RAID-level migration. The Rebuild operation must be started manually after the expansion or migration procedure is complete. (RAID-level migration changes a virtual drive from one RAID level to another.)

Hot Swap

A hot swap is the manual replacement of a defective drive unit while the computer is still running. When a new drive has been installed, a Rebuild operation occurs automatically if these situation occurs:

- The newly inserted drive is the same capacity as or larger than the failed drive.
- The newly inserted drive is placed in the same drive bay as the failed drive it is replacing.

The RAID controller can be configured to detect the new drives and rebuild the contents of the drive automatically.

Drive States

A drive state is a property indicating the status of the drive. The drive states are described in the following table.

Parity Type	Description
Online	A drive that can be accessed by the RAID controller and is part of the virtual drive.
Unconfigured Good	A drive that is functioning normally but is not configured as a part of a virtual drive or as a hot spare.
Hot Spare	A drive that is powered up and ready for use as a spare in case an online drive fails.
Failed	A drive that was originally configured as Online or Hot Spare, but on which the firmware detects an unrecoverable error.
Rebuild	A drive to which data is being written to restore full redundancy for a virtual drive.
Unconfigured Bad	A drive on which the firmware detects an unrecoverable error; the drive was Unconfigured Good or the drive could not be initialized.
Missing	A drive that was Online but which has been removed from its location.
Offline	A drive that is part of a virtual drive but which has invalid data as far as the RAID configuration is concerned.
Shield State	An interim state of physical drive for diagnostic operations.
Copyback	A drive that has replaced the failed drive in the RAID configuration.

Virtual Drive States

The virtual drive states are described in the following table.

Parity Type	Description
Online	The virtual drive operating condition is good. All configured drives are online.
Degraded	The virtual drive operating condition is not optimal. One of the configured drives has failed or is offline.
Partial Degraded	The operating condition in a RAID 6 virtual drive is not optimal. One of the configured drives has failed or is offline. A RAID 6 drive group can tolerate up to two drive failures.
Failed	The virtual drive has failed.
Offline	The virtual drive is not available to the RAID controller.

Beep Codes

An alarm sounds on the MegaRAID controller when a virtual drive changes from an optimal state to another state, when a hot spare rebuilds, and for test purposes.

Parity Type	Virtual Drive State	Beep Code
RAID 0 virtual drive loses a virtual drive	Offline	3 seconds on and 1 second off
RAID 1 virtual drive loses a mirror drive	Degraded	1 second on and 1 second off
RAID 1 virtual drive loses both drives	Offline	3 seconds on and 1 second off
RAID 5 virtual drive loses one drive	Degraded	1 second on and 1 second off
RAID 5 virtual drive loses two or more drives	Offline	3 seconds on and 1 second off
RAID 6 virtual drive loses one drive	Partially degraded	1 second on and 1 second off
RAID 6 virtual drive loses two drives	Degraded	1 second on and 1 second off
RAID 6 virtual drive loses more than two drives	Offline	3 seconds on and 1 second off
A hot spare completes the Rebuild process and is brought into a drive group	B/A	1 second on and 3 seconds off
A copy back occurs after a Rebuild operation completes	Optimal	1 second on and 3 seconds off

RAID Levels

The RAID controller supports RAID levels 0, 00, 1, 5, 6, 10, 50, and 60. The supported RAID levels are summarized in the following section.

In addition, the RAID controller supports independent drives (configured as RAID 0 and RAID 00 drive groups) The following sections describe the RAID levels in detail.

Summary of RAID Levels

A RAID 0 drive group uses striping to provide high data throughput, especially for large files in an environment that does not require fault tolerance.

A RAID 1 drive group uses mirroring so that data written to one drive is simultaneously written to another drive. The RAID 1 drive group is good for small databases or other applications that require small capacity but complete data redundancy.

A RAID 5 drive group uses disk striping and parity data across all drives (distributed parity) to provide high data throughput, especially for small random access.A RAID 6 drive group uses distributed parity, with two independent parity blocks per stripe, and disk striping.

A RAID 6 virtual drive can survive the loss of any two drives without losing data. A RAID 6 drive group, which requires a minimum of three drives, is similar to a RAID 5 drive group. Blocks of data and parity information are written across all drives. The parity information is used to recover the data if one or two drives fail in the drive group.

A RAID 00 drive group is a spanned drive group that creates a striped set from a series of RAID 0 drive groups.A RAID 10 drive group, a combination of RAID 0 and RAID 1 drive groups, consists of striped data across mirrored spans.

A RAID 10 drive group is a spanned drive group that creates a striped set from a series of mirrored drives. A RAID 10 drive group allows a maximum of 8 spans. You must use an even number of drives in each RAID virtual drive in the span. The RAID 1 virtual drives must have the same stripe size. A RAID 10 drive group provides high data throughput and complete data redundancy but uses a larger number of spans.

A RAID 50 drive group, a combination of RAID 0 and RAID 5 drive groups, uses distributed parity and disk striping. A RAID 50 drive group is a spanned drive group in which data is striped across multiple RAID 5 drive groups. A RAID 50 drive group works best with data that requires high reliability, high request rates, high data transfers, and medium-to-large capacity.

NOTE

Having virtual drives of different RAID levels, such as RAID Level0 and RAID Level5, in the same drive group is not allowed. For example, if an existing RAID5 virtual drive is created out of partial space in an array, the next virtual drive in the array has to be RAID Level 5 only.

A RAID 60 drive group, a combination of RAID level 0 and RAID Level 6, uses distributed parity, with two independent parity blocks per stripe in each RAID set, and disk striping. A RAID 60 virtual drive can survive the loss of two drives in each of the RAID 6 sets without losing data. A RAID 60 drive group works best with data that requires high reliability, high request rates, high data transfers, and medium-to-large capacity.

NOTE

The MegaSR controller supports the standard RAID levels – RAID0, RAID1, RAID5, and RAID10. The MegaSR controller comes in two variants, SCU and AHCI, both supporting a maximum of eight physical drives. A maximum of eight virtual drives can be created (using RAID0, RAID 1, RAID5, and RAID10 only) and controlled by the MegaSR controller. One virtual drive can be created on an array (a maximum of eight if no other virtual drives are already created on the MegaSR controller), or you can create eight arrays with one virtual drive each. However, on a RAID10 drive group, you can create only one virtual drive on a particular array.

RAID 0 Drive Groups

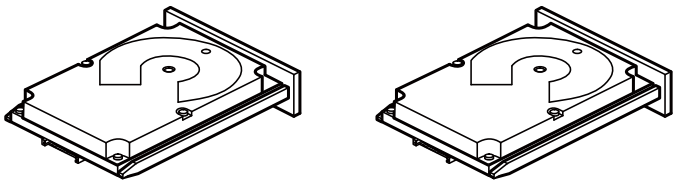
A RAID 0 drive group provides disk striping across all drives in the RAID drive group. A RAID0 drive group does not provide any data redundancy, but the RAID 0 drive group offers the best performance of any RAID level. The RAID 0 drive group breaks up data into smaller segments, and then stripes the data segments across each drive in the drive group. The size of each data segment is determined by the stripe size. A RAID 0 drive group offers high bandwidth.

By breaking up a large file into smaller segments, the RAID controller can use both SAS drives and SATA drives to read or write the file faster. A RAID 0 drive group involves no parity calculations to complicate the write operation. This situation makes the RAID 0 drive group ideal for applications that require high bandwidth but do not require fault tolerance. The following table provides an overview of the RAID 0 drive group. The following figure provides a graphic example of a RAID 0 drive group.

NOTE

RAID level 0 is not fault tolerant. If a drive in a RAID 0 drive group fails, the entire virtual drive (all drives associated with the virtual drive) fails.

Uses	Provides high data throughput, especially for large files.Any environment that does not require fault tolerance.
Strong points	Provides increased data throughput for large files. No capacity loss penalty for parity.
Weak points	Does not provide fault tolerance or high bandwidth.All data is lost if any drive fails.
Drives	1 to 32



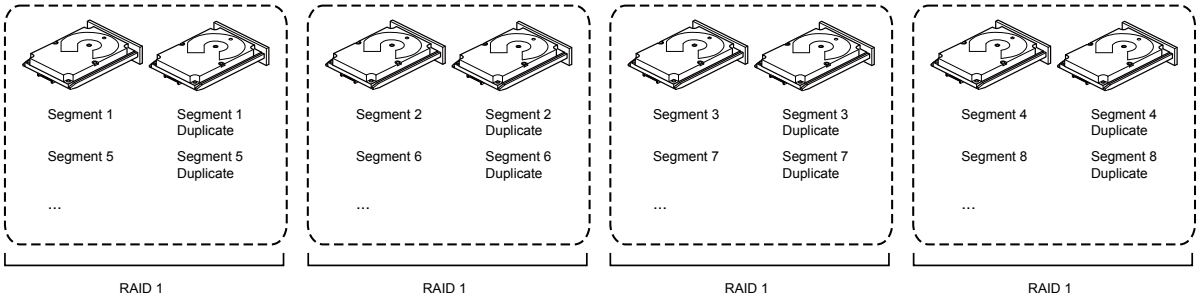
Segment 1
Segment 3
Segment 5
Segment 7

Segment 2
Segment 4
Segment 6
Segment 8

RAID 1 Drive Groups

In RAID 1 drive groups, the RAID controller duplicates all data from one drive to a second drive in the drive group. A RAID 1 drive group supports an even number of drives from 2 through 32 in a single span. The RAID1 drive group provides complete data redundancy, but at the cost of doubling the required data storage capacity. The following table provides an overview of a RAID1 drive group. The following figure provides a graphic example of a RAID1 drive group.

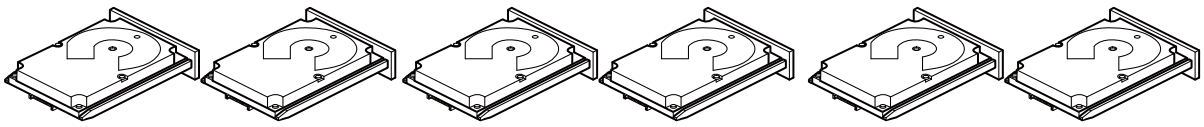
Uses	Use RAID 1 drive groups for small databases or any other environment that requires fault tolerance but small capacity.
Strong points	Provides complete data redundancy.A RAID 1 drive group is ideal for any application that requires fault tolerance and minimal capacity.
Weak points	Requires twice as many drives. Performance is impaired during drive rebuilds.
Drives	2 through 32 (must be an even number of drives)



RAID 5 Drive Groups

A RAID 5 drive group includes disk striping at the block level and parity. Parity is the data's property of being odd or even, and parity checking is used to detect errors in the data. In RAID5 drive groups, the parity information is written to all drives. A RAID5 drive group is best suited for networks that perform a lot of small input/output (I/O) transactions simultaneously.The following table provides an overview of a RAID5 drive group. The following figure provides a graphic example of a RAID5 drive group.

Uses	Provides high data throughput, especially for large files. Use RAID 5 drive groups for transaction processing applications because each drive can read and write independently. If a drive fails, the RAID controller uses the parity drive to re-create all missing information.Use also for online customer service that requires fault tolerance.Use for any application that has high read request rates but random write request rates.
Strong points	Provides data redundancy, high read rates, and good performance in most environments. Provides redundancy with lowest loss of capacity.
Weak points	Not well suited to tasks requiring lots of small writes or small block write operations. Suffers more impact if no cache is used. Drive performance is reduced if a drive is being rebuilt. Environments with few processes do not perform as well because the RAID drive group overhead is not offset by the performance gains in handling simultaneous processes.
Drives	3 through 32



Segment 1	Segment 2	Segment 3	Segment 4	Segment 5	Parity (1 to 5)
Segment 7	Segment 8	Segment 9	Segment 10	Parity (6 to 10)	Segment 6
Segment 13	Segment 14	Segment 15	Parity (11 to 15)	Segment 11	Segment 12
Segment 19	Segment 20	Parity (16 to 20)	Segment 16	Segment 17	Segment 18
Segment 25	Parity (21 to 25)	Segment 21	Segment 22	Segment 23	Segment 24
Parity (26 to 30)	Segment 26	Segment 27	Segment 28	Segment 29	Segment 30

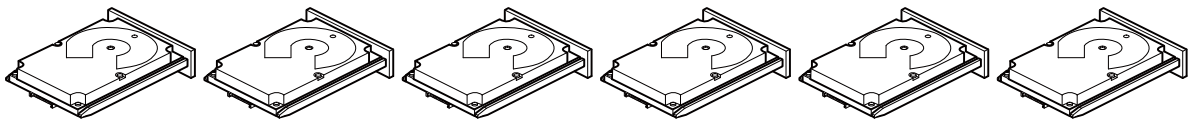
RAID 6 Drive Groups

A RAID6 drive group is similar to a RAID5 drive group (disk striping and parity), except that instead of one parity block per stripe, there are two. With two independent parity blocks, A RAID6 drive group can survive the loss of any two drives in a virtual drive without losing data. A RAID6 drive group provides a high level of data protection through the use of a second parity block in each stripe. Use a RAID6 drive group for data that requires a very high level of protection from loss.

In the case of a failure of one drive or two drives in a virtual drive, the RAID controller uses the parity blocks to re-create all of the missing information. If two drives in a RAID6 virtual drive fail, two drive rebuilds are required, one for each drive. These rebuilds do not occur at the same time. The controller rebuilds one failed drive, and then the other failed drive.The following table provides an overview of a RAID6 drive group.

Uses	Use for any application that has high read request rates but low random or small block write rates.
Strong points	Provides data redundancy, high read rates, and good performance in most environments. Can survive the loss of two drives or the loss of a drive while another drive is being rebuilt.Provides the highest level of protection against drive failures of all of the RAID levels.Performance is similar to that of a RAID5 drive group.
Weak points	Not well-suited to tasks requiring a lot of small and/or random write operations.A RAID 6 virtual drive must generate two sets of parity data for each write operation, which results in a significant decrease in performance during write operations. Drive performance is reduced during a drive Rebuild operation.Environments with few processes do not perform as well because the RAID overhead is not offset by the performance gains in handling simultaneous processes. A RAID6 drive group costs more because of the extra capacity required by using two parity blocks per stripe.
Drives	3 through 32

The following figure shows a RAID6 drive group data layout. The second set of parity drives is denoted by Q. The P drives follow the RAID5 drive group parity scheme.



Segment 1	Segment 2	Segment 3	Segment 4	Parity (P1–P4)	Parity (Q1–Q4)
Segment 6	Segment 7	Segment 8	Parity (P5–P8)	Parity (Q5–Q8)	Segment 5
Segment 11	Segment 12	Parity (P9–P12)	Parity (Q9–Q12)	Segment 9	Segment 10
Segment 16	Parity (P13–P16)	Parity (Q13–Q16)	Segment 13	Segment 14	Segment 15
Parity (P17–P20)	Parity (Q17–Q20)	Segment 17	Segment 18	Segment 19	Segment 20

Note: Parity is distributed across all drives in the drive group.

RAID 00 Drive Groups

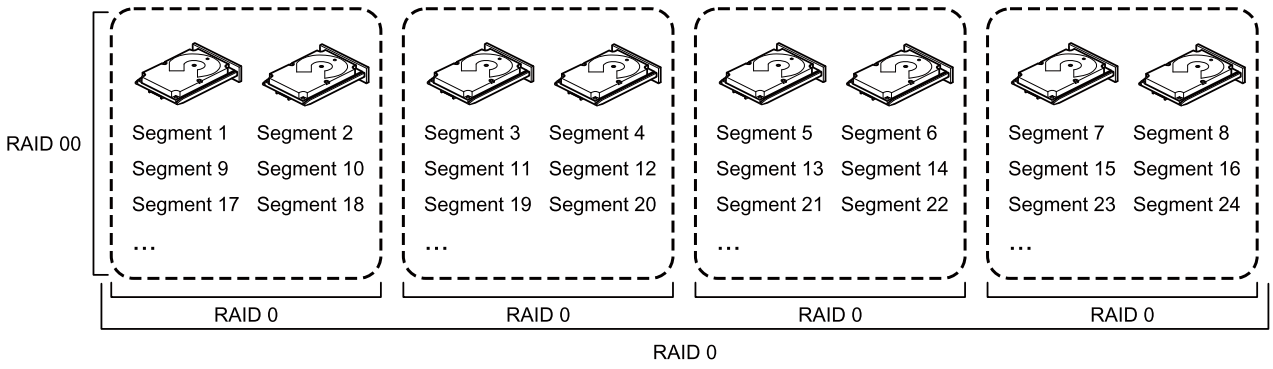
A RAID 00 drive group is a spanned drive group that creates a striped set from a series of RAID0 drive groups. A RAID00 drive group does not provide any data redundancy, but, along with the RAID0 drive group, does offer the best performance of any RAID level. A RAID00 drive group breaks up data into smaller segments and then stripes the data segments across each drive in the drive groups. The size of each data segment is determined by the stripe size. A RAID00 drive group offers high bandwidth.

NOTE

RAID level 00 is not fault tolerant. If a drive in a RAID 0 drive group fails, the entire virtual drive (all drives associated with the virtual drive) fails.

By breaking up a large file into smaller segments, the controller can use both SAS drives and SATA drives to read or write the file faster. A RAID00 drive group involves no parity calculations to complicate the write operation. This situation makes the RAID00 drive group ideal for applications that require high bandwidth but do not require fault tolerance. The following table provides an overview of the RAID00 drive group. The following figure provides a graphic example of a RAID 00 drive group.

Uses	Provides high data throughput, especially for large files.Any environment that does not require fault tolerance.
Strong points	Provides increased data throughput for large files. No capacity loss penalty for parity.
Weak points	Does not provide fault tolerance or high bandwidth. All data lost if any drive fails.
Drives	2 through 256



RAID 10

A RAID10 drive group is a combination of RAID level 0 and RAID level 1, and it consists of stripes across mirrored drives. A RAID10 drive group breaks up data into smaller blocks and then mirrors the blocks of data to each RAID1 drive group. The first RAID1 drive in each drive group then duplicates its data to the second drive. The size of each block is determined by the stripe size parameter, which is set during the creation of the RAID set. The RAID 1 virtual drives must have the same stripe size.

Spanning is used because one virtual drive is defined across more than one drive group. Virtual drives defined across multiple RAIDlevel 1 drive groups are referred to as RAID level 10, (1+0). Data is striped across drive groups to increase performance by enabling access to multiple drive groups simultaneously.

Each spanned RAID 10 virtual drive can tolerate multiple drive failures, as long as each failure is in a separate drive group. If drive failures occur, less than total drive capacity is available. Configure RAID 10 drive groups by spanning two contiguous RAID1 virtual drives, up to the maximum number of supported devices for the controller. A RAID10 drive group supports a maximum of 8spans, with a maximum of 32drives per span. You must use an even number of drives in each RAID10 virtual drive in the span.

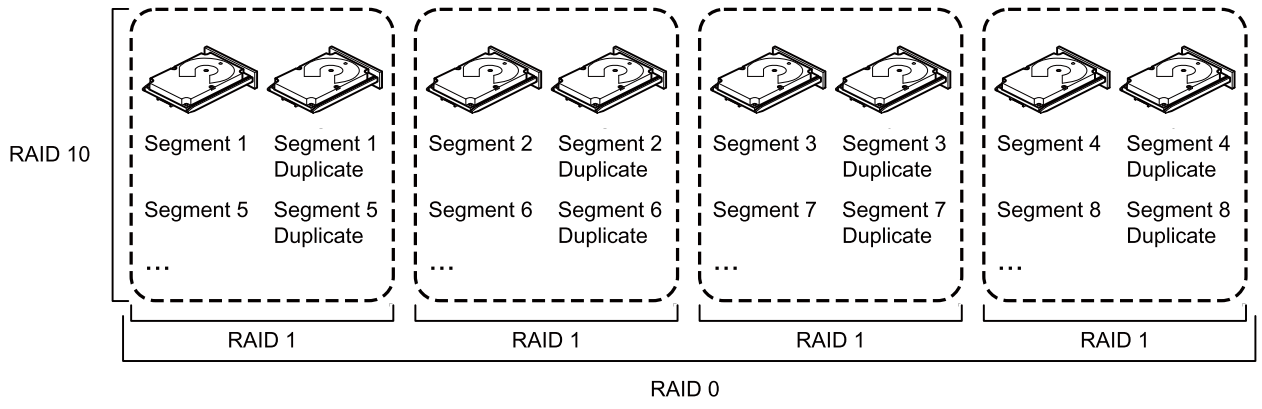
NOTE

Other factors, such as the type of controller, can restrict the number of drives supported by RAID 10 virtual drives.

The following table provides an overview of a RAID10 drive group.

Uses	Appropriate when used with data storage that needs 100 percent redundancy of mirrored drive groups and that also needs the enhanced I/O performance of RAID 0 (striped drive groups.) A RAID10 drive group works well for medium-sized databases or any environment that requires a higher degree of fault tolerance and moderate-to-medium capacity.
Strong points	Provides both high data transfer rates and complete data redundancy.
Weak points	Requires twice as many drives as all other RAID levels except in RAID 1 drive groups.
Drives	4 to 32 in multiples of 4 — The maximum number of drives supported by the controller (using an even number of drives in each RAID 10 virtual drive in the span).

In the following figure, virtual drive 0 is created by distributing data across four drive groups (drive groups 0 through3).



RAID 50

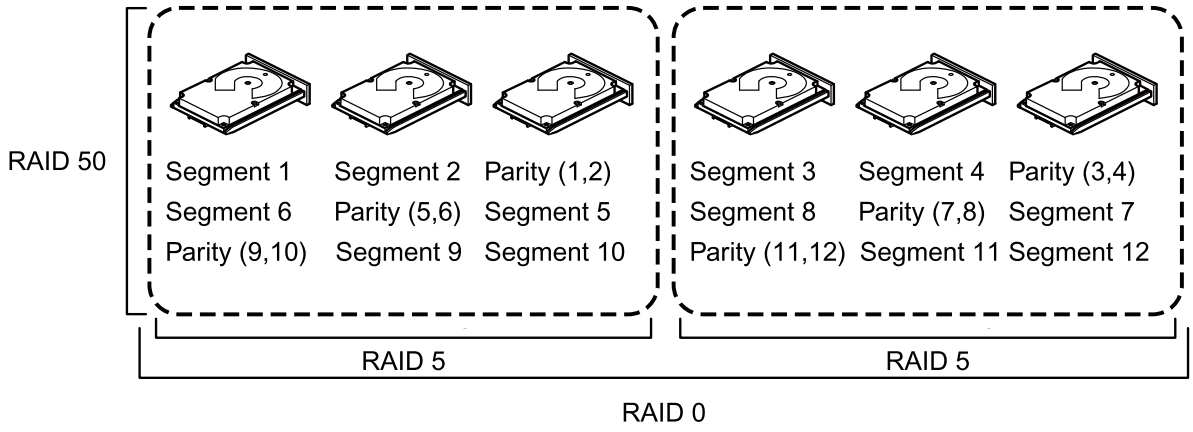
A RAID50 drive group provides the features of both RAID0 and RAID5 drive groups. A RAID50 drive group includes both distributed parity and drive striping across multiple drive groups. A RAID50 drive group is best implemented on two RAID5 drive groups with data striped across both drive groups.

A RAID50 drive group breaks up data into smaller blocks and then stripes the blocks of data to each RAID5 disk set. A RAID5 drive group breaks up data into smaller blocks, calculates parity by performing an exclusive OR operation on the blocks, and then performs write operations to the blocks of data and parity to each drive in the drive group. The size of each block is determined by the stripe size parameter, which is set during the creation of the RAID set.

A RAID level 50 drive group can support up to eight spans and tolerate up to eight drive failures, though less than total drive capacity is available. Though multiple drive failures can be tolerated, only one drive failure can be tolerated in each RAID 5 level drive group.

The following table provides an overview of a RAID50 drive group.

Uses	Appropriate when used with data that requires high reliability, high request rates, high data transfer, and medium-to-large capacity. Also used when a virtual drive of greater than 32 drives is needed.
Strong points	Provides high data throughput, data redundancy, and very good performance.
Weak points	Requires two times to eight times as many parity drives as a RAID 5 drive group.
Drives	Eight spans of RAID 5 drive groups that contain 3 to 32 drives each (limited by the maximum number of devices supported by the controller)



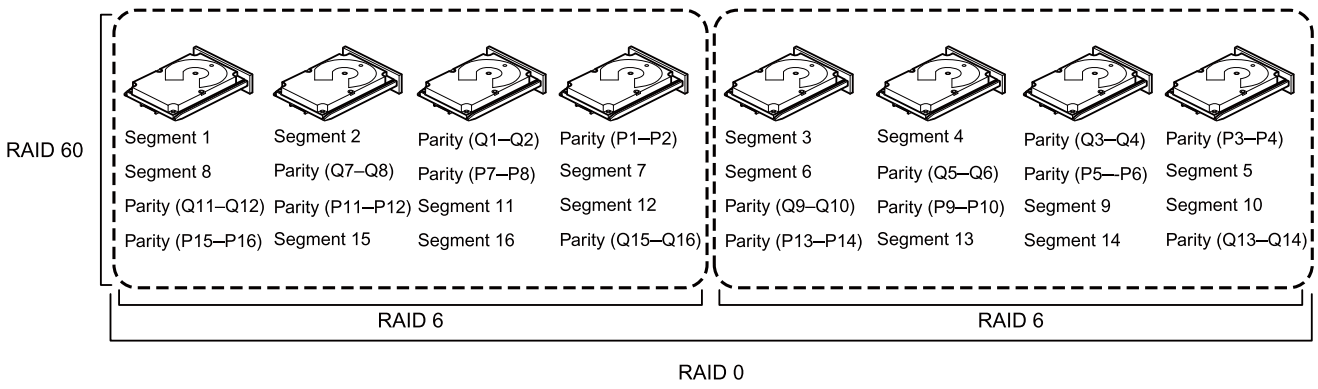
RAID 60

A RAID 60 drive group provides the features of both RAID 0 and RAID 6 drive groups, and includes both parity and disk striping across multiple drive groups. A RAID6 drive group supports two independent parity blocks per stripe. A RAID 60 virtual drive can survive the loss of two drives in each of the RAID6 drive group sets without losing data. A RAID60 drive group is best implemented on two RAID6 drive groups with data striped across both drive groups.

A RAID60 drive group breaks up data into smaller blocks and then stripes the blocks of data to each RAID6 disk set. A RAID6 drive group breaks up data into smaller blocks, calculates parity by performing an exclusive-OR operation on the blocks, and then performs write operations to the blocks of data and writes the parity to each drive in the drive group. The size of each block is determined by the stripe size parameter, which is set during the creation of the RAID set.

A RAID60 drive group can support up to 8spans and tolerate up to 16 drive failures, though less than total drive capacity is available. Two drive failures can be tolerated in each RAID 6 level drive group.

Uses	Provides a high level of data protection through the use of a second parity block in each stripe. Use a RAID60 drive group for data that requires a very high level of protection from loss. In the case of a failure of one drive or two drives in a RAID set in a virtual drive, the RAID controller uses the parity blocks to re-create all of the missing information. If two drives in a RAID 6 set in a RAID60 virtual drive fail, two drive Rebuild operations are required, one for each drive. These Rebuild operations can occur at the same time. Use for online customer service that requires fault tolerance. Use for any application that has high read request rates but low write request rates. Also used when a virtual drive of greater than 32 drives is needed.
Strong points	Provides data redundancy, high read rates, and good performance in most environments. Each RAID6 set can survive the loss of two drives or the loss of a drive while another drive is being rebuilt.Provides the highest level of protection against drive failures of all of the RAID levels.
Weak points	Not well-suited for small block write or random write operations. A RAID 60 virtual drive must generate two sets of parity data for each write operation, which results in a significant decrease in performance during write operations.Drive performance is reduced during a drive Rebuild operation. Environments with few processes do not perform as well because the RAID overhead is not offset by the performance gains in handling simultaneous processes. A RAID6 drive group costs more because of the extra capacity required by using two parity blocks per stripe.
Drives	A minimum of 6.



Note: Parity is distributed across all drives in the drive group.

Technical Specifications

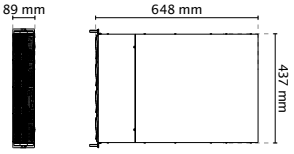
Hardware Information

Model	NR9681
System	
OS	Embedded Windows
CPU	Intel Core i5
Flash	64G SATA DOM
RAM	8GB
Watchdog	Hardware + Software
Power Restoration	System Restart Automatically after Power Recovery
Storage	
HDD Devices	Hot-Swappable Tray x8
HDD Max. Capacity	6TB x8
Disk Management	Create, Format and Remove Disk RAID 0, 1, 5, 6, 10
Video & Audio	
Video Output	HDMI x1, Display Port x1, VGA x1, DVI x1
Resolution	HDMI: 4096x2304 DP: 3200x2000 VGA/DVI: 1920x1200
Graphics Decoder	Hardware decoding
Decoding Capacity	H.265/H.264: 2560x1920 @ 30 fps (2-CH) 1920x1080 @ 120 fps (8-CH) 1280x720 @ 240 fps (16-CH) 1280x720 @ 480 fps (32-CH) 1280x720 @ 480 fps (64-CH)
Camera Position	Change the viewcell position on the Live View screens
External Interface	
USB Interface	USB 2.0 x4 USB 3.0 x2
Audio	Microphone audio jack Input x1 3.5 Line input audio jack x1 3.5 Line output audio jack x1
Network	
Network Interface	10/100/1000Mbps Ethernet (RJ-45) x2
Protocols	IPv4,TCP/IP, HTTP, HTTPS, UPnP, RTSP/RTP/RTCP, SMTP, FTP, DHCP, NTP, DNS, DDNS, IP Filter
Power	
Power Input	Redundant Power 100~220V AC
Power Consumption	Max. 740 W
LED Indicator	
LED Indicator	Power, HDD, Net1, Net2, Overheat, Power fail
Mechanic	
Form Factor	2U Rackmount
Operation Buttons	Power, Reset
Dimensions	89 (H) x 437 (W) x 648 (D) mm
Weight	27 kg (without HDD)
Operating Temperature	5˚C ~ 35˚C (41˚F ~ 95˚F)
Humidity	0 ~ 95%
General	
Safety Certifications	CE, LVD, FCC, VCCI, C-Tick, UL
Warranty	36 months
Client PC Requirements	
Operating System	Microsoft Windows 8, 7, Vista, XP Microsoft Windows Server 2012, 2008, 2003, 2000
CPU	Intel Celeron or above
Memory	2 GB or above
Ethenet	10/100Mbps
Display Resolution	1024x768 pixels or above
Web Browser	Internet Explorer 11/10/9 (32 bit)
Software AP	Installation Wizard 2, Shepherd, VAST
Mobile/Tablet App	iViewer (iOS/Android)
Accessories	
Others	Power Cord, Quick Installation Guide, 8x H.D.D. Tray, 1x USB Mouse

Software Information

Record	
Maximum Channel	64
Record Throughput (MB)	512 Mbps
Network Throughput (MB)	400 Mbps
Audio Format	G.711, G.726, AMR, AAC
Video Format	MJPEG, MPEG4, H.264 AVC, H.264 SVC, H.265
Video Resolution	VGA, 1MP, 2MP, 3MP, 5MP & 9MP Camera
Recording Time (sec.)	Pre-Record: 3 ~ 15 Post-Record: 10 ~ 60
Recording Stream	Single
Recording Mode	Continuous, Schedule, Manual, Event, Activity Adaptive Streaming
Recording Setting	Recycle (unit: Size or Day)
Recording Path	Local Path or Network Path
Record Video Format	3GP
LiveView (Local Display)	
Stream Application	Stream Selection & Auto Stream Size
LiveView Display	64-Channel (with Dual Monitors) Multi Layout Display: 1x1, 2x2, 1+5, 3x3, 1+12, 4x4, 5x5, 1+31, 1P+2, 1P+6, 1P+8, 2V, 3V, 4V, 2V+3 Single Layout Display, Full Screen Display, Sequential Display
Monitor Enhancement	Drag & Drop, Remote I/O Control, PiP (Digital Zoom), Instant Replay, De-interlace, Video Display Mode (Aspect Ratio, Hide Borders, Keep Top/Down Borders), Fisheye Dewarp (Regular: 1O, 1P, 1R, 1O3R, 4R; Wall Mount: 1P2R, 1P3R; Ceiling/Floor Mount: 2P, 4R Pro, 1O8R), Video Enhancement (Basic Mode: Brightness, Contrast, Saturation, Hue; Intelligent Mode: Defog, Rain, Snow, Fire / Smoke)
PTZ Control	Panel Control & Mouse Click Control
PTZ Operation	Direction Control, Home, Zoom, Focus, Iris, Preset, Patrol (Group), Pan, Stop, Speed
Playback (Local Display)	
Playback Display	16 Channels Multi Layout Display: Multi Layout Display: 1x1, 2x2, 1+5, 3x3, 1+12, 4x4, 2V, 3V, 4V, 2V+3 Single Layout Display, Full Screen Display, Sequential Display
Playback Control	Play, Rewind, Pause, Stop, Next/Previous Video Start, Next/ Previous Frame, 1/8X ~ 64X Speed Control, Bookmark
Video Search	Browsing, Date & Time (Fast), Event, Bookmark, Alarm, Log, Timeline, Timeline Scale
Monitor Enhancement	Drag & Drop, PiP (Digital Zoom), De-interlace, Video Display Mode (Aspect Ratio, Hide Borders, Keep Top/Down Borders), Fisheye Dewarp (Regular: 1O, 1P, 1R, 1O3R, 4R; Wall Mount: 1P2R, 1P3R; Ceiling/Floor Mount: 2P, 4R Pro, 1O8R), Video Enhancement (Basic Mode: Brightness, Contrast, Saturation, Hue; Intelligent Mode: Defog, Rain, Snow, Fire/Smoke)
Snapshot	JPEG & BMP
Video Clip Export	AVI, 3GP & EXE
LiveView (Remote)	
LiveView Display	32 Channels Multi Layout display: 1x1, 2x2, 3x3, 4x4, 5x5, 1+5, 1+12, 1+31
Monitor Enhancement	Drag & Drop, Image Freeze, Audio Control, Remote I/O Control, Event Notification, Bookmark, Fisheye Dewarp (1O, 1P, 1R)
PTZ Control	Panel Control
PTZ Operation	Direction Control, Home, Zoom, Preset
Snapshot	JPEG
Playback (Remote)	
Playback Display	1 Channel Multi Layout display: 1x1
Playback Control	Regular (Play, Pause, Stop), Speed Control, Timeline, Timeline Scale
Monitor Enhancement	Drag & Drop, Audio Control, PiP Control, Fisheye Dewarp (1O, 1P, 1R)
Snapshot	JPEG
Alarm Management	
Schedule Type	Continuous, Schedule, Manual
Camera Event	Motion, DI/O, Video Lost/Restore, PIR, Tampering, Temperature, IR, Line Crossing Detection, Loitering Detection, Field Detection
Camera Status	Connection Status, Recording Status, Recording Error
Substation	Substation Connection Status
Storage Status	Storage Connection Status, Storage Capacity Status
Station Status	License Status, Network Status, Virtual Memory Status
Action	Email, Start Recording, Set DO, GSM Short Message, HTTP & Client Notification
Recording Time (sec.)	Max. 30
Backup	
Manual	USB Dongle (FAT Format) NAS (SMB & CIFS)
System	
User Management	Authentication: Basic Account / Windows AD Account User Account: 1024 User Account Time Limit: No limitation User Level: Administrator / Power User / User / Operation / Guest
Log	Operation, System and Event Log
Date&Time	Sync Server
Firmware	Manual update
Restore Default	Supported
Backup/Restore (Configuration)	Supported
Language	Czech, English, French, German, Italian, Japanese, Persian, Portuguese, Russian, Spanish, Simplified Chinese, Traditional Chinese
Camera Intergration	
Insert Camera	Manual, Search
Video (Media) Setting	Compression, Resolution, FPS, Video Quality
Audio Setting	Codec, Bitrate
PTZ Control	Panel Control & Mouse Click Control
PTZ Operation	Direction Control, Home, Zoom, Focus, Iris, Preset, Patrol (Group), Pan, Stop, Speed
Motion Detection	Supported
ONVIF Core Spec	Version 2.2 or above (By Project)
ONVIF Stream	Video (H.264, MPEG4 & MJPEG) & Audio (G.711, One Way)
ONVIF Recording	Continuous, Schedule, Manual
ONVIF Control	PTZ Control (Up, Down, Left, Right & Zoom In/Out)
ONVIF Discover	Discover the other brand camera through "Insert Camera & Batch Insert"
Device Intergration	
UPS	Windows UPS Compatible
Joystick	VIVOTEK USB Joystick All Windows® Compatible USB Joystick
I/O Box	Advantech ADAM-6000
Switch	VIVOTEK VivoCam PoE Switch (AW-GEV Series)

Dimensions



VIVOTEK INC.
All specifications are subject to change without notice. Copyright © VIVOTEK INC. All rights reserved. Ver. 6

6F, No.192, Lien-Cheng Rd., Chung-Ho, New Taipei City, 235, Taiwan, R.O.C. T: +886-2-82455282 F: +886-2-82455532 E: sales@vivotek.com W: www.vivotek.com

VAST Server and Client Components

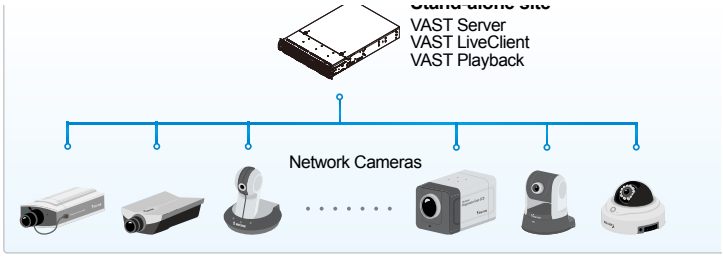
There are four components in VAST: one server component--VAST Server, three client components--**VAST LiveClient, VAST Playback**, and **VAST Matrix**.

VAST Server provides a centralized management site for video recording. **VAST LiveClient** is a client program for the user to login and modify the server's configuration, edit the server's recording storage, schedules and many other functions on the server; **VAST Playback** is another client program for the user to log in and browse the recorded video database and video clips related to specific events on the server.

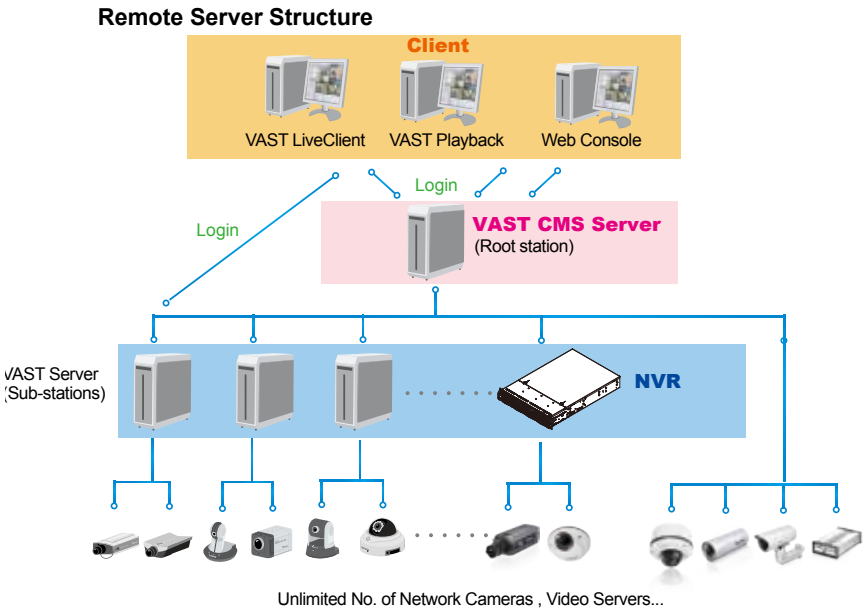
Usage Scenario

The powerful management scalability of VAST makes it suitable for managing small- to large-scale structures.

All the functions can be simultaneously performed on one single site.



For users who manage large-scale surveillance deployments, please plan the hierarchical structure first. Then you can start to add cameras to each station and connect these sub-stations to the root station. The whole hierarchical management system is thus constructed.



Please refer to page 231 for Logical Tree configuration, which allows for a flexible and use-oriented privilege control.

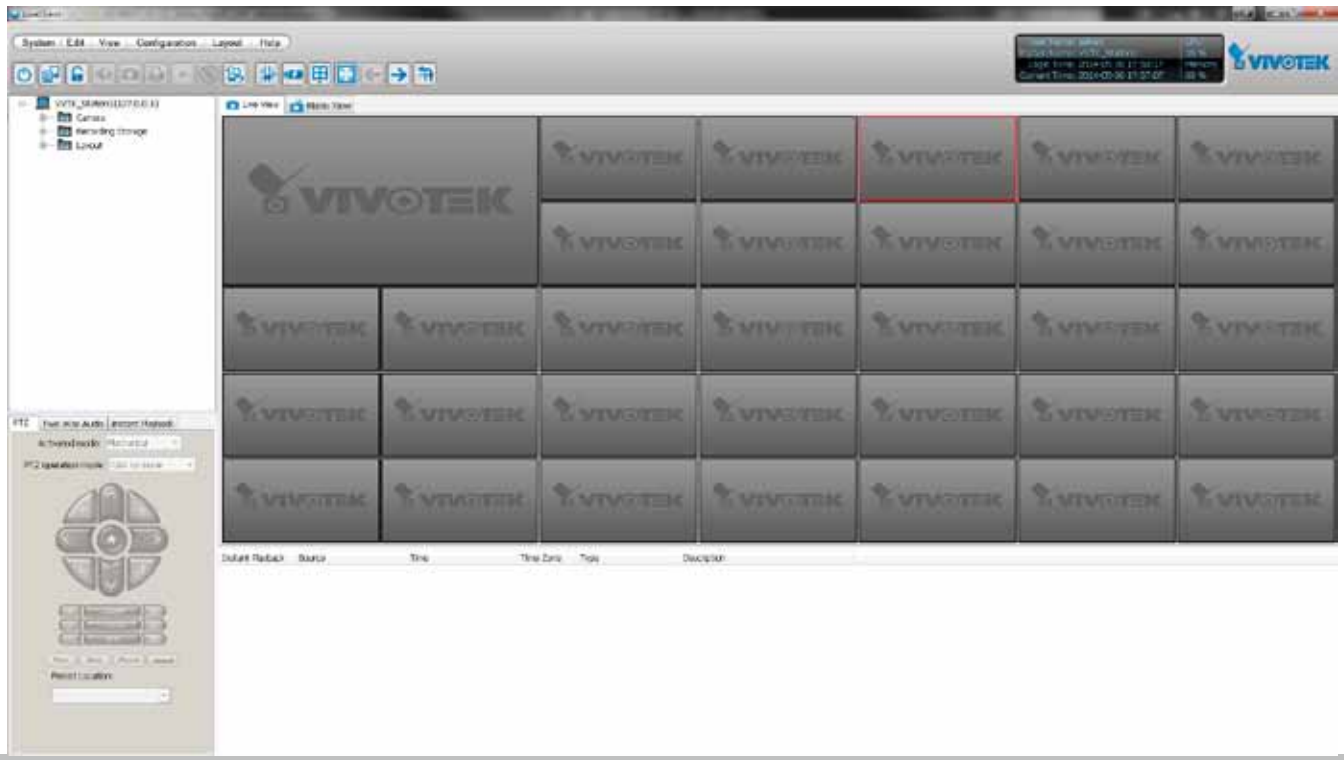
VAST Server Functionality

- Centralized management site for all the logged in clients
- Maintain the configuration of the hierarchical management list
- Hundreds of video recording channels
- Store recorded data onto multiple networked or local hard disks
- Live video for the local/remote LiveClient users
- Retrieval of recorded video for the local/remote Playback users
- Zero latency database recovery

LiveClient is the management interface to your VAST server. The server-related settings are made via the VAST LiveClient utility. The convenient and intuitive user interface on VAST LiveClient provides access to camera, live monitoring, and recording configurations.

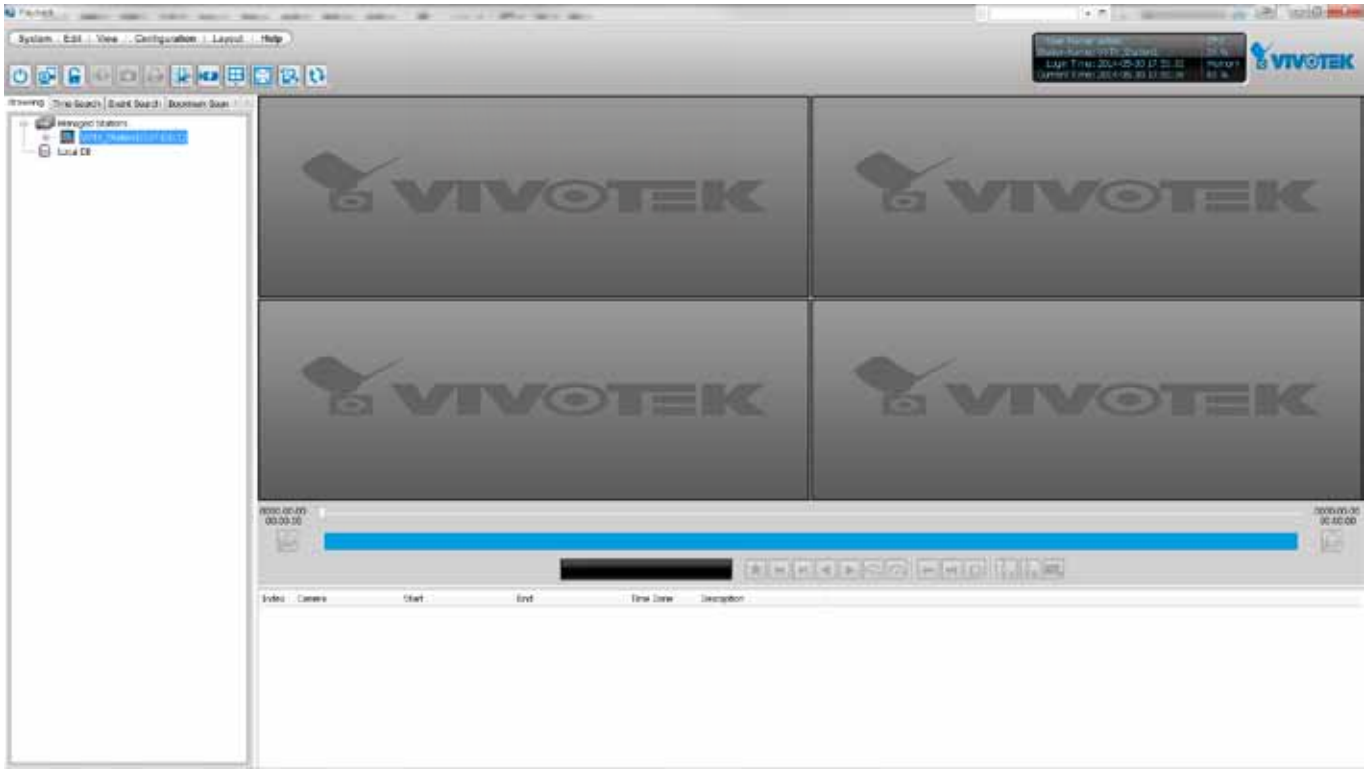
VAST LiveClient Functionality

- Server function control
  - Hierarchical station management
  - User account management
  - Recording storage management
  - Recording schedule management
  - Recorded data backup
  - Event trigger management
- Flexible video live view layout
  - Dual screens for a maximum of 64 or more channels for simultaneous monitoring
  - 1x1, 2V, 1P+2, 3V, 2x2, 4V, 2V+3, 1+5, 1P+6, 3x3, 1P+8, 1+12, 4x4, 5x5, 1+31 monitoring layouts (V stands for vertical layout)
  - 1P+2, 1P+6, and 1P+8 Panoramic PTZ layouts
  - Multiple video viewing pages
- Virtual Matrix for video wall display
- Intelligent PiP function
- E-map for overall management
- Network storage for recorded video
- Convenient switching among multiple monitors
- PTZ / E-PTZ operation panel for camera control
- Supports two way audio
- Instant playback for event recording
- Instant replay for immediate playback
- Supports joystick control
- Remote configuration for network cameras



VAST Playback Functionality

- Browse the database of recorded video from the server
- Flexible video playback layout
  - Maximum 16 channels with simultaneous playback
  - 1x1, 2V, 3V, 2x2, 4V, 2V+3, 1+5, 3x3, 1+12, 4x4 video playback layouts
- Supports powerful playback functions
  - 1/8x, 1/4x, 1/2x slow-down playback
  - 2x, 4x, 8x, 16x, 32x, 64x video playback speed
- Intelligent PiP function
- Supports convenient evidence and data exporting
  - Export media files of recorded video
  - Supports snapshot and print out
- Supports convenient switch among multiple monitors
- Search engine:
  - Time search
  - Event search
  - Bookmark search
  - Alarm and Log search
- Playback while recording
- Support synchronous/ asynchronous playback



VAST Software License

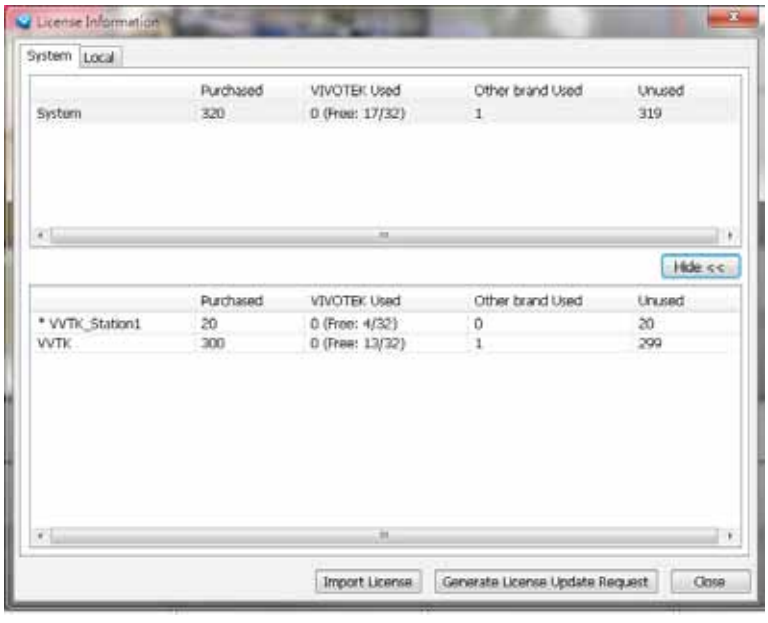
To activate the software, refer to the flow chart below:

Scenario	Need	Action
Dongle license users	Need more CHs	1. Help > License > export license. 2. Send license file to VIVOTEK to purchase more dongle license.
New users preferring more than 32 CHs	Need more than 32 CHs.	1. Install the 256 CH trial VAST. 2. Help > License > Generate license update request. 3. Send request file to VIVOTEK to purchase software license.
New users fine with 32 CHs	Fine with less than 32 CHs.	1. Install the 32 CH free VAST.

The VAST software provides 32 free channels. Since revision 1.11, the VAST software is activated using a software license instead of the original hardware dongle.

For users running the previous dongle version, there is no need to upgrade their original license. If they need the license for more channels, They can export their license file, and purchase more dongle licenses.

For users who require more than 32 channels, they can install the 256 channel trial version first, and go to **Help** > **License** page, and click on **Generate License Update Request.** Send the request back to VIVOTEK to purchase more channel licenses.



When you purchased and received the official software license, use the **Import License** function to activate the official license.

When importing purchased licenses, you can manally select which station/license file to update, or click the **Auto Dispatch** button and let system decide the distribution of license updates especially when there are substations under a managing VAST server.

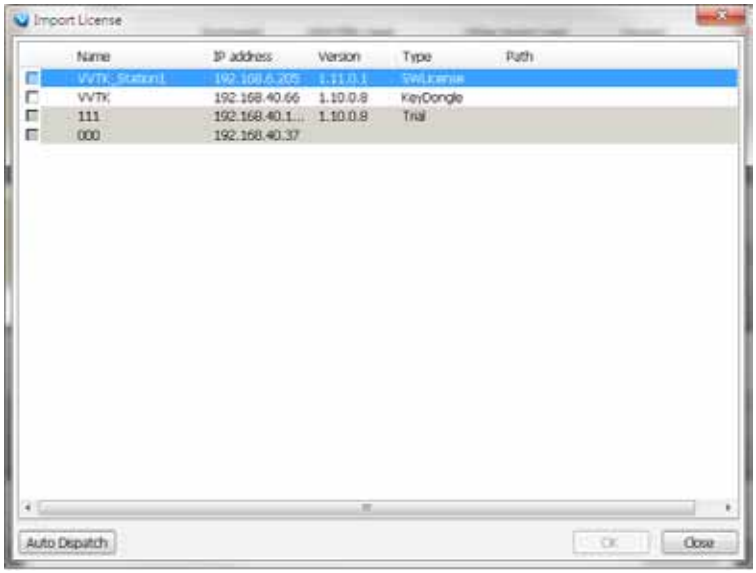
Before the Auto Dispatch function is available, license has to be individually updated on every substations.

Reminders for VAST Software License

■ **Limitations**:

1. The Batch import/export function applies when a managing VAST server needs to collect and update the licensing information from subordinate VAST substations and itself. An enterprise may have a central management server and several VAST instances running in branch offices. In that case, the substations will be listed on the device list, and may not be displayed on a hierarchical structure.

   The Batch import/export function is accessed through the **Help** > **License** menu on LiveClient.



2. The batch download/import function only takes effect on a VAST instance running on server, not on the Linux-based NVR.
3. The trial channels on VAST substations will not be available for use on a managing VAST server (one that manages multiple substations).
4. If you access a VAST deployment via a web console, the license related information will not be available.
5. In this revision, an identical software license applies to both VIVOTEK and other-brand cameras (ONVIF). You do not need to activate two different kinds of software licenses.
6. The Batch export update of the current license profile is supported.
7. The licensing mechanism does not apply to machines running Virtualized OSes (**VMWare**, **VirtualBox**, **Hyper-V**, **Parallels**), either through an upgrade or generating software license on a new installation.
8. If VAST is removed and then re-installed, the number of licensed channels remains intact.
9. If users plan to integrate the software licenses from previous dongle licenses, problems may occur if users changed the exported license file name.

10. The VAST rev. 1.11 supports 32 free channels, and trial licenses for up to 256 channels. Note that the unused trial licenses in a VAST substation will not be available for a managing VAST server. The 32 free licenses will be available for a stand-alone VAST server only.
11. The software license verifies its availability on a machine by checking the computer's main components, e.g., GPU or memory. If a VAST server has several of its main components replaced, the software license may become invalid. Note that users can only change 2 components on a substation (server components - CPU/Memory/Graphics card/Network card/Main board).
12. For an older VAST installation containing a VAST substation licensed through the dongle, the 32 free channels will be automatically added to the total number of licensed channels. One substation comes with 32 free channels. The added number of licensed channels will become available for the managing VAST server.

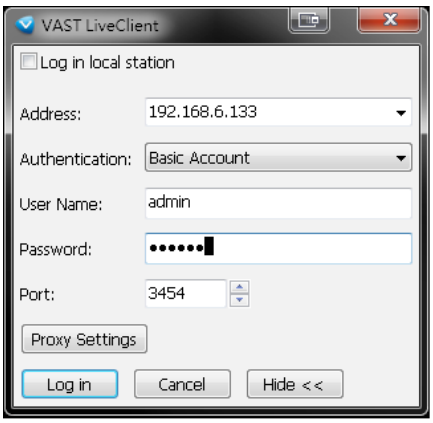
VAST LiveClient Configuration

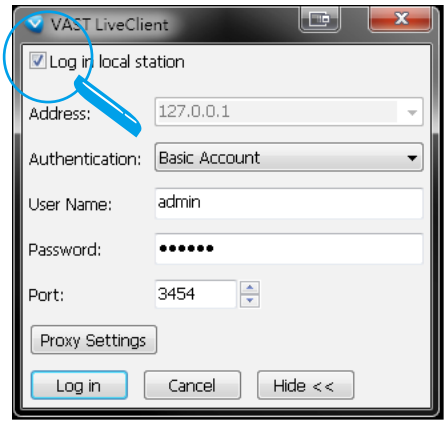
Activating the VAST LiveClient and Logging in to a VAST Server

VAST LiveClient allows you to monitor live video from cameras managed by the VAST Server; it is also the main user interface for server function control.

Follow the steps below to activate VAST LiveClient:

1. Run the **VAST LiveClient** program using the shortcut on desktop.
2. A **Login** window will pop up. Enter the information as shown below:
   - If you want to login to a remote VAST Server, enter the **IP Address**, **User Name**, **Password** and the **Communication Port** of the target server correctly. Click **Login** to log in to the target server.
   - If you want to login to a local host that is running VAST Server, check the **Login local station** check-box, then the local **IP Address** will be displayed automatically. Enter the **User Name**, **Password**, and **Communication Port** of the local server for login. Click **Login** to login to the target server.

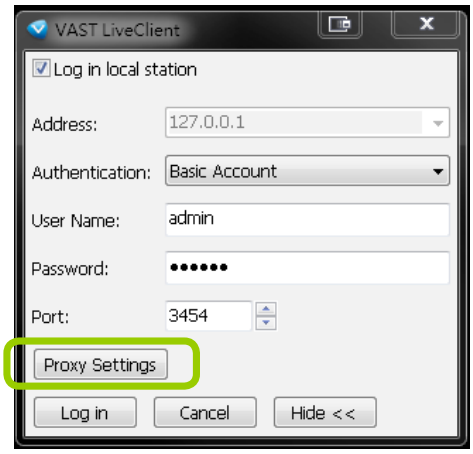


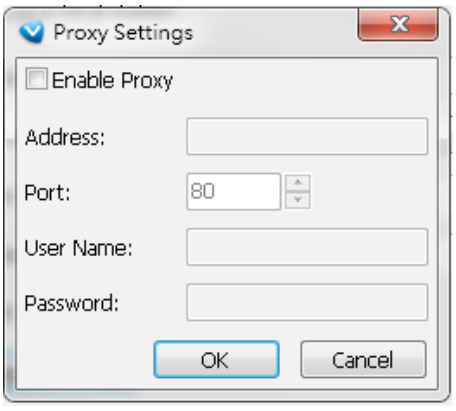


- Please refer to page 132 for how to enable and configure **Windows AD accounts**.

3. The VAST LiveClient monitoring window will prompt.

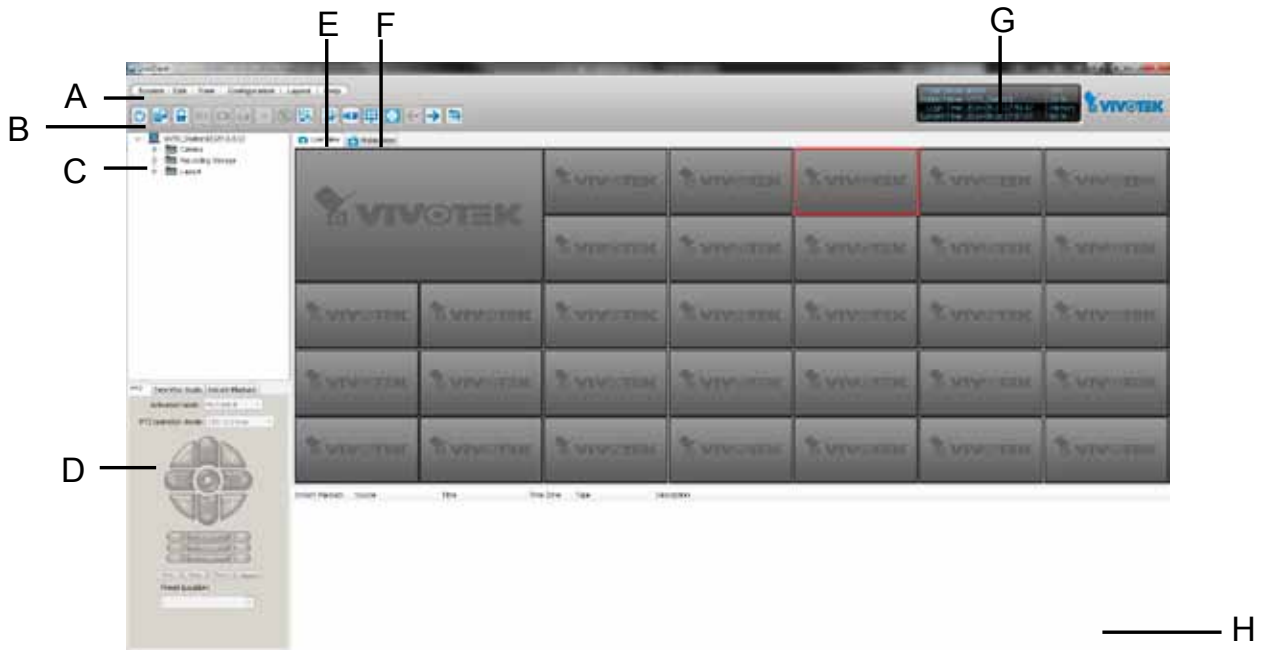
- *If your network environment need to set up proxy, click **More >>** to extend the login window, then click **Proxy Settings** to open the dialog. Then enter related information to link to your proxy server.*





- *Available functions of the VAST LiveClient program will be enabled according to the role of your login account. For more details about the privileges of the user account, please refer to **How to Manage User Accounts** on page 129.*

VAST LiveClient User Interface



A. Menu bar B. Quick access bar C. Hierarchical management tree
D. Camera control panel (PTZ / Two way audio / Instant Playback control panel)
E. Live view window F. Matrix view window G. Status panel H. Alarm window

Menu Bar

Menu Item	Drop-down Options
System	Lock / Enable Click On Image (Disable Click On Image) / Language / Second View / E-map / Launch Playback / Logout / Exit
Edit	Manually Begin Recording (Stop Manual Recording) / Snapshot / Print / Record to EXE (3GP, AVI) / Snapshot Zoomed Image / Print Zoomed Image / Find
View	Logical Tree view/ Device Tree view/ PTZ Panel / Two Way Audio Panel / Instant Playback Panel / Alarm Window / Full Screen / Minimize / Matrix View
Configuration	Camera Management (Insert Camera / Update Camera / Delete Cameras / Batch Insert Cameras / Camera Configuration) / Station Management / Logical Tree View management / IO Box Management / User Management / Association Management / Alarm Management / Virtual Matrix Management (Matrix Management / Matrix View Settings) / Station Settings (General Settings / Network Settings / Recording Storage Settings / Recording Schedule Settings / Scheduled Backup Settings / Server Settings / Relay Settings) / Client Settings (Snapshot Settings / Recording Settings / View Settings / General Settings / Joystick Settings / Proxy Settings / PiP Settings) / Video Enhancement (Basic Image Adjustment / Defog)
Layout	Start Rotating (Stop Rotating) / Save to / Delete / Choose
Help	About / License

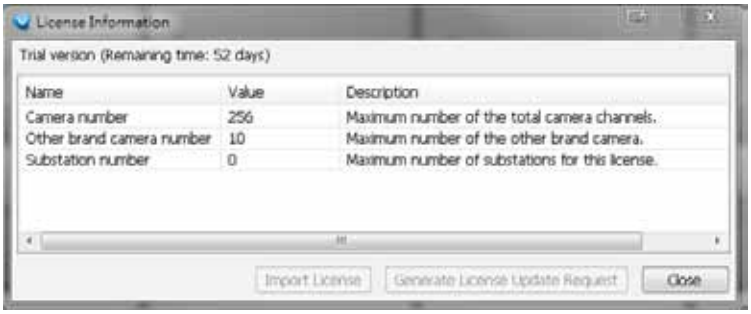
Status Panel

User Name
Station Name (IP Address)
Login Time (yyyy-mm-dd hh:mm:ss)
Current Time (yyyy-mm-dd hh:mm:ss)

Help Panel

The Help panel provides software revision information and the access to the associated iViewer software in either the iOS or Android version. You can also click on the License button to review the number of cameras and manageable substations.

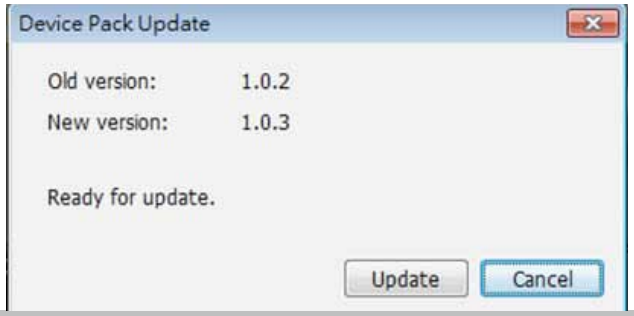
If necessary, you may also use the Import License button to activate the functionality you separately purchased or generate a license request.



Device Pack Update

A Device Pack consists of information of new VIVOTEK cameras or the updated information for previous models, such as various configurations including resolutions, FPS, DI/DO, etc. For example, some panels, such as the PTZ panel, may not be available for a new PTZ camera. Your VAST server might not recognize the features of the latest VIVOTEK cameras. With the Device Pack, you can configure and implement the latest VIVOTEK models without the need to upgrade the entire VAST software to acquire the associated information. Please visit: http://www.vivotek.com/web/product/productdetail.aspx?Model=VAST. For configurations not specified in the device pack, you can still open a web console with individual cameras to change their configuration.

You can consult VIVOTEK's technical support for the latest Device Pack [CSV files (*.csv)], and use the Update... button in the Help window to replenish camera information. The update information will be displayed, and the update process is completed almost immediately.



Quick Access Bar

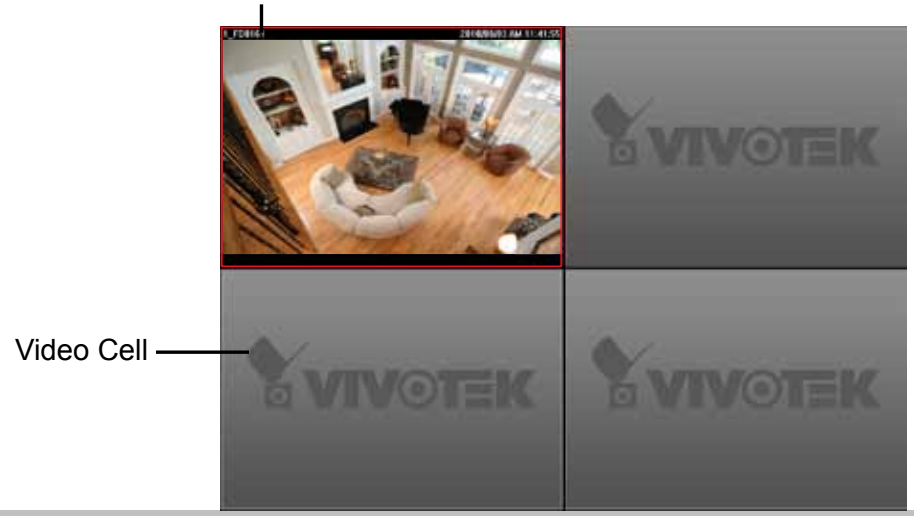
Icon	Function	Description
	Exit	Exit the system
	Logout	Log out from the current station
	Lock	Click to Lock the system for security concerns (Unlock the system)
	Volume	Adjust the audio volume of the current video (Mute)
	Snapshot	Capture pictures from the focus live video cell
	Print	Print out the pictures of focus live view window or all live video cells
	Record to Media	Record media in EXE/3GP/AVI format (Recording Media)
	Alert Sound	Play sound when an event triggers
	Switch Screen	Switch the current window to another screen
	Adjust SVC Level	Dynamically adjust the SVC control over frame rates
	Remove All Connections	Remove all live videos from the live view window
	Layout	Change the layout of the live view window
	Full Screen	Maximize the live video cell
	Page Up	Switch to the previous live view page
	Page Down	Switch to the next live view page
	Start / Stop Rotating	Start or stop live view layout rotating

Some buttons will be disabled if the selected devices do not support the corresponding functions.

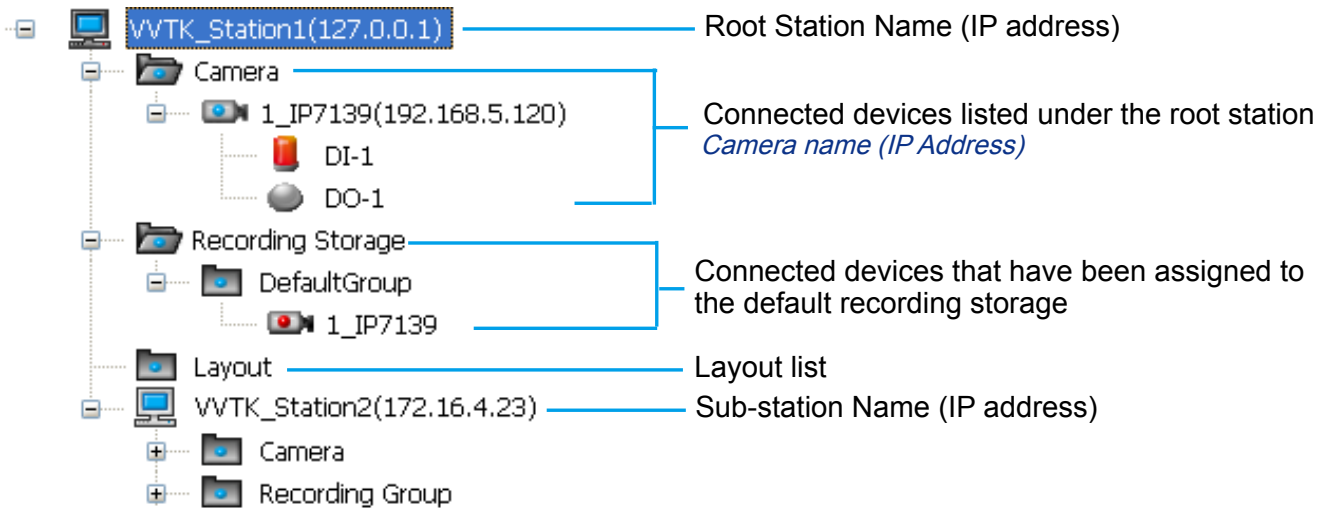
Live Video Monitoring Window

The "VIVOTEK" logo is displayed where no camera has been assigned to a video cell.

The red frame ( ) represents the current selection.



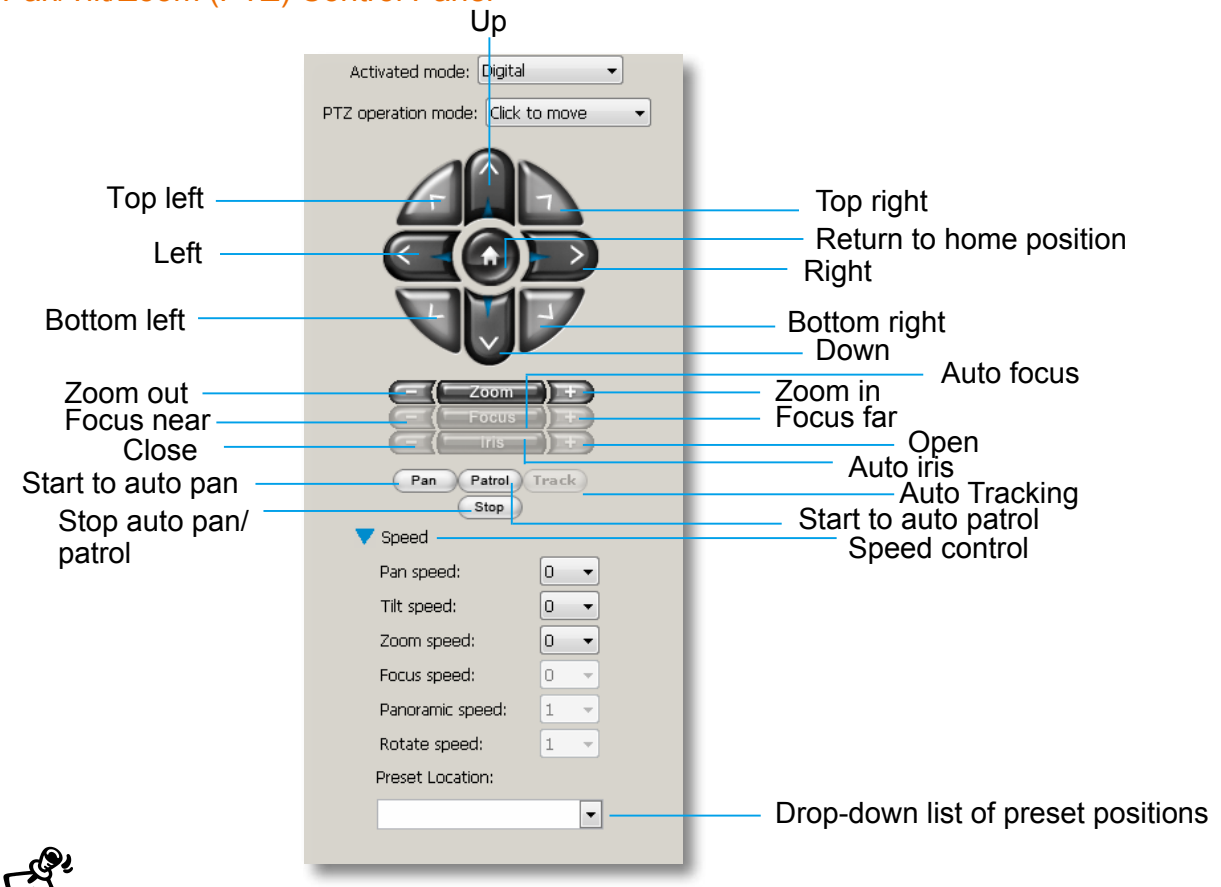
Hierarchical Management Tree



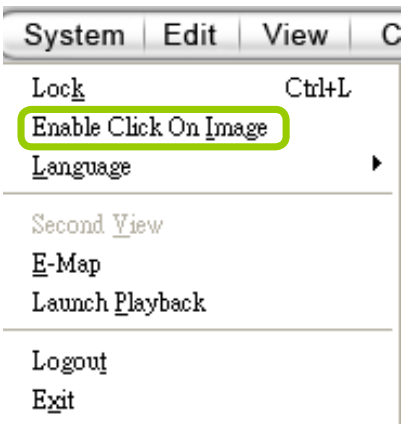
Icon	Description
	A station (The host that's installed with VAST Server)
	A station (The host that's installed with ST7501 Server)
	VIVOTEK fixed network camera (or ONVIF cameras) Red dot signifies that the camera is recording.
	VIVOTEK PTZ network camera Red dot signifies that the camera is recording.
	VIVOTEK dome network camera Red dot signifies that the camera is recording.
	VIVOTEK fisheye network camera Red dot indicates that the camera is recording.
	VIVOTEK video server Red dot signifies that the video server is recording.
	Digital input on / off
	Digital output on / off
	A layout of the live monitoring window
	A station that's not able to be connected currently.
	A device that's not able to be connected currently.

Camera Control Panel

Pan/Tilt/Zoom (PTZ) Control Panel



- *There are two types of PTZ control: Digital (E-PTZ for megapixel cameras) and Mechanical (PTZ cameras or fixed cameras with camera control via RS-485). If the connected cameras support PTZ/E-PTZ function, the PTZ option(s) will appear on the drop-down list. For detailed camera control settings, please refer to the user's manual that came with VIVOTEK network camera .*
- *Click **System > Enable Click On Image** to use the mouse for the control of the PTZ and E-PTZ functions in the video cells for linked cameras. An icon will appear in the video cell as shown below.*



- *You can control the PTZ function through joystick as well. For more information regarding to the joystick configuration, please refer to instructions on page 213.*

VIVOTEK's latest SD8xxx speed dome series supports the **Continuous Move** control. The "**Click to move**" enables one movement by every mouse click on the PTZ buttons.

When Continuous Move is enabled from the PTZ panel, you can click and hold down the mouse button on an arrow key to command the camera to continue moving to that direction. The move will stop when you release the mouse button. Also, if the pan/tilt/zoom/focus speed is configurable for a PTZ camera, you can use the **Speed** button to display the speed options: pan, tilt, zoom, focus, panoramic, and rotate speeds.

For fisheye cameras, two more options will be available: Panoramic speed and Rotate speed. These two options apply to the onscreen control for the Panoramic and Regional views.

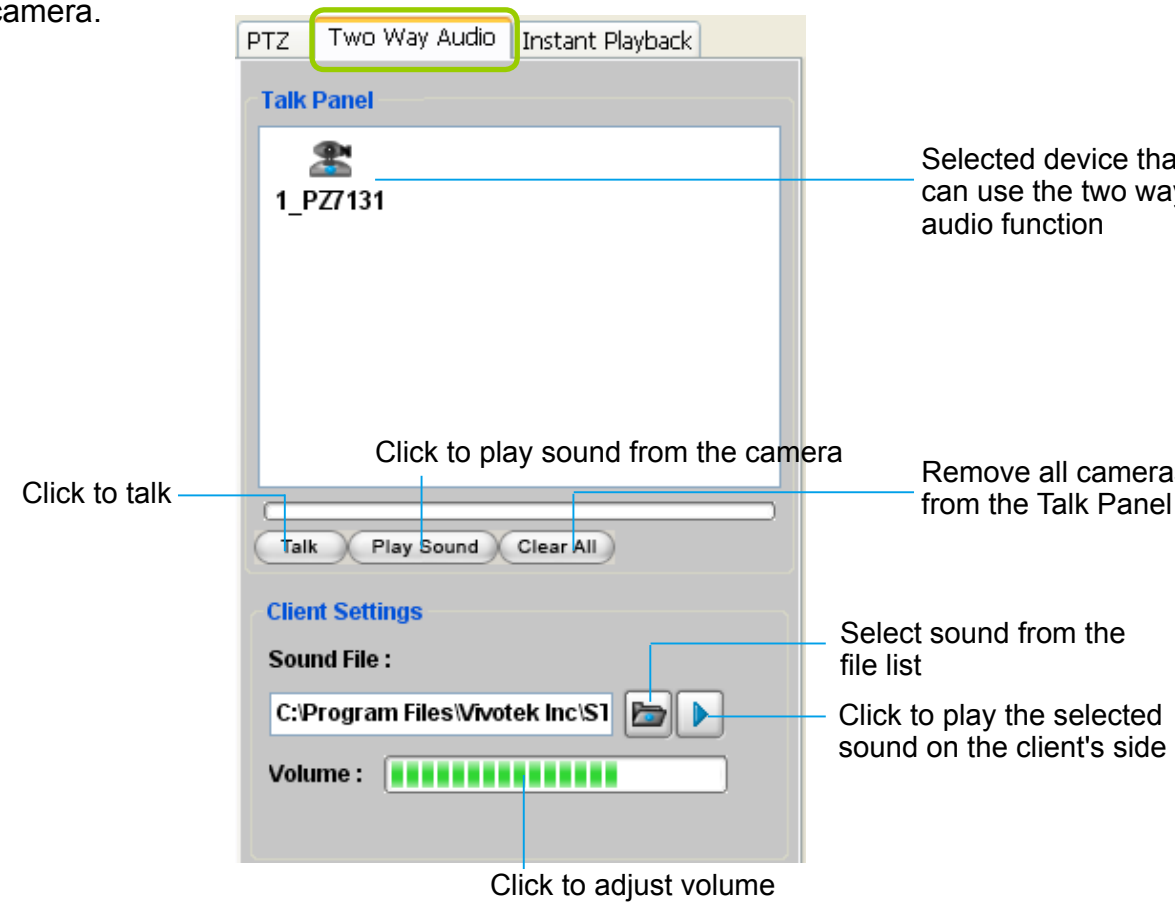
In addition to the PTZ panel, the following hot key combinations are also available:

Ctrl + NumPad (PTZ control)		
Up	Ctrl + 8	
Left	Ctrl + 4	
Home	Ctrl + 5	
Right	Ctrl + 6	
Down	Ctrl + 2	
Focus (Far - Near)	Ctrl + 1	Ctrl + 3
Zoom (Out - In)	Ctrl + 7	Ctrl + 9
Pan	Ctrl + /	
Stop	Ctrl + *	
Patrol	Ctrl + -	

Preset locations (pre-configured by users)	Ctrl + 0~9 (number keys above the alphabetic keys)
Full screen	Ctrl + F
Single view	Ctrl + V
Previous layout page	Alt + PageUP
Next layout page	Alt + PageDown
First layout page	Alt + Home
Last layout page	Alt + End
Snapshot	Ctrl + S
Stop alarm	Ctrl + A
Mute audio from current stream	Ctrl + M
Start/ Stop rotation	Ctrl + O

Two Way Audio Control Panel

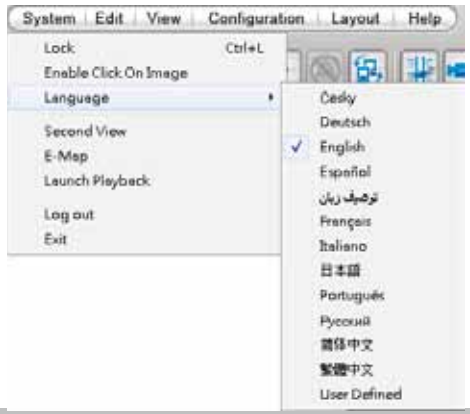
The two way audio function allows the user to remotely communicate with people nearby the network camera.



- *For detailed information about **How to Use the Talk Panel**, please refer to page 186.*
- *Only cameras that come with the two way audio function can be added to the Talk Panel.*

Language Selection

VAST currently supports multi-lingual user interfaces including: English, Česky, Deutsch, Español, Farsi, Français, Italiano, 日本語, Português, Русский, 簡体中文, 繁體中文. If you want to select another language for the interface, please click **System > Language** on the menu bar to select the desired language. Please note that if you want to change the language option, a message will prompt to remind you to restart the system.



If you want to use "User Defined" language, please prepare images and language strings, and upload the files to the following folders:

...\VAST\Client\LiveClient\language\zz_UD (language string)
...\VAST\Client\LiveClient\image (images)

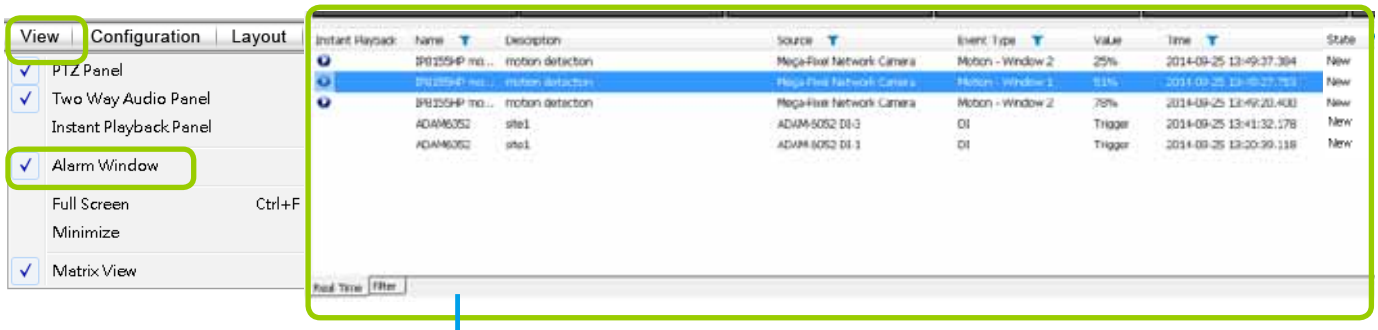
Alarm Window

- Only the alarm-related messages will be displayed in this window. An Alarm is a configuration consisting of triggers and reactions set to activate during a specific period of time. The Alarm-related settings is configured in **Configuration** > **Alarm management**. See page 139 for more information.

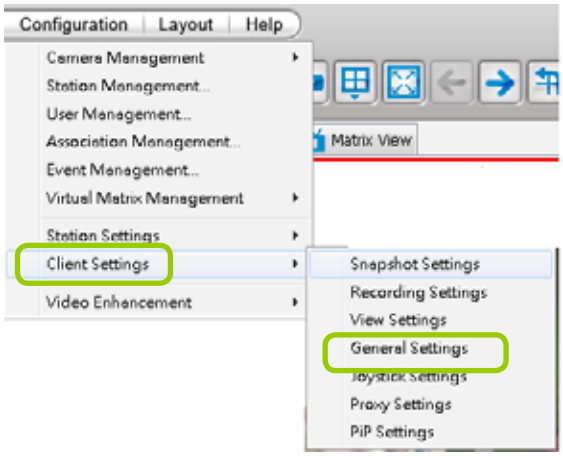
- For the event messages of the overall system operation, please refer to the **Playback** > **Log viewer**.

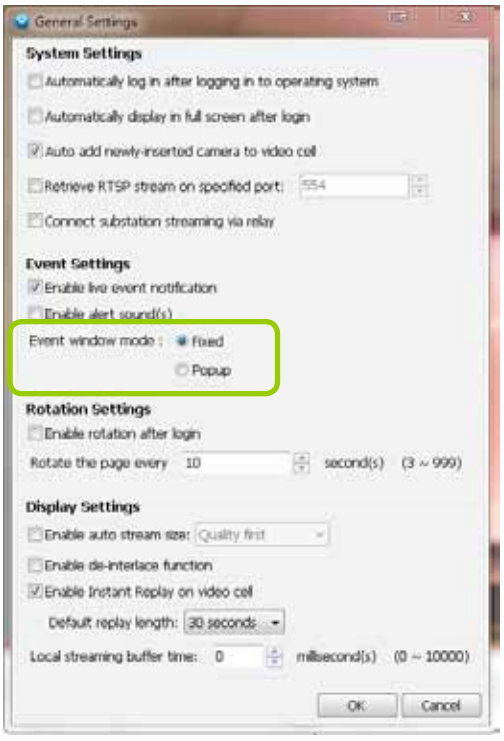
- If a VAST server is reset, the Alarms will disappear from the Alarm window. You can go to the Playback utility and use the **Alarm search** function to retrieve the past events.

Click **View > Alarm Window** to open a window showing the real-time information for event triggers. If you want to hide this window, deselect this option on the menu bar.



The default Alarm window is set to be fixed on the bottom of the LiveClient. If you want to change the Alarm window as a popup page, please open the **Configuration > Client Settings > General Settings** window to switch the display modes.





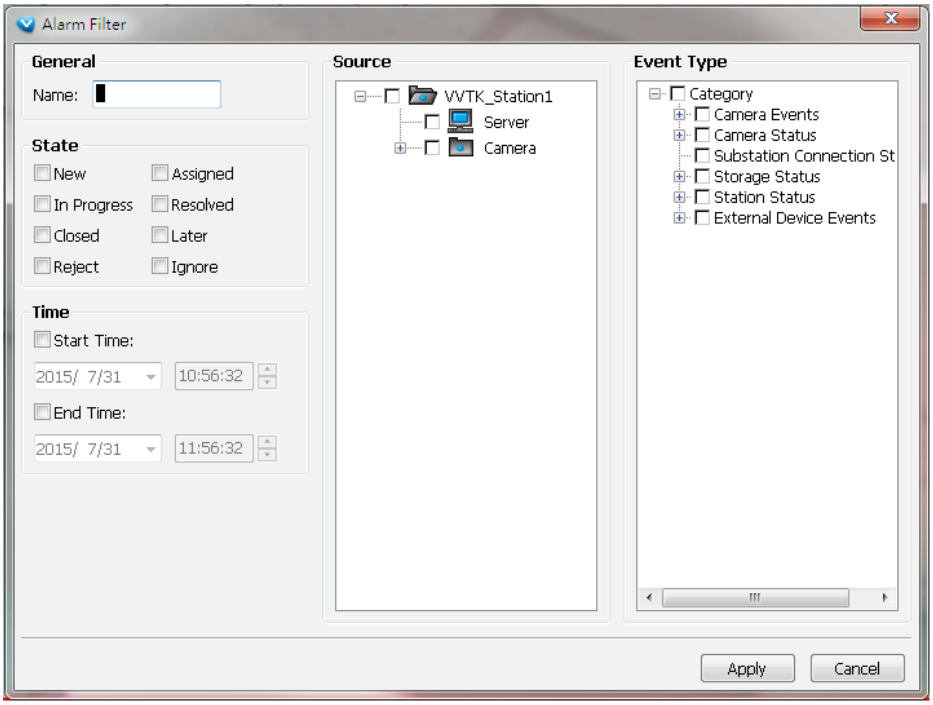
- The **Event Type** field in the Alarm window shows the event category and another field **Value** displays the **percentage** of motion in the detection window. You can go to the Configuration setting page of the connected device to set the percentage.

Alarm Filter

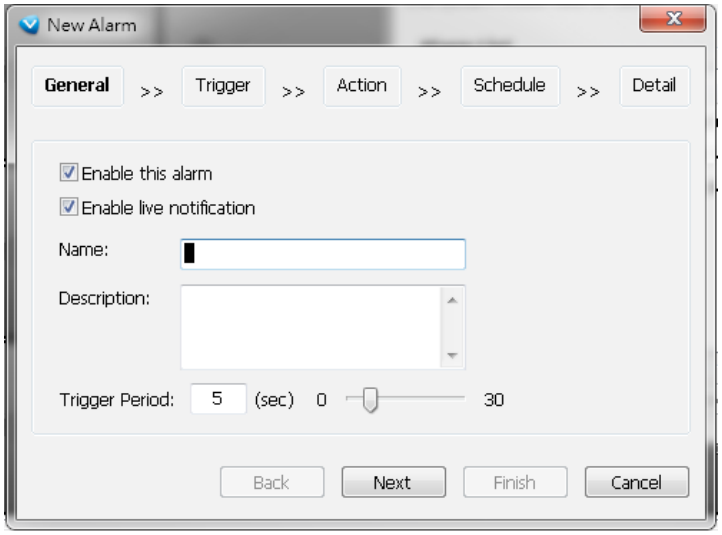
On the Alarm panel, a list of alarms will be displayed. Click on the attributes with a funnel icon.

Instant Playback	Name	Description	Source	Event Type	Value	Time	State
	SD DI		SD8161 DI-2	DI	Trigger	2015-07-31 11:50:36.426	New
	SD DI		SD8161 DI-2	DI	Trigger	2015-07-31 11:50:24.722	New
	SD DI		SD8161 DI-2	DI	Trigger	2015-07-31 11:50:13.750	New

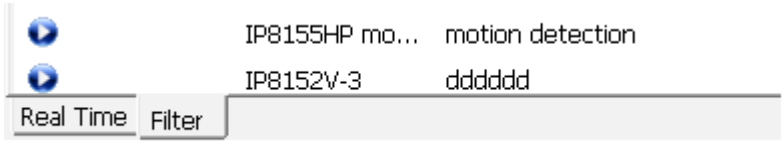
The Alarm Filter window will prompt. Use the Name, Time selector, and the State checkboxes in the Source and Event Type panes to specify what kinds of alarms will be displayed.



For example, you can set up a filter to display the alarms with a name associated with a specific camera, such as "bullet on the corridor." The name of the alarm is configured in **Configuration** > **Alarm** management on page 139.

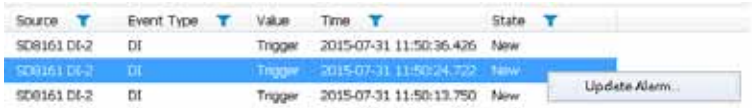


Use the Filter tab at the bottom of the Alarm window to display a different sorted result.

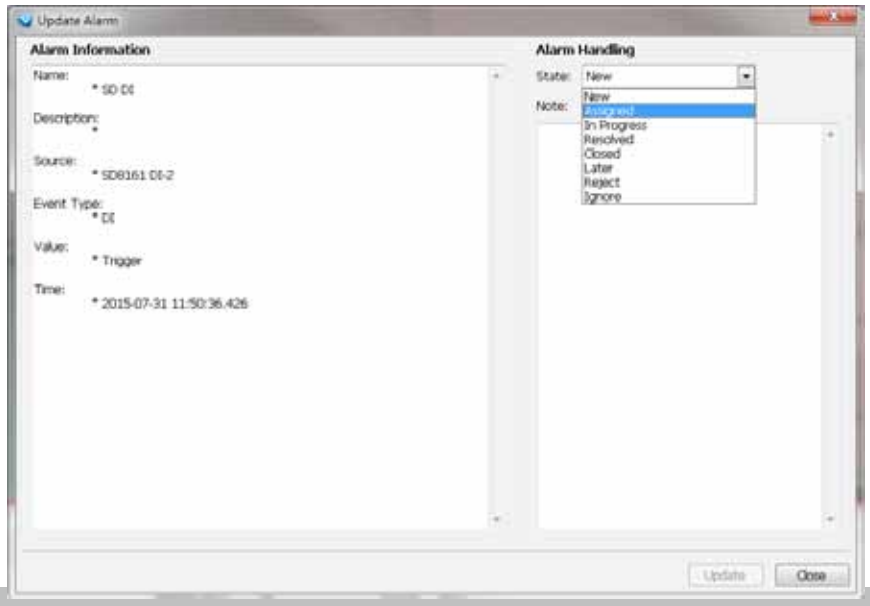


Alarm State

Left-click to select an alarm, and then right-click to display the **Update Alarm** button.



You can change the alarm state from the pull-down menu. For example, if someone has already been sent to check out the situation, for example, an intruder broke in through a window, you can select the Assigned status. A 1024 bytes decription can be added into the alarm Note for future reference.

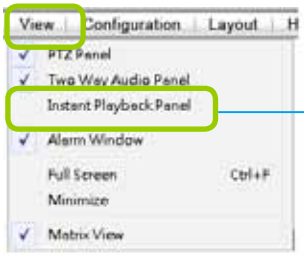


If an alarm is proved as a false alarm, the alarm can be designated as Ignore or Resolved, and so on.

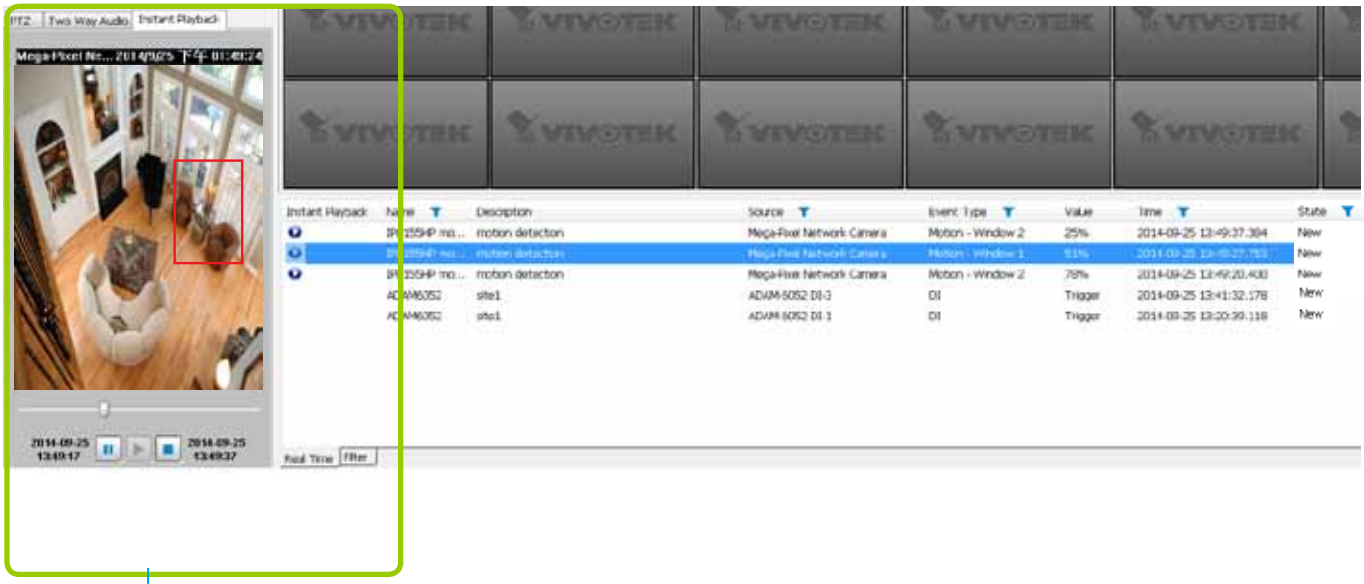
The different alarm states can also be used as the filtering conditions in the Alarm filter. Single or multiple states can be selected in the filter. For example, to display the Resolved alarms only, use the Resolved state as the filter.

Instant Playback

Check **View > Instant Playback** to open the window on the panel. The entries listed in the Event panel are the short recordings made from triggered events.



Deselect this item if you want to hide this window.



Instant Playback Window with a slide bar, play, pause, and stop function

The recorded media that was triggered by an event will be indicated with a playable icon.

You can **double-click** an event on the list to playback the recorded video. Each event contains a video clip of 20 seconds in length. (The default recording data of an event is 20 seconds. For more information about event recording, please refer to page 159.)

Instant Replay

If a camera is currently recording to the VAST server, then a Replay button will be available at the lower left corner of its view cell. This allows you to immediately retrieve the video recording in the past few seconds or minutes.

The Instant Replay function enables you to quickly retrieve videos of what has just happened (20 seconds to 15 minutes ago), without the need to open the Playback utility for the past videos.

Prerequisites for Instant Replay:

1. The function is enabled by default, only available on a LiveClient installed on a PC.
2. There must be recorded videos of the immediate past. If the video streams from a camera were not recorded, you can not retrieve videos using the Instant Replay function.

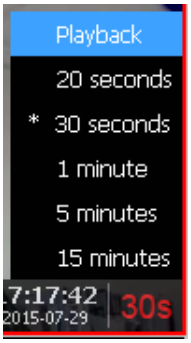
NOTE:

1. When using the Instant Replay function and you change the stream number on a video cell, the Instant Replay will be interrupted.
2. The Instant Replay will also be interrupted when the time comes for a rotation of Live View pages. For example, if you have multiple Live View pages and you set up a rotation of these pages by every 10 seconds, page swap (rotation) still has a higher priority even if you are viewing the Instant Replay.

How to Use:

1. On a selected view cell, mouse over to the lower left corner. A Replay icon will appear.
2. Click on it to display the Replay control bar. Click on the play button.

3. The default queue length is 30 seconds. You can click on the number on the right to change the queue length.



The Playback option allows you to directly open the Playback utility. A maximized single view window will open. In this single view, previous recording will be played, but, unlike the smaller Instant playback pane, the playback will continue until manually stopped.

This playback mode is not memorized as the norm the next time you use the Instant Replay function.

The queue length configuration stays with the view cell, and it will not go unless you remove and insert the camera again.

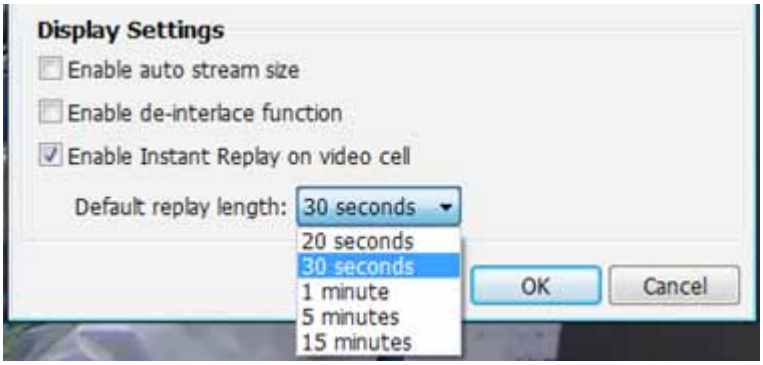
4. To stop the Replay and return to the Live View, click on the **Return to Live** button.

5. On a Replay view cell, you can apply the same Snapshot, Print, Single view and Full screen control as those on a normal view cell. You can also right-click to display the Display Mode and Video Enhancement functions.

   Click and drag the playhead to skip or move to a different point in time on the playback.

   An active Replay view cell is indicated by the Replay text indicator and the time of occurrence of the current playback.

   To change the default Replay settings, open the Configuration > Client Settings > General Settings menu.



Audio Control

The audio function will be enabled if the device is equipped with an internal or external microphone. For detailed audio control settings, please refer to page 138.

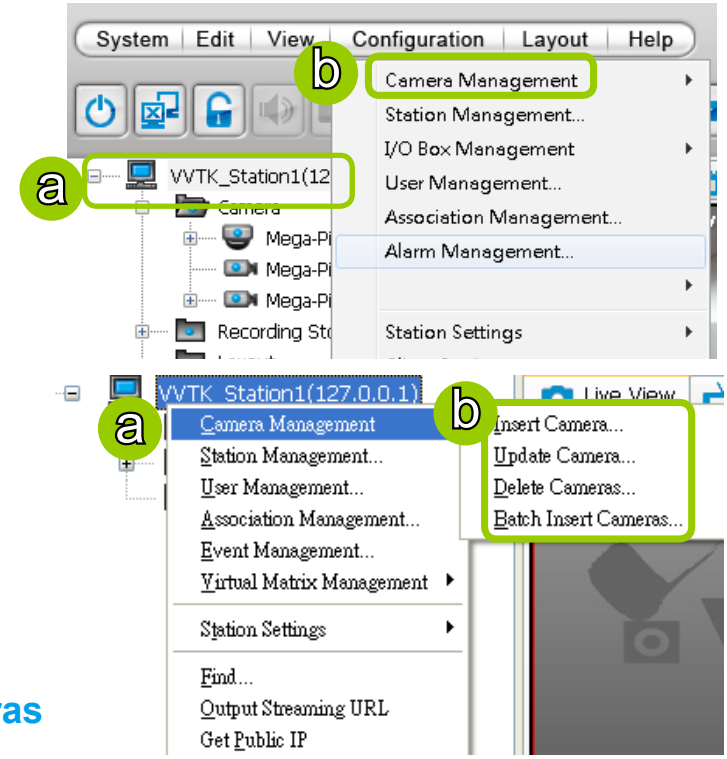
How to Manage Devices

Please follow the steps below to open the Camera Management window:

a. Select the station from the hierarchical management tree.

b. Click **Configuration > Camera Management** on the menu bar (or **right-click** the station, then select **Camera Management**).

c. Then you can choose to insert, update, delete, or batch insert cameras.



Insert Cameras

Please follow the steps below to add devices to a station:

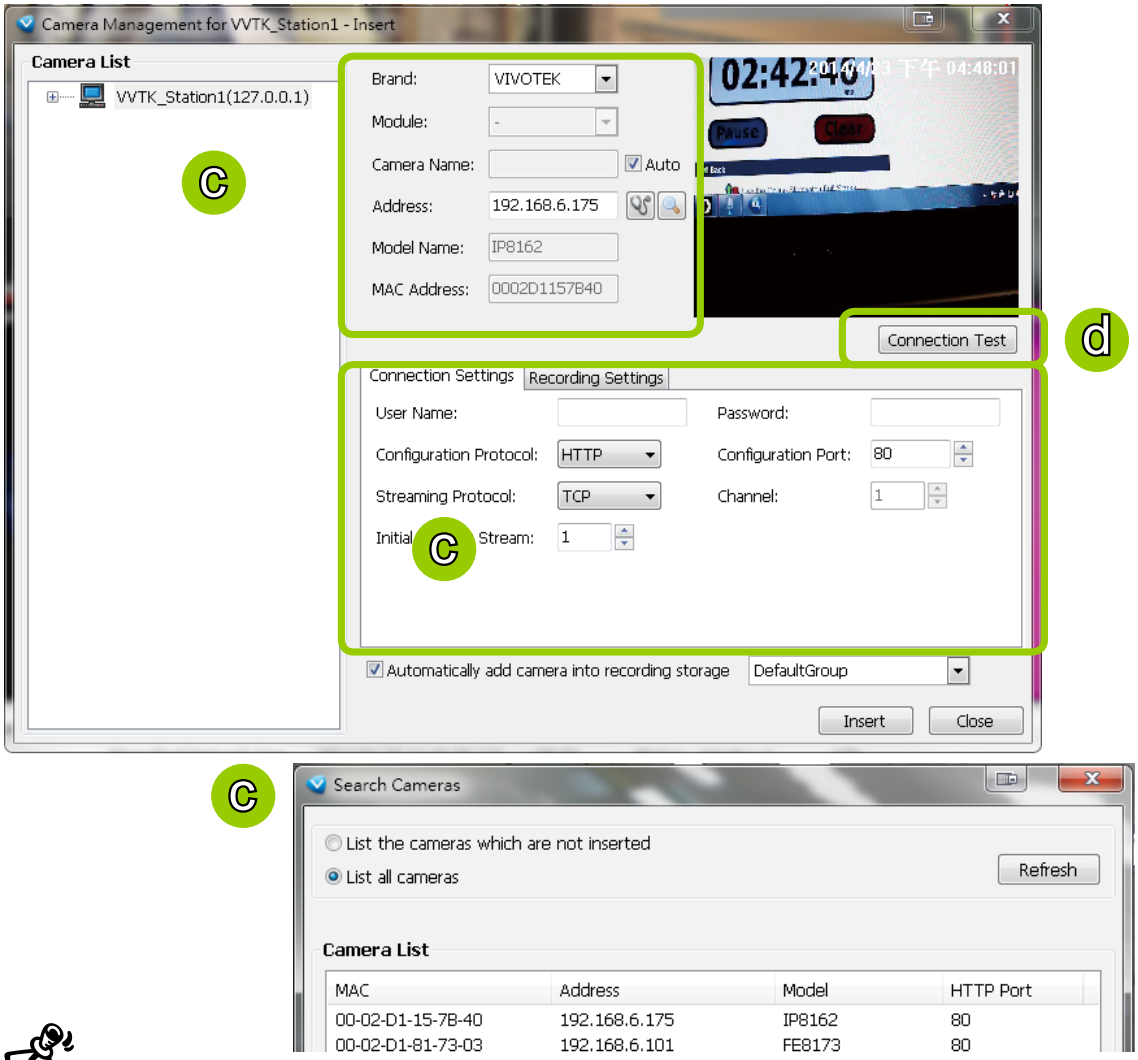
a. Click **Configuration > Camera Management > Insert Camera** on the menu bar (or **right-click** the device/station, then select **Camera Management > Insert Camera**).

b. The **Camera Management - Insert** window will pop up. The device tree managed by the station will be displayed in the left Camera List window.

c. Enter the **Camera Name**, **IP address** (or you can enter an **IP address** and check **Auto** to get a camera name automatically) and configure the **Connection Settings**.

- If the camera is on the LAN, you can click **Search Camera** to detect all VIVOTEK network cameras on the LAN. A **Camera List** window will pop up and show a list of detected cameras on the LAN. On the top of **Camera List** window, you can select "**List the cameras which are not inserted**" or "**List all cameras**". The items listed below will then change accordingly. You can click **Mac, IP Address, Model, HTTP port** to sort the items. Then select a camera from the list to insert to the station.
- The streaming protocol determines how the live video stream is sent from the camera to the local computer. Please refer to the note on the next page for a detailed description of each transmission protocol. Specify the recommended live monitoring stream for the device. If you want to change the live viewing stream, please refer to the next page to update the camera settings. Or you can **right-click** the desired cell, then select a desired stream. Please refer to Dual / Multiple Streams on page 106 for a detailed illustration.
- Click **Detect Model** to detect the device. The Model Name and MAC Address of the device will automatically be displayed in the respective fields if the connection is successful.

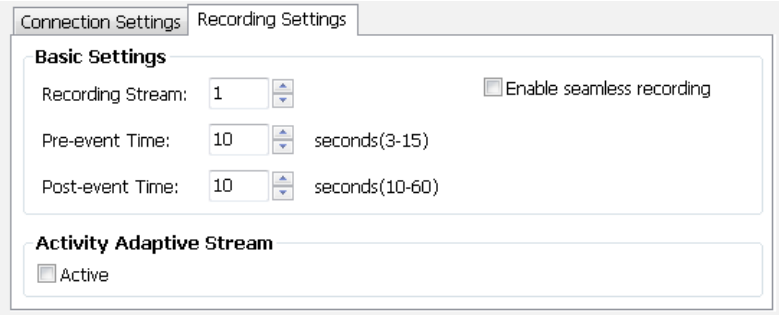
d. If you want to make sure you are connected to the target device, click **Connection Test** to preview the live video from the device.



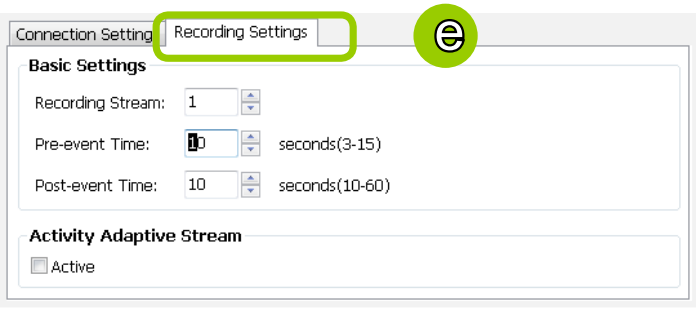
- *If you want to use "HTTPS Port", please enable the HTTPs settings on the configuration page of the Network Camera first.*
- *The characteristics of each protocol are shown in the following table:*

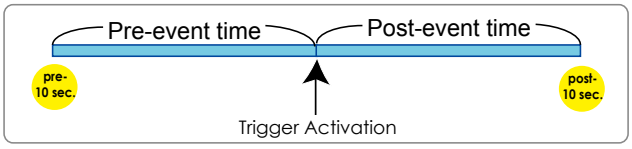
Protocol	Description
UDP	UDP uses a simple transmission model without implicit hand-shaking dialogues for guaranteeing reliability, ordering, or data integrity. Thus, UDP provides an unreliable service and data grams may arrive out of order, appear duplicated, or go missing without notice. This protocol allows for almost real-time audio and video streams. However, network packets may be lost due to network burst traffic and images may be obscured. Activate UDP connection when occasions require time-sensitive responses and video quality is less important.
TCP	TCP provides the service of exchanging data reliably directly between two network hosts, whereas IP handles addressing and routing message across one or more networks. In particular, TCP provides reliable, ordered delivery of a stream of bytes from a program on one computer to another program on another computer. This protocol guarantees the delivery of streaming data and thus provides better video quality. The downside with this protocol is that the real-time effect is worse than that with UDP for a narrower bandwidth.
HTTP	HTTP is a networking protocol for distributed, collaborative, hypermedia information systems. It's the foundation of data communication for the World Wide Web. This protocol allows for the same quality as TCP and the users need not open a specific port for streaming under some network environment. Users inside a firewall can utilize this protocol to allow streaming data through.
HTTPS	This protocol enables authentication and encrypted communication over SSL (Secure Socket Layer), which protects streaming data transmission over the Internet on higer security level.

e. Configure **Recording Settings**:



- Recording Stream: By default, the stream source of the recording stream is stream 1, if you want to change it later on, please refer to the previous page to update the camera settings (Update Camera).
- Pre-event time: Enter a number to decide how much time to record before an event is triggered.
- Post-event time: Enter a number to decide the duration of recording after an event is triggered.

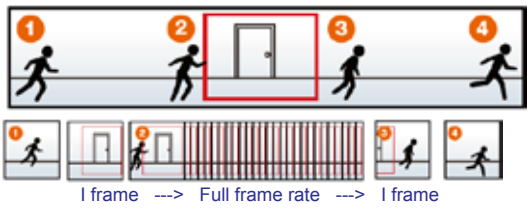


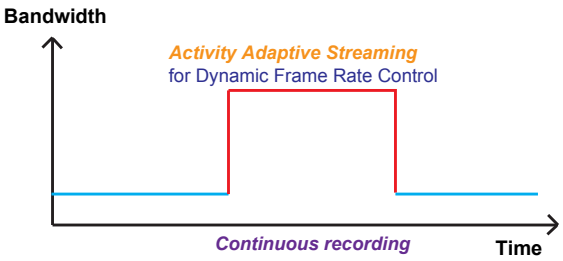


For example: If both the Pre-event time and Post-event time are set to 10 seconds, a total of 20 seconds of video will be recorded if an event is triggered. This function is supported by the buffer area on a VAST server.

Note the following with the associated configuration:

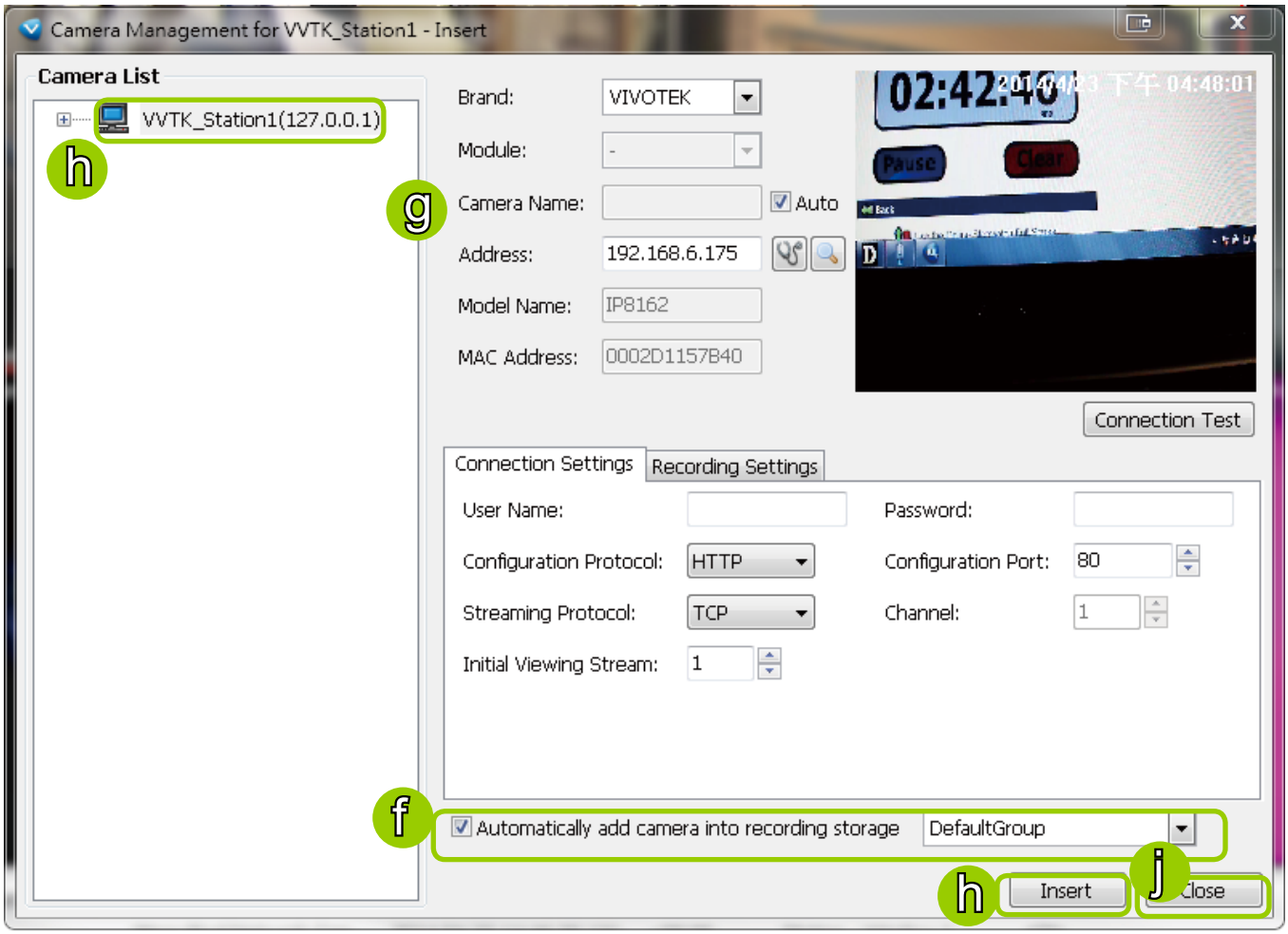
- The Pre-/Post-event time configuration only applies to event recording.
- The Activity Adaptive Stream (a.k.a., AAS) only applies to the Continuous Recording.





- Activity Adaptive Stream (active if possible): Check this item to enable activity adaptive stream recording. For cameras that come with multiple streams features, users can make use of activity adaptive streaming for dynamic frame control.

  If you check Activate Activity Adaptive Stream, the VAST server will record full-frame-rate video only when an event is triggered on the camera; otherwise, it will only request the I frame data during normal monitoring, thus effectively save lots of bandwidths and storage.



f. The device will automatically be assigned to the default recording group. Deselect the item if you want to cancel this setting.

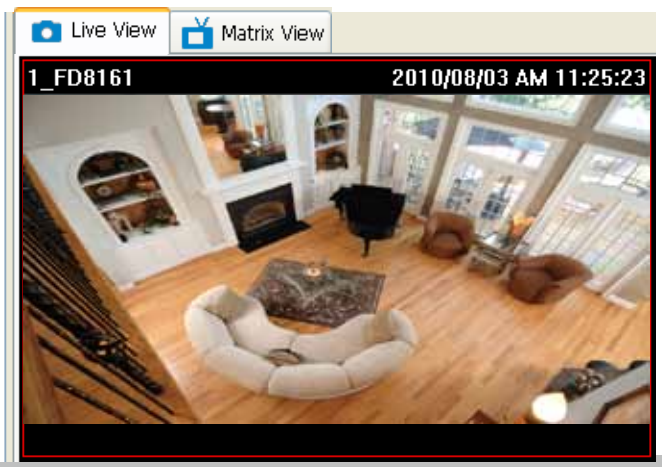
g. You can deselect the "Auto" checkbox behind the **Camera Name** entry, and manually enter a name of your choice, such as "East alley bullet." This name will be used as the folder name for the recorded video files. An index number will still be appended to the folder name. Note that if this name is changed when the recording is taking place, the configuration change will not take effect until the next day.

h. When all settings are completed, click **Insert** to add the device to the station. The device will be displayed under the Camera List on the left.

i. To insert additional devices to the station, repeat the above steps.

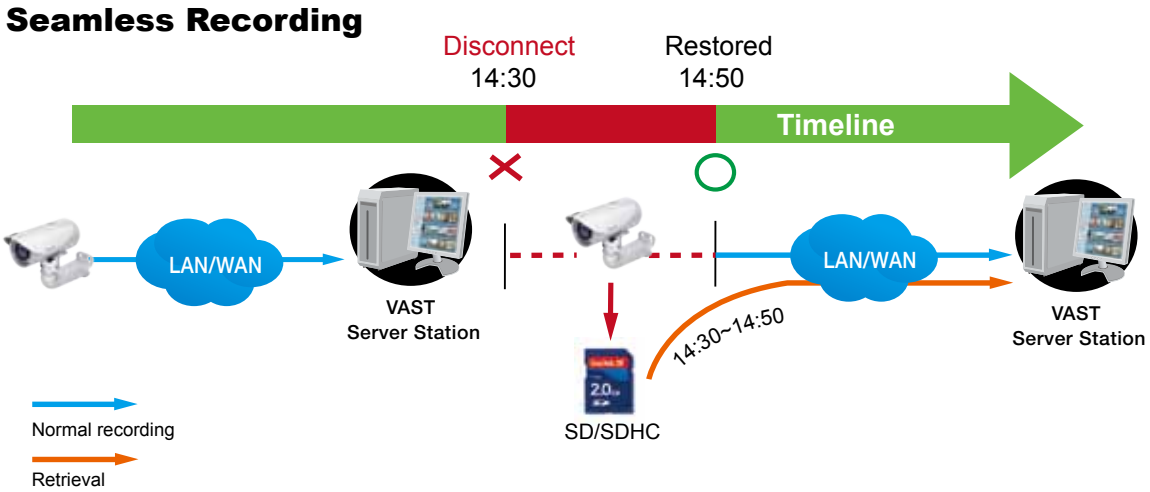
j. When completed, click **Close** to exit the camera management window.

k. Back to the main window, you will find the newly-inserted devices displayed under the station and the live video in the video cell.



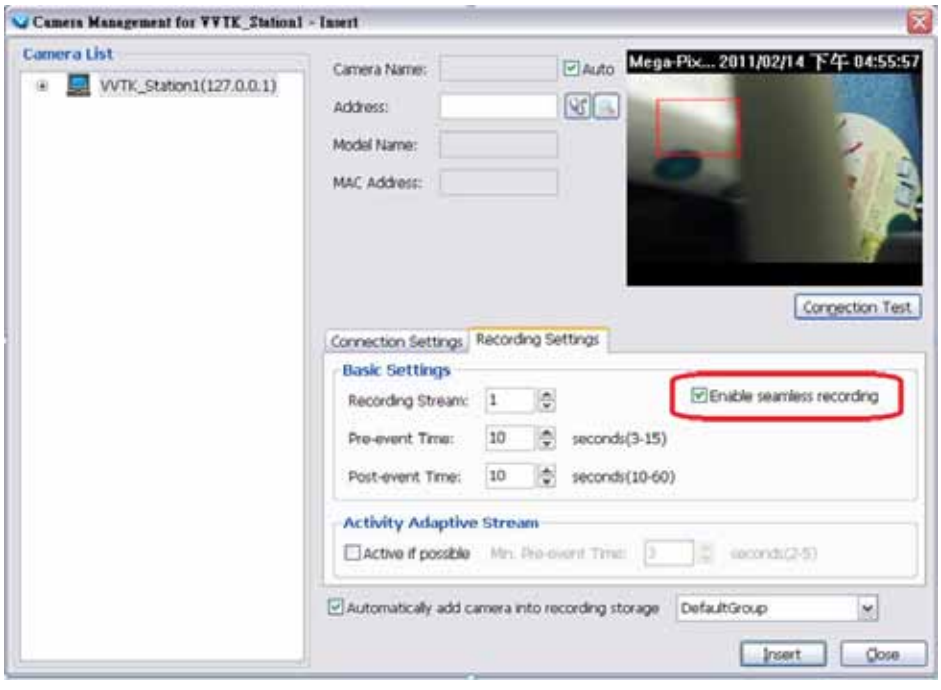
Seamless Recording

Seamless Recording safeguards critical videos in the occurences of network disconnection. In the event of temporary disconnection, video is stored in individual cameras' SD/SDHC/SDXC card; and once the connection is restored, a VAST server can automatically resumes the recording. More remarkable is that, a VAST server can simultaneously retrieve the time-tagged videos that were temporarily stored on SD/SDHC/SDXC cards. For information about the latest firmware/software revisions that support this feature, please contact your sales representatives or technical support.



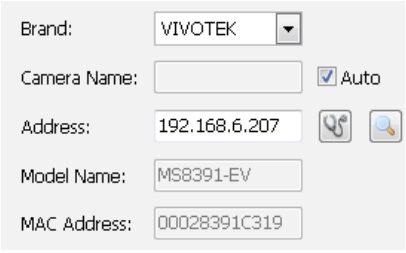
The video data retrieved from SD/SDHC/SDXC card also include event-triggered recordings such as pre- or post-event footages, if events were detected during the network outage.

The Seamless Recording feature is enabled when inserting, updating, or batch inserting cameras in the Camera Management window. The firmware/hadware compatibility of this feature is automatically detected, i.e., this feature is not available when a non-compliant camera is attached. If a compatible camera is attached, a checkbox will be available as shown below.



Tips:

Try out the **Detect model** button on the Insert Camera page if the Seamless Recording checkbox does not appear.



- When the SD/SDHC/SDXC card storage space is full, cameras will stop recording. When the network conneciton between VAST server and cameras is restored, videos in the SD card will be transmitted back to the VAST server. Note that the videos that were not recorded during the time when the network was disconnected will not be transmitted.
- If the videos on the cameras belong to those that are about to be erased within 24 hours (e.g., for the lack of storage space on a VAST server), those videos will not be retrieved.

Limitations:

- Retrieving video fragments from a camera can momentarily double the throughput of normal video streaming.
- Video streams recorded using the MJPEG codec is not supported by Seamless recording.
- Seamless recording can only take place from a camera with 1 video stream recorded to a maximum of 3 VAST servers. .

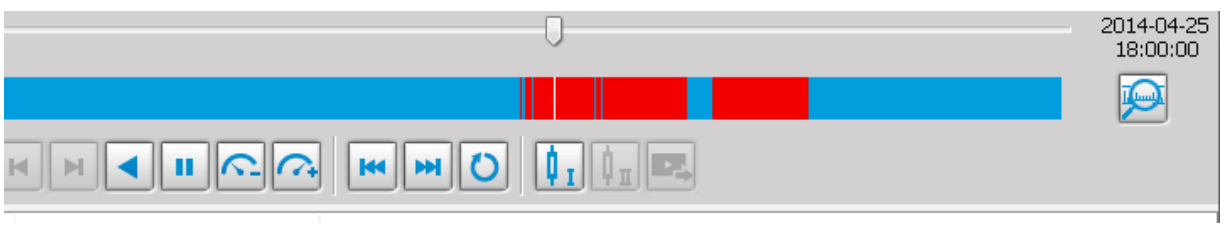
Onscreen Elements for Seamless Recording:

- The associated icons will appear in the Liveview, popup window on e-Map, and the Matrix view. The status icon appears on the upper right of the view cell.
- Below is the description of the Seamless recording statuses and the indicative icons. Normally the video fragments will be retrieved first, and then the event log:

	Currently not recording video from camera, but is retrieving data from camera due to previous disconnection.
	Currently not recording video from camera, but is retrieving event log.
	Currently recording video to system as well as retrieving data.
	Currently recording video to system as well as retrieving event log.

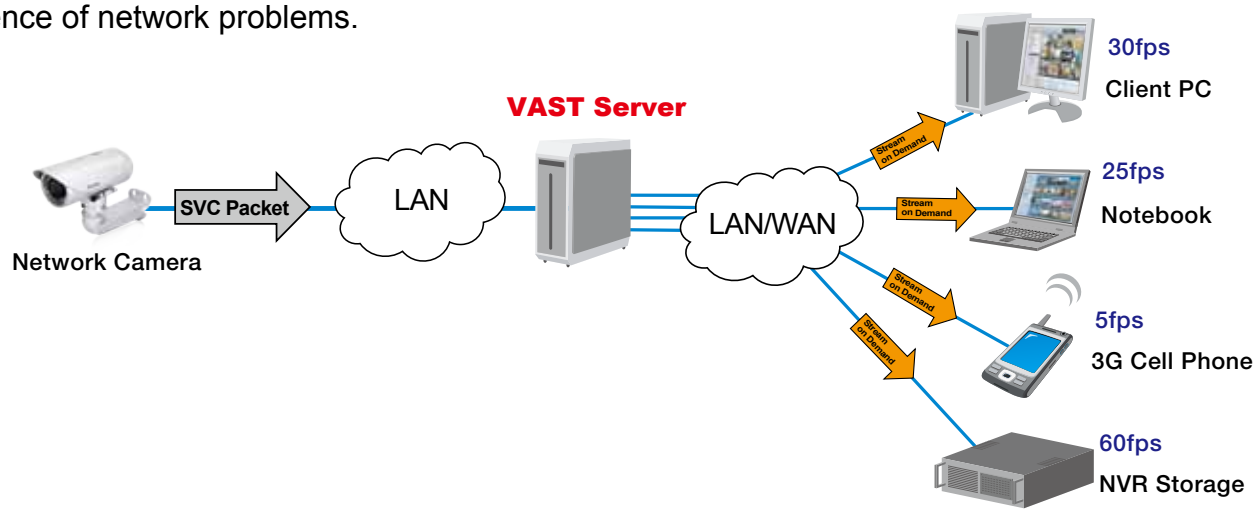
After a period of time, the gaps of recording (those blue lines or blocks representing network interruptions during the recording) should be gradually stitched up. It is, however, system integrators' responsibility to build a reliable network. Additional bandwidth should also be available for retrieving fragmented recordings from the camera side.

The VAST checks for the need for retrieving framented videos by every one minute. If the retrieval failed due to some network faults, the server will re-try the retrieval tasks later on.



Enable SVC

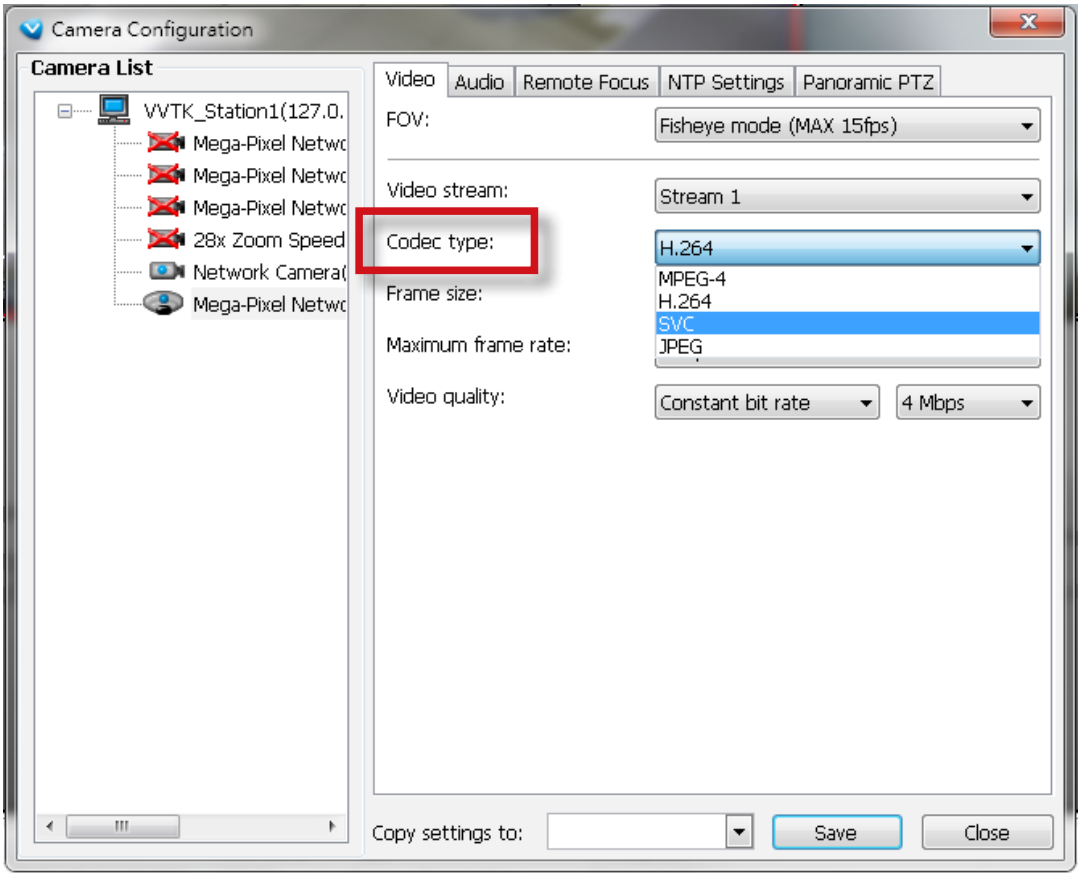
If the camera to-be-added supports the latest SVC (Scalable Video Coding) feature, select the SVC checkbox to enable the related control. The SVC feature enables streaming of videos for multiple clients from one single set of layered IP packets. Designed for saving bandwidth and CPU load on client stations, the frame rate of a video stream appearing through a view cell can be individually adjusted. This feature applies when an administrator experiences unstable video streaming due to the lack of network bandwidth, less-than-ideal hardware, or during an occurence of network problems.



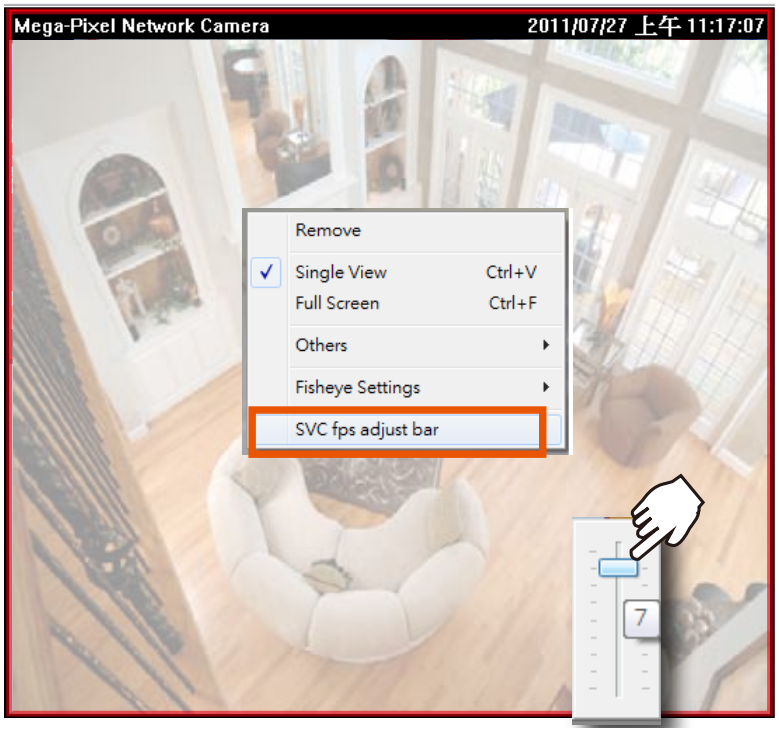
The VAST server (rev. 1.6.1 and later) automatically negotiates with a camera and determines whether a network camera comes with the SVC feature.

To configure the SVC-related feature:

1. When inserting a new camera into your configuration, select the streaming option, usually the stream #1.



2. Right-click on the view cell of an SVC-enabled camera. Select **SVC fps adjust bar**.



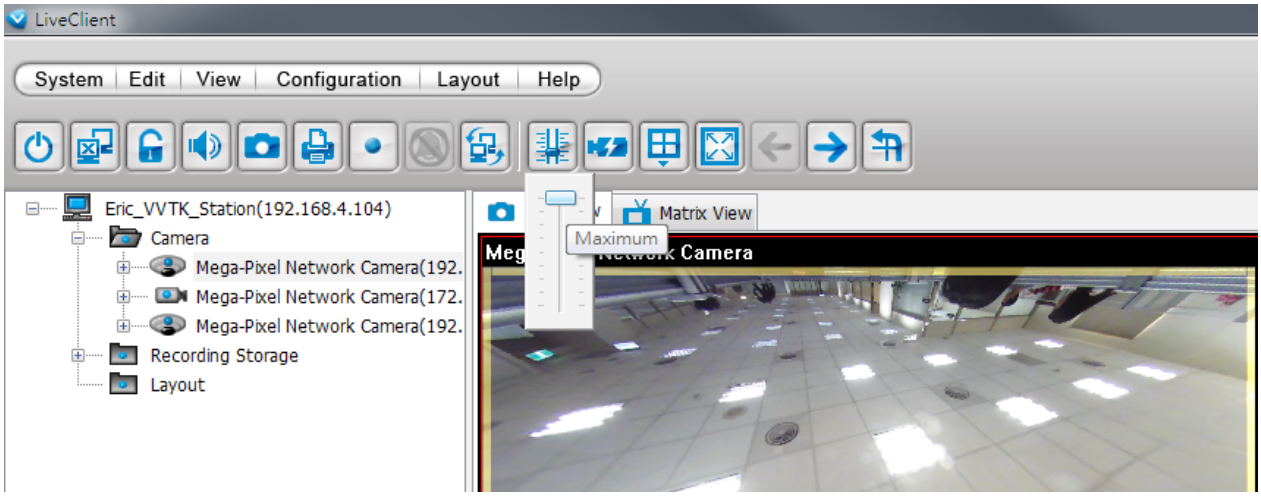
3. A slide bar will appear above the view cell. Click and drag the slide bar. A numeric indicator will display the current selection. See below for the frame rates represented by the numeric indicator.

Indicator	Frames per second (fps)
Maximum	30
7	26
6	22
5	18
4	12
3	8
2	4
1	1
Minimum	1/4

NOTE:

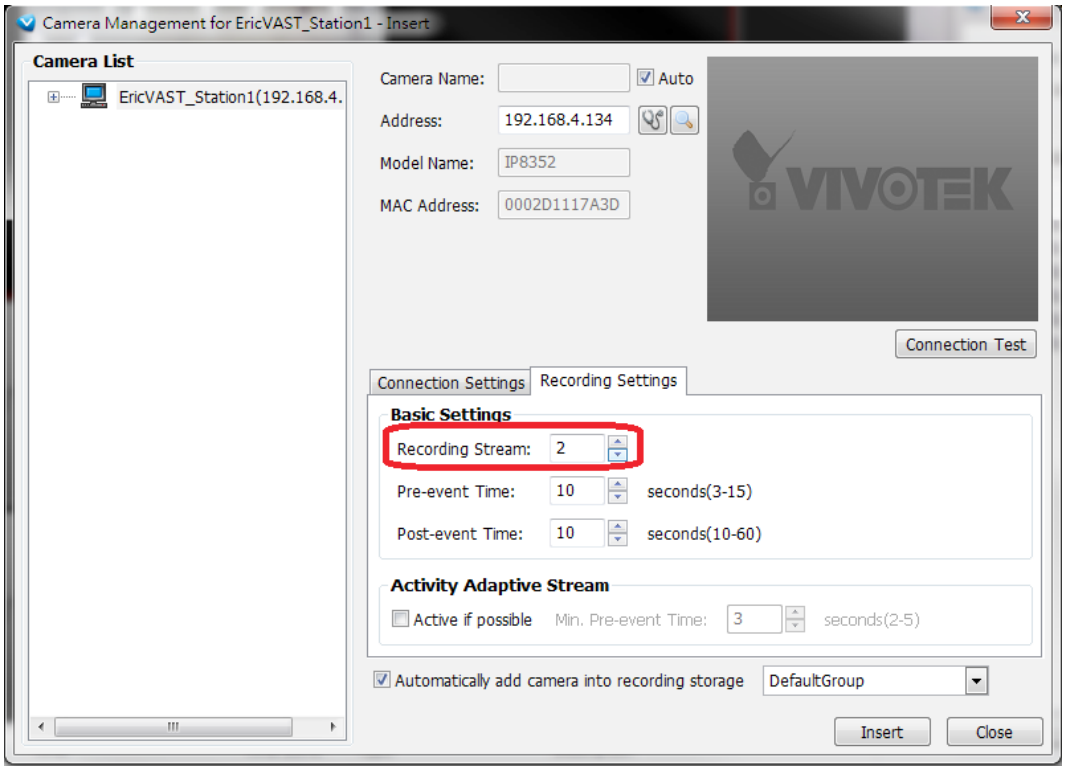
The SVC feature only applies to H.264 and MJPEG streams. It is not applicable to MPEG-4 streams. Please refer to Configuration -> Media -> Video for individaul stream settings.

If you have multiple SVC-enabled cameras, you can enable a collective setting via the **Adjust SVC level** button on the tool bar. The frame rate selected here will then apply to all view cells on the VAST LiveClient console.



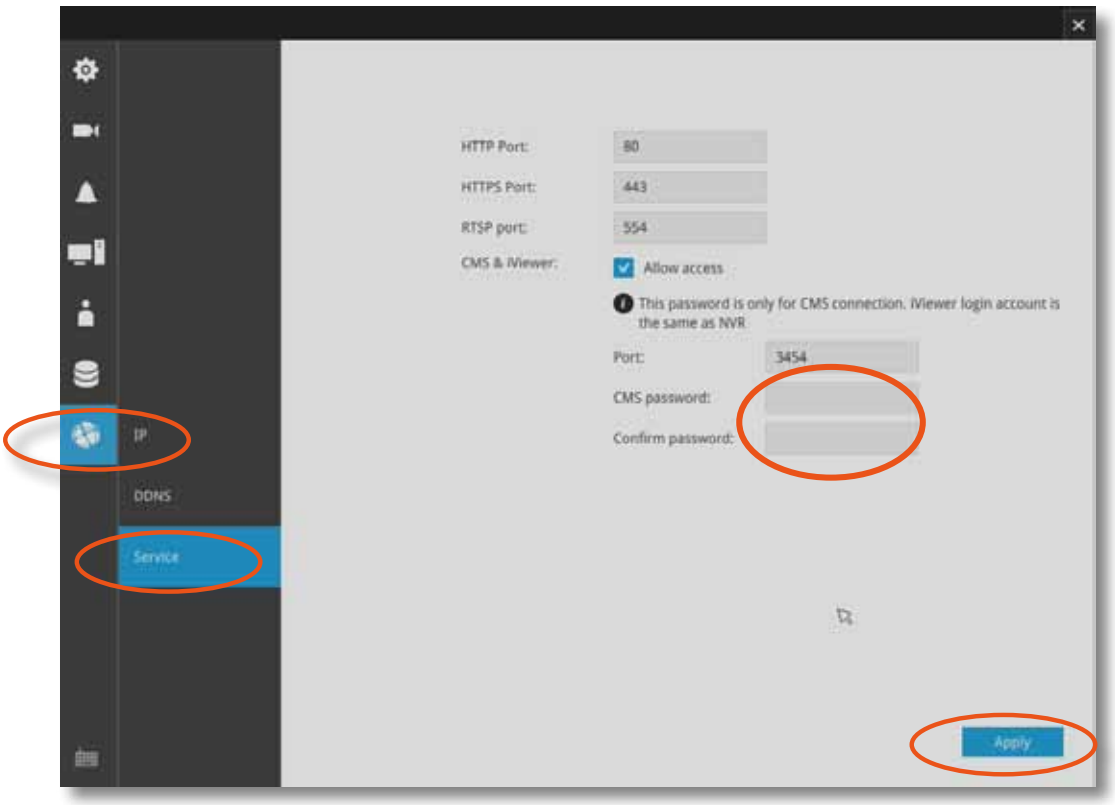
Please note that the SVC related setting can not take effect while the LiveClient station is running the Layout Rotation. Stop the layout rotation before configuring the SVC function.

While you save your bandwidth for live viewing, you can still record full-frame-rate video by changing the recording setting. For example, you can enable resource-saving SVC on stream #1 and configure stream #2 to be recorded with full details, in terms of frame size, frame rate, and video quality.

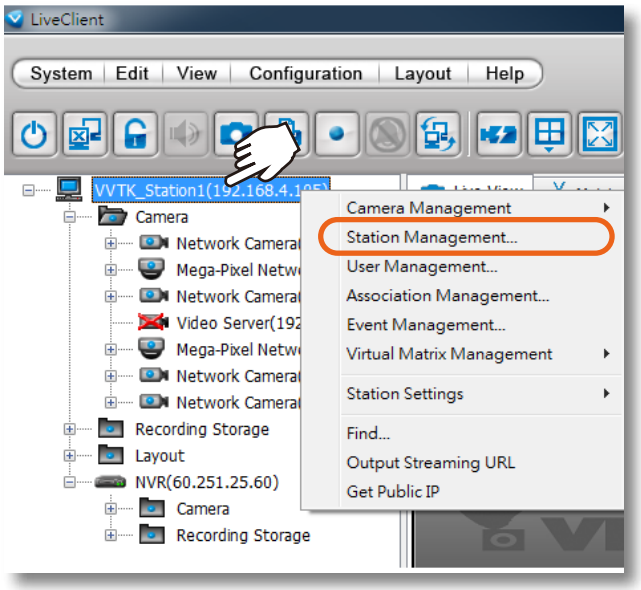


Insert NVR (Network Video Recorder)

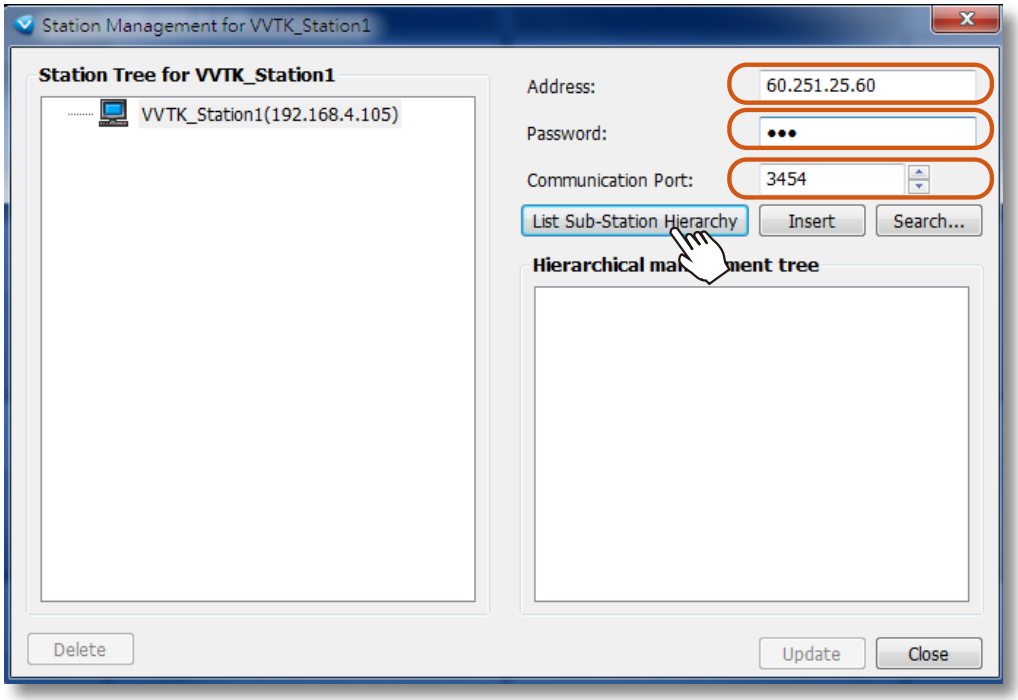
1. Before you can include an NVR system into your current configuration, you should enable the corresponding configuration on a web management console with the NVR system. In **Configuration > System > VAST**, click on the **Enabled** checkbox and enter a password for authentication.



2. Return to your VAST management screen. Left-click to select your VAST station on the navigation panel, and then right-click to display and select "Station Management..."

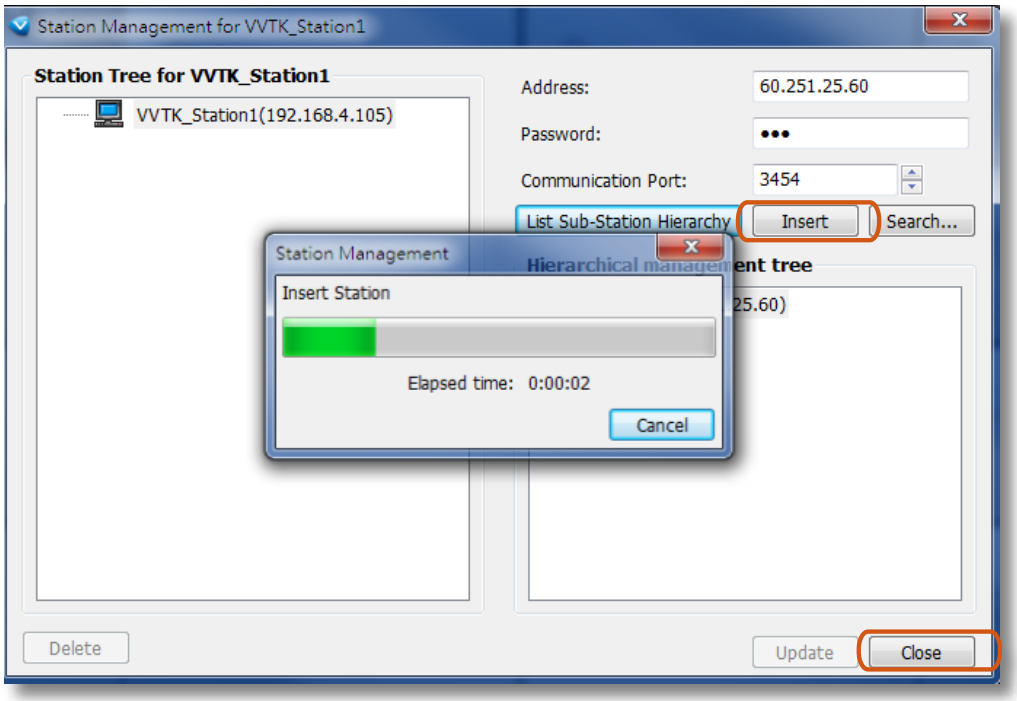


3. The Station Management window will prompt. Enter the **Address**, **Password**, and check if the **Communication Port** match that you set for the NVR. Click on the **List Sub-Station Hierarchy** button.

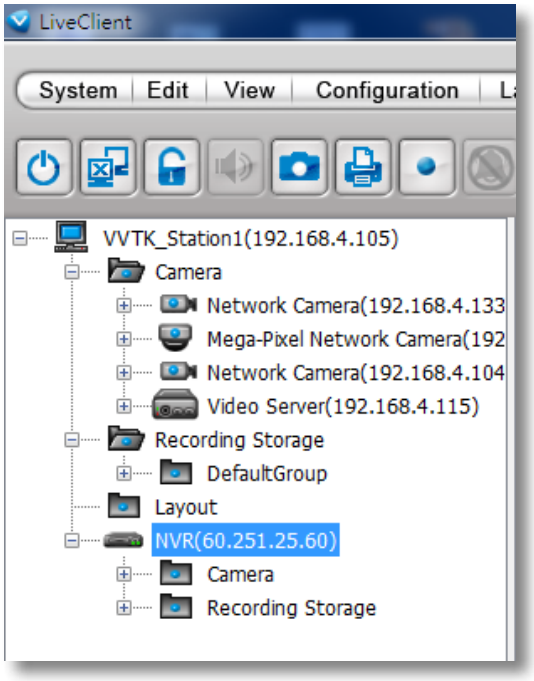


After a brief delay, the NVR server will be listed in the column. You may also use the **Search** button to locate similar devices if they are reacheable in your local area network.

4. You can then click the **Insert** button to add the NVR server to your configuration. When done, click the **Close** button.

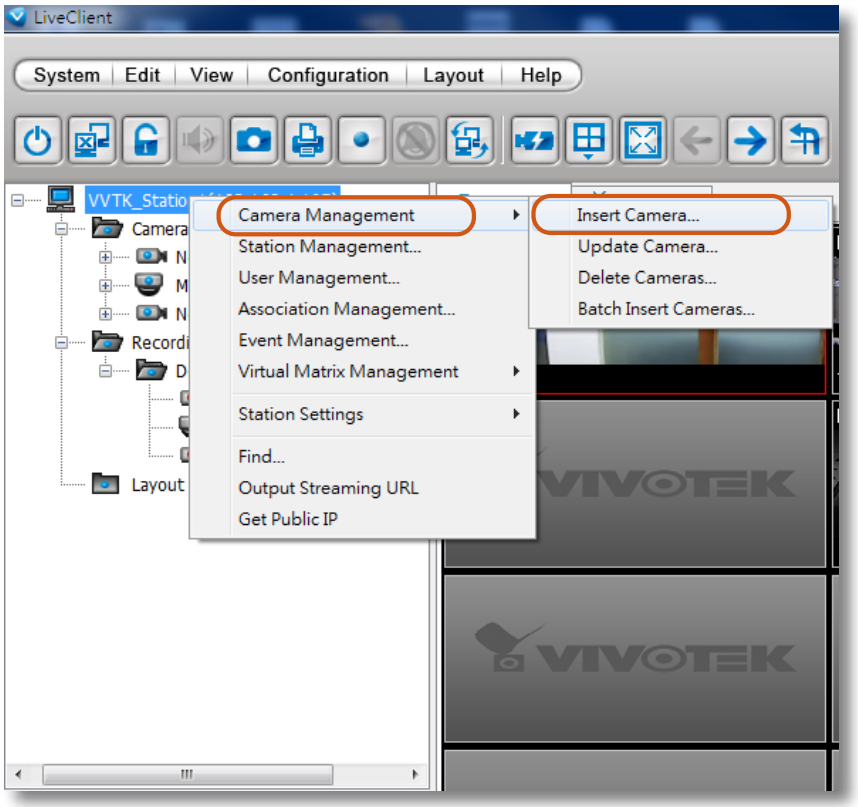


5. The NVR will appear in the navigation panel along with its subordinate cameras.

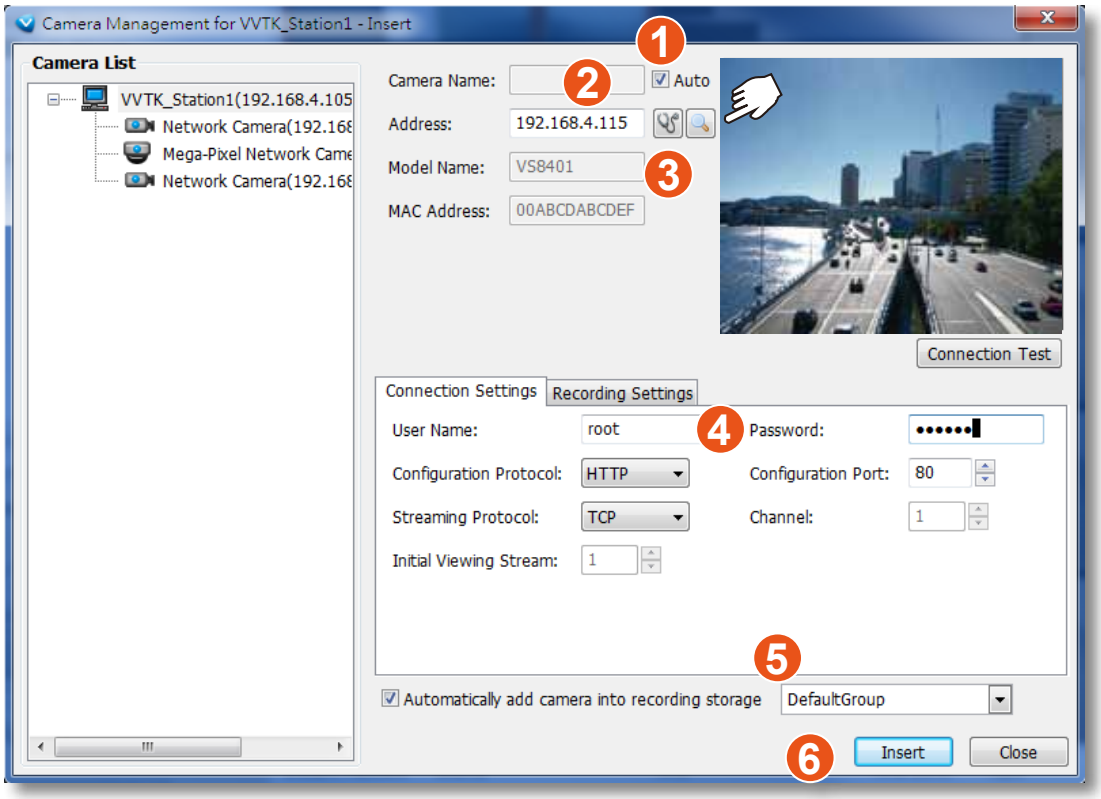


Insert a Video Server

1. Left-click on your VAST station, and then right-click to display the **Camera Management** command. Let your cursor stay on the command for a second and then move to the **Insert Camera** command. Click on the command to open its configuration window.



2. See below for the steps to insert a Video Server along with its subordinate cameras.



2-1. You can deselect the **Auto** checkbox to enter a name for the Video Server. If set to Auto and your video server already has a name, that name will be displayed in your device list.

2-2. Enter the **Address** of the video server - or - use the **Search** button to open a Search window.

2-3. If you enter its address and it is found after you click on the **Detect Model** button, its **Model Name** and **MAC Address** will be listed.

2-4. Before you click the Detect button, you should enter the **User Name** and **Password** for access to the video server. You should also confirm the **Configuration Protocol**, **Configuration Port**, **Streaming Protocol**, and the rest of the networking parameters.

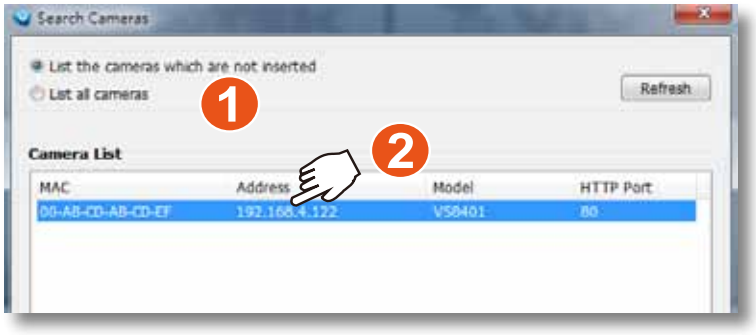
2-5. You may select or deselect the checkbox in front of the recording storage option - or - use the pull-down menu to select the default group or a pre-configured storage group.
You might use the **Connection Test** button to verify if the stream comes from the device you prefer.

2-6. Click **Insert** to include the video server to your configuration.

The Video Server should now be listed on the Camera List.

You can also use the **Search** button to poll the local area network for VIVOTEK's devices. You can select to list all cameras or list those that have not been included in your current configuration.

Click on a device, and its detailed information will immediately appear in the **Camera Management** window on the left. For recording settings, please refer to page 83 as previously described.



Update Devices

Please follow the steps below to update a device via Camera Management window:

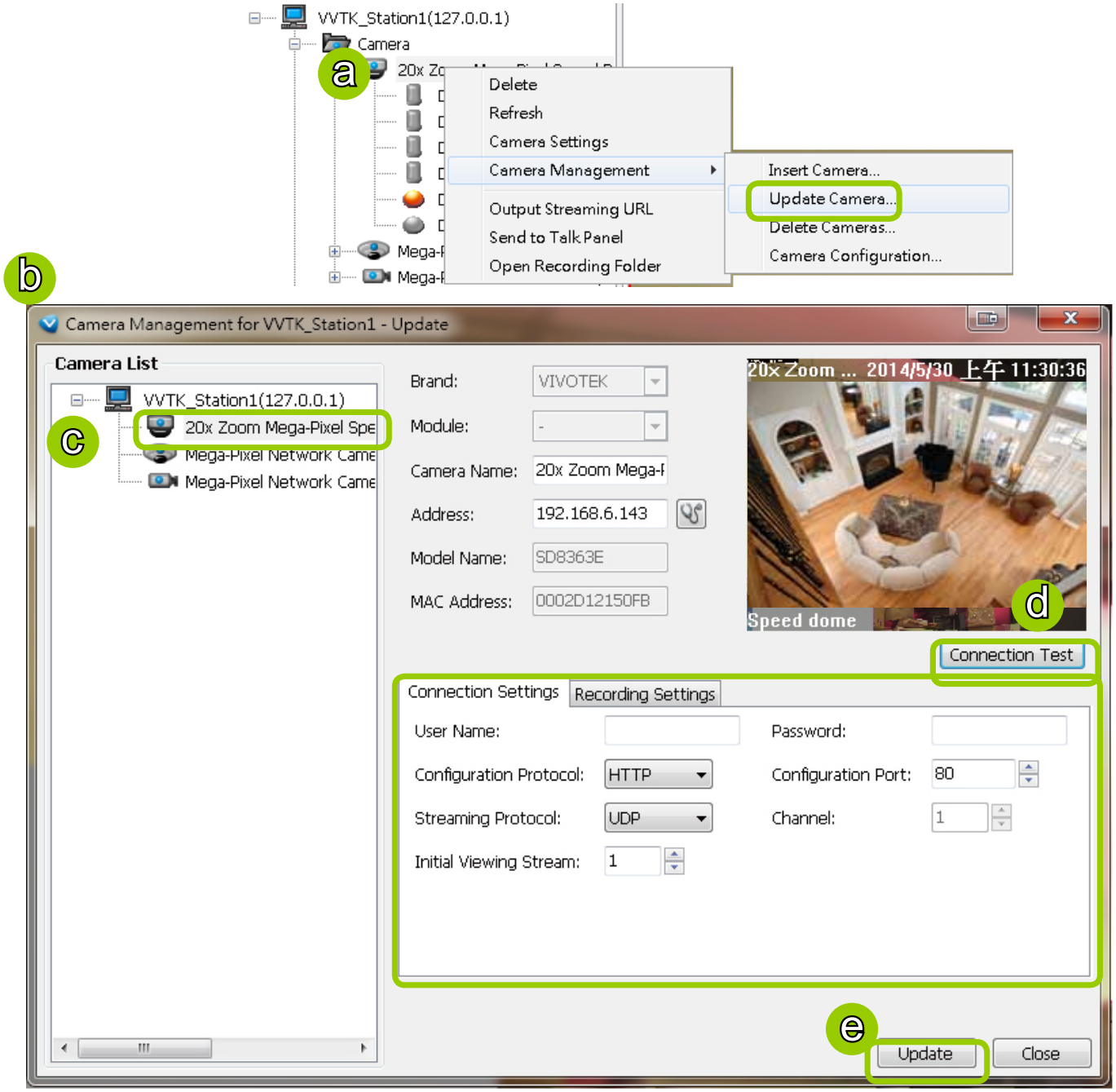
a. Click **Configuration > Camera Management > Update Camera** on the menu bar (or **right-click** the device/station, then select **Camera Management > Update Camera**).

b. The **Camera Management - Update** window will pop up. The device tree managed by the station will be displayed in the left Camera List window.

c. Select a device from the list you want to update. Its related information will automatically be displayed in the corresponding fields in the Camera Management window. Then you can modify **Connection Settings** and **Recording Settings** of the device.

d. After modifying the settings, you can click **Connection Test** to preview the live video from the device.

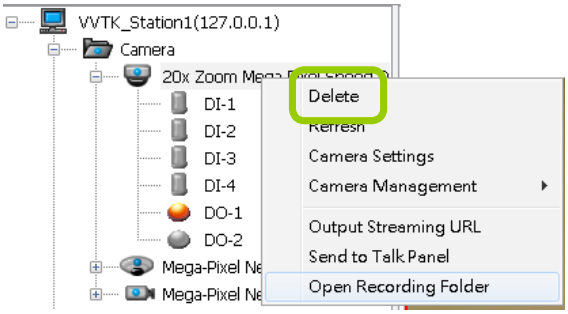
e. When all settings are completed, click **Update** to enable the settings.

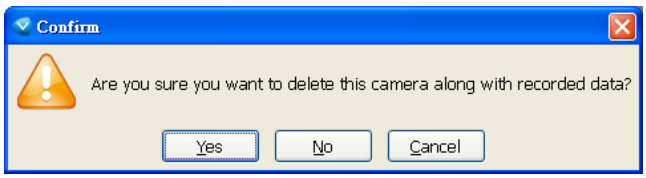


Delete Devices from the VAST Server

- Delete a device:

  Right-click the device on the device tree, then select **Delete.** A dialog box will pop up. Click **Yes** to delete the device along with the recorded data; click **No** to delete the device but retain the recorded data; click **Cancel** to cancel the delete action.





- Delete more than one device at a time:

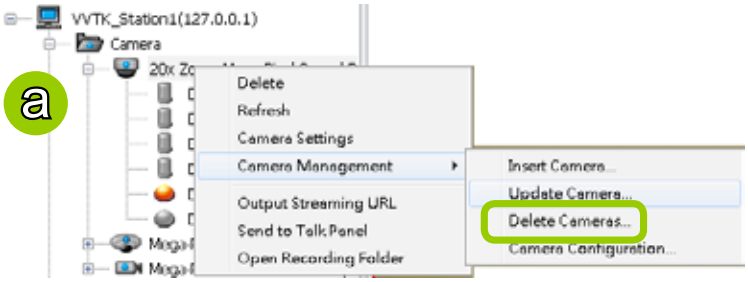
a. Click **Configuration > Camera Management > Delete Cameras** on the menu bar (or **right-click** the device/station, then select **Camera Management > Delete Cameras**).

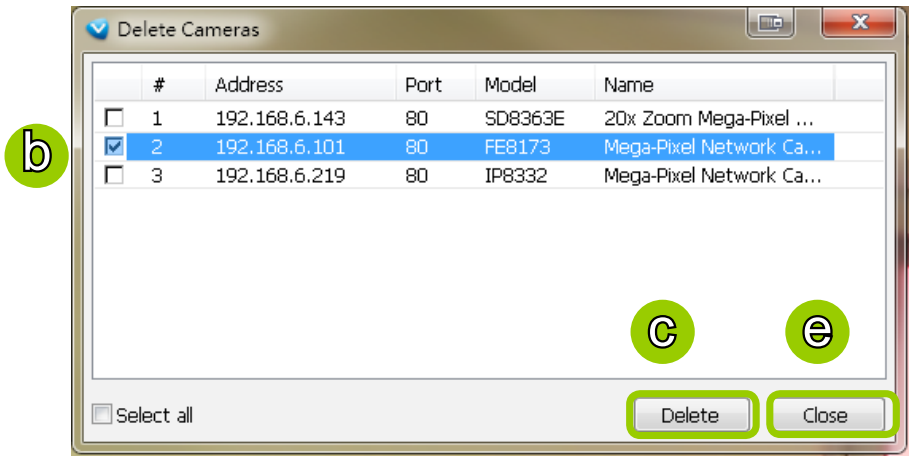
b. The **Delete Cameras** window will pop up.

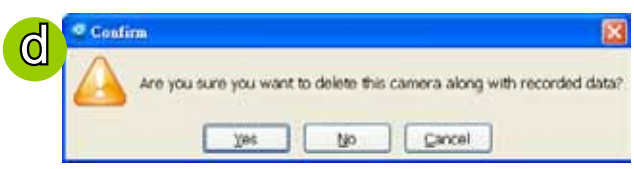
c. Select the devices you want to delete from the list, then click **Delete**.

d. A dialog box will pop up. Click **Yes** to delete the device along with the recorded data; click **No** to delete the device but retain the recorded data; click **Cancel** to cancel the delete action.

e. When completed, click **Close** to exit the **Delete Cameras** window and return to the main window. The deleted device will disappear from the station.







Batch Insert Devices

Batch insert is a very useful function that allows user to search, filter, and import a row of devices that are in the same LAN to a VAST station. The basic settings can also be applied to those inserted devices simultaneously, e.g., a common user name and password.

Please follow the steps below to batch insert devices to a station:

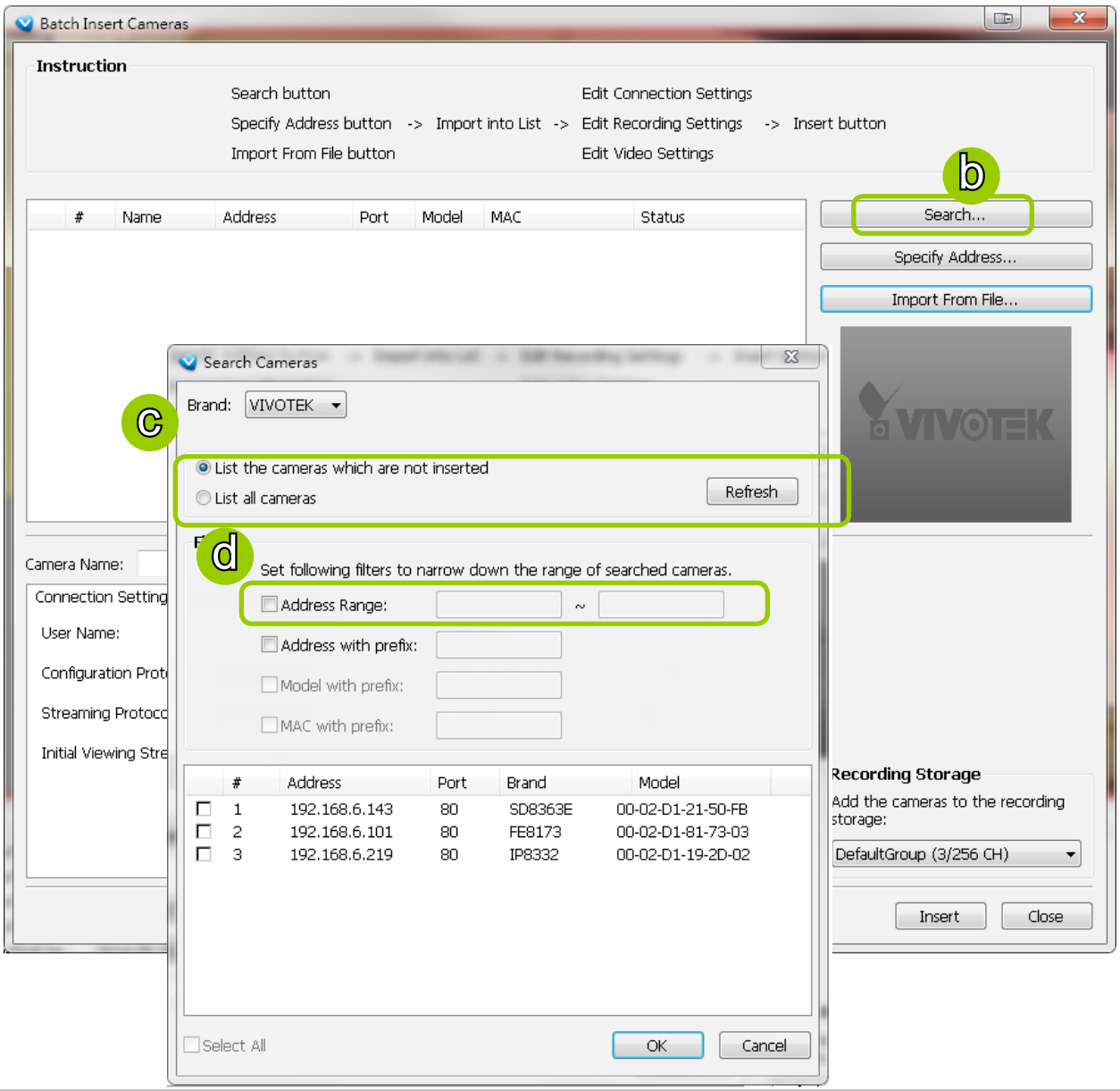
a. Click **Configuration > Camera Management > Batch Insert Cameras** on the menu bar (or **right-click** the station, then select **Camera Management > Batch Insert Camera**).

b. The **Batch Insert Cameras** window will pop up. Then click **Search** to open the Search Camera window.

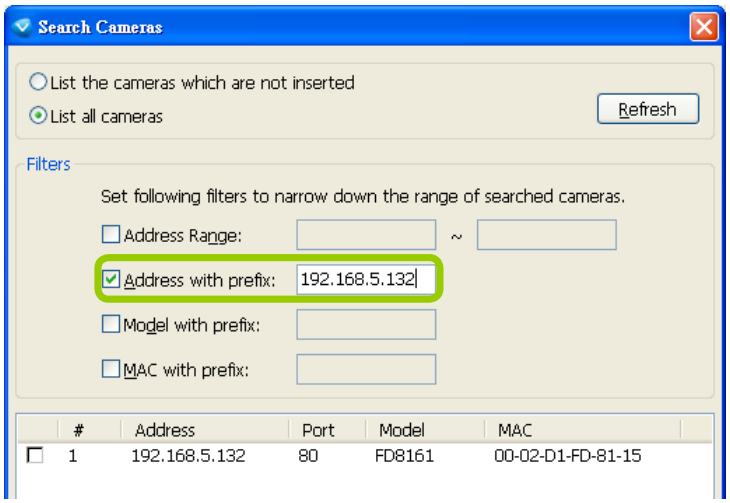
c. On top of the Camera List window, you can select "List the cameras which are not inserted" or "List all cameras". The items listed below will then change accordingly. You may select ONVIF-compliant cameras as well using the Brand selector.

d. Use the 4 Filters to narrow down the range of the wanted cameras from the list.

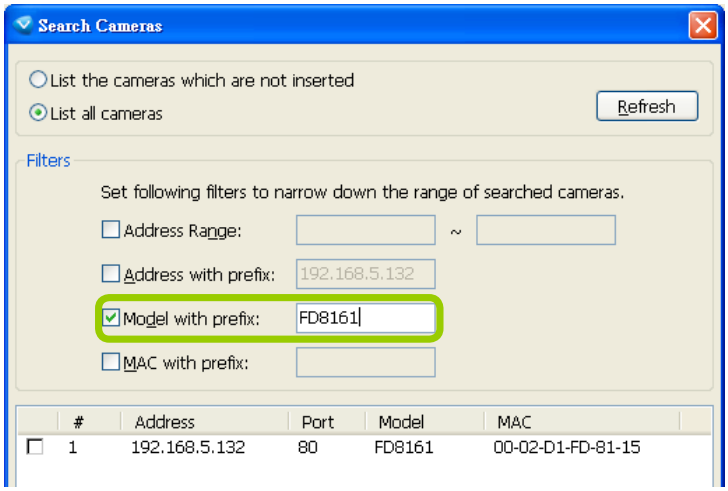
- IP Range: Type in a range of IP address to narrow down the list; the filter automatically applies after you fill in a correct IP range.



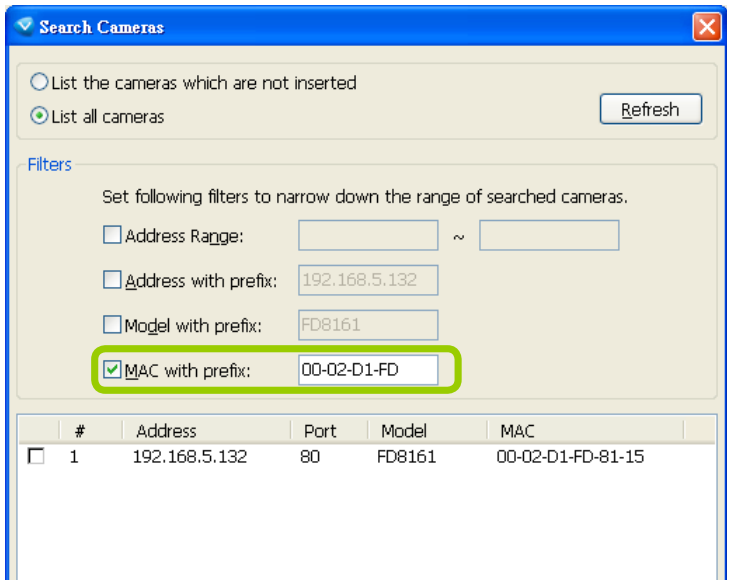
- IP with prefix: Type in the prefix of the IP address to narrow down the list.



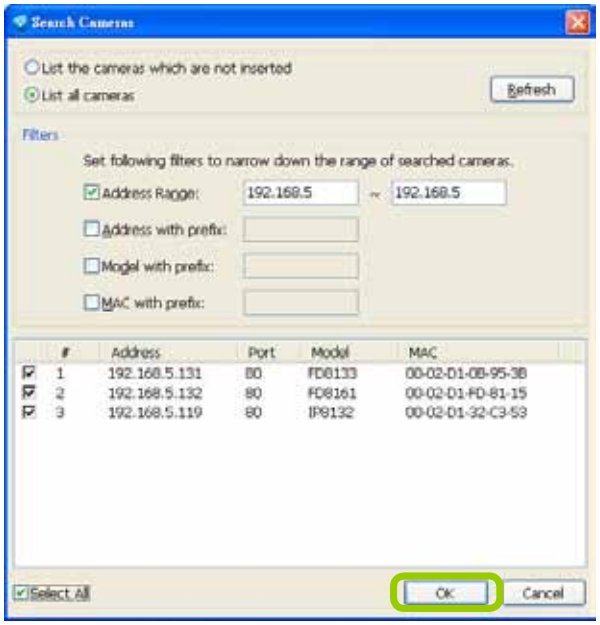
- Model with prefix: The user can type in the prefix of the model name or the complete model name of the cameras to narrow down the list.



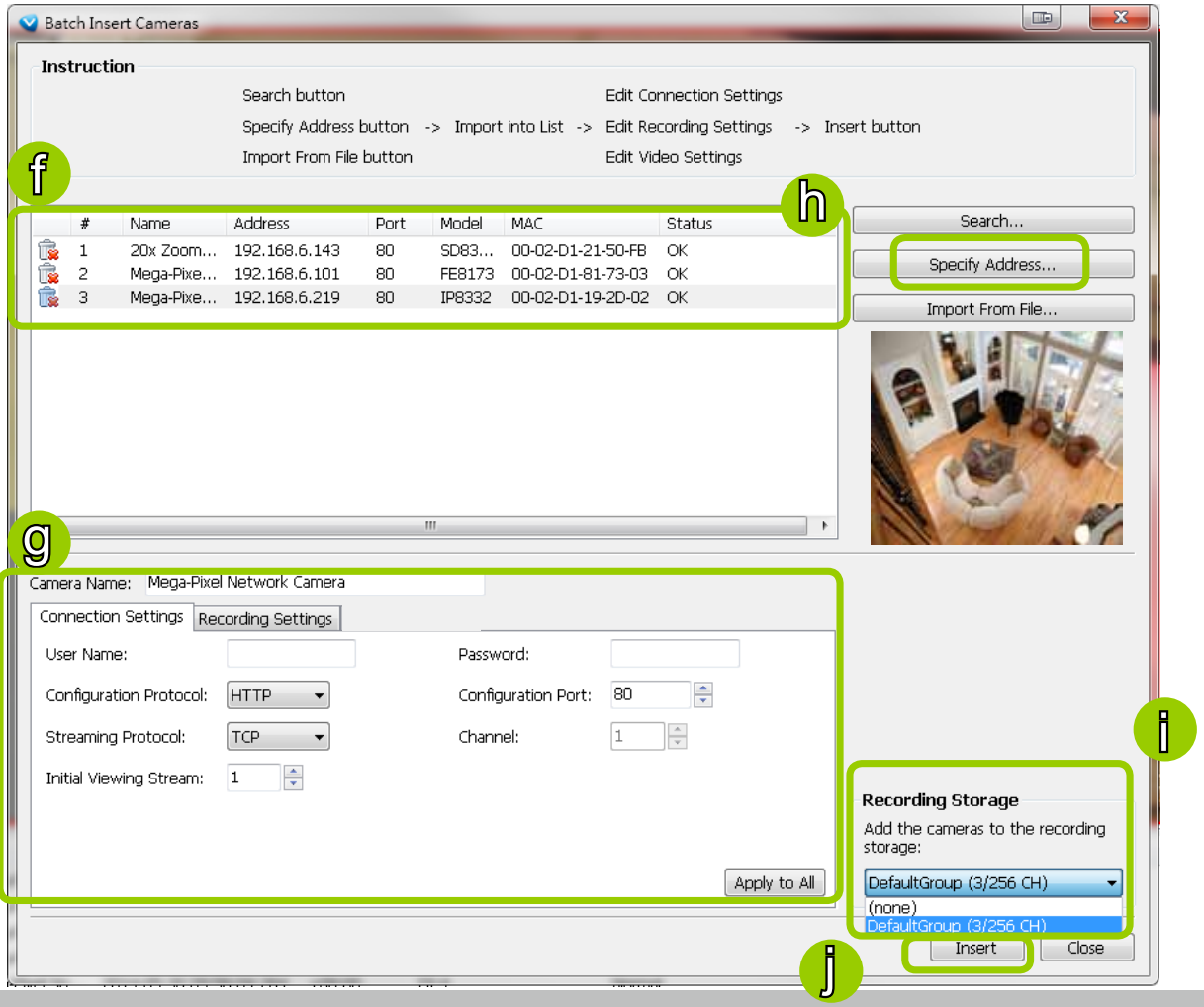
- MAC with prefix: You can type in the prefix of the MAC address of the cameras to narrow down the list.



e. When the list is filtered, you can select the cameras one by one or check **Select All** to add them to the batch insert list. Then click **OK** to finish searching.

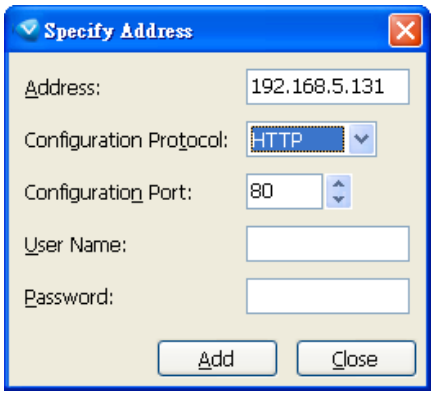


f. The selected cameras will be shown on the batch insert camera list with the camera information and the connection status. When you click on a camera, a live view will show up on the right side for you to identify the cameras on the list. If you want to remove a camera from the list, click the trash can icon to delete it.



g. At the bottom of the window, there is a field for you to alter the camera settings including Connection Settings and Recording Settings. You can apply the new settings to each camera on the list, or click **Apply to All** to apply the same configurations to all the cameras. For more information about Connection Settings and Recording Settings, please refer to Insert Device on page 81 for detailed information.

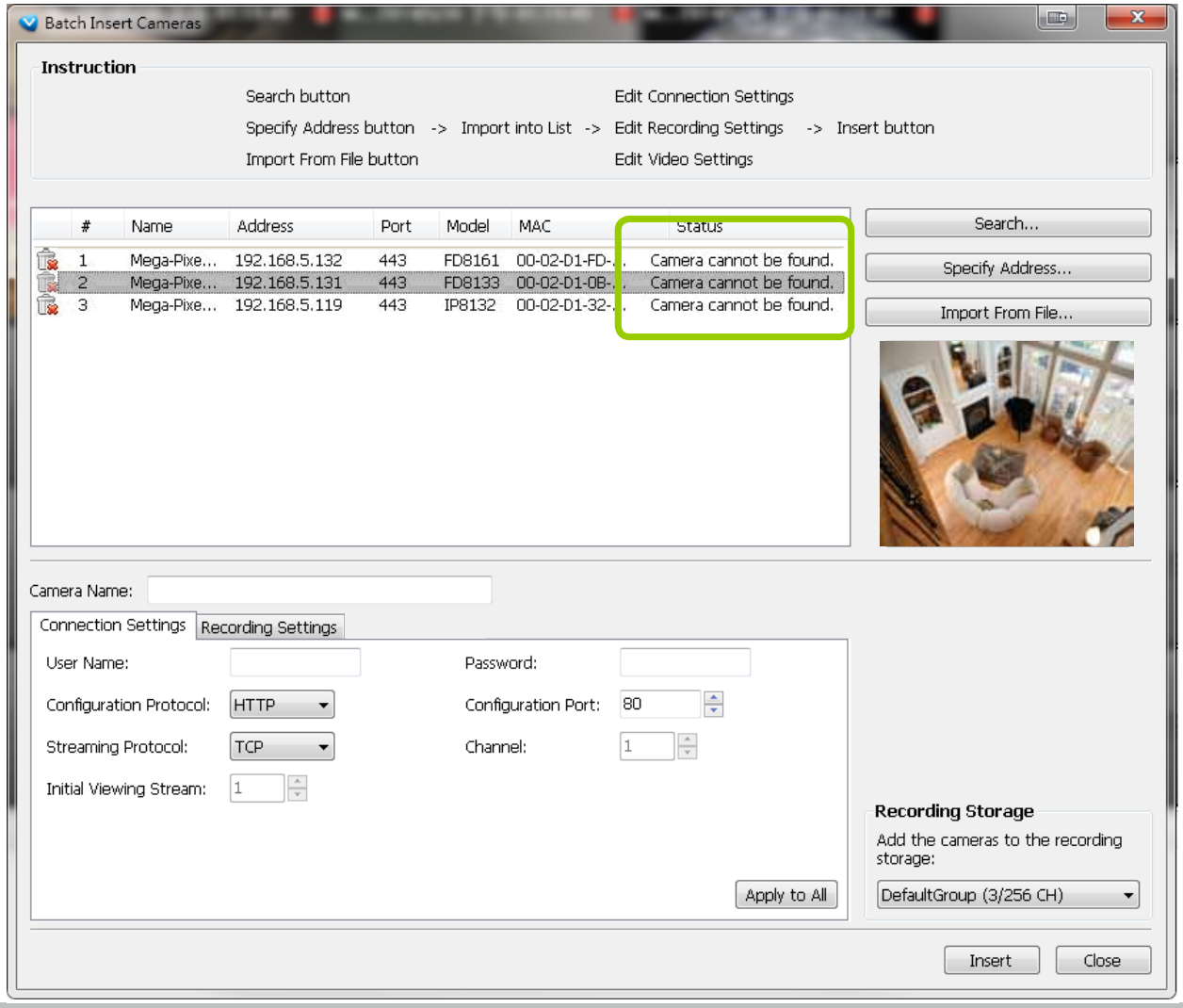
h. Specify host: If you want to add a camera to the list, click **Specify Address** to directly add a wanted camera. Click **Add** after filling in the correct information. The camera will be added to the list of the Batch Insert Camera window.



i. By default, all inserted devices will be applied to the default recording group. Deselect the **Add** checkbox if you do not want to assign the selected devices to the default recording group.

j. Click **Insert** when all the settings are done. Cameras will be added.

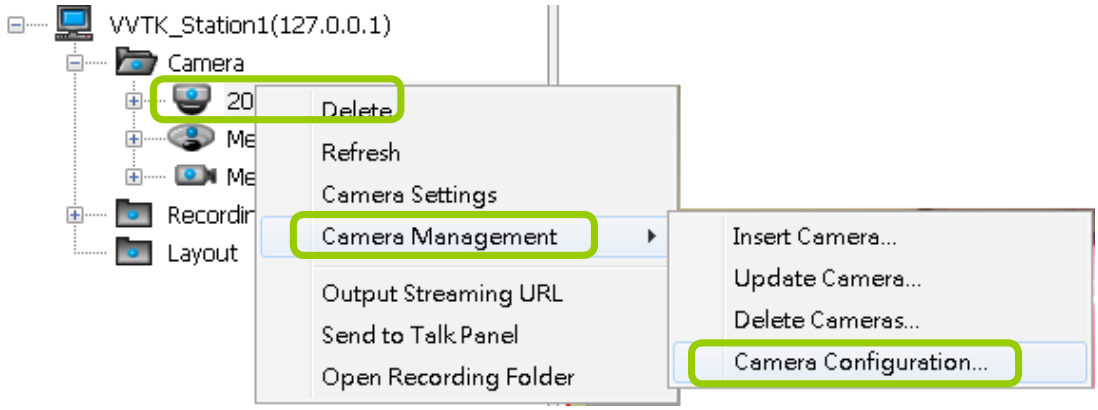
When you modify the camera settings, and when the connection information (User Name, Password, Configuration Protocol, Configuration Port, and Streaming Protocol) does not match the current network environment, the camera will be disconnected and the status of the camera will become "Camera cannot be found" as shown below.



You can enter a User name and Password and use the Apply to All button to apply this combination to all selected cameras. This way, you do not need to change the user name and password for every individual cameras.

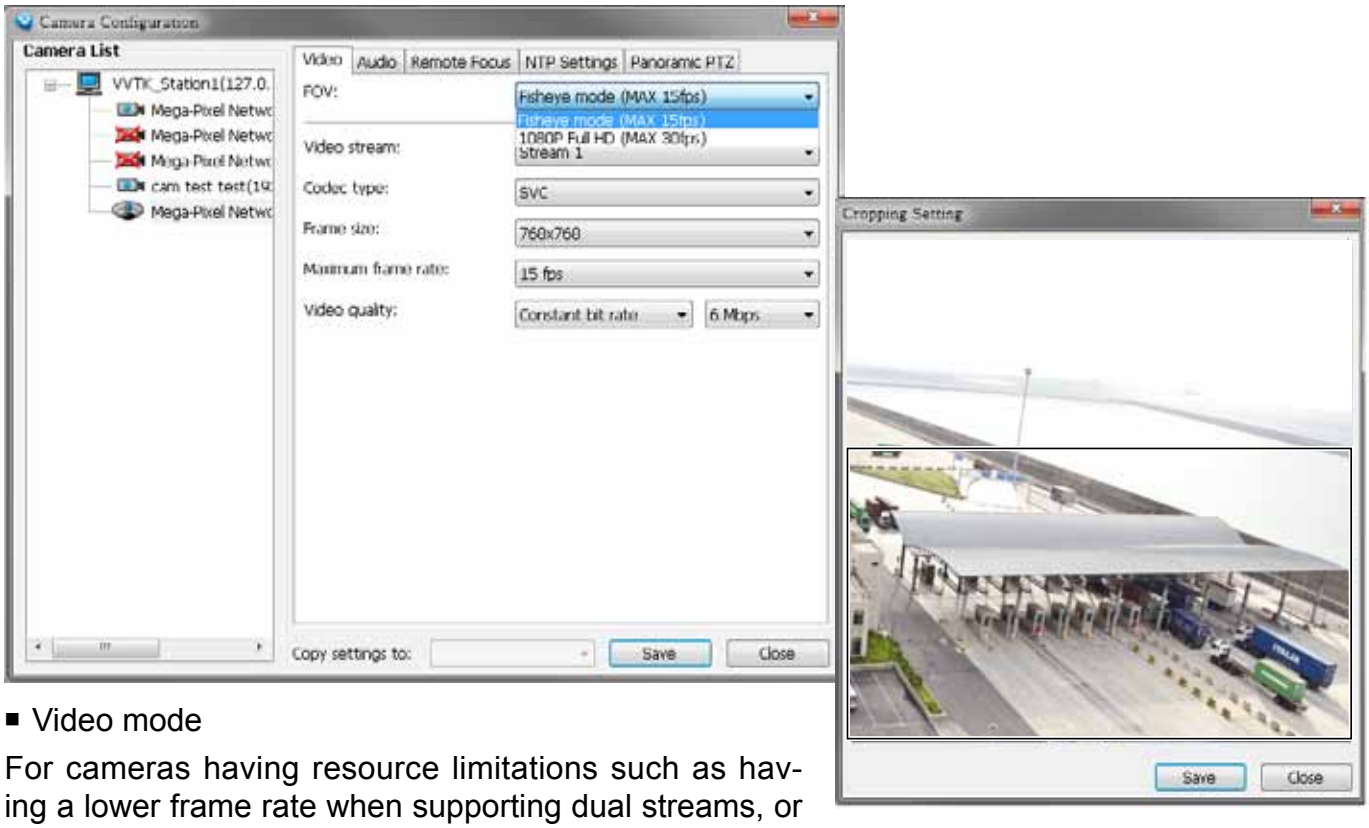
Camera Configuration

The **Camera Configuration** function group provides immediate access to the video streaming and other settings without the need to open a web console. The function group is accessed by selecting a camera on the device tree, and right-click to select **Camera Management** > **Camera Configuration**. If you have new VIVOTEK cameras and the VAST server can not recognize their features, see page 69 for how to update camera information using the Device Pack update.



- FOV (Field of View)

The FOV configuration is available for 5 megapixel cameras (such as IP8372 and IP8172P), which allows you to crop a portion of the image captured by the sensor. The FOV setting applies in the scenario where you do not need all of the video a camera can capture. For example, when shooting a parking lot where the upper half of the image is the sky. Cropping a field of view can help save bandwidth and reduce the requirements for storage space.

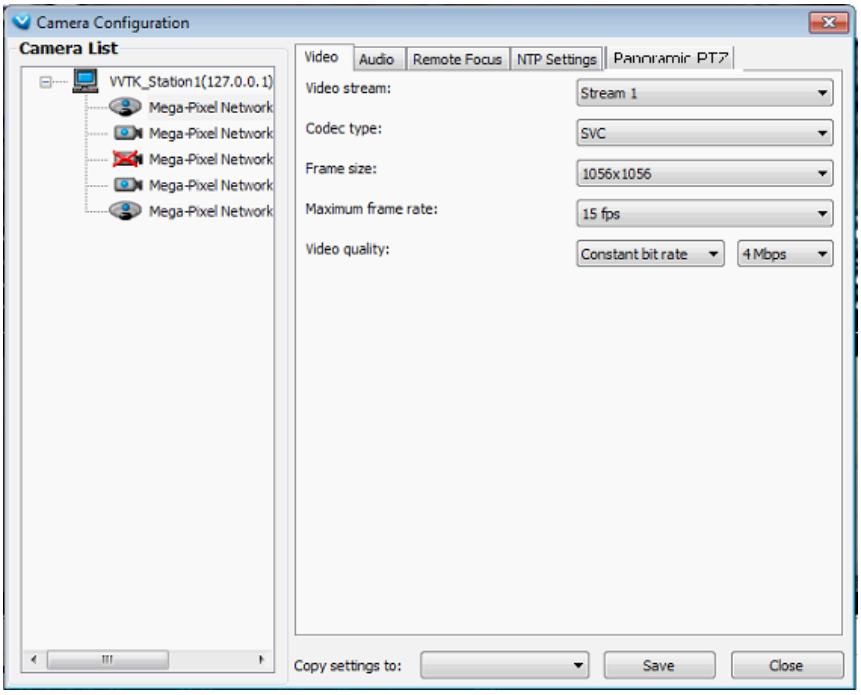


- Video mode

For cameras having resource limitations such as having a lower frame rate when supporting dual streams, or lower frame rate when using the Rotation mode, its video mode is automatically displayed in the Video window.

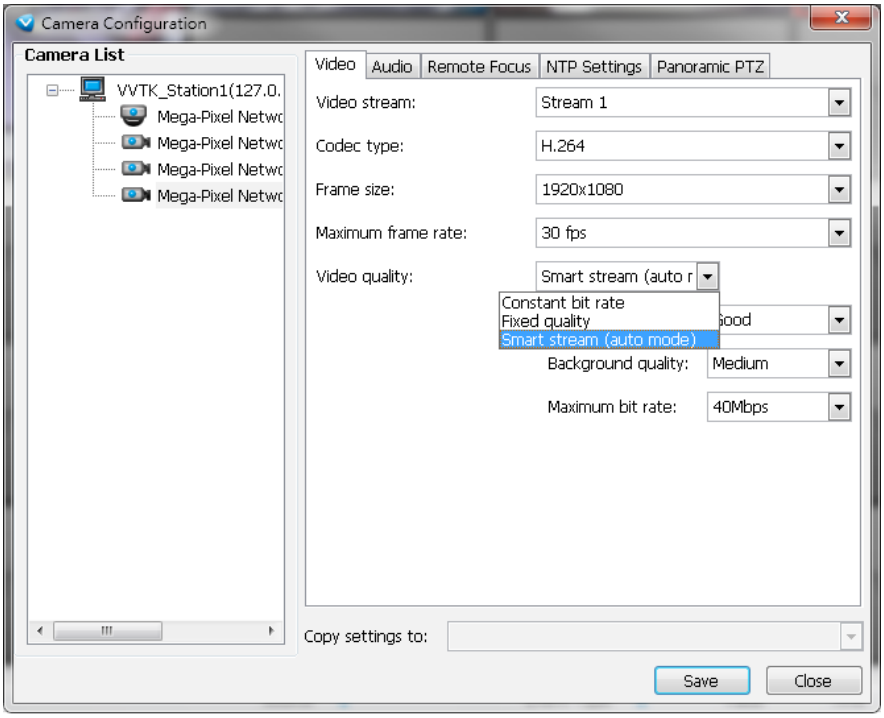
■ Video

This tabbed window privides access to the selection of the live view stream, its compression codec, frame size, max. frame rate, and video quality. Note that the **Constant Bit Rate** methodology can be used to ensure that the size of video stream does not exceed a preferred threshold, regardless of the complexity or the changes of pixels in the image. You should use a maximum of 1080P as **frame size** and 6Mbps as **constant bit rate** for video streams managed by this system.



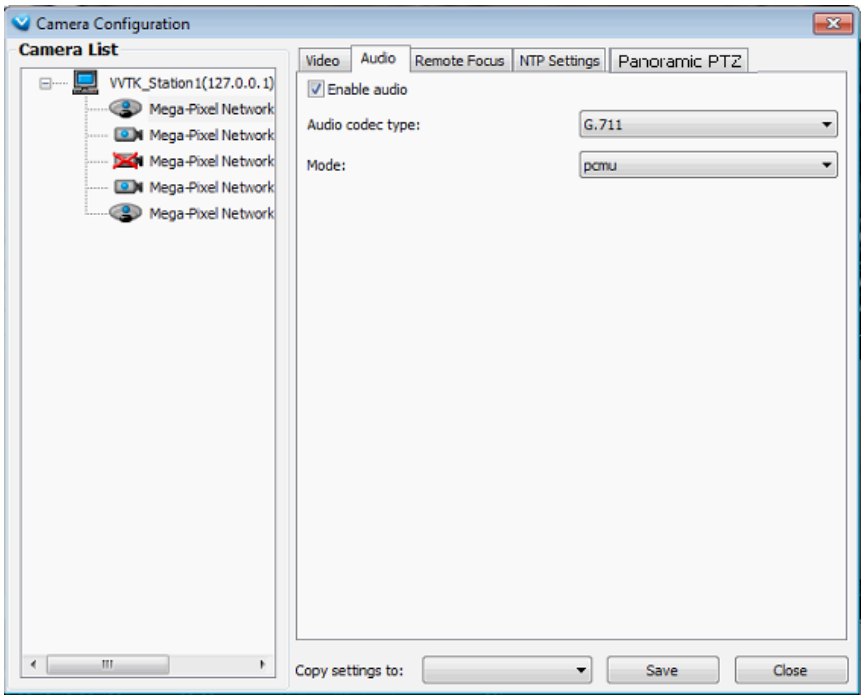
If your camera supports the **Smart Stream** function, the related options will be available with the Video quality. Note that only the **Auto mode** option will be available.

Auto: When set to Auto, only the moving objects and the areas around them will be displayed with the Foreground quality. The rest of the screen will be displayed with the Background (lower) quality.



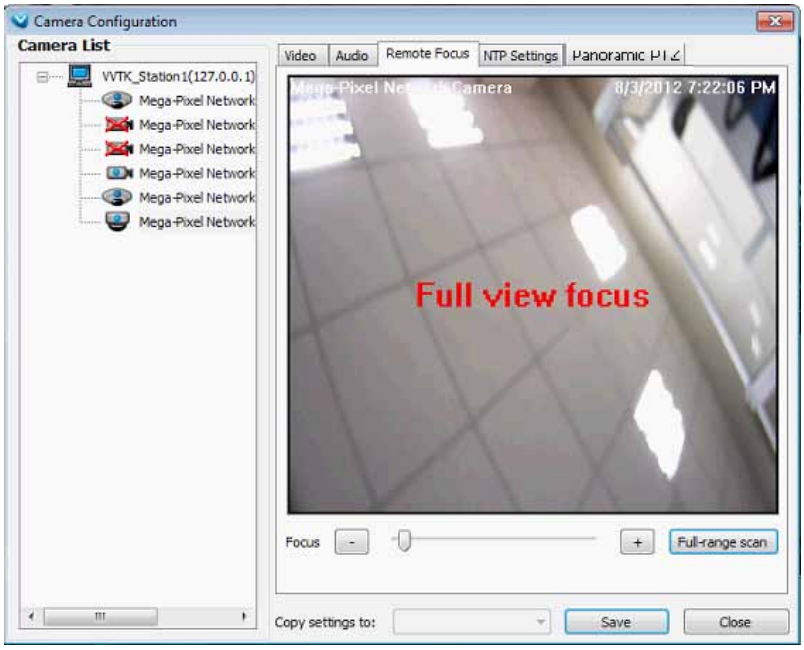
- Audio

If audio feed is preferred, configure the audio codec type, sampling bit rate, and operating mode in here.



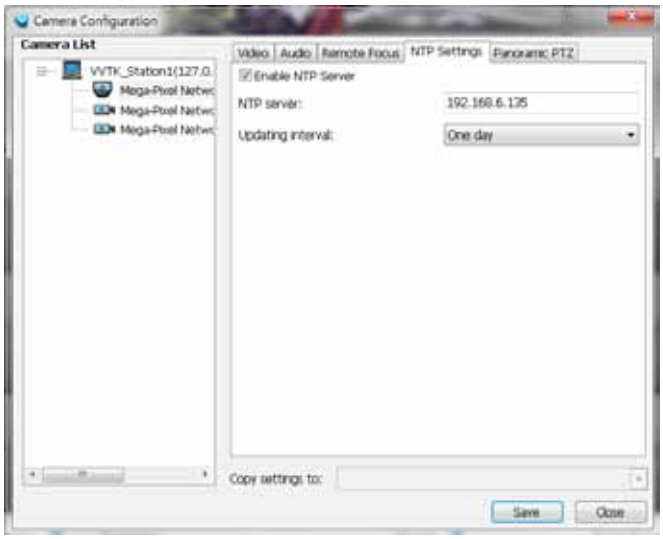
■ Remote Focus

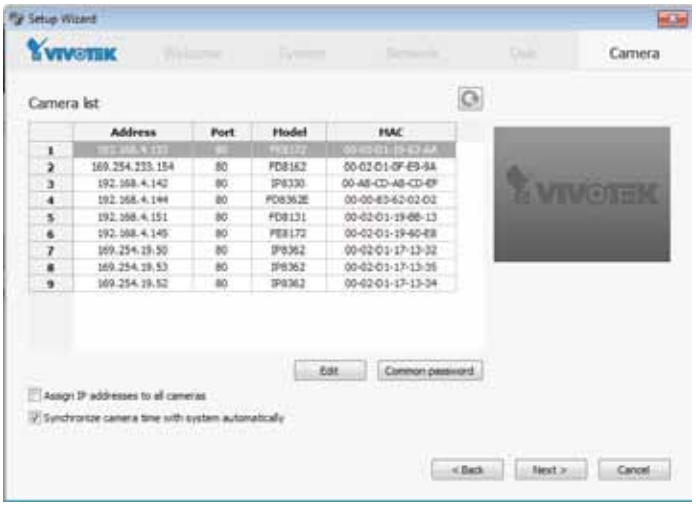
For cameras supporting the remote focus feature, such as the FD8362E that comes with a motorized lens, this window provides finetune buttons and full-range scan fucntion to help reach the best image focus.



■ NTP Settings

If cameras' real time clocks are set to be synchronized with a time server, enter the NTP server's address or domain name and specify an Updating interval. If you select the "Synchronize camera time with system automatically" checkbox during the initial setup, the NTP server IP will be the VAST server's IP.

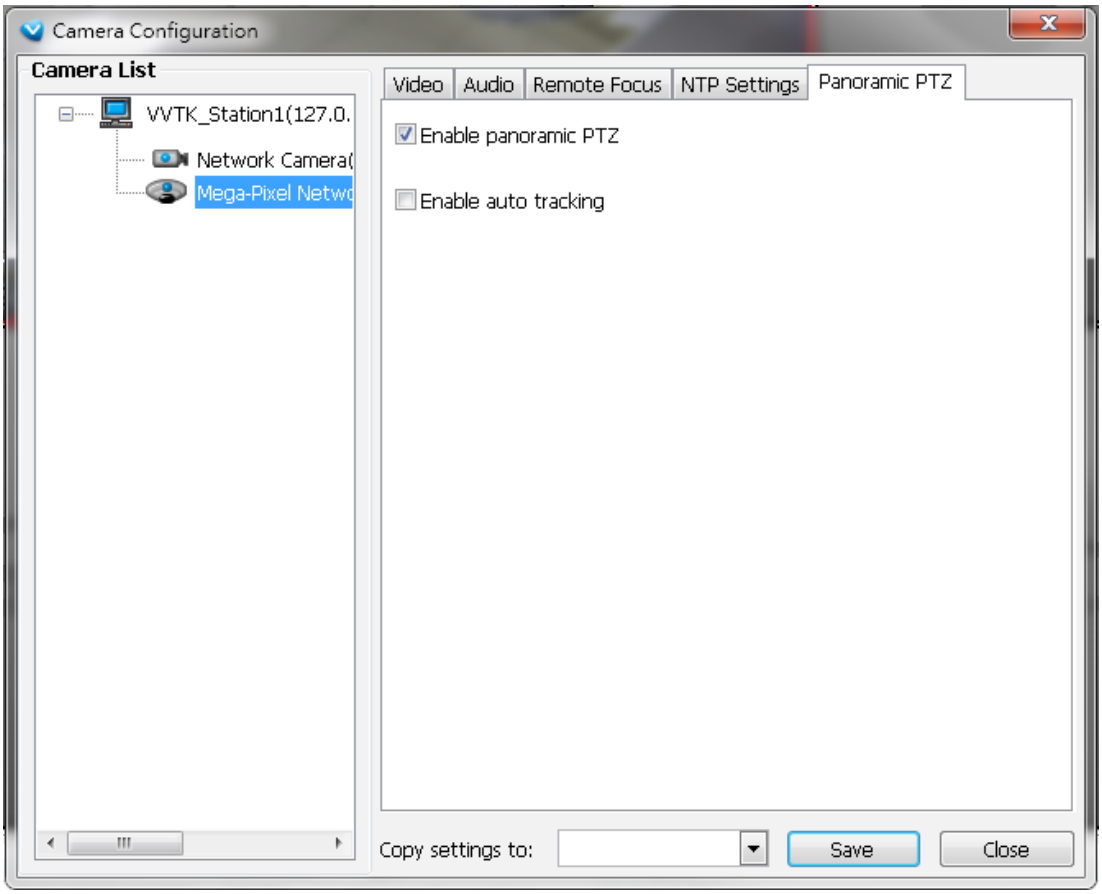




Always remember to **Save** your configuration before leaving this window. You can also use the "**Copy settings to"** button below to duplicate your current settings to adjacent cameras.

- Panoramic PTZ

Please refer to **Appendix A** Panoramic PTZ configuration on page 288 or the Panoramic PTZ Installation Guide for more information.



View Live Videos

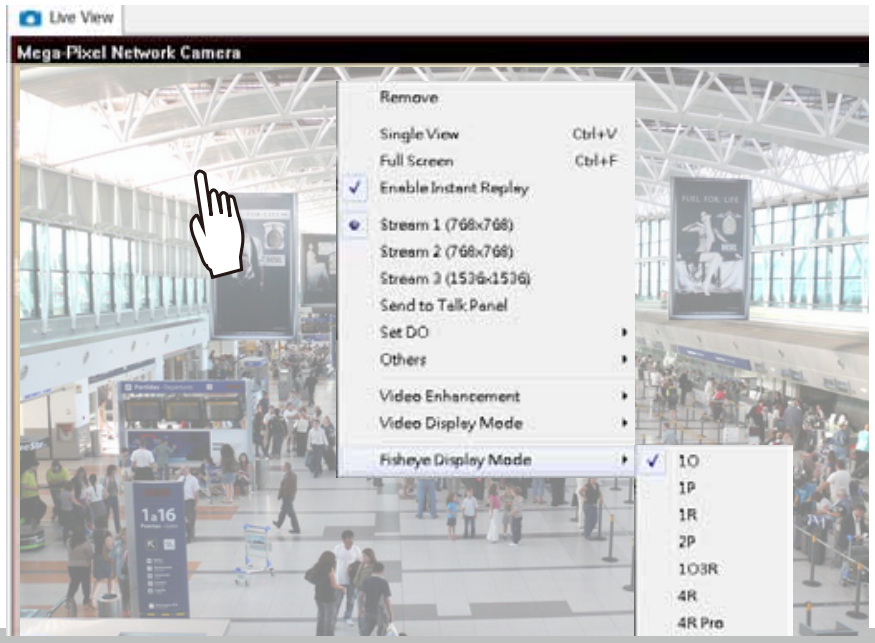
The server will automatically add a newly-inserted device to the video cell for live viewing. You also can **double-click** the target device or **drag-and-drop** the target device from the hierarchical management tree to the video cell.

Dual / Multiple Streams

For dual-stream devices, you can **right-click** on the focused cell to select stream 1 or stream 2. For multiple-stream devices, you can select from stream 1 ~ stream 4.

Fisheye Display Modes

By default, a circular view is displayed when a fisheye camera is successfully connected. To display Regional, Panoramic, or the combination of different views, **right-click** on a fisheye camera's live view to display the associated commands. The display modes available are: 1O (Original), 1P (Panoramic), 1R (Regional), 2P (2 Panoramic), 1O3R (1 Original & 3 Regional), 4R (Quad Regional), 1O8R (1 Original & 8 Regional), and 4R Pro (4 Proactive) modes.

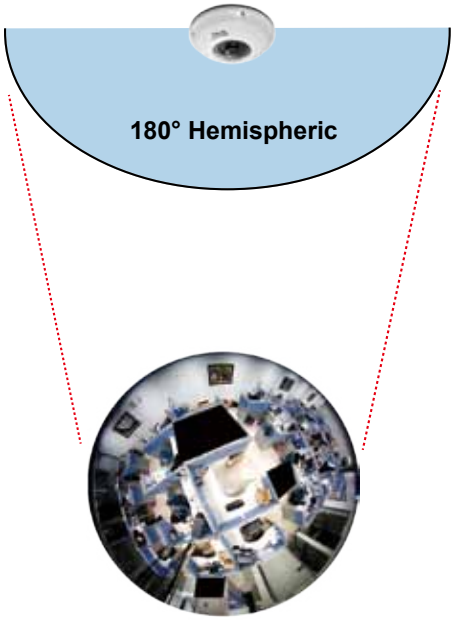


Fisheye Display Modes: below are conceptual drawings for different display modes.

1O (Single Original) Display mode:

An **Original** oval view covers the hemisphere taken by the fisheye lens.

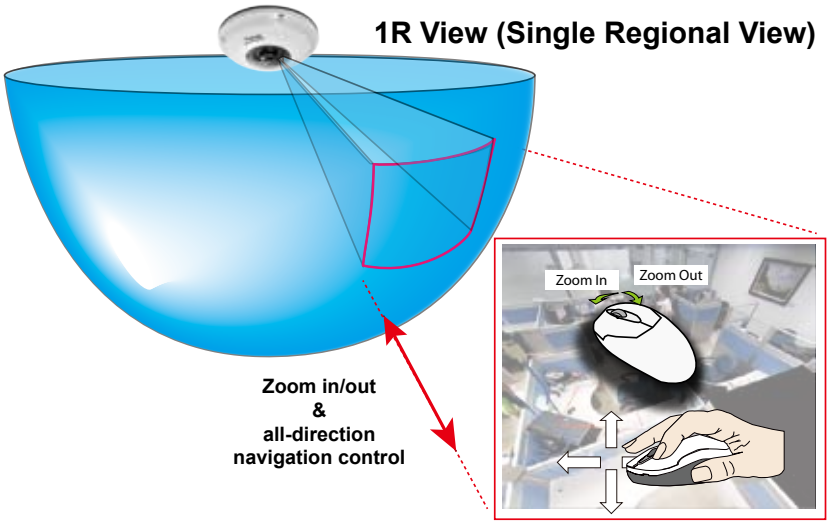
1O View (Original View)



1R (Single Regional) Display mode:

A **Regional** view crops a portion of the hemisphere as a region of interest. You can zoom in or out or move the view area elsewhere from on the regional view.

1R View (Single Regional View)



A Regional view is dewarped, by correcting images from the distorted oval view to a rectangular and visually proportional image.

1P (Single **Panoramic**) Display mode:

With image correction algorithms in firmware, the hemispheric image is transformed into a rectilinear stripe in the 1P display mode. Viewers can use the PTZ panel or simply use mouse control to quickly move through the 360º panoramic view.

Note that the 1P view is apt for an overview, the Zoom in/out function does not apply in this mode.

1P (Panoramic) Mode Screen Control

2P (2 Panoramic) Display mode:

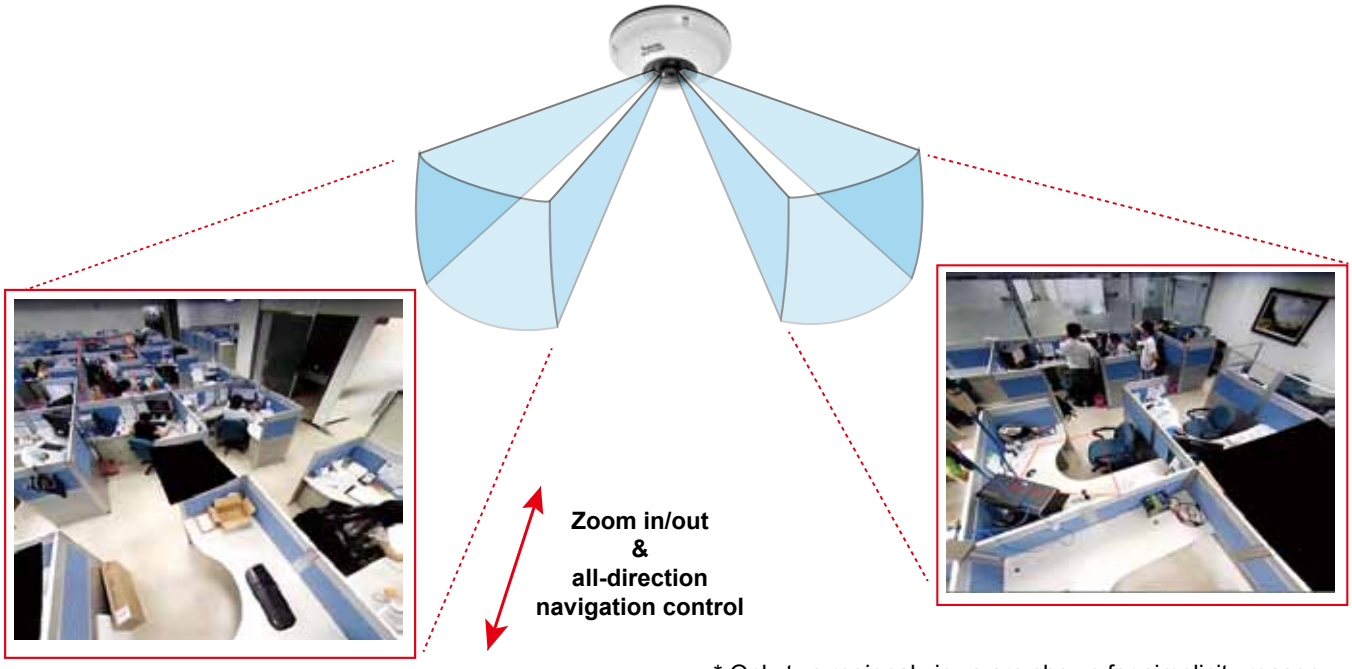
Two dewarped rectangular views are placed one on top of another each showing 180 degree of panoramic view. The 2P view looks like the upper view shows the front of hemisphere, and the lower view the rear half of the hemisphere.

2P (Panoramic) Mode Screen Control

1O3R (One Original & 3 Regional) Display mode:

Fisheye cameras also support the display of multiple regional views taken from within the same hemisphere, and they can be displayed with or without an Original view in its view cell.

3R View (Regional View)



* Only two regional views are shown for simplicity reason

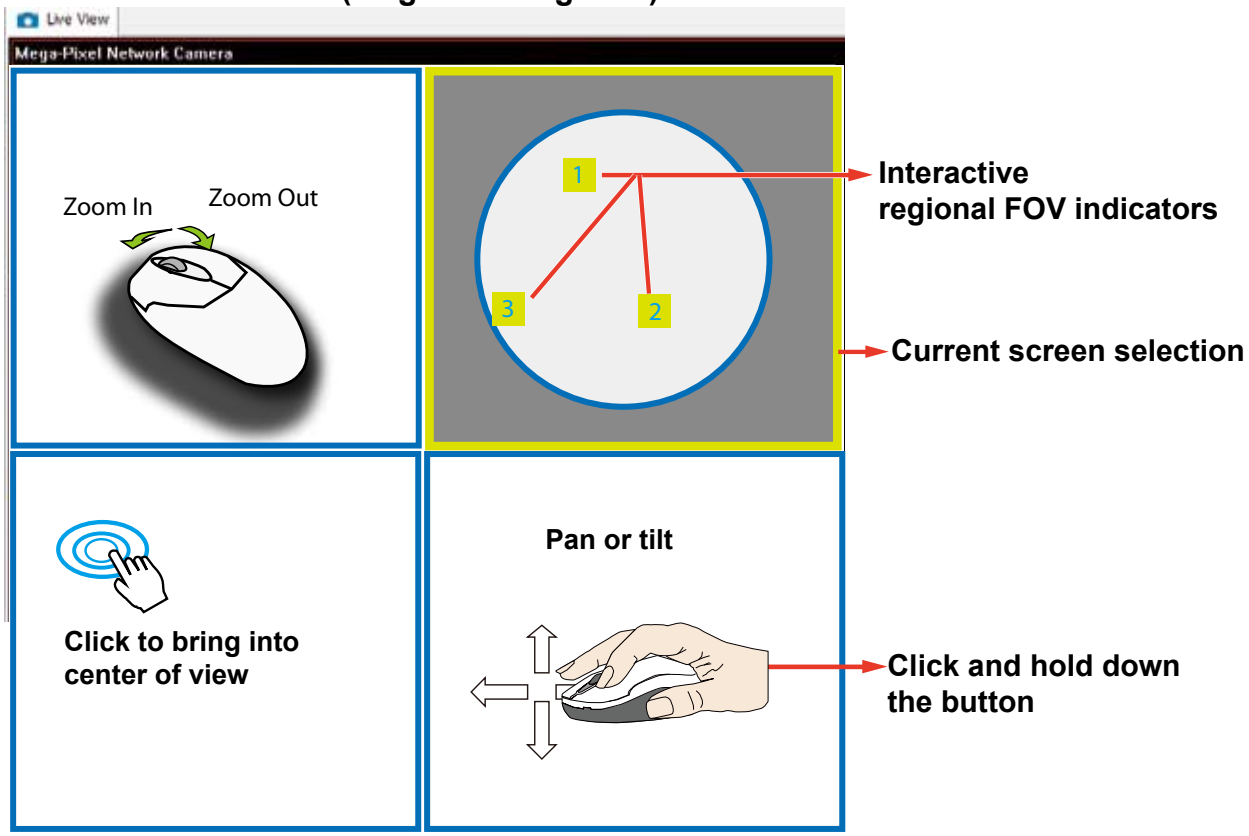
PTZ Mouse Control

The "Mount type" setting also determines the display modes available to your display modes. Please refer to fisheye camera's User Manual for more information.

A highly versatile mouse control is implemented with fisheye cameras. The same control takes effect on a browser management session, on the LiveClient utility, and even on a video playback screen. See the drawing below for how it works.

You can click and hold down the left mouse button to quickly swipe through the field of view, change the view angle, or use the mouse wheel to zoom in/out on a region of interest. However, the PTZ mouse control is only available in the **"R" (Regional) mode**. In the **Panoramic mode**, you can only scroll horizontally across the 180º or 360º panoramic view.

1O3R (Original & Regional) Mode Screen Control

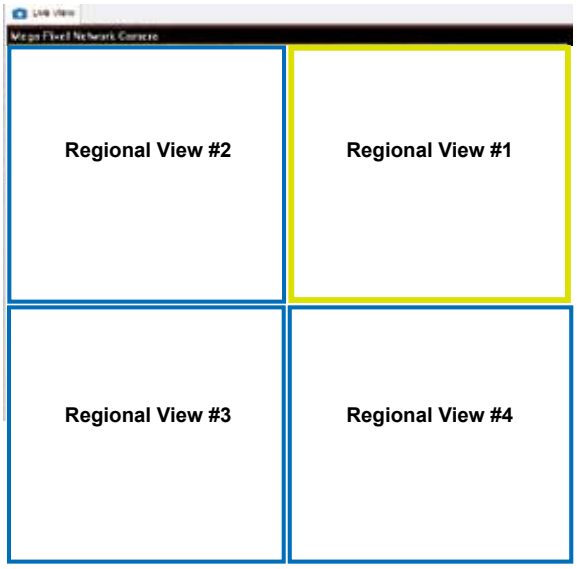


The various display modes require the support of D3D technologies by your display card on the LiveClient or Playback station. Most off-the-shelf display cards today support this feature.

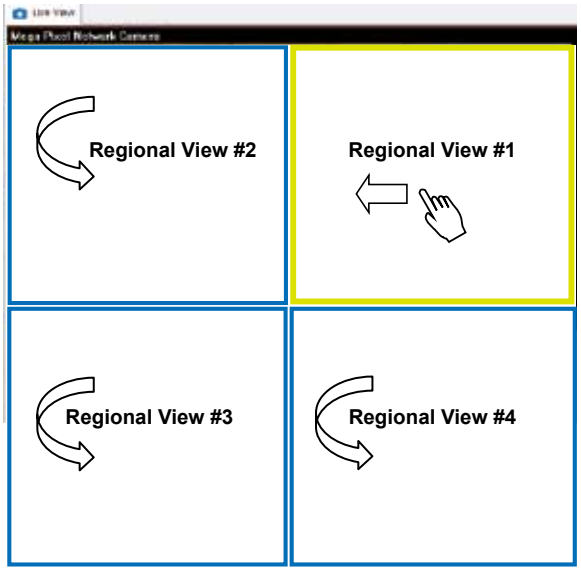
The onscreen mouse control is very agile. Therefore, use the PTZ panel for more delicate moves in a field of view. **Pan** and **Patrol** moves are also supported if you have configured preset PTZ positions in the camera's firmware. Note that the Pan move takes place in the Panoramic and Regional views, while the Patrol function through preset positions applies only in the Regional views.

Below are the conceptual drawings for other display modes. The available display modes can different with different mount types:
Regular: 1O, 1P, 1R, 1O3R, 4R.
Wall mount: 1P2R, 1P3R.
For more information, you can refer to fisheye camera's user documents.

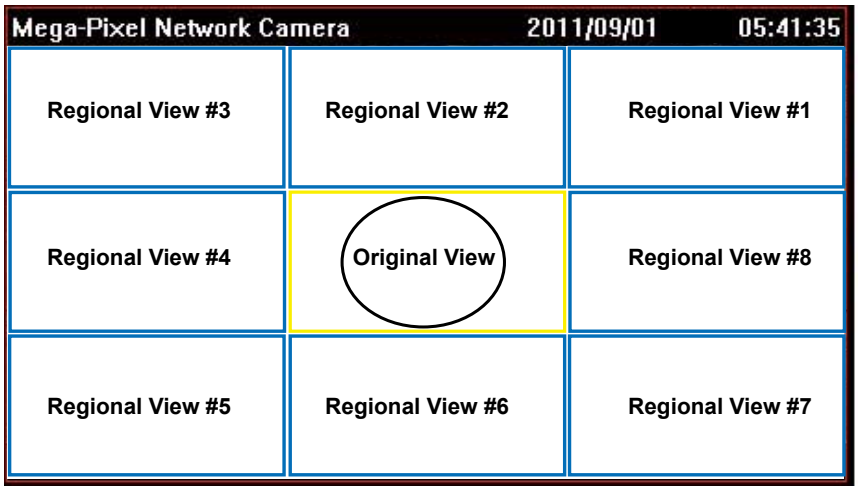
4R (Quad Regional) Display mode:



4RPro (4 Regional Proactive) Display mode:

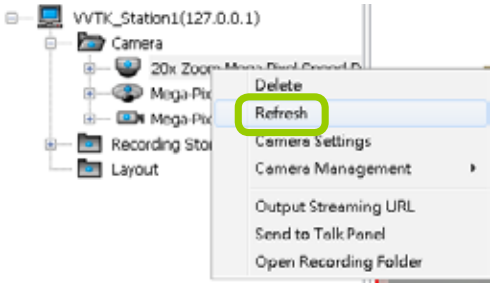


1O8R (One Original & 8 Regional) Display mode:



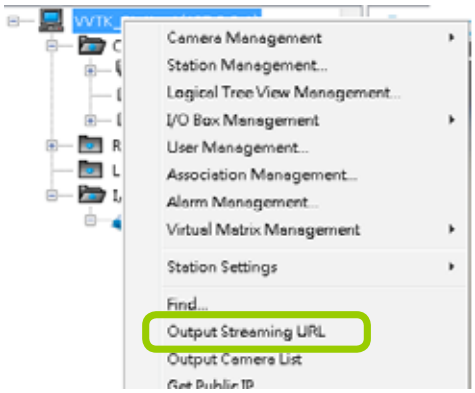
Refresh

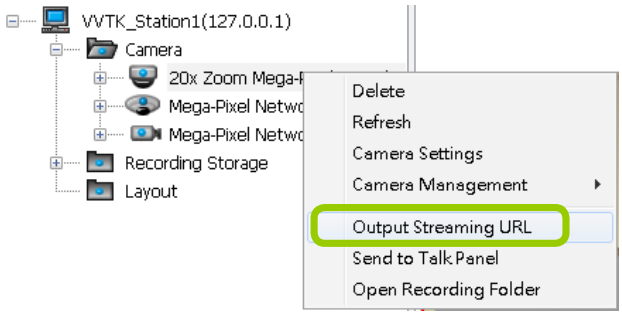
Right-click the device, then click **Refresh**, the camera information will be refreshed from the server.



Streaming Server

Right-click the station or the device and click **Output Streaming URL**. A .txt file with streaming URL will pop up. Then you can use this URL to link to the live streaming through QuickTime Player.



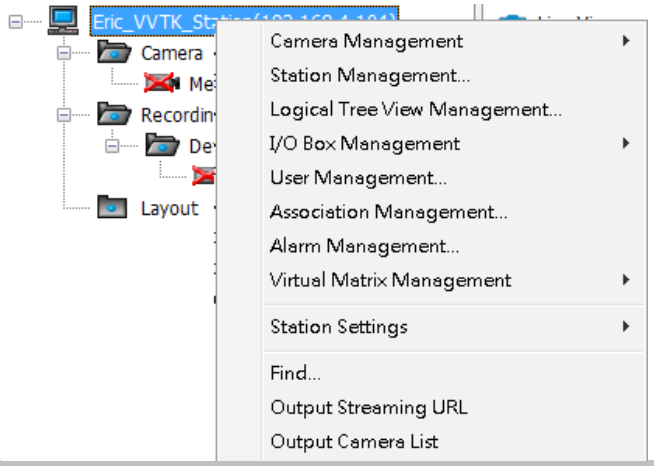


Output Camera List

This command produces a text file containing cameras' brand name, IP address, and HTTP port information. The camera list file can later be used for Batch Insert function, Import from File.

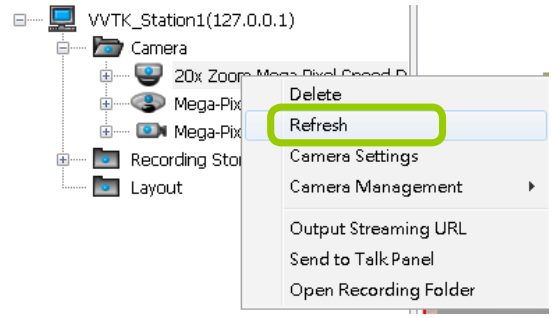
Get Public IP

If your access to Internet is via PPPoE, this function will display the public IP provided by your service provider. If your access to Internet is via a router, please consult your network administrator or consult your ISP for a valid public IP.

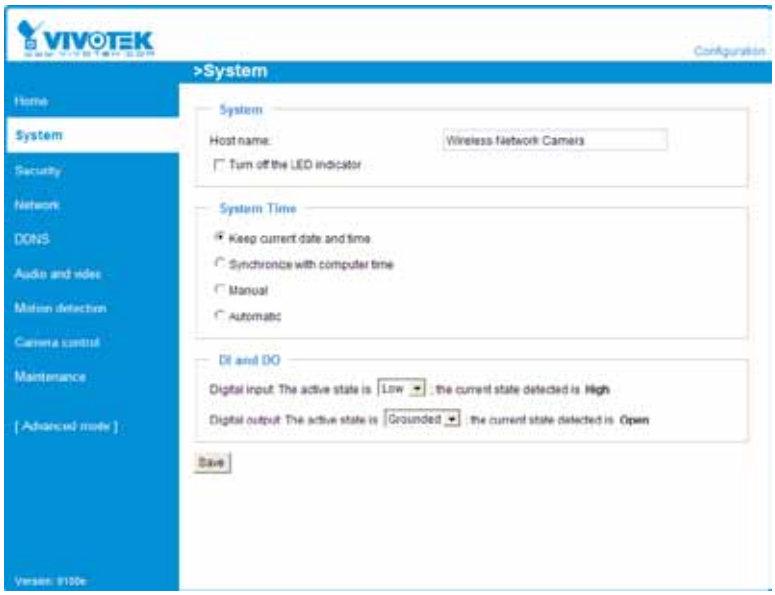


Camera Settings

Left-click to select a camera, **Right-click,** and then click **Camera Settings** to open a brower's session to the camera.



You must have an IE browser rev. 7.0 or above for opening a management session.



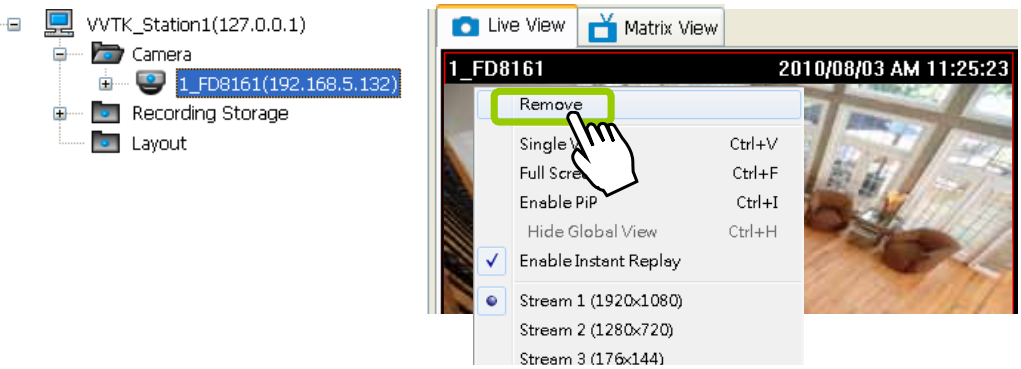
Open Recording Folder

Click on this button, and the default recording folder will prompt. The specific folder for a specific camera will be opened.

Remove Live Video from the Video Monitoring Window

There are two ways to remove a live video from the video cell:

Method 1. **Right-click** the video cell and select **Remove**.



Method 2. **Drag-and-drop** the live view from the video cell to the hierarchical management tree window.

If you want to remove all live videos from the video cells, please click on the menu bar.

How to Change the VAST LiveClient Layout

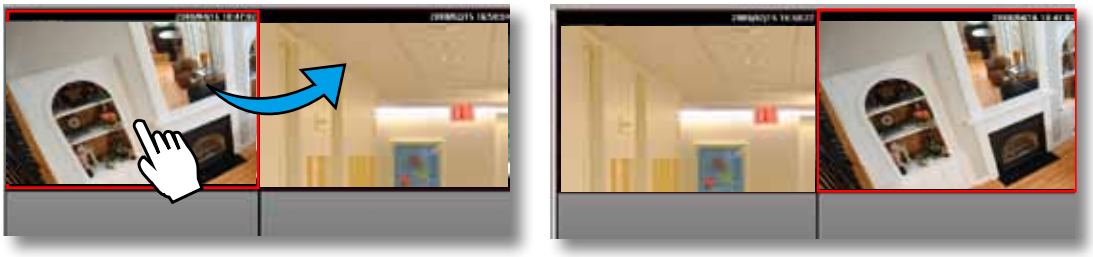
Changing the Layout of the Live Video Monitoring Window

VIVOTEK VAST LiveClient supports up to 32-CH simultaneous video viewing on a single monitor and allows you to change the layout of the live video monitoring window based on the number of inserted devices.

Switch Video Channels

To move a video channel to another empty video cell, **drag-and-drop** the view to the target video cell.

To switch two different channels, **drag-and-drop** one view to the other, then the two different channels will be switched to the opposite.



Configure Layout Mode

Click the **Layout** button on the quick access bar. Select a desired layout mode, and the layout window will be changed accordingly. Below we illustrate 15 types of layout modes and the corresponding page numbers:

Layout mode	Description	No. of Video page
1 x 1		32
2V		16
1P+2		20
3V		11
2 x 2		8
4V		8
2V+3		7
1 + 5		4
1P+6		8
3 x 3		3
1P+8		6
1 + 12		2
4 x 4		2
5 x 5		1
1 + 31		1

P-PTZ modes

More than 1 video page; rotation function is enabled

Only 1 video page; rotation function is disabled

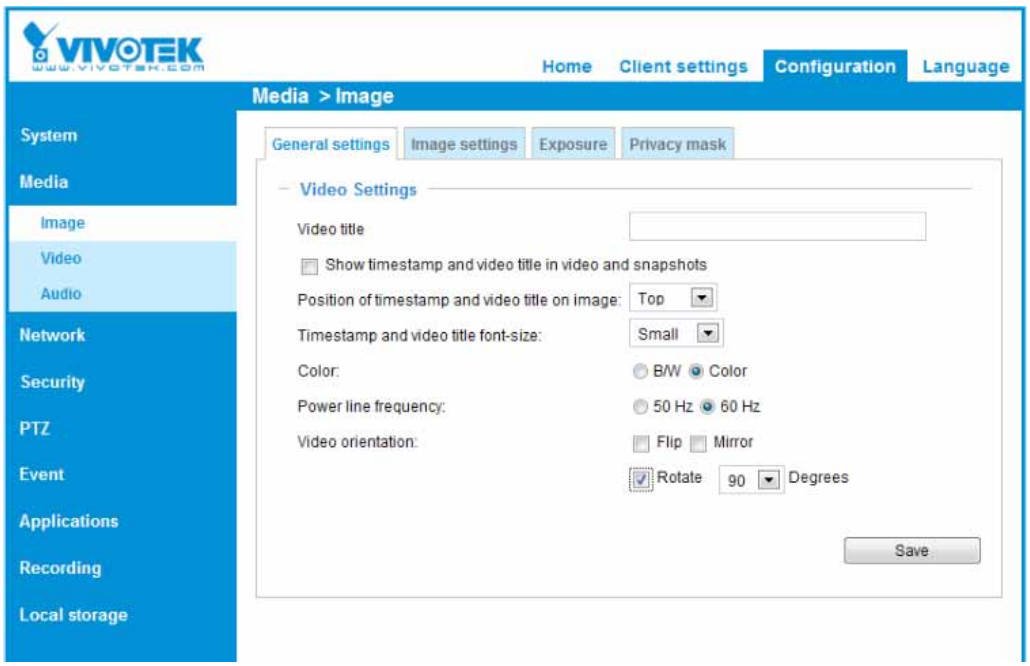
Configure Layout Mode

Click the **Layout** button on the quick access bar. Select a desired layout mode, and the layout window will be changed accordingly. Below we illustrate 11 types of layout modes and the corresponding page numbers:

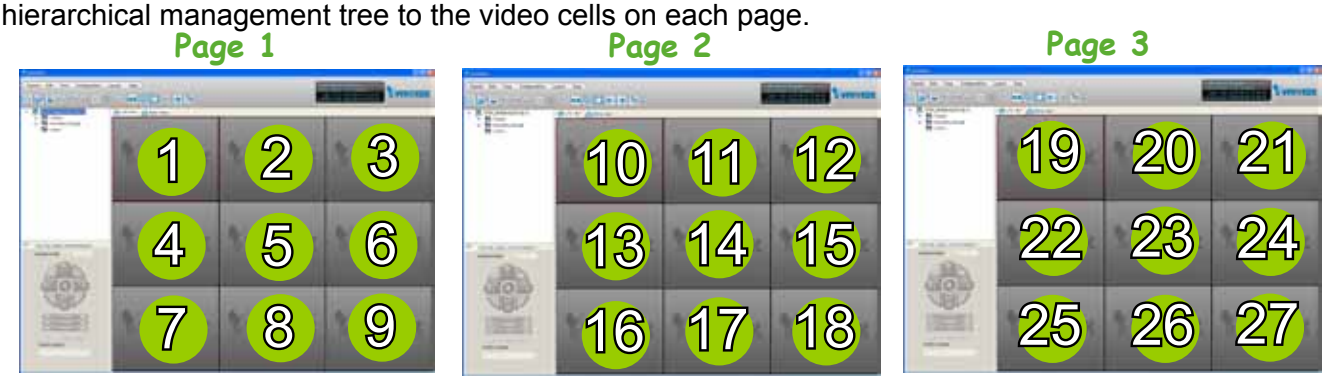
The 1P+2, 1P+6, and 1P+8 layouts apply exclusively to the Panoramic PTZ configurations. Please refer to page 287, **Appendix A Panoramic PTZ Configuration,** for details.

Normally, a Panoramic PTZ layout will consist of 1 fisheye Original view, 1 speed dome field of view, and 1 fisheye Panoramic view as shown below. Note that the interactive click-on-image control only takes place on the Original and the Panoramic views.

Some layout modes (1x1, 2V, 3V, 2x2, 4V, 2V+3, 1+5, 3x3, 1+12, 4x4) will spread all video channels into several pages. Some cameras support the video Rotation function for scenarios such as a tall, long corridor or the inside of a vehicle. The Rotation configuration is made through a web console with such cameras.



For example, under the 3x3 layout mode, you can switch among the pages by clicking and on the quick access bar. To arrange the content of each page, manually **drag-and-drop** cameras from the hierarchical management tree to the video cells on each page.

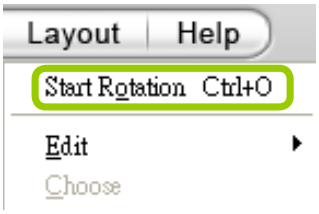


Rotating Video Pages

For layout modes that contain more than one page, the LiveClient provides the rotating function for displaying all video pages in turn.

- To enable this function, click on the Quick Access Bar, which will become **Stop Rotating**, and the video pages will start to rotate so that the user does not have to click to move to the next page.
- To disable this function, click **Stop Rotating**, which will become on the Quick Access Bar.

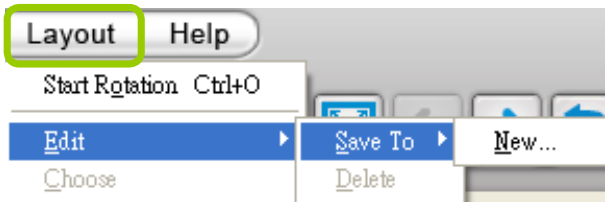
You can also click **Layout > Start to Rotate/Stop Rotating** to enable/disable this function.

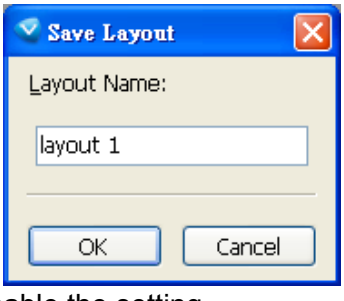


The default rotating time interval is 6 seconds. If you want to edit rotation settings, please refer to **Rotation Settings** on page 209.

Edit Layout

Please follow the steps below to save a layout:
a. Arrange a layout mode and drag devices to their desired video cells.
b. Click **Layout > Edit > Save to > New** on the menu bar. A **Layout Name** dialog box will pop up.

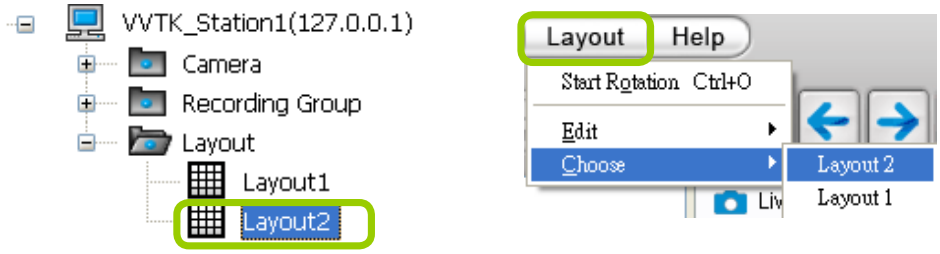




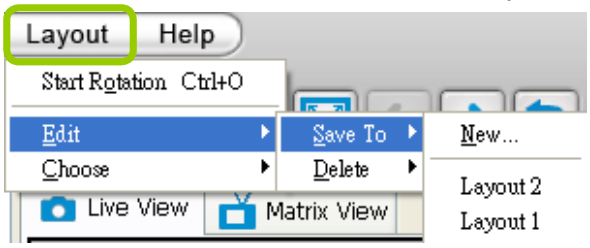
c. Enter a name for the the layout, then click **OK** to enable the setting.

d. Back to the monitoring window, the new layout will be displayed under the hierarchical management tree as shown below. You can save up to 10 layouts.

e. To change to another layout, **double-click** the layout options on the hierarchical management tree, or click **Layout > Choose** on the menu bar to select a desired layout.

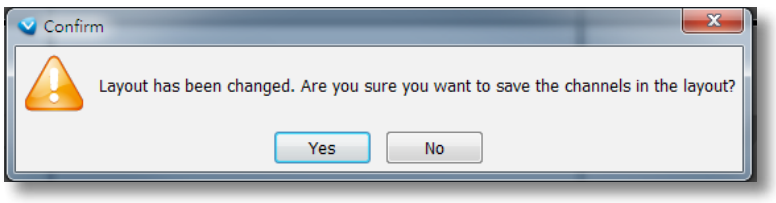


- If you want to edit an existing layout, arrange a layout mode and drag devices to the desired video cells, then click **Layout > Edit > Save to > New** to save as a new layout or an **existing layout** to replace with the new one.



- If you want to delete an existing layout, **right-click** the layout item on the hierarchical management tree or click **Layout > Edit > Delete** on the menu bar to delete it.

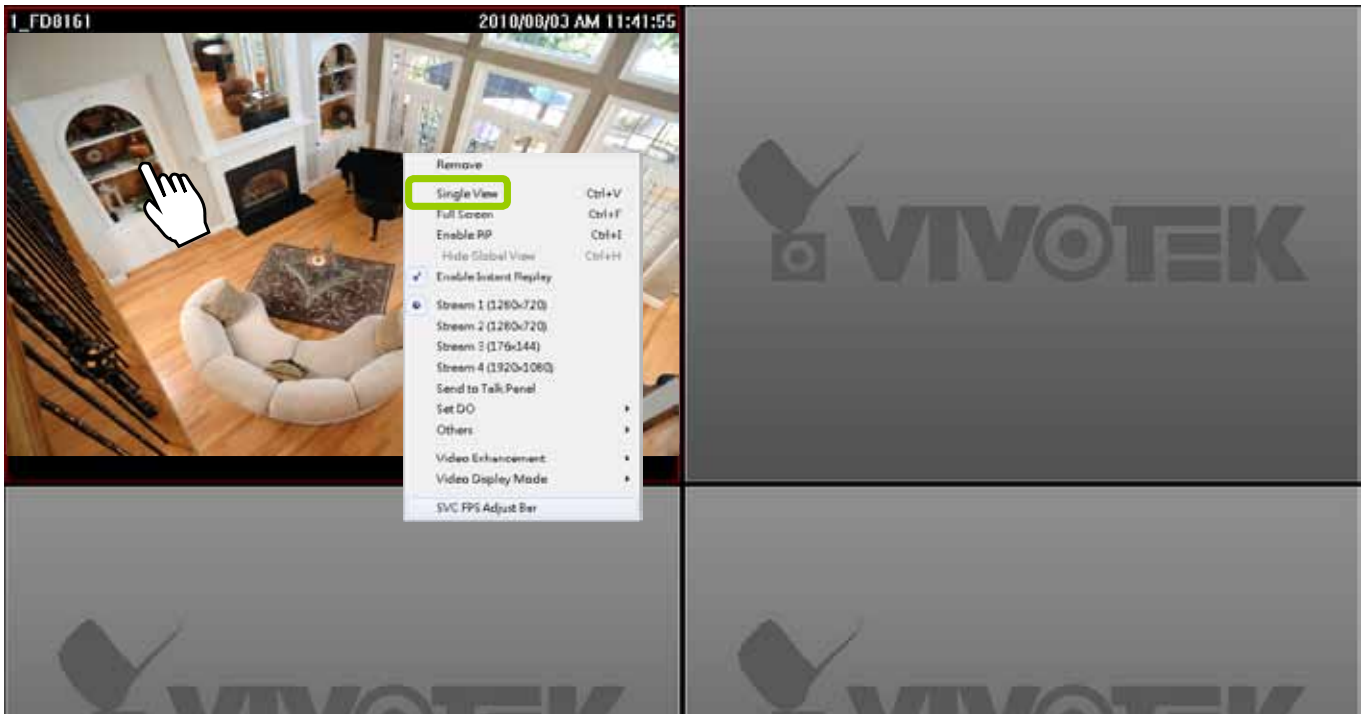
Whenever you close the LiveClient or Playback programs and changes in screen layout have been made, you will be prompted to save your current configuration.

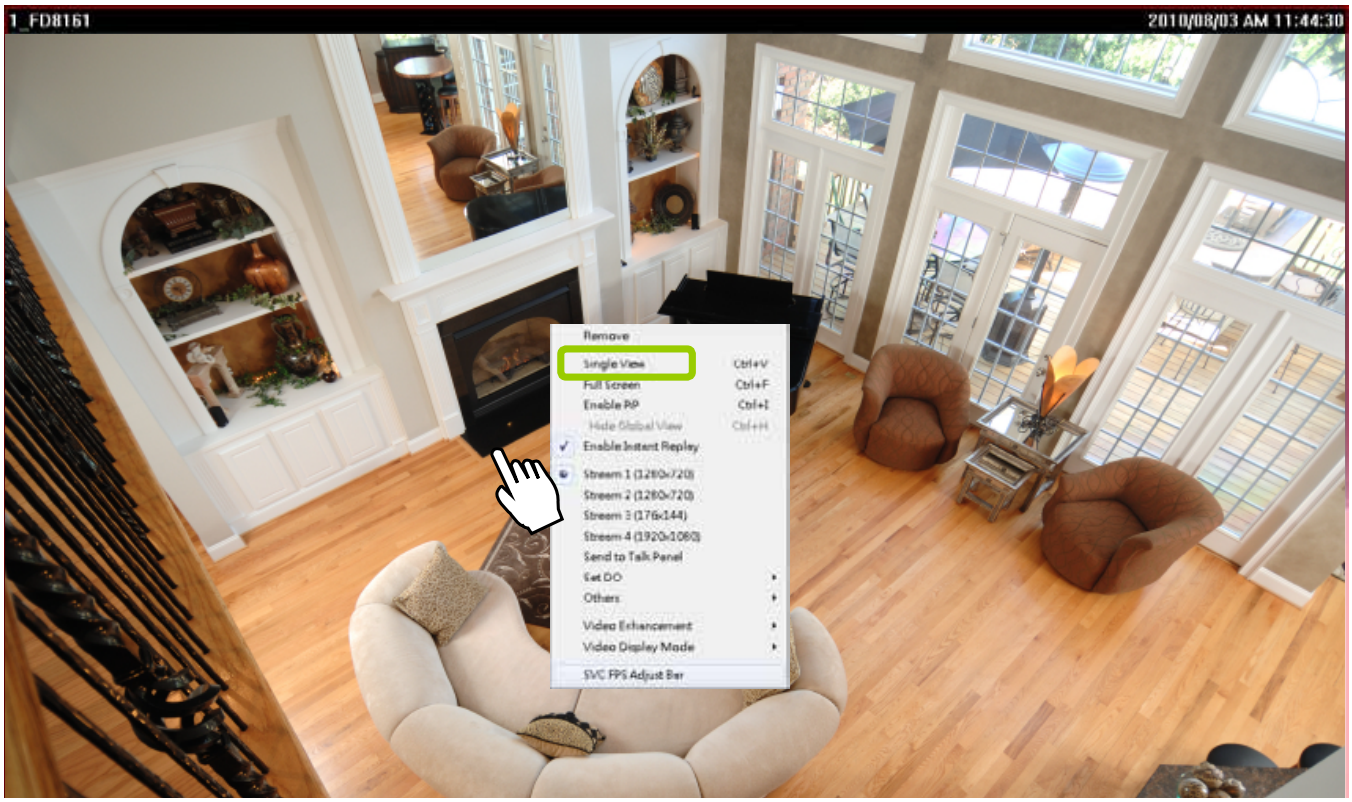


Maximize/Minimize the Live Video Monitoring Window

- Single View: to maxmize a video cell to the entire live video window

Double-click the video cell, or **right-click** the video cell and select **Single View**. The focused video will occupy the entire playback window as shown below.



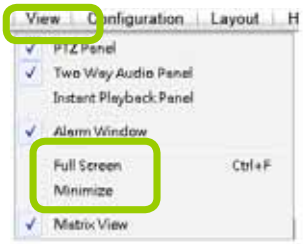


To restore to the original layout, **double-click** the video cell or **right-click** the video cell and uncheck **Single View.**

- Full Screen: Maximize the live video monitoring window to the entire screen

Click **Full Screen** on the quick access bar or **right-click** the video cell and select **Full Screen**. In addition, you can also click **View > Full Screen** on the menu bar to maximize the live video monitoring window.

To restore to the original layout, you can **right-click** a video cell and uncheck **Full Screen** or click the **Esc** button on the keyboard to exit full screen mode.



- Minimize: If you click **View > Minimize** on the menu bar, LiveClient will minimize to the Windows tool bar.

View Live Video on Dual Monitors

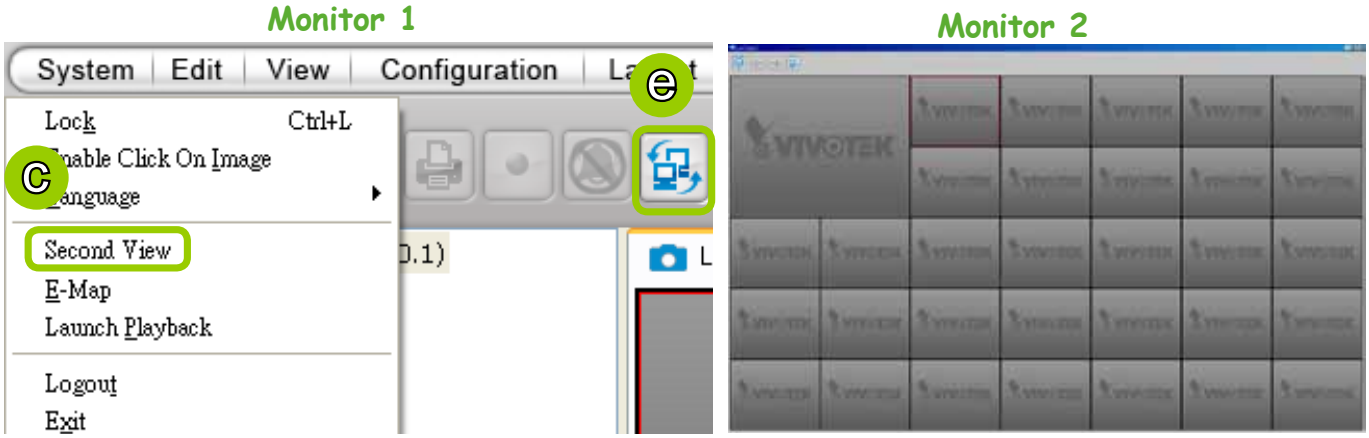
VAST also supports live video viewing on dual monitors, allowing you to manage a maximum of 64 channels concurrently on two screens. Moreover, the layout of the video monitoring window on different monitors can be set up individually.

Please follow the steps below to set up dual-screen mode:

a. Set up dual monitors for your local computer.

b. Launch VAST LiveClient on monitor 1.

c. Click **System > Second View** on monitor 1, then the live video monitoring window will be displayed in monitor 2 as shown below.



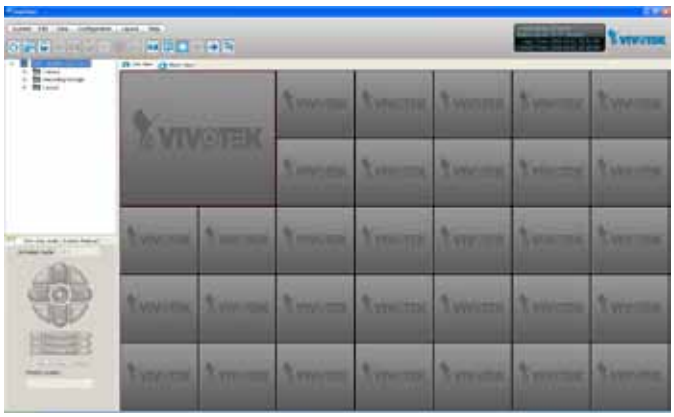
d. There are two ways to view live videos. One is to **drag-and-drop** the target device from the hierarchical management tree window to the video cells. The other is to click any video cell on monitor 1 or monitor 2, then **double-click** the target device; the live video will be displayed in monitor 1 or 2 in accordance with your selection.

e. If you click **Switch Screen** on the quick access bar, the live monitoring window on monitor 1 and monitor 2 will swap.

Simultaneously Viewing up to 64 Channels

If you select 1+31 layout on dual screens, you can view a maximum of 64 channels live video simultaneously. In this case, each layout contains 32 channels on 1 video page.

Monitor 1 - 32 channel

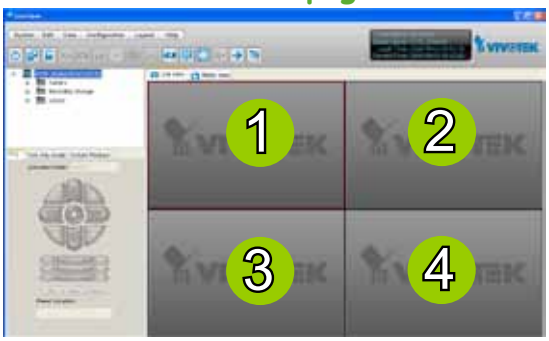


Monitor 2 - 32 channel

Using different layouts on each monitor

You can also select different layout for two monitors, simply click the **Layout** button on the quick access bar. Below is an example of the 2x2 layout with 8 video pages on monitor 1 and the 4x4 layout with 2 video pages on monitor 2. You can click and to switch among the video pages.

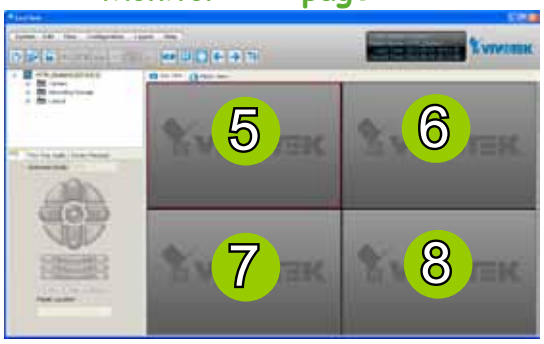
Monitor 1 - page 1



Monitor 2 - page 1

Click

Monitor 1 - page 2



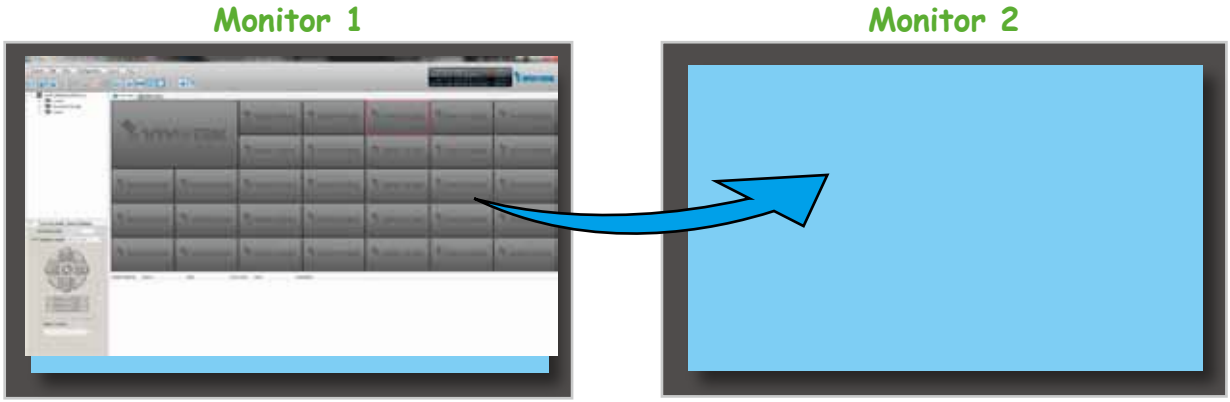
Monitor 2 - page 2

Monitor 1 - page 8

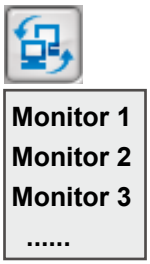
View Live Video with Multiple Monitors

If you have multiple screens in your monitoring center, you can switch the VAST LiveClient Window among these screens.

- If you have two monitors, click **Switch Screen** on the menu bar; the LiveClient window on monitor 1 will switch to monitor 2.



- If you have three or more monitors, a drop-down list will be displayed when you click **Switch Screen** on the menu bar. The number of items on this list depends on the number of your screens. Select a desired screen on the drop-down list and the LiveClient Window will switch to the specified screen.



How to Manage Stations

The VAST Server allows you to construct a hierarchical management system by adding more sub-stations to the root station. Under each sub-station, it can also insert sub-stations and network cameras.

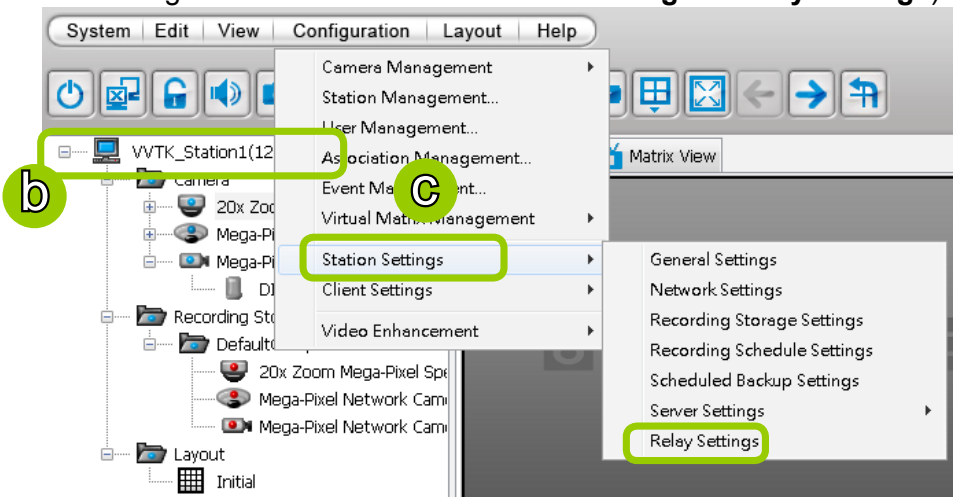
Relay Settings

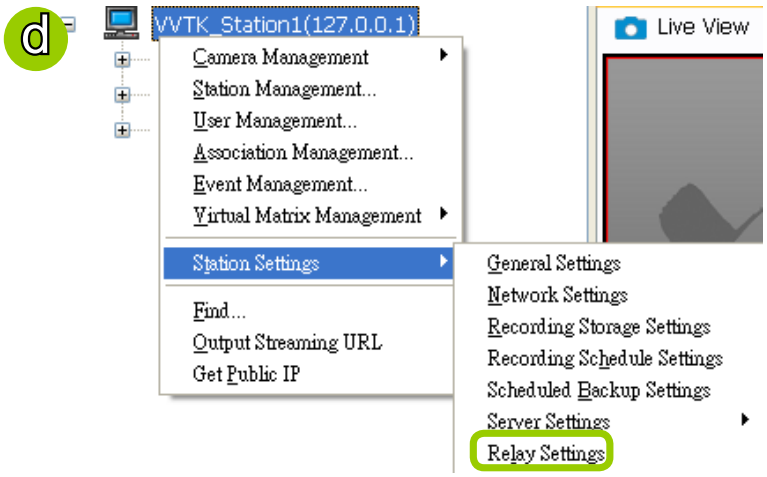
Before adding a sub-station, please follow the instruction below to enable the sub-station's Relay Settings first.

a. Login to the sub-station.

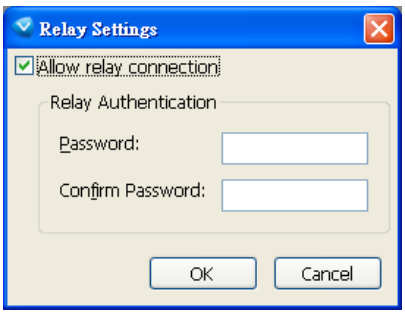
b. Select the station from the hierarchical management tree.

c. Click **Configuration > Station Settings > Relay Settings** on the menu bar (or **right-click** the station on the hierarchical management tree and select **Station Settings > Relay Settings**).





d. The **Relay Settings** window will pop up. Check **Allow Relay Connection** and enter a **Password**. Then click **OK** to enable the settings.



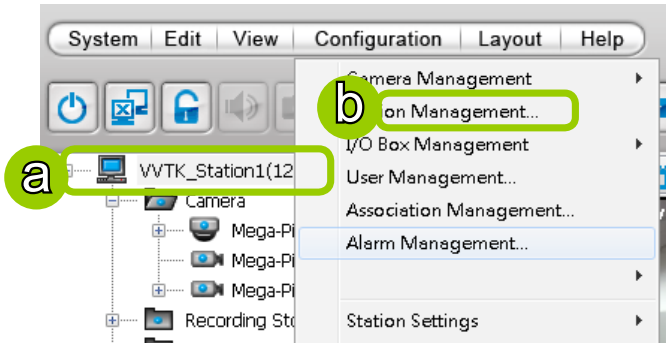
Insert Sub-stations

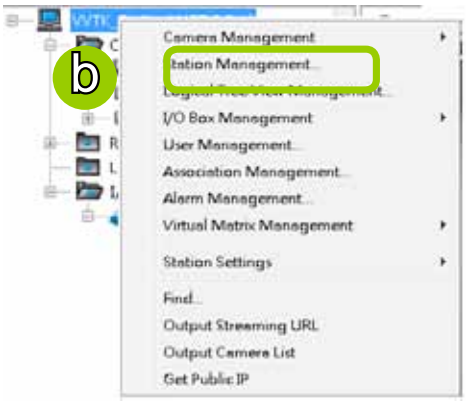
Please follow the steps below to add sub-stations:

a. Select a target station from the hierarchical management tree.

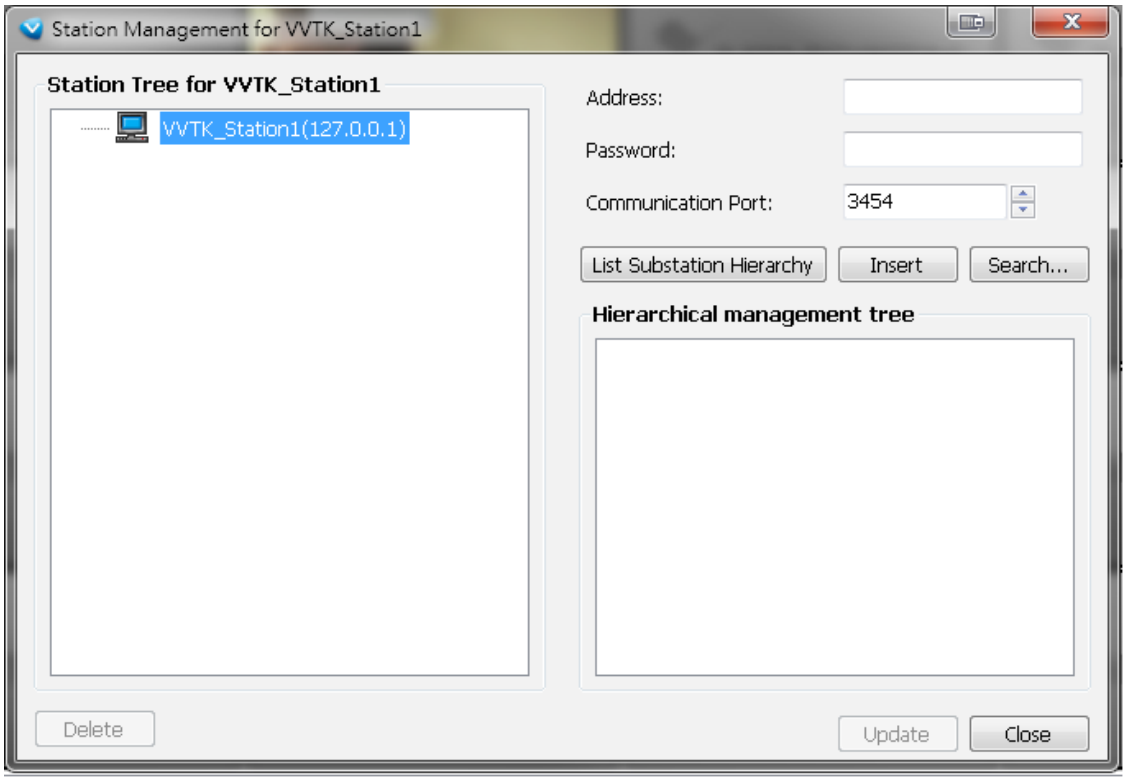
b. Click **Configuration > Station Management** on the menu bar (or **right-click** the target station, then select **Station Management**).

c. The **Station Management** window will pop up. The hierarchical management tree managed by the target station will be displayed on the left panel.





c



d. Before inserting the sub-station, you can click **List Sub-station Hierarchy** button to know if there is any sub-station under it.

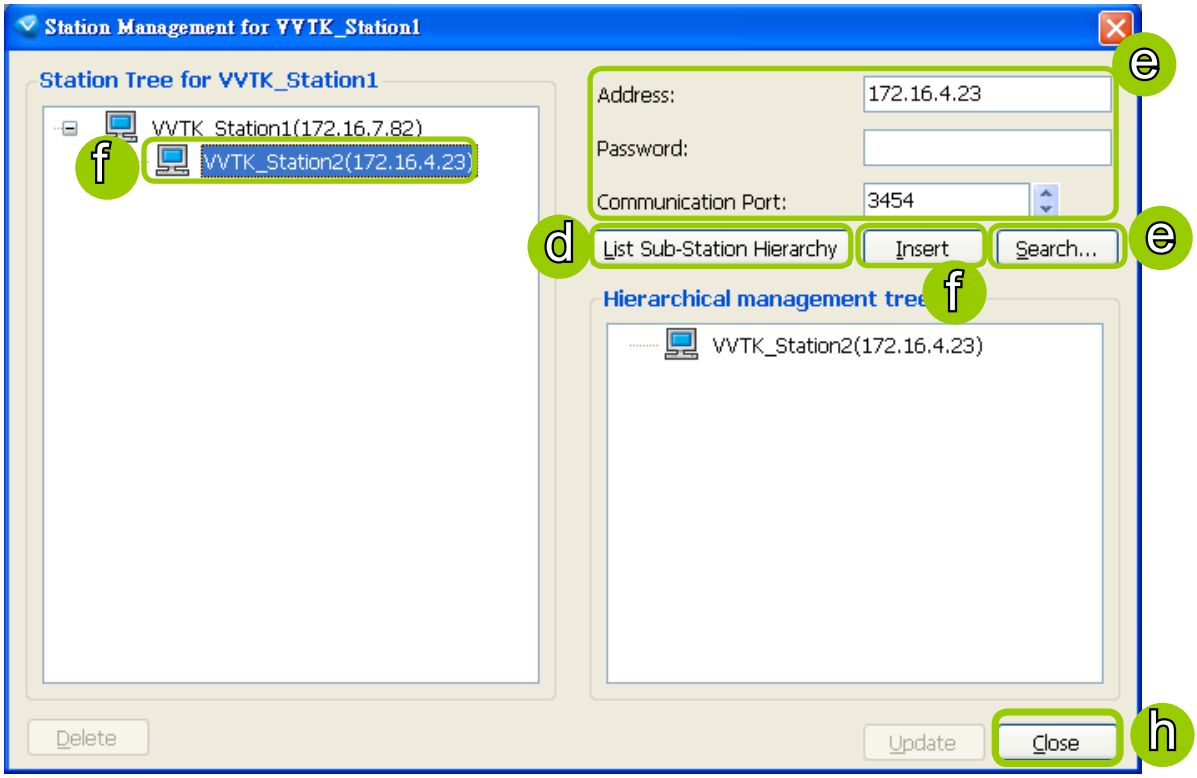
e. Enter the sub-station's **IP address** and **Password (defined in Relay Settings, not login password)**. The default communication port is 3454.

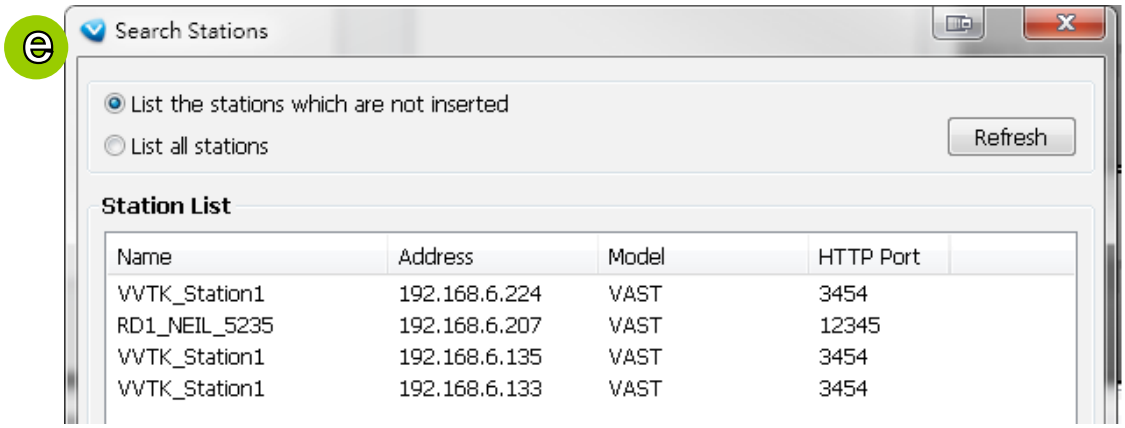
- If the sub-station is on the LAN, you can click the **Search Station** button to detect all ST7501 and VAST on the LAN. A **Station List** window will pop up and show a list of detected cameras on the LAN. On the top of **Camera List** window, you can select "**List the stations which are not inserted**" or "**List all stations**". The items listed below will then change accordingly. You can click **Name, IP Address, Model, Http port** to sort the items. Then select a device from the list to insert to the station.

f. When all settings are done, click **Insert** to add the sub-station to the target station. The sub-station will be displayed under the left station tree.

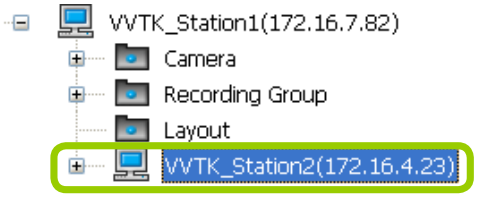
g. To insert additional sub-stations to the target station, repeat the above steps.

h. When completed, click **Close** to exit the Station Management window.

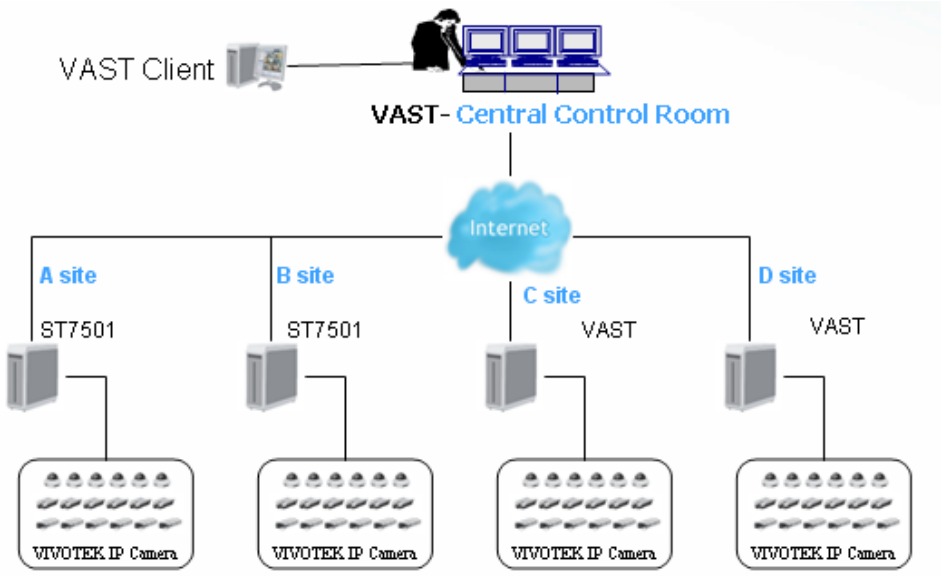




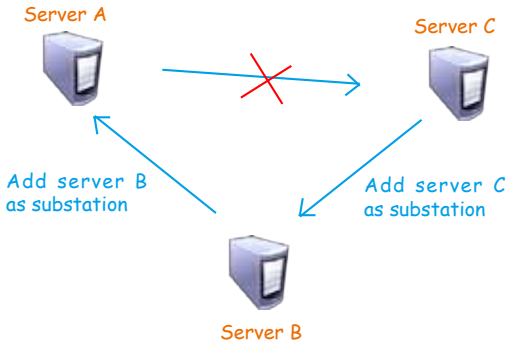
i. Back to the main window, you will find the newly-inserted stations displayed under the hierarchical management tree.



- *You can add VAST or free standard ST7501 as the sub-stations. The number of sub-stations can be added to the server depends on your key dongle. The VAST server will automatically detect the USB dongle installed on your host PC. Following is an illustration for two-level hierarchical architecture:*



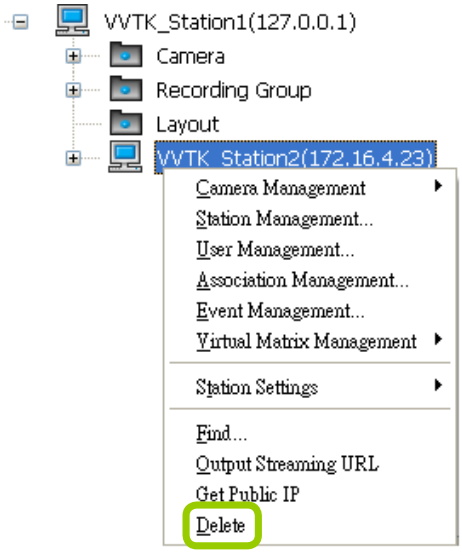
- *Please note that the following cyclic relay is not allowed.*



Delete Sub-stations

There are two ways to delete a sub-station:

Method 1. Select the sub-station on the hierarchical management tree, then **right-click** to delete.



Method 2. Delete the sub-station via the Station Management window:

a. Click the station on the hierarchical management tree, then click **Configuration > Station Management** on the menu bar (or **right-click** the station, then select **Station Management**).

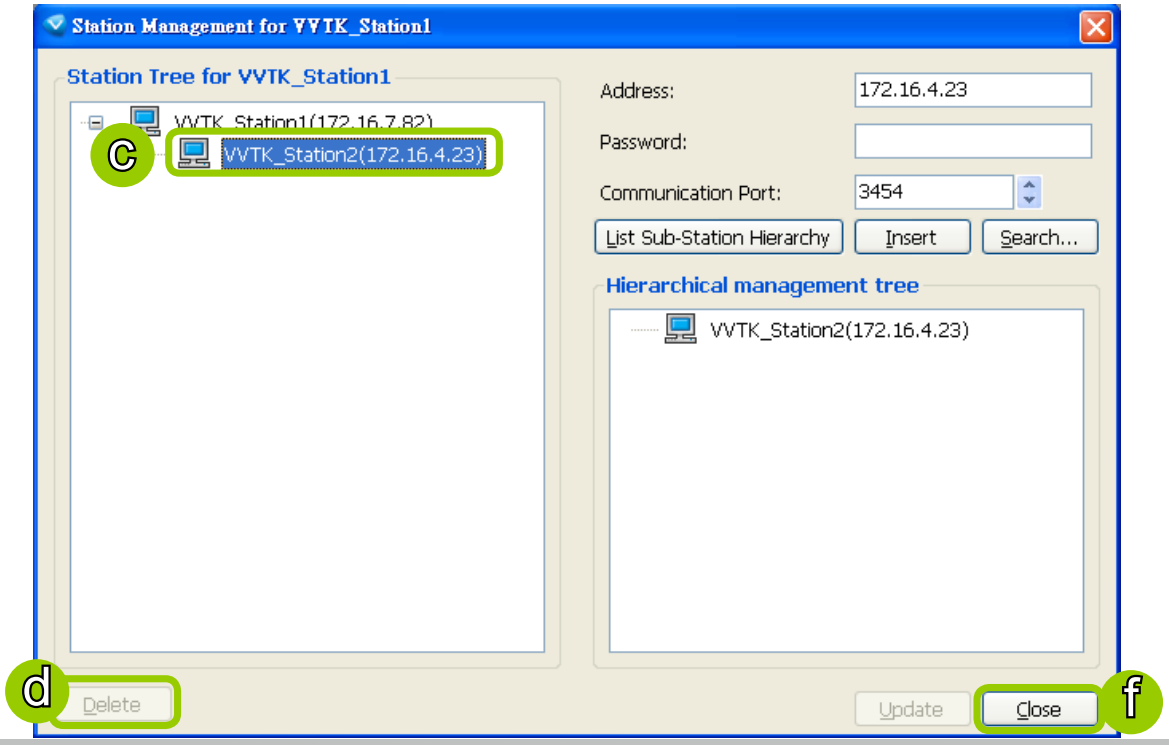
b. The **Station Management** window will pop up. The hierarchical management tree managed by the station will be displayed in the left Station List window.

c. Select a station from the list you want to delete. Its related information will automatically be displayed in the corresponding blanks in the Station Management window.

d. Click **Delete** to delete it.

e. To delete additional devices, repeat step c. and d.

f. When completed, click **Close** to exit the camera management window and return to the main window. The deleted device will disappear from the hierarchical management tree.



Update Stations

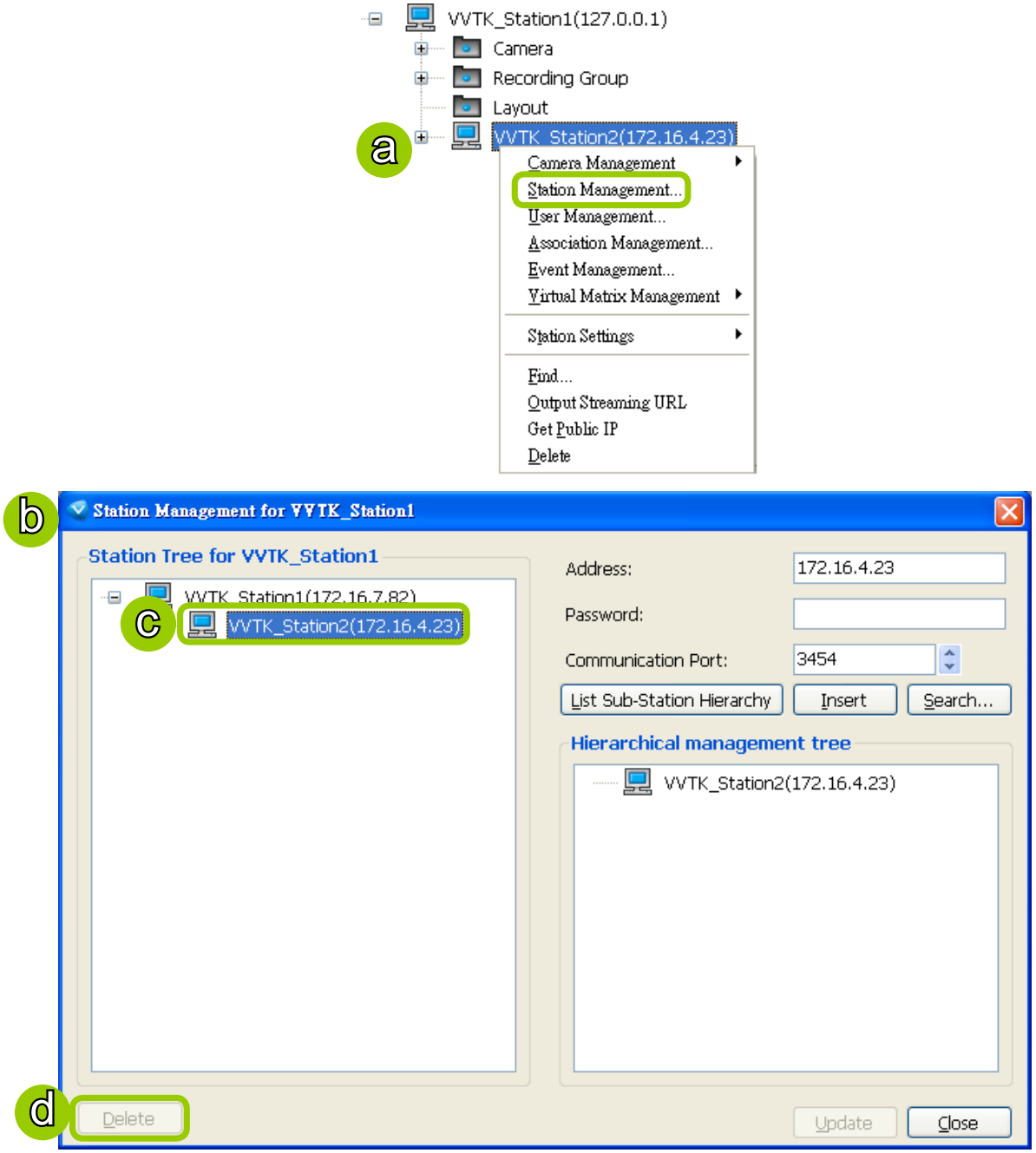
Please follow the steps below to update a station via Station Management window:

a. **Right-click** the target device on the hierarchical management tree and click **Station Management.**

b. The **Station Management** window will pop up. The hierarchical management tree managed by the station will be displayed in the Station List window on the left.

c. Select a station from the list you want to delete. Its related information will automatically be displayed in the corresponding blanks in the Station Management window.

d. When all settings are completed, click **Update** to enable the settings.



How to Manage User Accounts

VAST allows users to apply multiple user accounts to a station with five levels of user roles: Administrator > Power User > User > Operator > Guest. Each role has different permissions listed as shown below. Moreover, Administrators have the highest privileges, while Power Users can only add/edit users as Power Users, Users, Operators, and Guests.

The Default User Roles and Permissions of User Accounts

Functions \ User Roles	Administrator	Power User	User	Operator	Guest	Description
Station Management	V	V				Add sub-station under the existing station
User Management	V	V	V			Manage user accounts
Camera Management	V	V				Insert and configure the camera settings
Association Management	V	V	V			Access and modify the association settings
Access Alarm Management	V	V	V			Access Alarm management
Modify Alarm Management	V	V	V			Modify Alarm management
General Station Settings	V	V				Modify general station settings
Station Network Settings	V	V				Modify network settings
Access Recording Storage/ Recording Schedule Settings	V	V	V	V		Access the recording group and recording schedule
Modify Recording Storage/ Recording Schedule Settings	V	V	V			Configure the recording group and recording schedule
Manually Record	V	V	V	V		Enable the recording function manually
Scheduled Backup Settings	V	V	V			Configure backup schedule
Access Server Settings	V	V	V			Access server settings
Modify Server Settings	V	V	V			Modify server settings
License Management	V	V				Allow user to manage station licenses
Relay Management	V	V				Allow user to manage station relaying settings
Client Settings	V	V	V	V		Configure the client settings: snapshot, AVI, etc.
Video Enhancement Settings	V	V	V			Allow user to edit profile for video enhancement and assign profile to camera in LiveClient

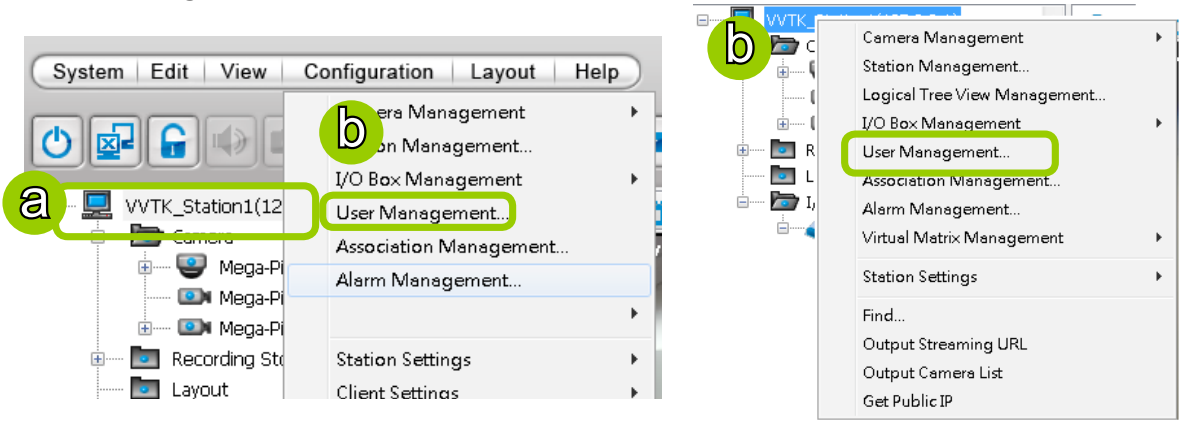
Privileges \ User Roles	Administrator	Power User	User	Operator	Guest	Description
Modify Directories	V	V	V			Add, remove and rename directories
Delete Station	V	V				Delete sub-station from a (parent) station
Delete Camera	V	V				Delete camera from the station
PTZ Control	V	V	V	V		PTZ control for PTZ cameras and speed domes in LiveClient
Device Control	V	V	V	V		Control the digital output or white light/IR illuminators of the cameras
Talk Control	V	V	V	V		Two way audio function for the cameras
Access Camera Configuration	V	V	V			Access the camera settings
Modify E-map	V	V	V	V		Allow user to modify the E-map
Event Search	V	V	V	V		Use built-in search engine to search specific events
Log Viewer	V	V	V	V		Use built-in search engine to search the log
Backup	V	V	V	V		Back up database manually
Record/Export Media	V	V	V	V		Record live stream or export playback stream to local files
Virtual Matrix Management	V	V				Allow user to manage virtual matrix
Virtual Matrix Control	V	V	V	V		Allow user to control virtual matrix
Playback Authority	V	V				Allow user to access Playback

Manage a User Account

Add a New User Account - Basic Account

a. Select the station from the hierarchical management tree.

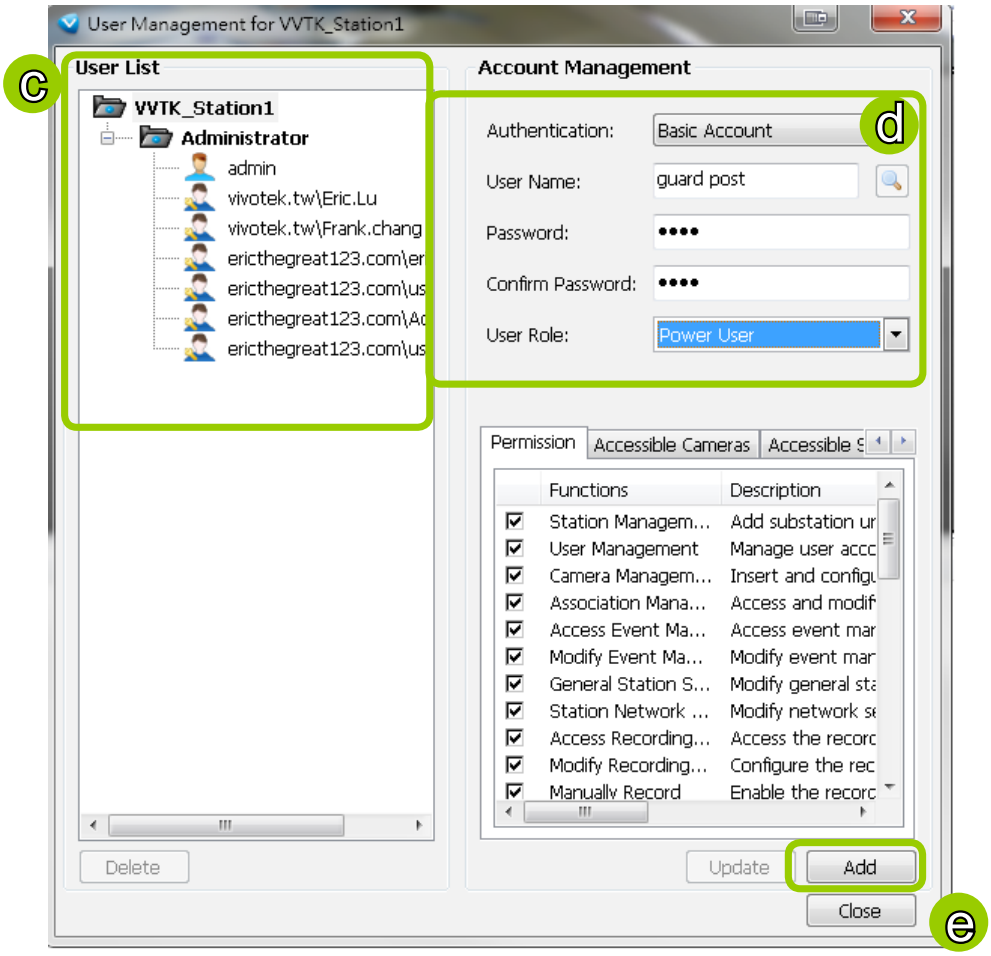
b. Click **Configuration > User Management** on the menu bar (or **right-click** the station, then select **User Management**).

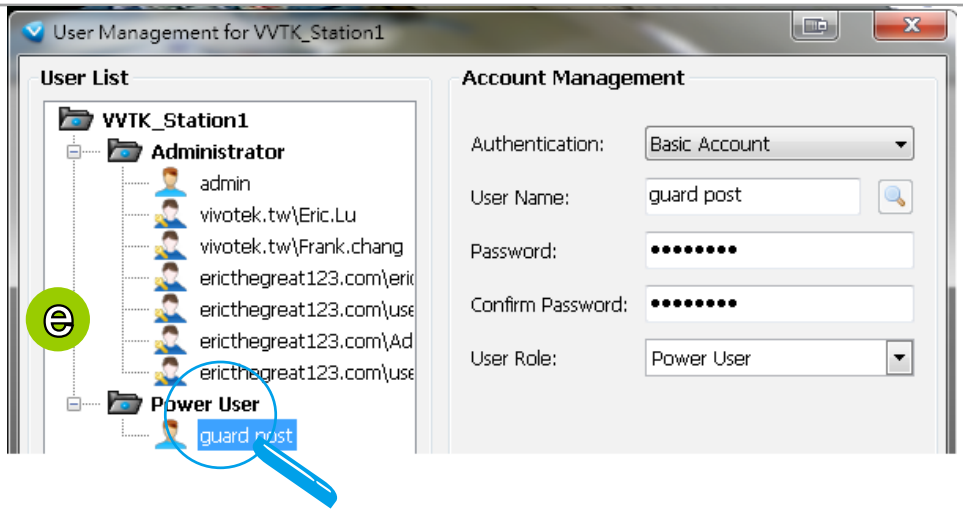


c. The **User Management** window will pop up. The user accounts under the station will be displayed under the left User List tree. Up to 1,021 users can be created (not including the default Admin and two internal communication accounts).

d. Enter the **User Name**, **Password,** and specify the **User Role** of this user.

e. Click **Add** to add the user account to the station. It will be displayed under the User List.





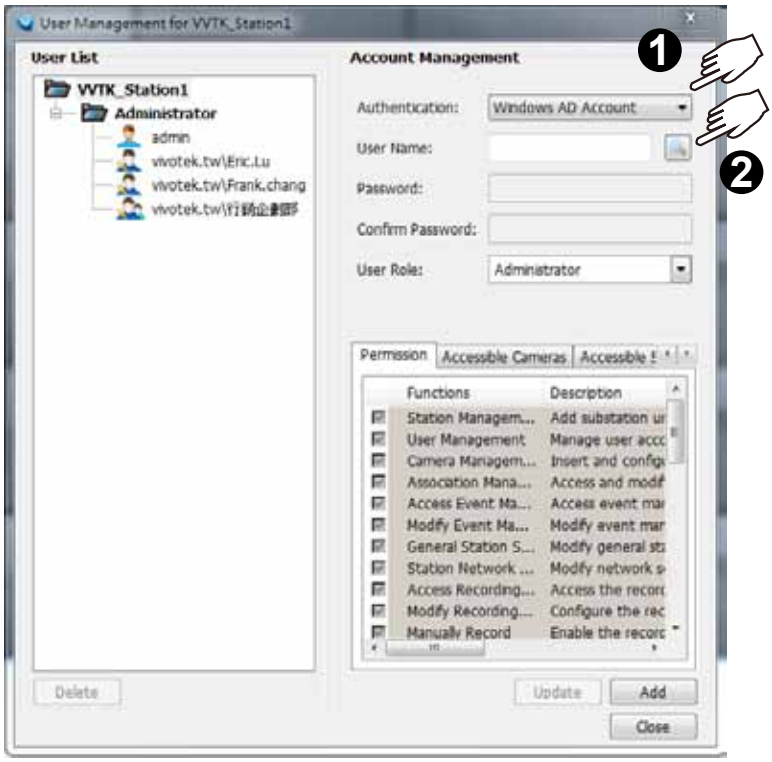
Add a New User Account - Windows AD Account

In an established, enterprise network environment, the support for Windows AD (Active Directory) infrastructure enables ease of integration using the credentials of existing users. Using the same AD authentication methodologies, you can configure the clients or users in an established network to access the VAST server configuration.

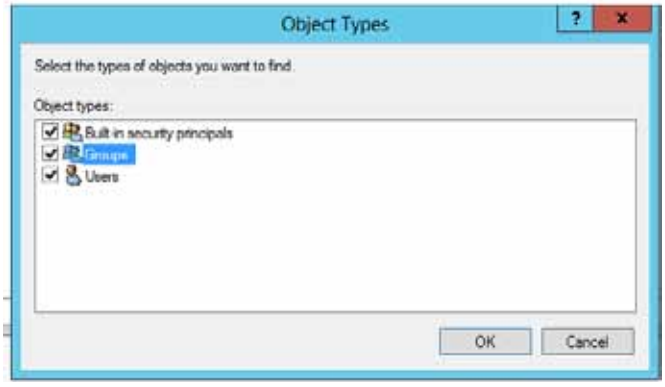
Note the following with Windows AD support:

1. The ST7501 software does not support Windows AD accounts. However, if you log in to a VAST server which supports Windows AD accounts, the AD account will work for an ST7501 sub-station managed by VAST.
2. If you install VAST server on a Windows XP machine with Postqre SQL server, the login using a Windows AD account will not work.
3. The VAST server must reside in a domain managed by the AD server.
4. This function does not support the environment that spans across multiple AD domains.
5. A user account hosted by an AD server cannot be modified in VAST.
6. A User Group and its members configured in AD cannot be managed in VAST.
7. You cannot add an account having the same name as one you used to log in VAST.
8. There are 3 types of account for VAST: VIVOTEK account, AD single user, AD group.

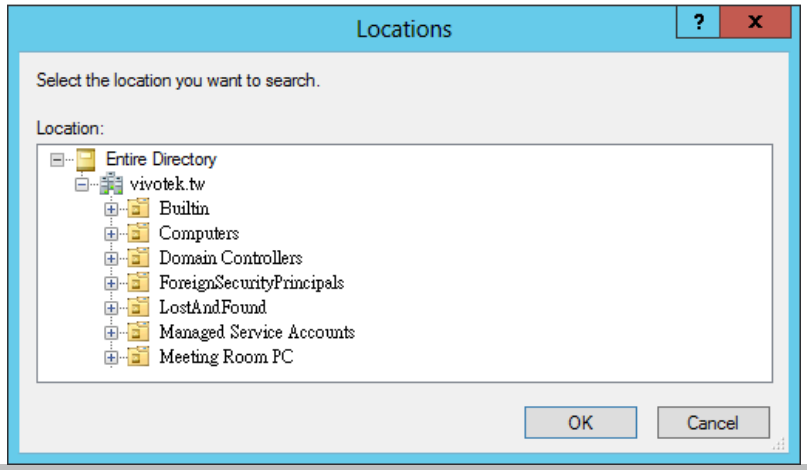
a. To configure a Windows AD user as a VAST user, enter the **User Management** window. Select **Windows AD Account**, and click on the **Search** button.



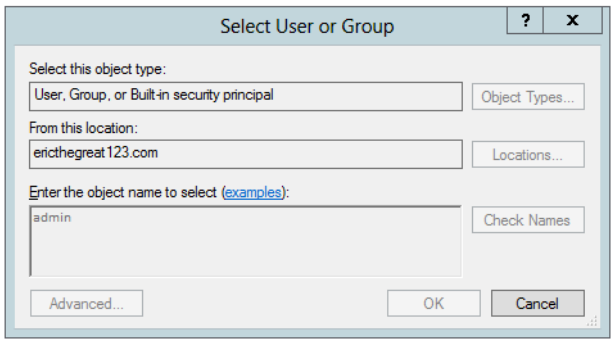
b. A Select User or Group window will prompt. Click on the **Object type** button. Select **Group** or **User**.

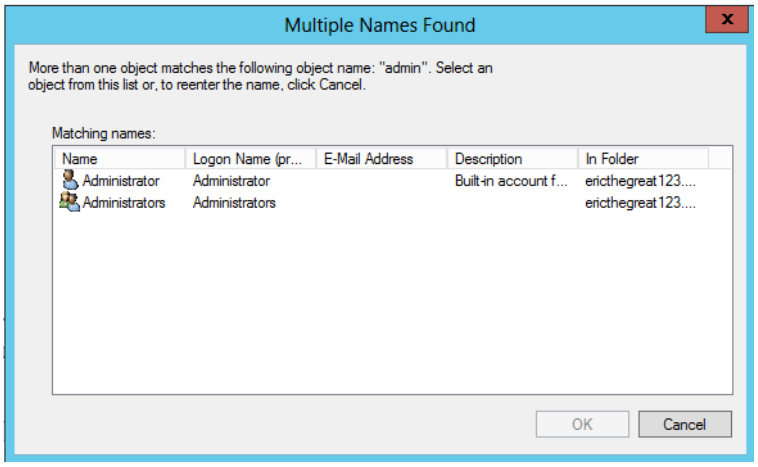


c. You can also click on the **Location** button to specify a search range on a location on the AD hierarchical tree, e.g., a department in an organization.



d. Enter a name for user or group that is known to the AD. Click on the **Check Name** button. The search results will be listed.





e. Click to select a user, and then click **OK** to confirm your selection.

f. Users thus added will be listed on the left in the **User List**. These users or groups will be listed with their domain name listed in front of them and indicated by different icons .

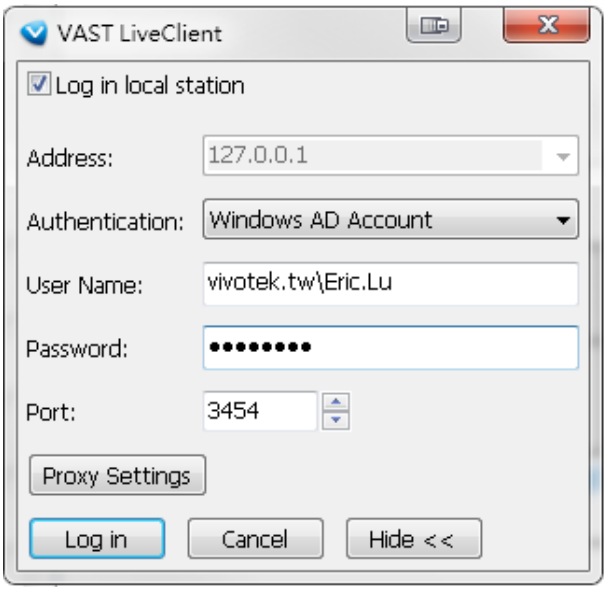
g. Select a **User Role** for the AD user as Administrator, Power user, user, operator, or guest.

h. Select user's privileges in terms of the **Permission**, **Accessible Cameras**, and **Accessible Substations** from the tabbed windows below.

i. Click the **Add** button to complete the process.

The next time you log in, you can select **Windows AD Account**, enter User Name and Password to access the VAST software.

Note that you should specify the domain name in front of the user name; "domain name\user name."

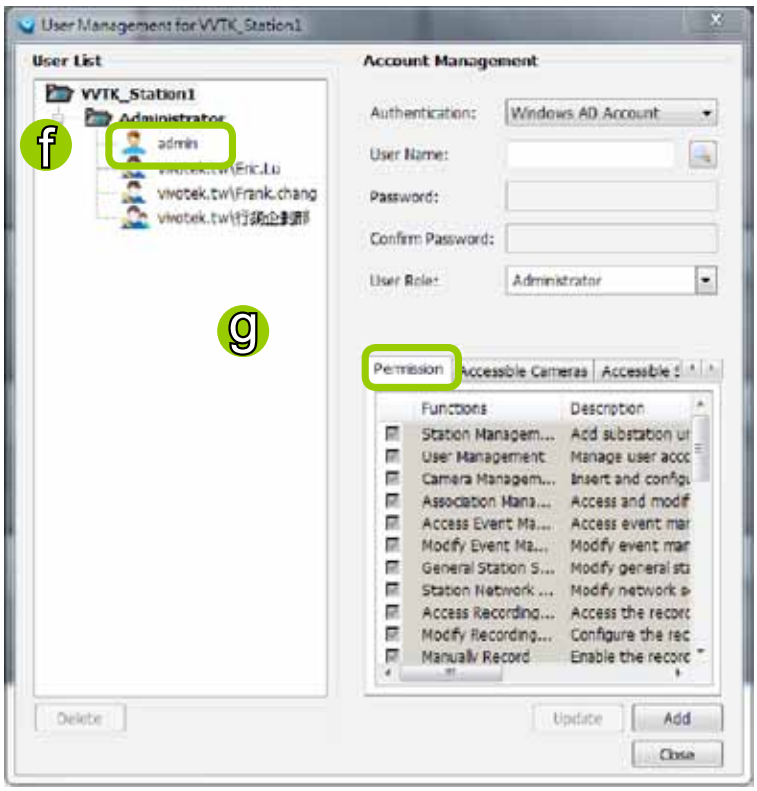


Permission of the User Account

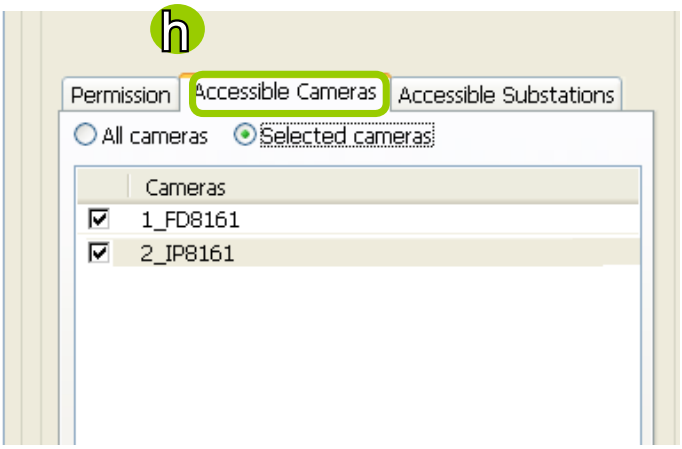
Administrator is granted with all access privileges, while other user roles' permission is limited. If you want to modify the permission, please login as the Administrator to configure the settings.

f. Select a User account from the User List tree.

g. If you want to set the limit of the permission of the user, click **Permission** tab to check or uncheck the items.



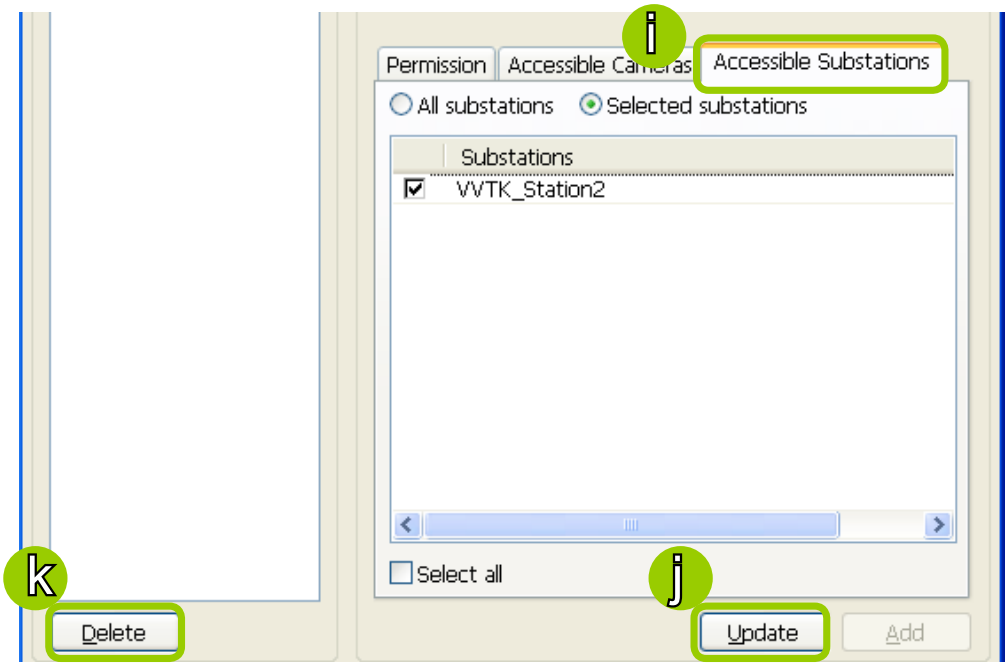
h. If you want to limit the devices accessible by the user, click **Accessible Cameras** tab to select the desired devices.



i. If you want to set the access limit of the sub-station accessible by the user, click **Accessible Substations** tab to select the desired devices.

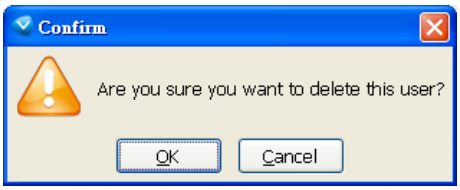
If you want to remove access permission mentioned above from the account, the user will not able to operate some functions listed in the following warning dialog.

j. When completed, click **Update** to enable the new settings.



Delete the User Account

k. Click **Delete**, a delete user dialog will pop up. Click **OK** to delete the user account.



If the Administrator modifies or deletes the User Account, that modified user might be kicked off from the station.

How to Set up Association Management

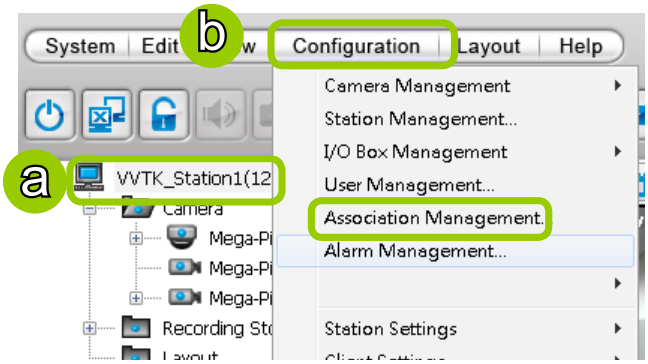
VAST LiveClient supports association management which allows the user to configure relative event trigger notifications of connected network devices. (E.g., DI/DO status on the hierarchical management tree, motion detection windows appear in the video cell, the event list in the event window)

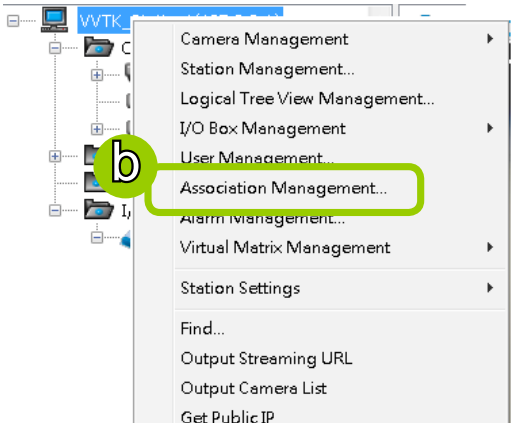
Association Management

Please follow the steps below to configure assocation settings:

a. Select the station from the hierarchical management tree.

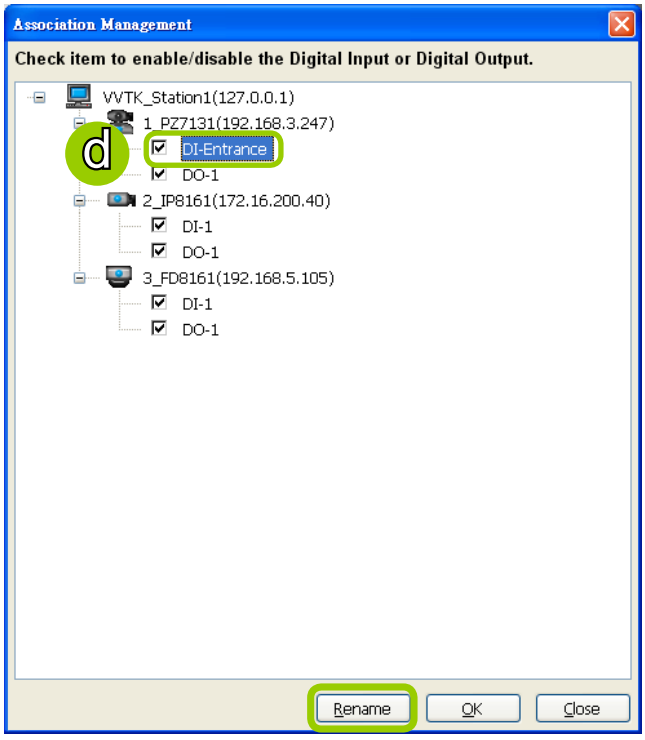
b. Click **Configuration > Association Management** on the menu bar (or **right-click** the station and select **Association Management**).

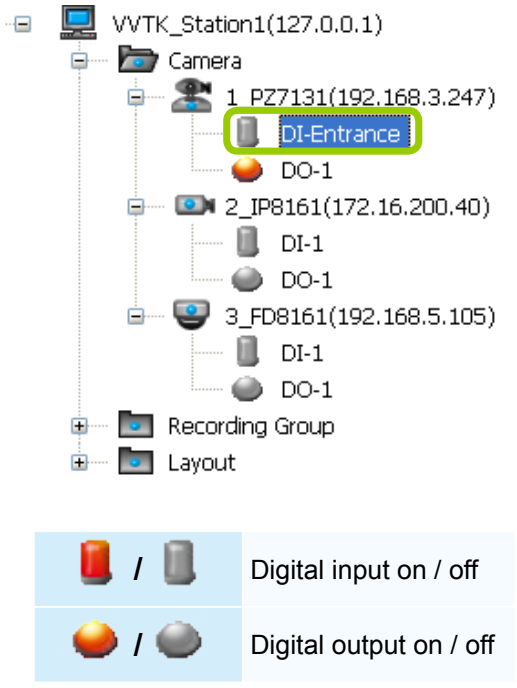




c. The **Association Management** window will pop up. Check or uncheck the items and click **Save** to enable the settings. The items you've selected will also be displayed under the hierarchical management tree.

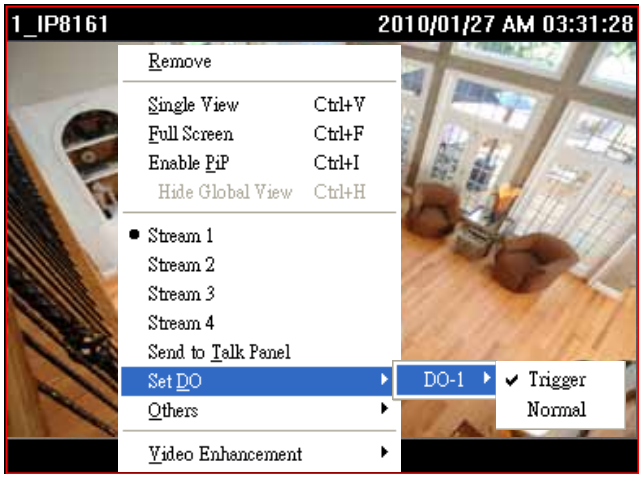
For example:

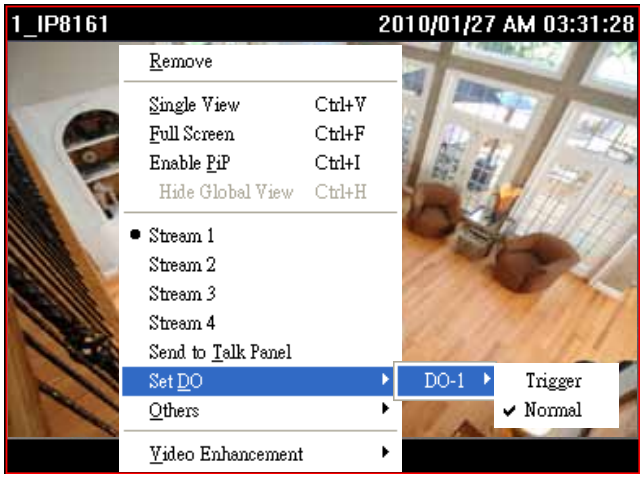




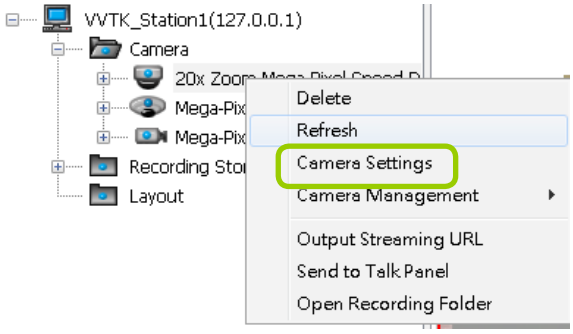
d. If you want to rename the DI device, select the DI item and click the **Rename** button. It will be very convenient for you to recognize the target DI device.

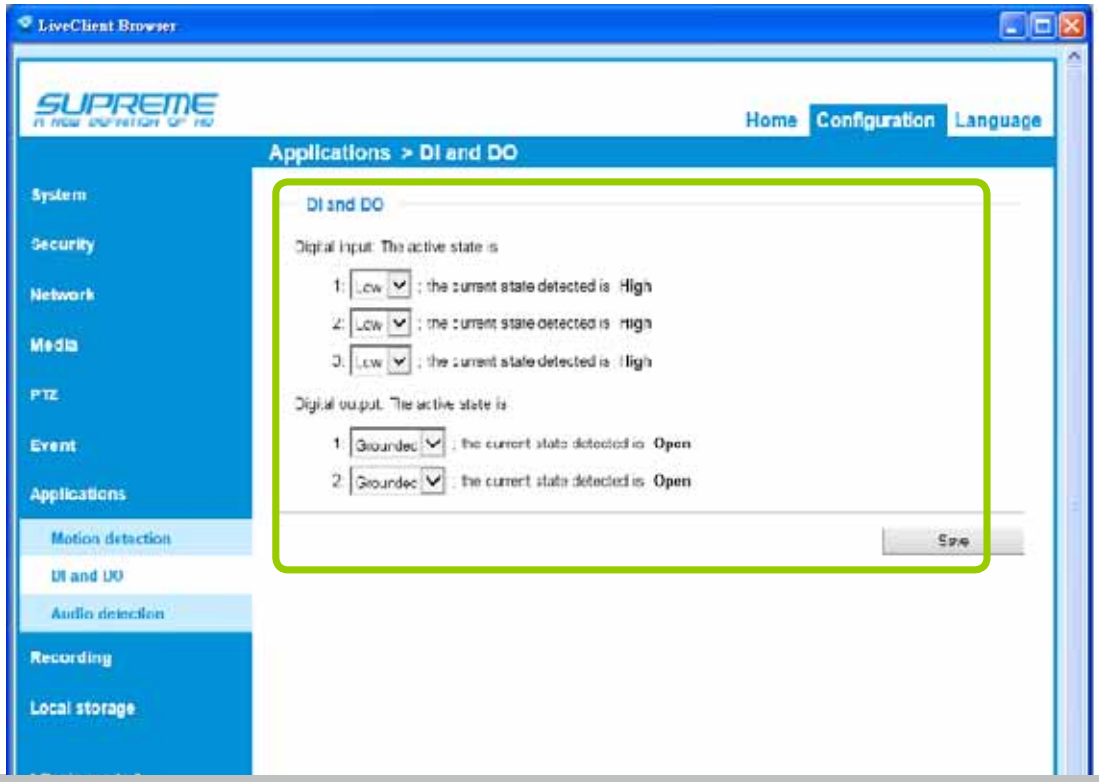
- *To manually enable DI/DO settings, please **right-click** the video cell and select **Set DO** to enable (**Trigger**) or disable (**Normal**) the digital output of the linked device.*





- *Before you configure the DI/DO Settings for VAST, please enable DI/DO settings on your network device and set up the camera correctly on the configuration page. You can **right-click** the device and click **Camera Settings** to open the configuration page.*





How to Set up Alarm Management

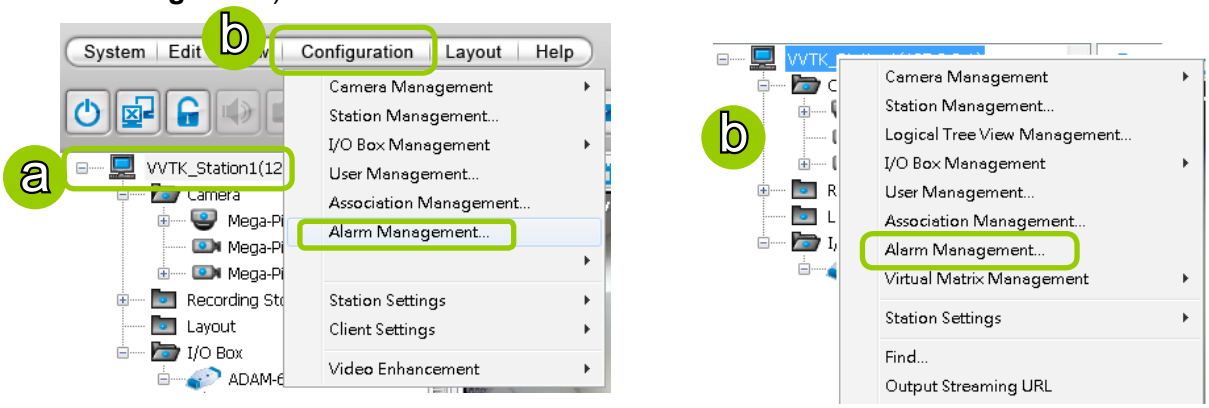
VAST LiveClient supports Alarm management which allows the server to respond to particular situations (events).

Alarm Management

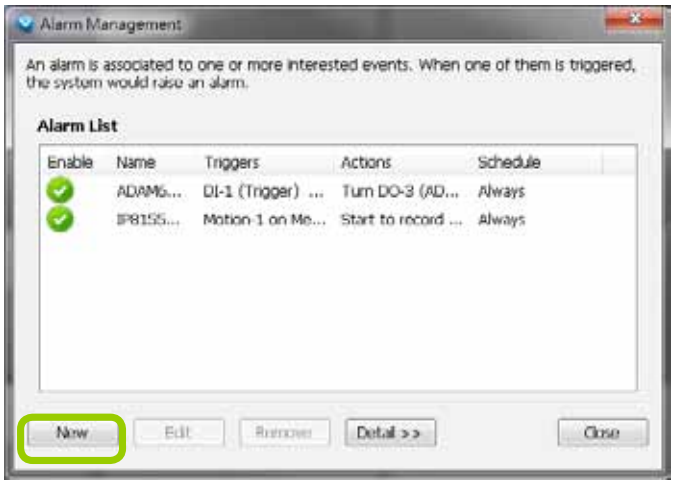
Please follow the steps below to configure event management:

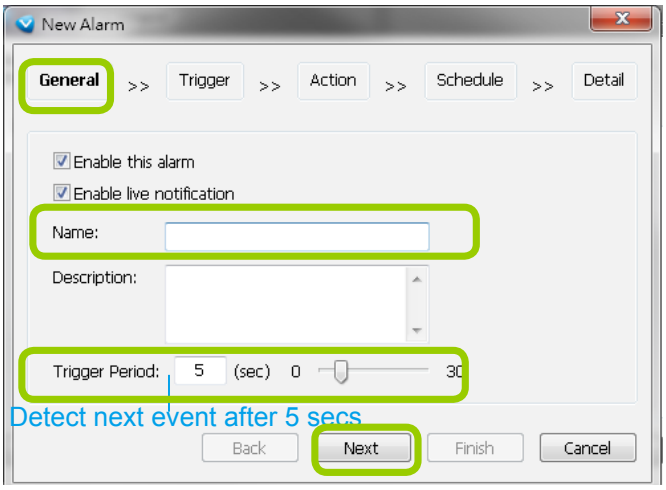
a. Select the station from the hierarchical management tree.

b. Click **Configuration > Event Management** on the menu bar (or **right-click** the station and select **Event Management**).



c. The **Alarm Management** window will prompt. Click **New** to set up a new event. Enter a name and description for the new alarm. When you finish the general settings, click **Next** to set up trigger source settings. The Alarm name you specify here will be displayed on the Alarm panel in the Live view.



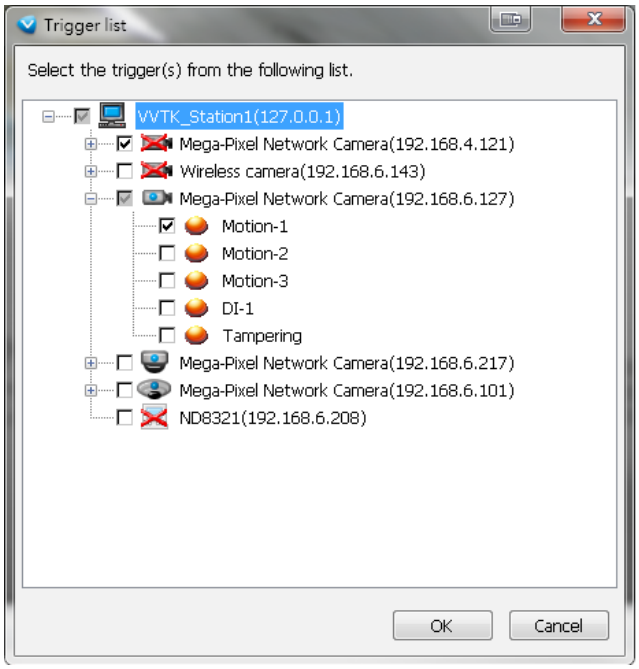


d. Click **Add** to select the trigger source by Device or Trigger Type.

Note that Motion detection windows are separately configured using web consoles with each individual cameras. Open a web console with the camera to configure Motion detection windows.

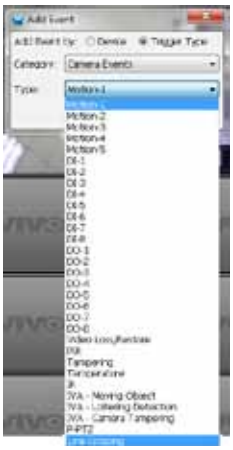
The Storage Status includes: Storage connection status and storage capacity status on NVR systems.

Each individual motion detection window can be used as a triggering condition. The Line Crossing and Field Detection packages running on cameras also apply as triggers.



If you connect your DI/DO devices via an I/O module (I/O box), please refer to page 296, **Appendix D Support for Digital I/O Modbus TCP Modules** for details.

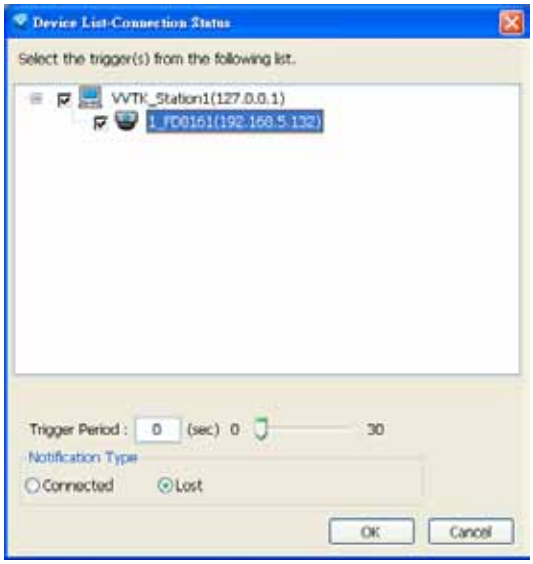
There is a new event trigger type, P-PTZ. The P-PTZ refers to the occurrence of Auto Tracking action in a Panoramic PTZ configuration.



Auto Tracking is configured on the fisheye camera in a Panoramic PTZ configuration.

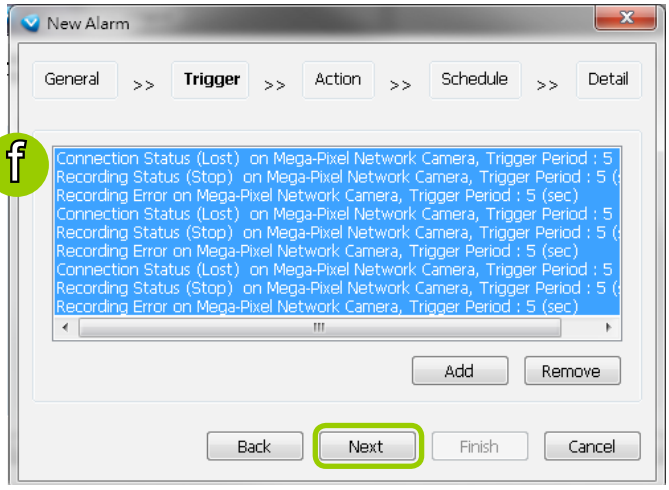
If you manually configure a detection area for the Auto Tracking function, the P-PTZ event will not be triggered.

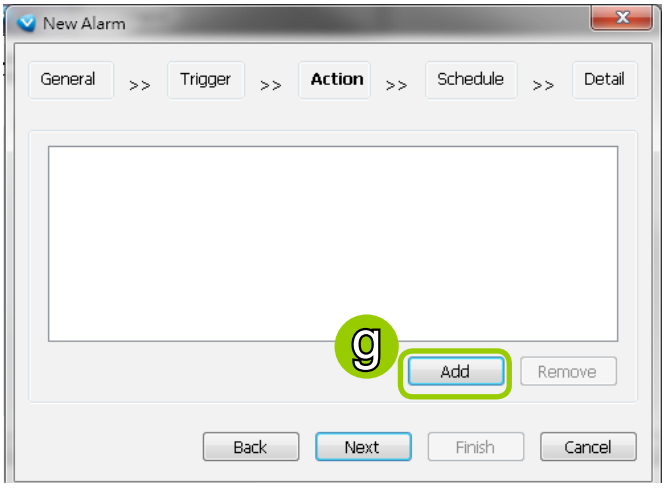
e. The Device List window will pop up. Select one or more devices and set the Notification Type. Depending on the trigger source, the Notification Type will be different. Then click **OK** to close the window.



f. The trigger source(s) will be listed on the window as shown below. If you want to add more Trigger sources, click **Add** and repeat d.~e. Then click **Next** to assign action(s) to the trigger source(s).

g. Click **Add** to open the **Action** Settings window.





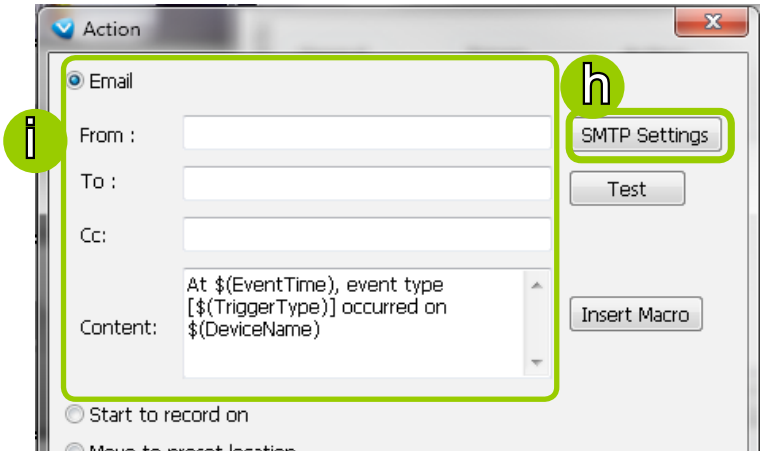
There are several types of Action Settings.

- Email: The sever will send a notification via e-mail when a trigger is activated.

  h. To enable this function, please set up the SMTP server first. Click **SMTP Setting** to open the window and refer to page 185 for detailed information.

  i. Enter the related informtaion. You can modify the mail content in the blank. If you want to modify the content, click **Insert Macro** to select the parameter. When completed, click **OK** on the bottom to enable the setting.

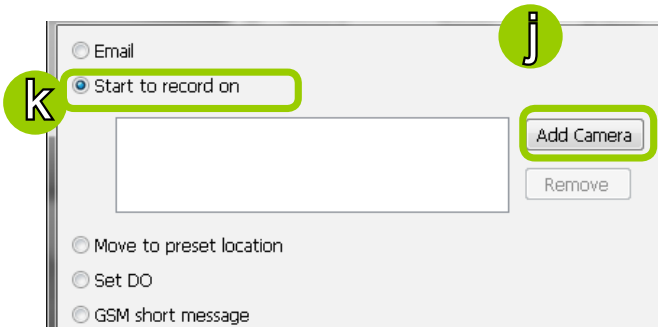
  Note that you can insert a snapshot taken by the time of alarm occurence of the recorded video. The snapshot will be sent along with the notification Email. The snapshot comes from camer's stream 1.

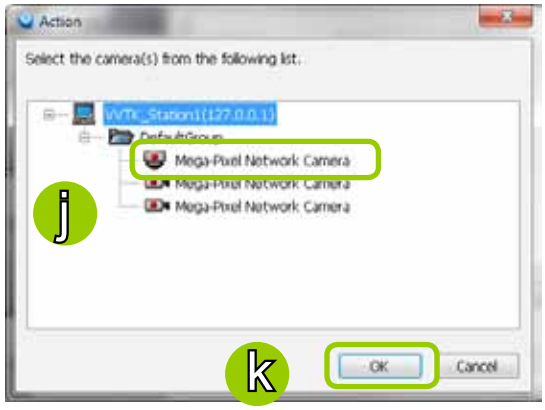


- Start to record on: The sever will start to record video from selected camera(s) when an event is triggered.

  j. Click **Add Camera** to select the target camera(s).

  k. The selected camera(s) will be listed on the left window below. When completed, click **OK** on the bottom to enable the setting.



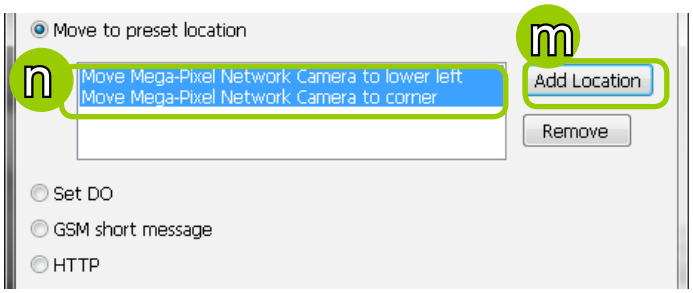


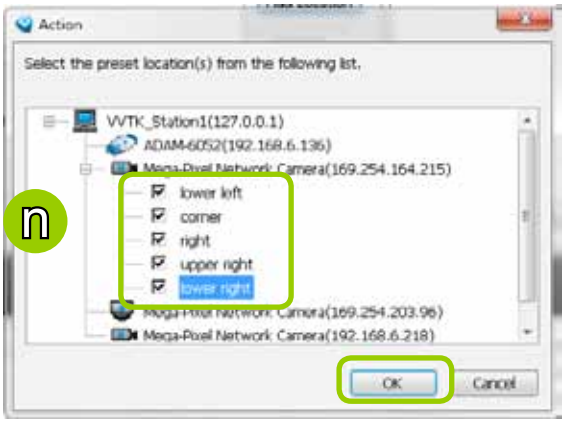
- Move to preset location: The target camera(s) will move the shooting area to the preset location(s) when an event is triggered.

  l. To enable this function, please set preset locations on the camera configuration page first.

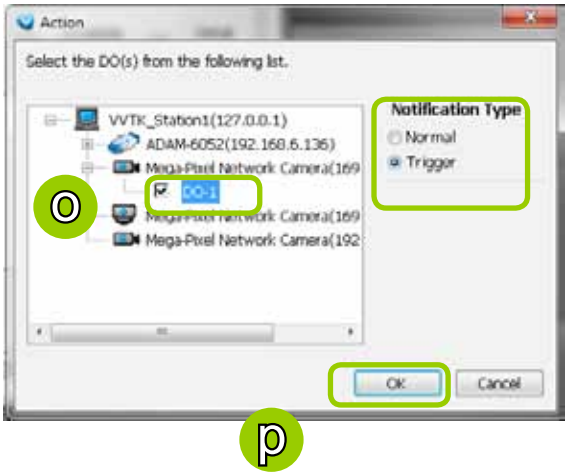
  m. Click **Add Location** to select preset location(s).

  n. The selected preset location(s) will be listed on the left window below. When completed, click **OK** on the bottom to enable the setting.

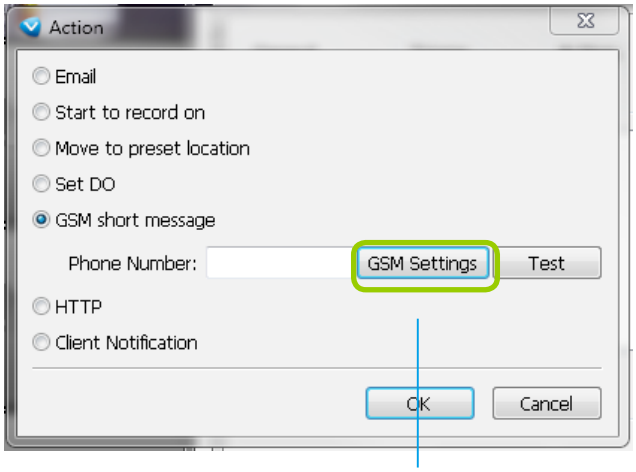




- Set DO: Select this option to turn on external digital output device(s) when an event is triggered. For more information about how to set DI/DO settings on the target camera, please refer to page 137.
  o. Click **Add DO** to select DO decive(s) and select a DO status (Normal or Trigger).
  p. The selected DO device(s) will be listed on the left window below. When completed, click **OK** to enable the setting.

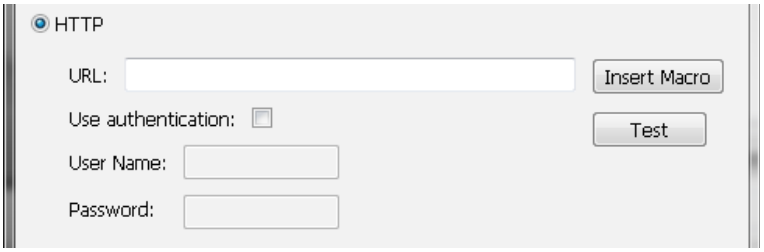


- GSM Short Message: The sever will send a short message to a GSM cell phone when an event is triggered.
  q. Please enter the Phone Number and open **GSM Settings** window to set related information if necessary. When completed, click **OK** to enable the setting.



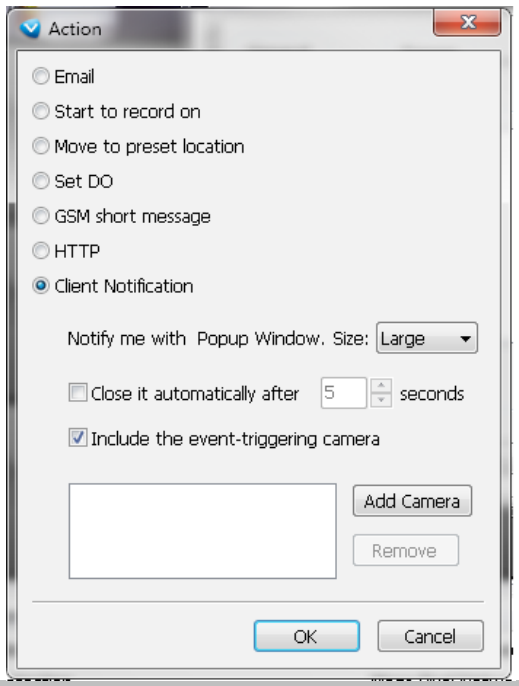
Please enter the country code if you use overseas call.

- HTTP: This function allows user to send a CGI command to the linked network camera, such as pan/tilt/zoom function or enable DO devices.
  r. You can click **Insert Macro** to select the parameter. Please enter authentification information if necessary. For example: http://192.168.3.66/cgi-bin/admin/setparam.cgi?system_hostname=$(EventTime) $(CameraName)
  If you want to use special characters such as $-_.+!*'(),#%+$,@:;/?=&, please refer to the following table to transfer the Code (Hex).
  For example: http://192.168.3.66/cgi-bin/admin/setparam.cgi?system_hostname=123&456
  --> http://192.168.3.66/cgi-bin/admin/setparam.cgi?system_hostname=123%26456

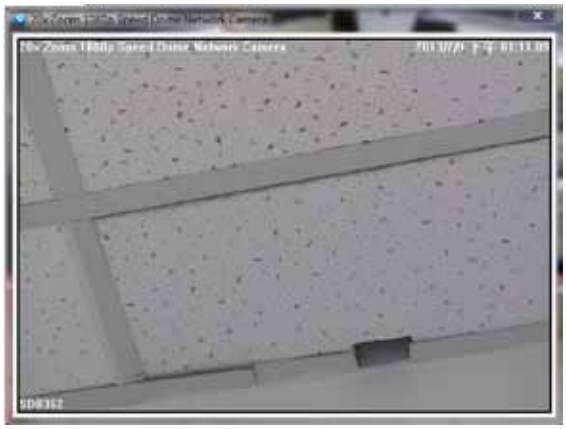


Character	Code (Hex)	Character	Code (Hex)
!	21	,	2C
#	23	-	2D
$	24	.	2E
%	25	/	2F
&	26	:	3A
'	27	;	3B
(	28	=	3D
)	29	?	3F
*	2A	@	40
+	2B	_	5F
		~	7E

- Client Notification: On the occurence of an event, a pop-up window will display to show what is triggering the current event. Select the window size, and select the display duration of the notification window. If not selected, the notification window is manually closed.



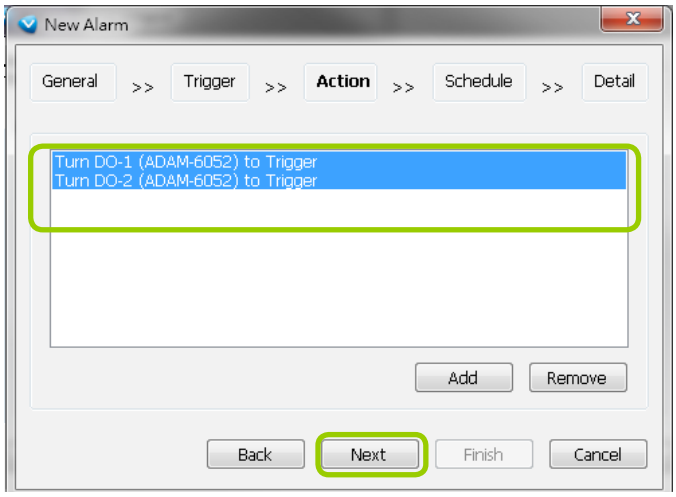
Include the event triggering camera: You can select to display the screens of other cameras (e.g., adjacent cameras) when the notification prompts.

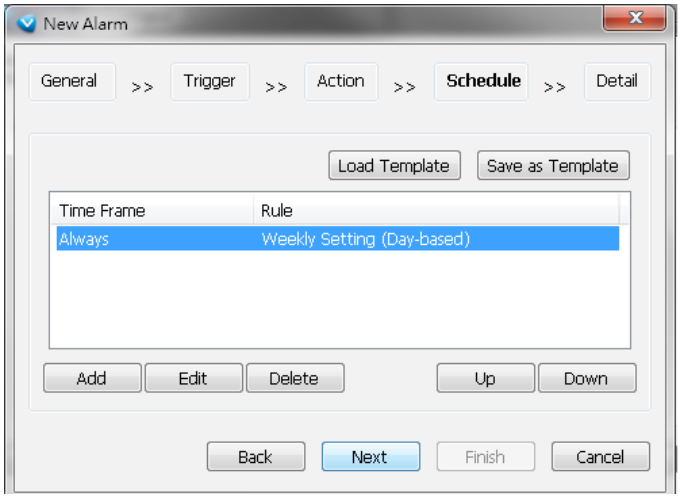


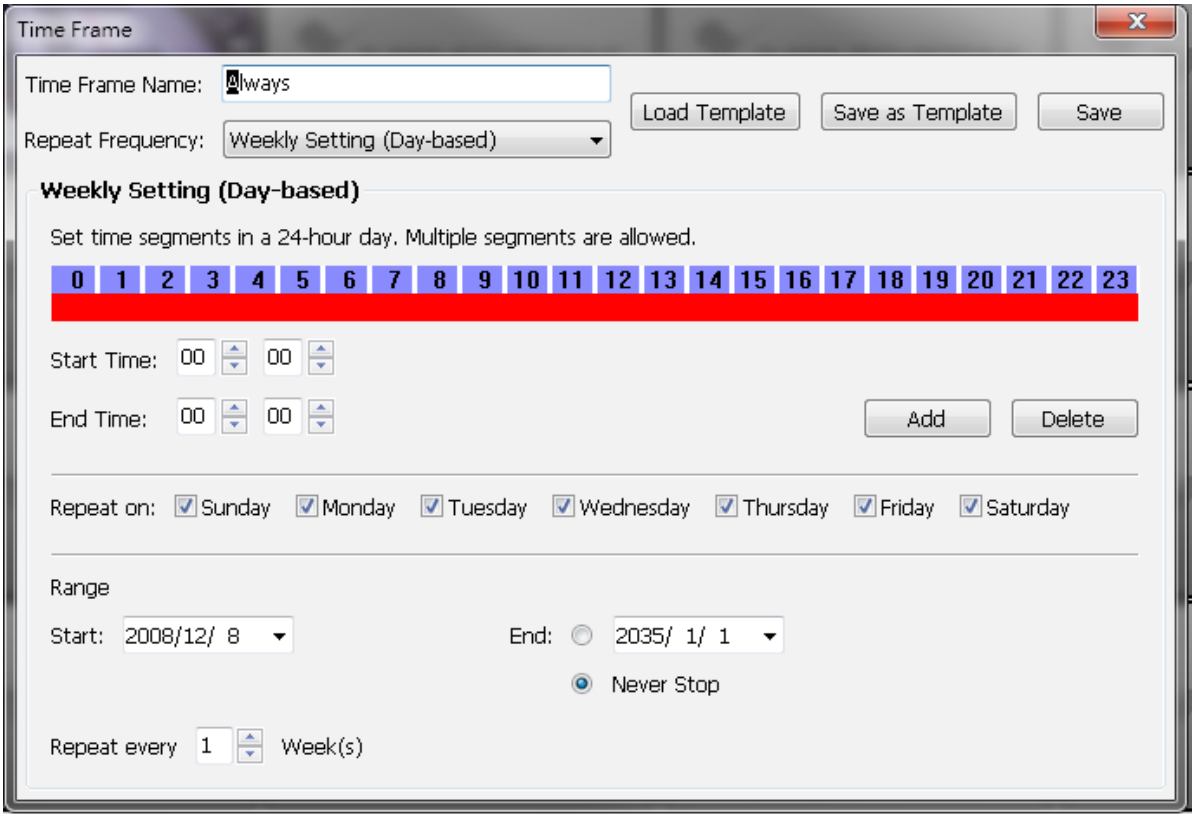
s. The action(s) will be listed in the window as shown below.

Then click **Next** to set up schedule(s) to the action(s).

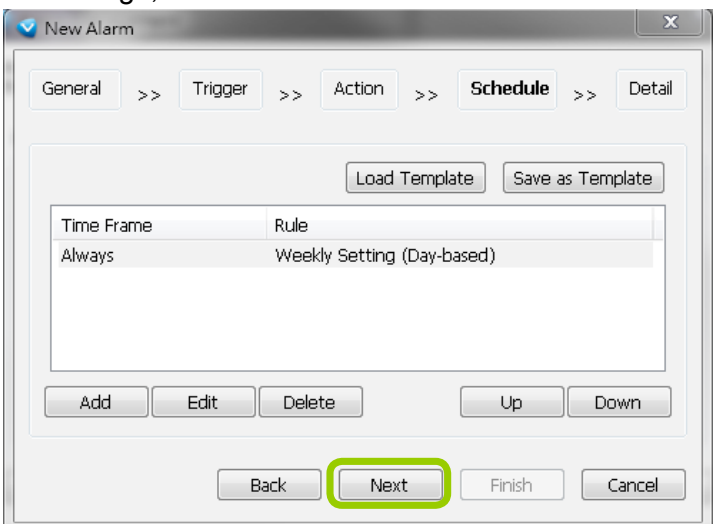
For more information about **Schedule Settings**, please refer to Recording Schedule Settings on page 161. You can assign more than one time frame to one action.



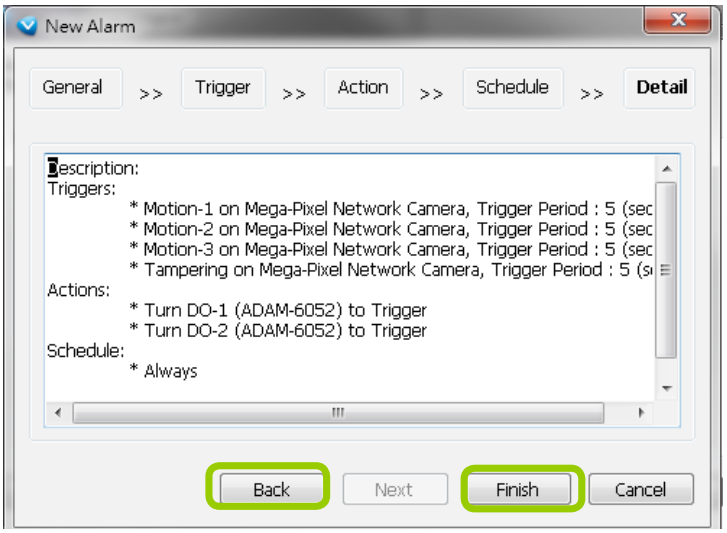




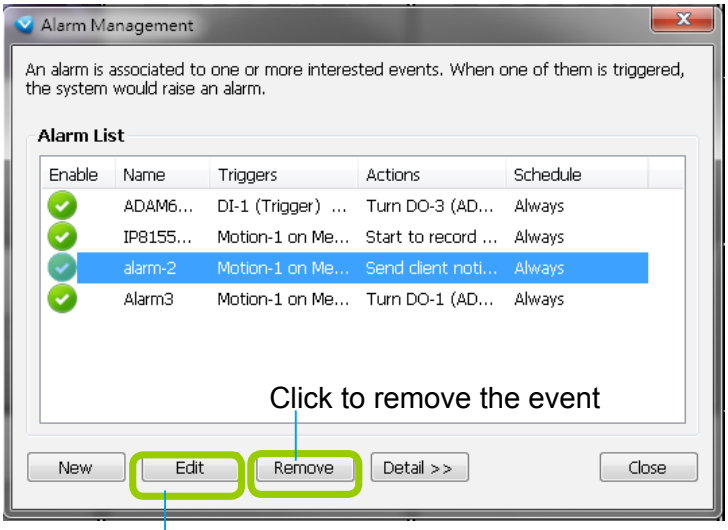
t. When you finish schedule settings, click **Next** to review the detailed information of the new event settings.



u. Following is the detailed information of the new event setting. You can click **Back** to modify the event setting or click **Finish** to close the window.



v. Following is an example of an enabled event. You can click **New** to set up more events or click **Close** to exit the window.



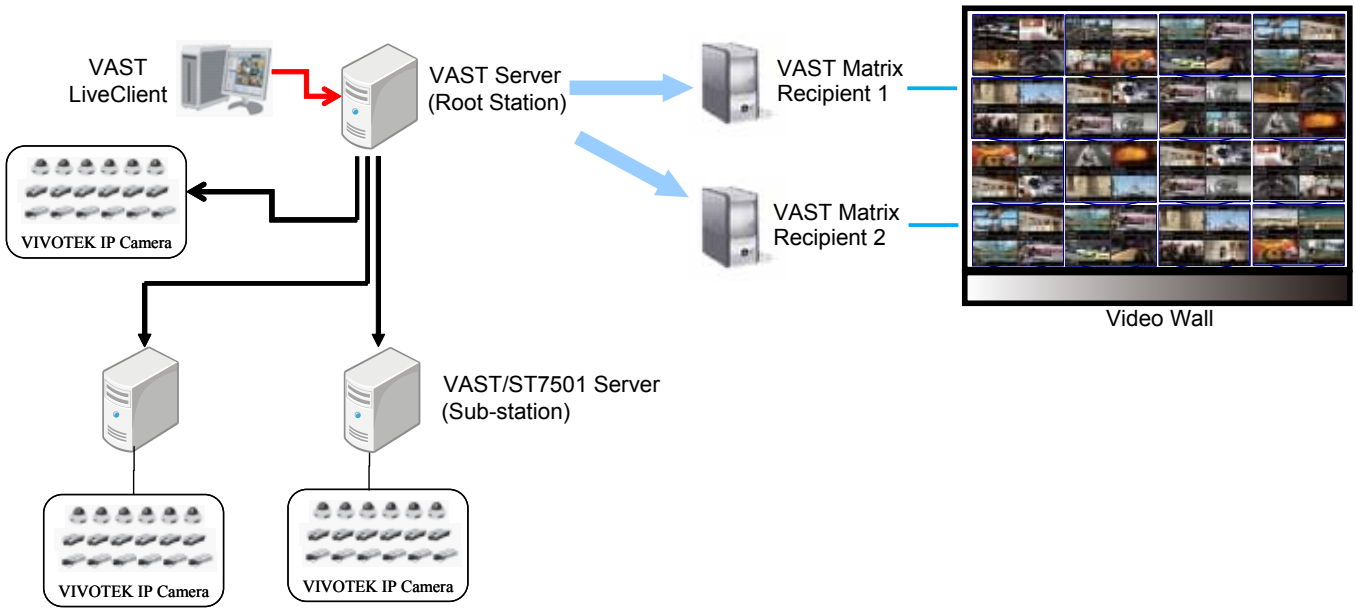
*If your target station has sub-station(s), the **trigger sources** can be selected from the device(s) under the sub-station(s); while the **actions** can only be performed on the device(s) under the target station.*

How to Manage the Virtual Matrix

Virtual Matrix is a very useful tool for multiple monitor display and management. Based on the whole surveillance system architecture, it efficiently helps user construct a real-time live video wall in the control center. Under a large-scale hierarchical system, through VAST LiveClient you can only simultaneously monitor up to 64-CH on dual monitors; while Virtual Matrix offers fully extension for numerous channels and screens, thus making VAST a very powerful central management system. Moreover, you can change the layout to 2x2 or 3x3 on each monitor to enlarge the video size, then display the video pages on saperate monitor for close-up monitoring.

The architecture of VAST Matrix

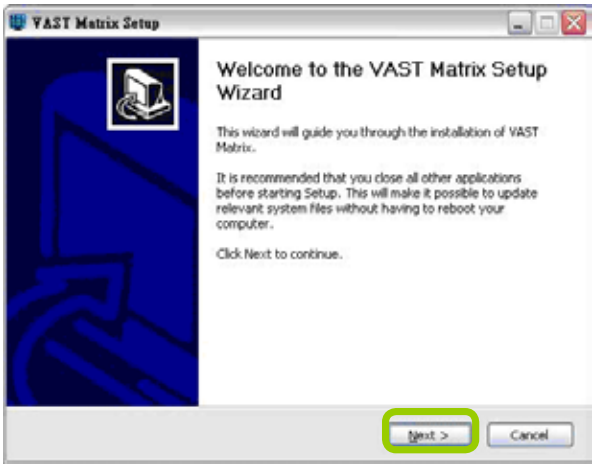
As the following picture shows, the surveillance system architecture is composed of VAST LiveClient, VAST Server with two sub-stations, and VAST Matrix separately on individual hosts. Before constructing the Virtual Matrix, please install and run VAST Matrix Program on Matrix Recipient connected with the video wall. Through the Virtual Matrix connection, you can use LiveClient to log in the root server to remotely manage and display all the live view onto the video wall by easily drag-and-drop. PTZ control is also available as on the LiveClient.



Installing VAST Matrix Program

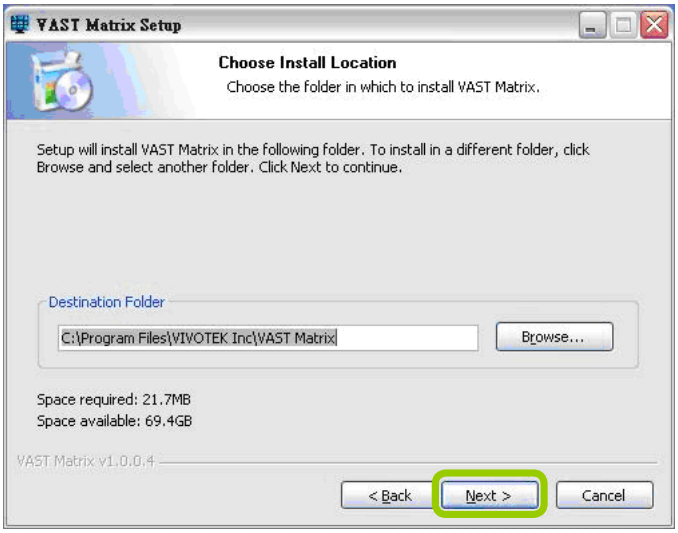
Please follow the steps below to install VAST Matrix Program:

a. Run **VASTMatrix_setup.exe** on another host (Matrix Recipient). Then click **Next** to start installation wizard.



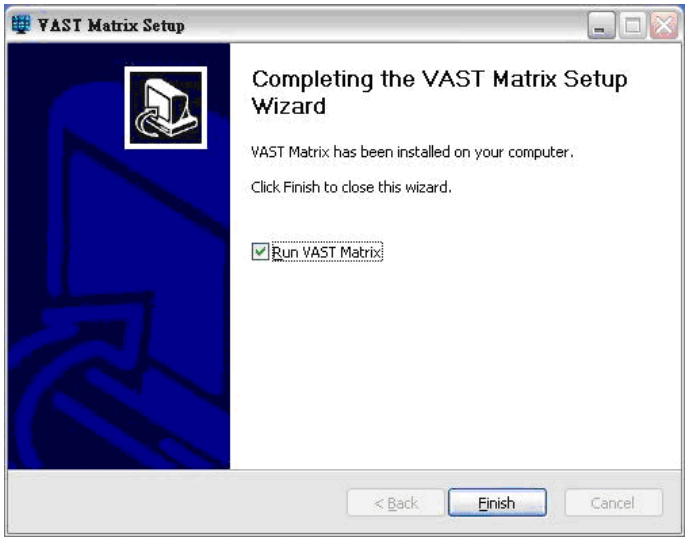
b. Carefully read to accept the End-User License Agreement for use. Click **I Agree** to the next step.

c. Choose the installing path as the destination folder, the required space and available space of the hard disk will be shown below for reference. Click **Next** to the next step.



d. Fill in the connection information with Port, Account & Password for VAST Server to connect to the Matrix Recipient.

e. Click **Finish** to close the installation wizard, and you might want to run VAST Matrix immediately after installation by selecting the option **Run VAST Matrix**.



Launching VAST Matrix

Please follow the steps below to install VAST Matrix Program:

a. Click the desktop icon to start VAST Matrix. When it's begun running, there will be a VAST Matrix tray icon on the toolbar for the user to configure easily.

b. The VAST Matrix live view window with multiple types of layout will be displayed. The following shows 32-channels layout.

c. **Right-click** on the live view window, a function menu will pop up. You may also open the menu by right-click on the tray icon.

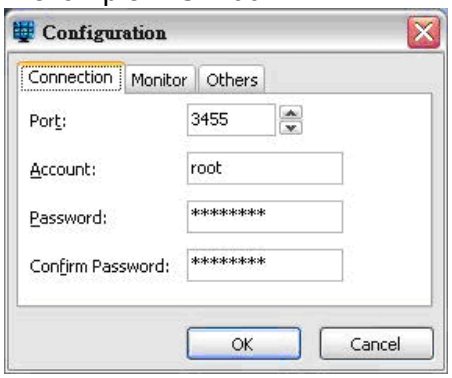
Configuration

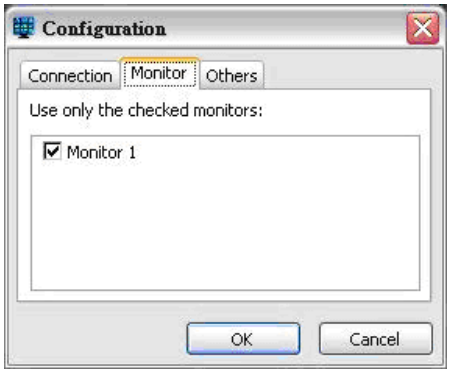
- Connection: Enter the account, password and port information for the VAST Recipient.
- Monitor: It shows the monitor(s) connected to your host. You can select the monitor(s) you wish to display as the video wall.
- Others

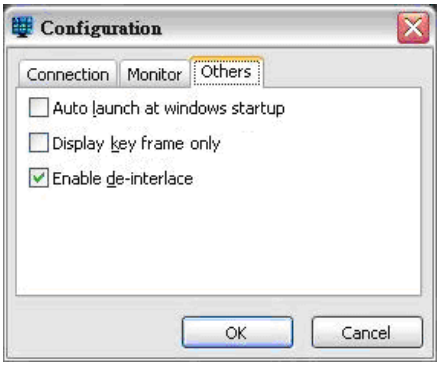
  Auto launch at windows startup: Select this option if you want VAST Matrix to launch when windows starts up in case to avoid the computer reboots by itself and accidentally shuts down VAST Matrix.

  Display key frame only: Select this option to display live video with the key frame only in order to save the bandwidth. It also lowers down the CPU loading and memory usage.

  Enable de-interlace: Select this option if your linked device does not support de-interlace function. For example: VS7100.







View Settings

Please refer to page 206 for detailed illustration.

About

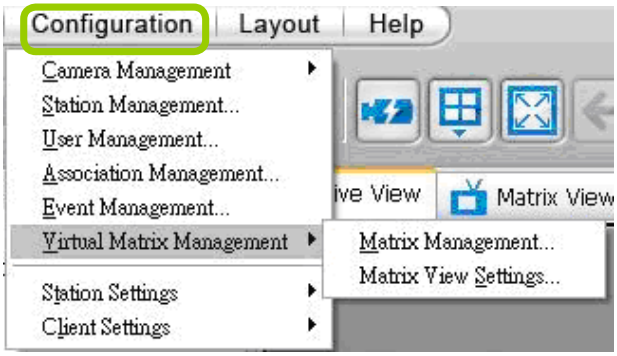
This dialog that shows the version of VAST Matrix and the simple statement of the version copyright.

Exit

Click to close the VAST Matrix.

VAST Matrix Management

Once the VAST Matrix Program is setup completely, the next step is to connect the VAST Server with VAST Matrix Recipient(s). Use LiveClient to log in VAST Server, then click **Configuration** > **Virtual Matrix Management** to configure Matrix Management and Matrix View Settings.



Matrix Management Settings

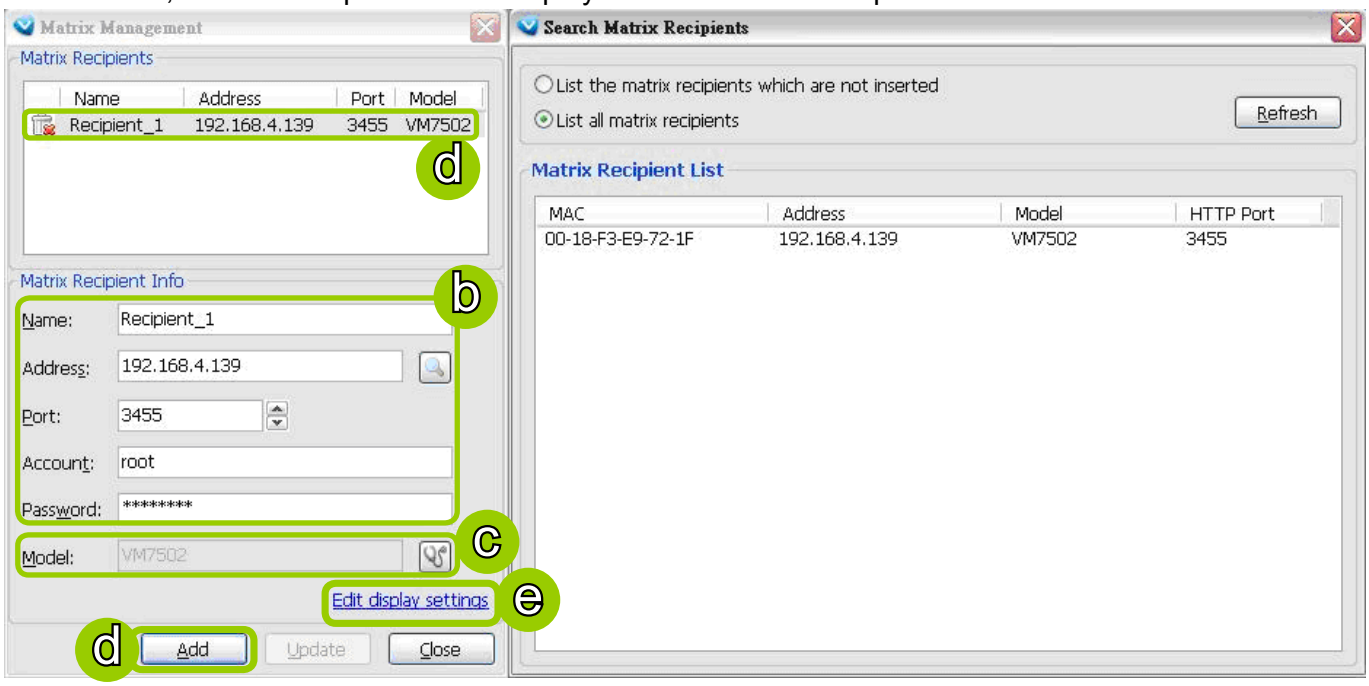
Please follow the steps to set up VAST Matrix Recipient(s):

a. Click **Configuration** > **Virtual Matrix Management > Matrix Management** to open the Matrix Management window.

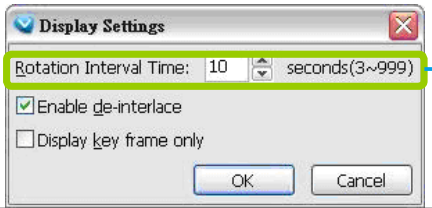
b. Manually enter the Matrix Recipient Info as previous settings, or you click the search button to search for the Matrix Recipient(s) on the LAN.

c. When the information of the target recipient is filled in, you can use the detect button to confirm if the filled information is correct.

d. Click **Add**, then the recipient will be displayed on the Matrix Recipients list window.



e. Click **Edit display settings** to set up the viewing interface for the monitors (video wall) connected to the Matrix Recipient host.



The Matrix View display is capable of executing rotation. The default interval time is set at 10 seconds.

f. If you want to set up more Martrix Recipients, repeat the above steps.

g. If you want to modify the Recipient Info, select it from the list to change settings, then click **Update** to enable the new settings.

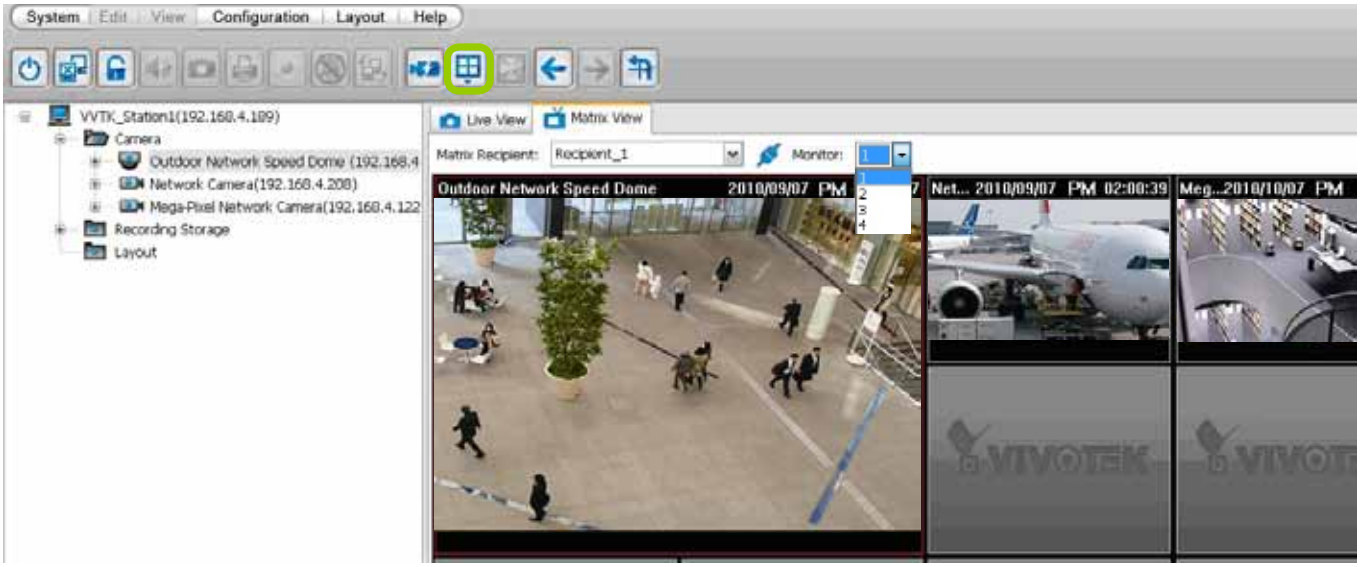
h. When all settings are done, click **Close** to exit the Matrix Management page.

Manage VAST Matrix through VAST LiveClient

Once the setup is complete in Virtual Matrix Management, you may go back to the main page of LiveClient, the connection between VAST Server and VAST Matrix will be working successfully. Then you can choose Matrix Recipient and the monitor from the drop-down list for the operation control. Some buttons on the quick access bar will be disabled when you switch from the Live View Panel to Matrix View Panel.

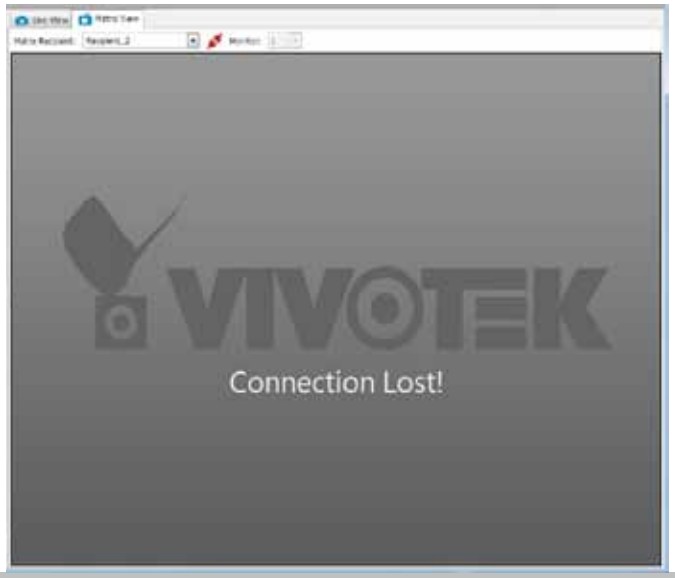
- Change the layout

As the following picture shows, you can click to change the layout and set new layout group on the Matrix View Panel as easy as control of the LiveClient. The layout on the monitor (video wall) will also change synchronizely once you change the layout on Matrix View Panel.



- Connection status

If the VAST Server is not able to connect to the Matrix Recipient, the status icon will become and show the reason of disconnecting when you slide the mouse to the connection status icon. The "Connection Lost" string will be displayed on the Matrix View window as shown below.



- Rotation

  VAST Matrix is capable of executing rotation by clicking . You can even select another layout group on the Matrix View window without stopping the rotation. If you want to adjust the rotation interval time, please refer to **Edit display settings** on page 151 for adjusting.

- PTZ

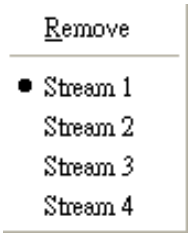
  VAST Matrix currently does not support PTZ control.

- Matrix View Menu

  Right-click on the window to open the menu.

  Remove: Remove the channel from VAST Matrix.

  Stream 1 ~ 4: Switch the camera stream between 1 ~ 4.



- Remove All Connections

  It's capable of removing all connections from VAST Matrix once by clicking on button.

Matrix View Settings

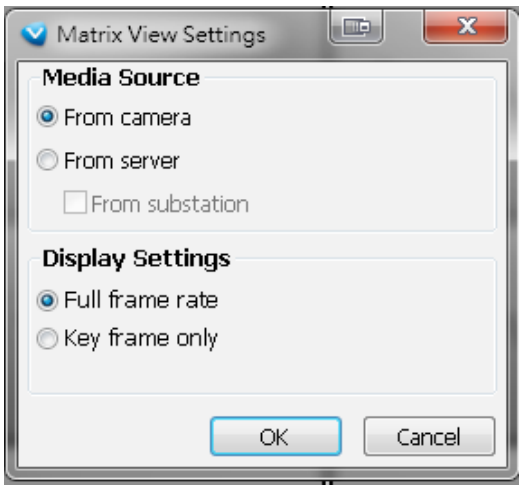
Click **Configuration** > **Virtual Matrix Management > Matrix View Settings** to open the window.

- Media Source

  You can choose the path of media source from camera directly or the CMS server to display on Matrix View.

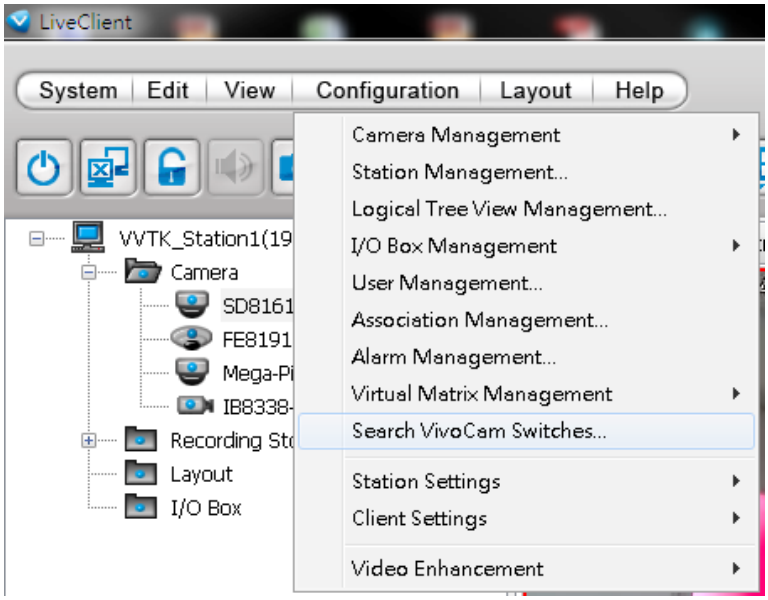
- Display Settings

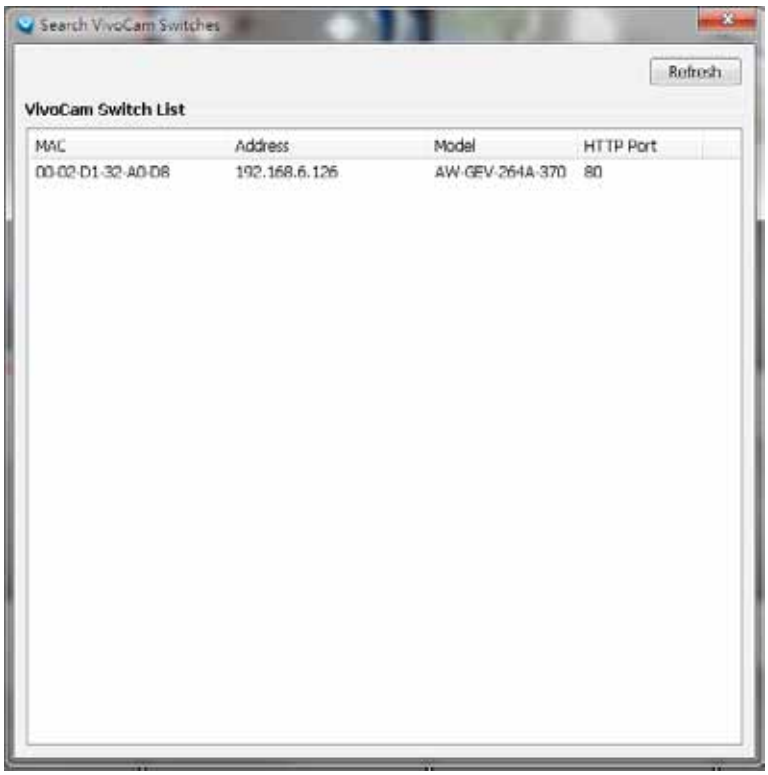
  You can choose the display frame rate as full frame rate or key frame only.



Search VIVOCam Switches

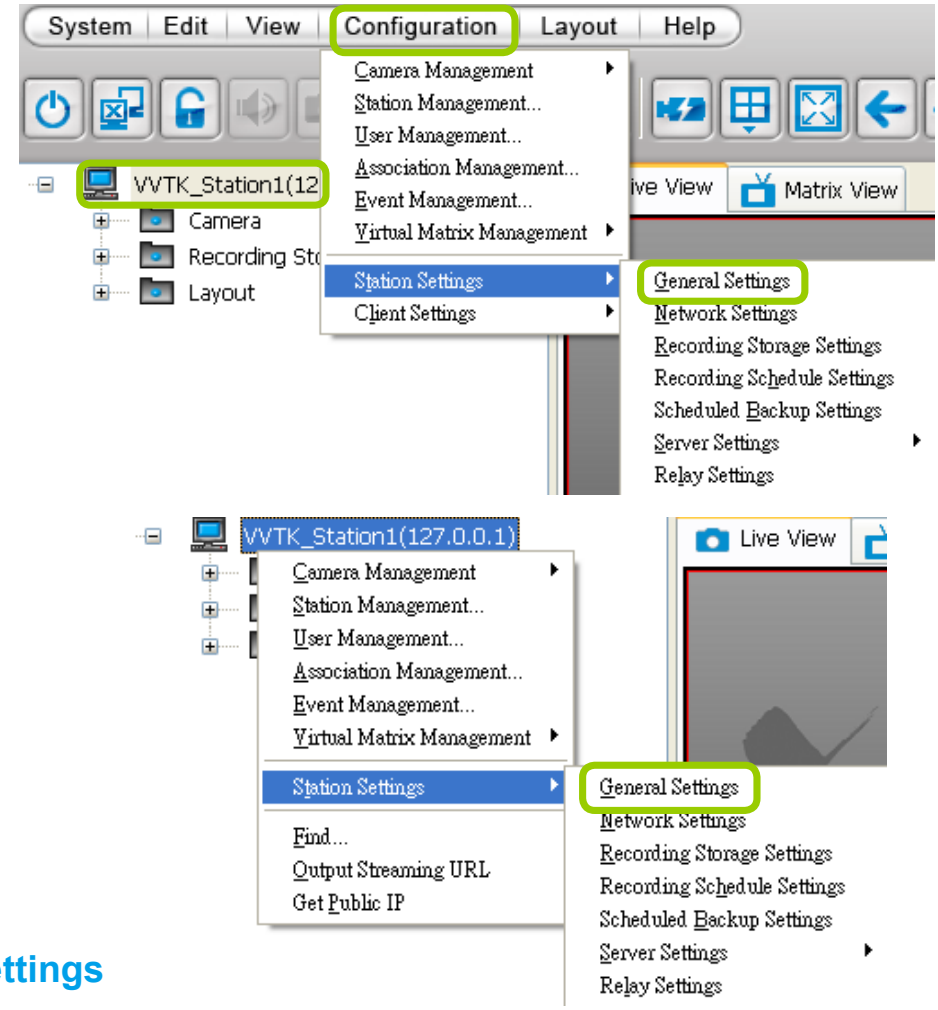
Use the serach managed switch function to locate and open a web console with the managed switches. Double-click on the entry found to open a web console.





How to Configure the Station General Settings

Select the target station from the hierarchical management tree, then click **Configuration > Station Settings > General Settings** on the menu bar (or **right-click** the station on the hierarchical management tree and select **Station Settings > General Settings**). The **Station General Settings** window will pop up.



Server Settings

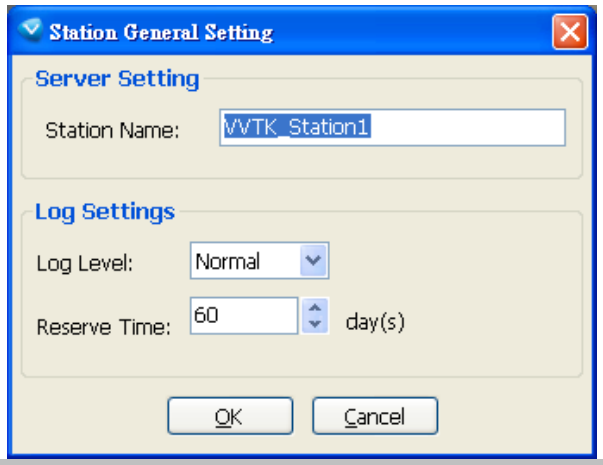
In this section, you can modify the Station Name.

Log Settings

In this section, you can set up **Log Settings** for the station.

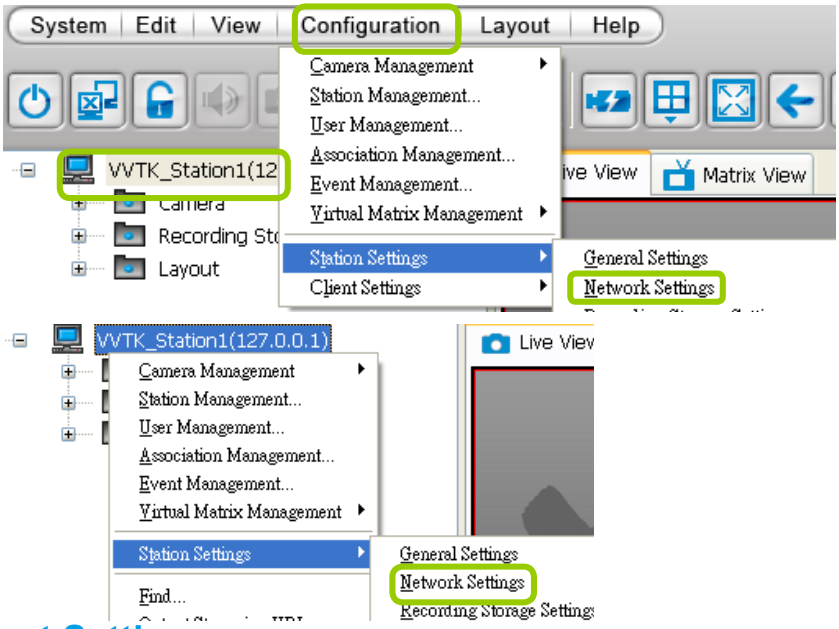
The VAST server allows user to search for the recorded log through VAST Playback. For more information, please refer to **How to Search Logs** on page 276.

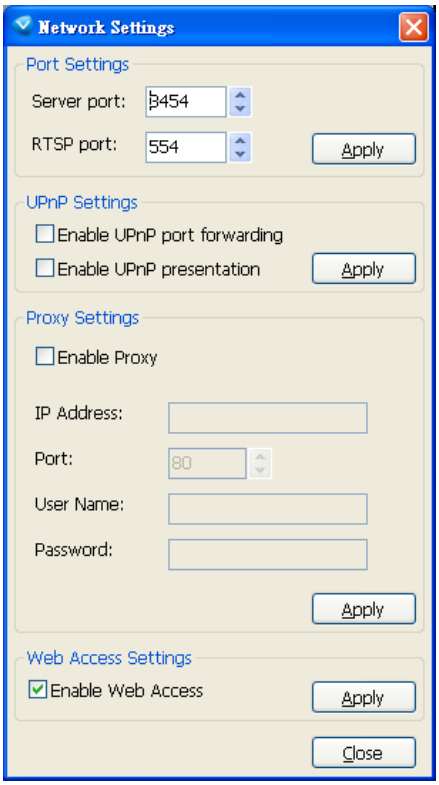
- Log level: Select **High** (only record high-level logs), **Normal** (record high-level and normal-level logs), **Low** (record all logs). For detailed information about log levels, please refer to page 277.
- Reserve Time: Enter the time interval that you want to reserve the log record. The maximum value is 365 days.



How to Configure Station Network Settings

Select the target station from the hierarchical management tree, then click **Configuration > Station Settings > Network Settings** on the menu bar (or **right-click** the station on the hierarchical management tree and select **Station Settings > Network Settings**). The **Network Settings** window will pop up.





Port Settings

- Server port: The default server port is set to 3454. If you change the server port, please enter the new value while logging the LiveClient next time.
- RTSP port: The RTSP (Real-Time Streaming Protocol) controls the delivery of streaming media. By default, the port number is set to 4543.

UPnP Settings

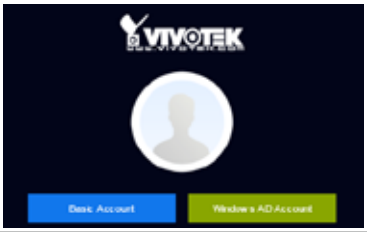
- Enable UPnP port forwarding: For client to access the VAST Server from the Internet, select this option to allow the server to open ports on the router automatically so the video streams can be sent out from a LAN. To utilize of this feature, make sure that your router supports UPnP™ and it is activated.
- Enable UPnP presentation: If you select this option, shortcuts to VAST Server will be listed in My Network Places.

Proxy Settings

In this section, you can enable, modify, or cancel **Proxy Settings** for VAST Server if your network devices are set up under a proxy.

Web Access Settings

User can access VAST LiveClient and Playback via Internet web browser (*http://IP address:3454*). For local host --> *http://127.0.0.1:3454. See page 132 for Windows AD account information.*



How to Edit Recording Groups

By default, all devices are assigned to the default recording group. You can manually remove a device from the default recording group. However, only those devices which belong to a recording group can produce recorded media files.

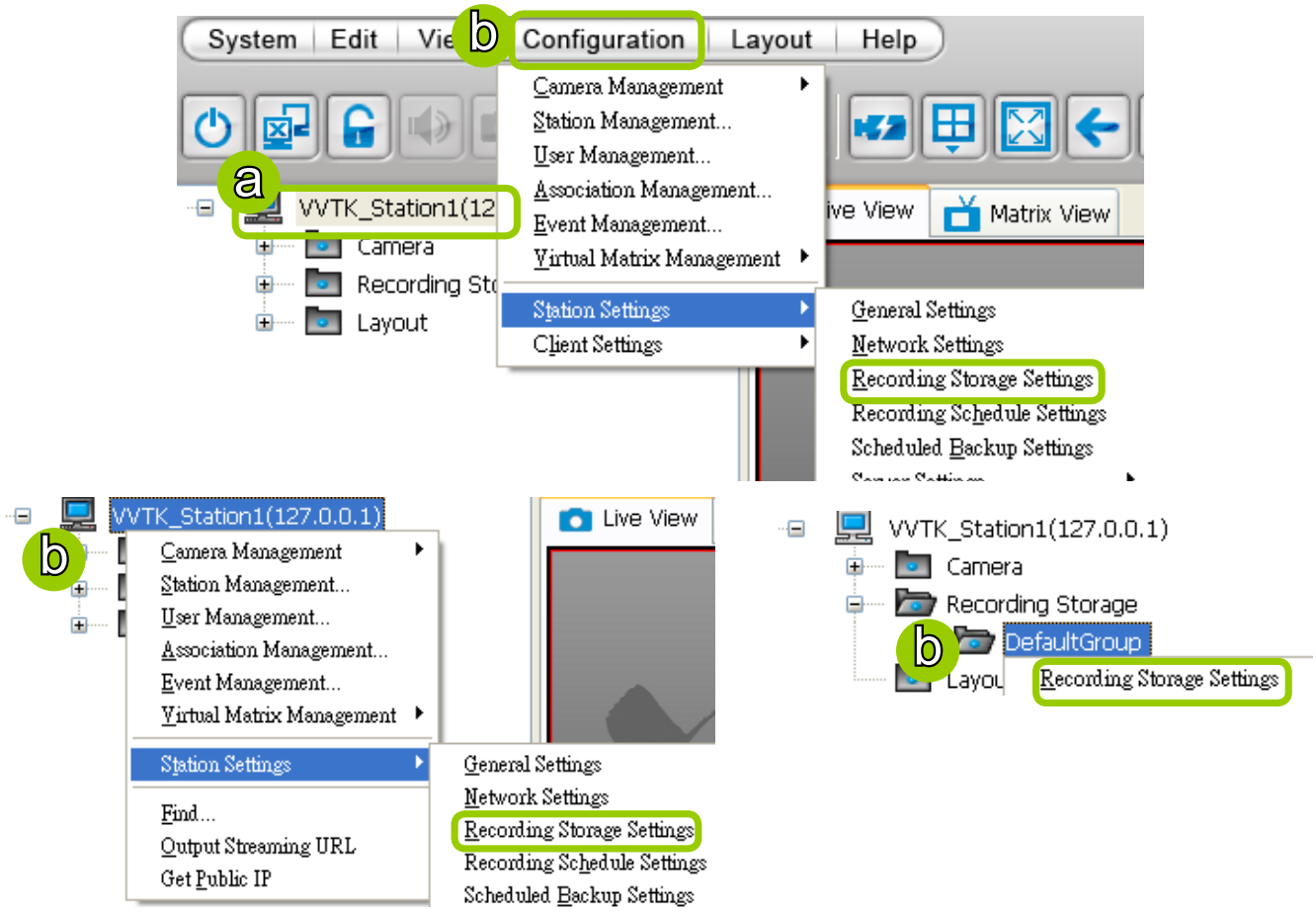
Another purpose of setting recording group is that you can divide all the managed devices into several recording groups, and for each recording group, you can assign several hard-disks (with recording paths) to store media data. The live media data will be stored in the first assigned hard-disk initially, and when the available space of the first hard disk reaches the preset reserved space limit, the media data will be stored in the second disk and so on. If the available space of the last disk reaches the reserved space limit, the recorded files in the first disk will be overwritten with the new media data. This procedure is called "Cyclic Recording".

Recording Storage Settings

Please follow the steps below to set up recording groups for a station:

a. Select the target station from the hierarchical management tree.

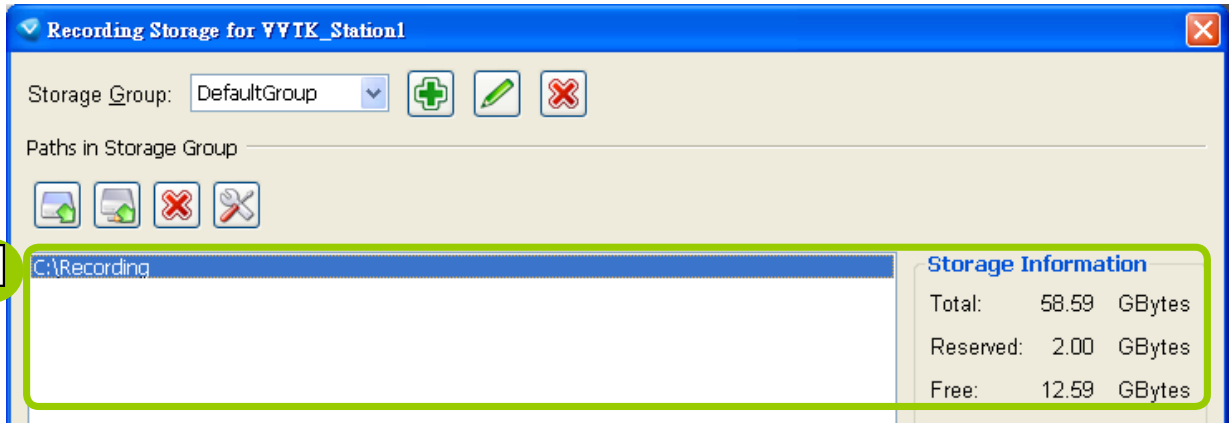
b. Click **Configuration > Station Settings > Recording Storage Settings** on the menu bar (or **right-click** the station on the hierarchical management tree and select **Station Settings > Recording Storage Settings**). You can also **right-click DefaultGroup** under the station **and** click **Recording Storage Settings** since all devices are assigned to the **Default Recording Group** by default settings.



c. The **Recording Storage Settings** window will pop up.

Default Storage Group Settings

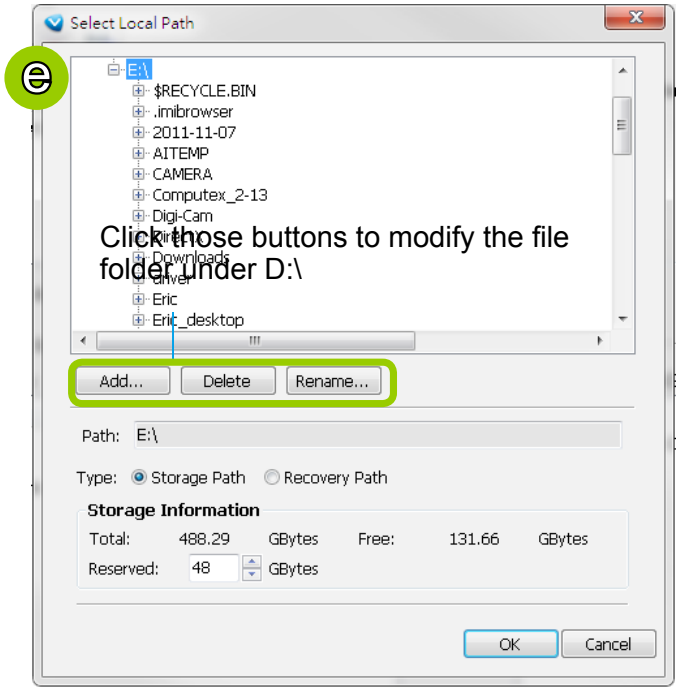
The following example shows the default storage group settings. You can click **Rename** to modify the group name or click **Delete** to remove the default settings.

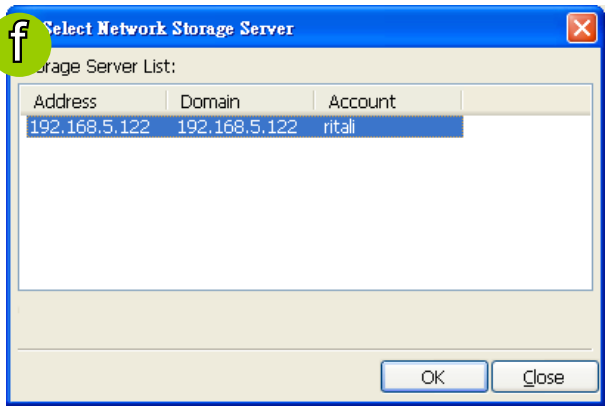


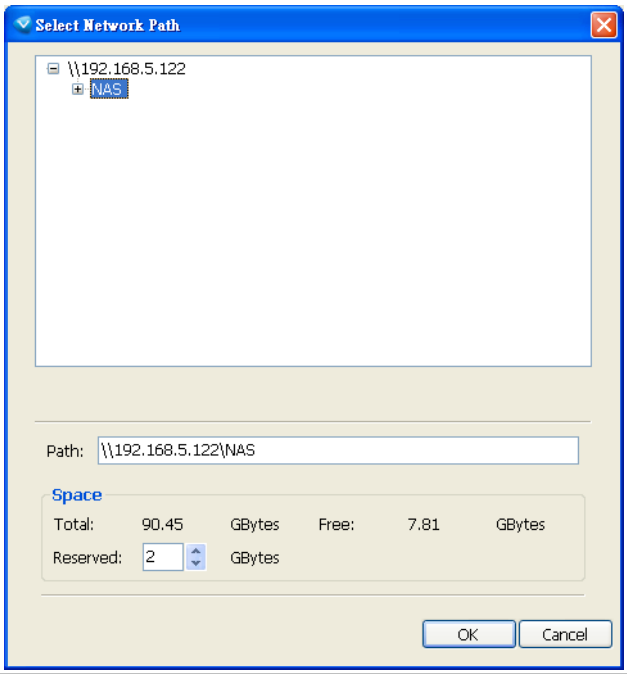
d. The default recording path is **D:\Recording**. The total space and free space of the disk is shown on the right for reference.

e. Add Local Path: Click to add another recording path on your local computer. A Select Path dialog will pop up as shown below. When all settings are complete, click **OK** to enable the settings, or click **Cancel** to discard the settings. The default reserved space is 10% of the disk volume.

f. Add Network Path: Click to add a networked storage for recorded data. Please refer to page 184 for detailed information about how to add a new network storage server. Then double-click the **Path** to assign a specific folder as a new recording path.



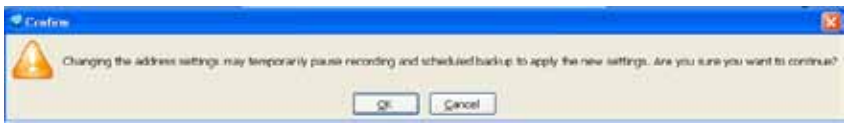




Note that the reserved space is the comparatively small amount of storage space saved for data transaction during recording cycles. The reserved space is not the storage space configured for video recording.

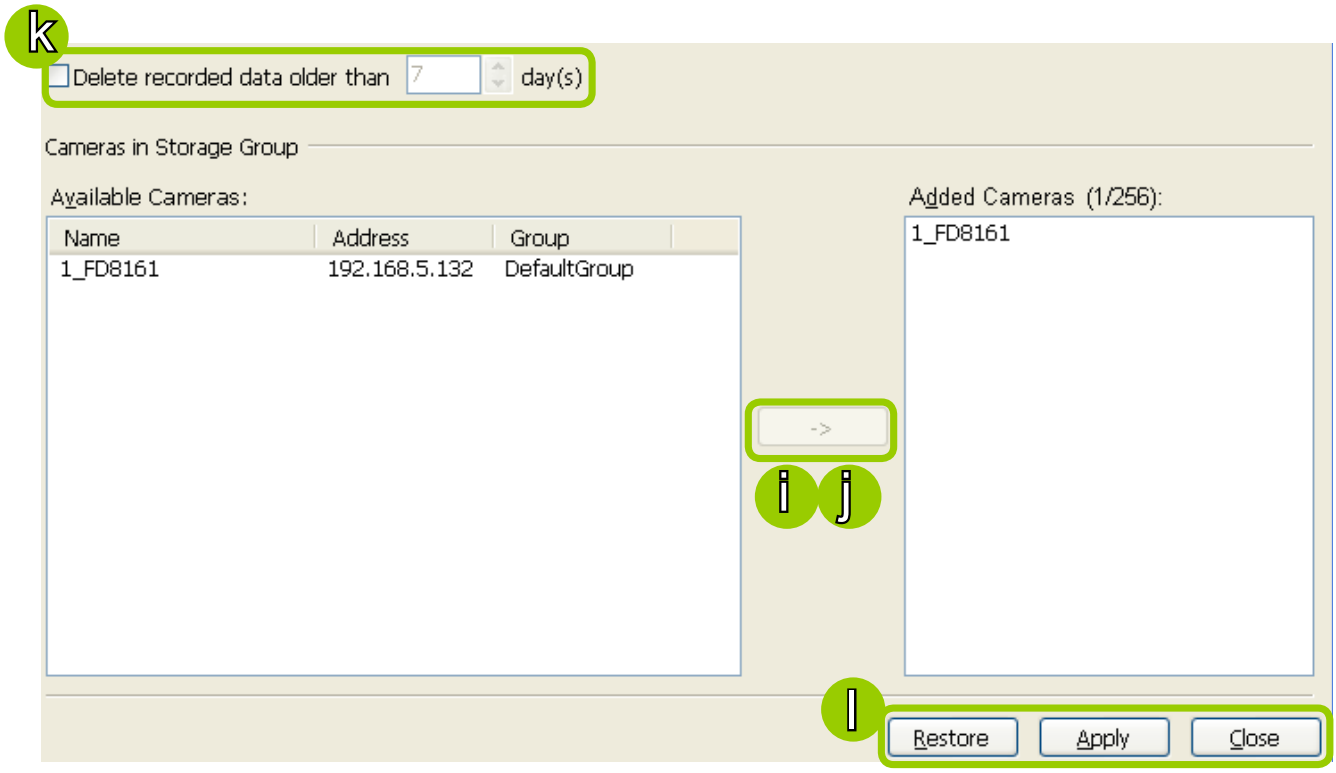
g. To modify the settings of a path, select the path from the list, then click **Change settings** to modify.

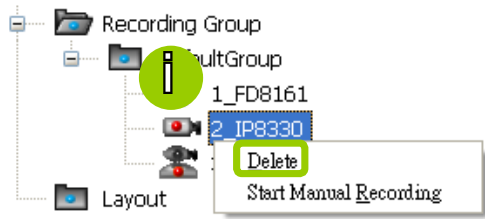
h. To delete a path, select the path from the list and click **Delete path**. A warning dialog box will pop up as shown below.

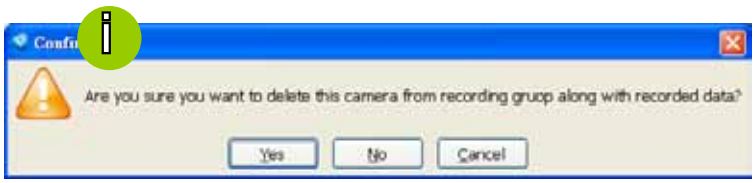


i. By default, all devices are assigned to the **Default Recording Group** in the window on the right. You can select device(s) from the list and click **<<** to delete device(s) (or **right-click** the device under DefaultGroup tree to delete it). Note that a **Delete Camera** dialog box will pop up. Click **Yes** to delete the device along with the recorded data; click **No** to delete the device but retain the recorded data; click **Cancel** to cancel the delete action. Please note that only those designated devices can record videos.

j. Click **>>** to add devices to the **DefaultGroup**.







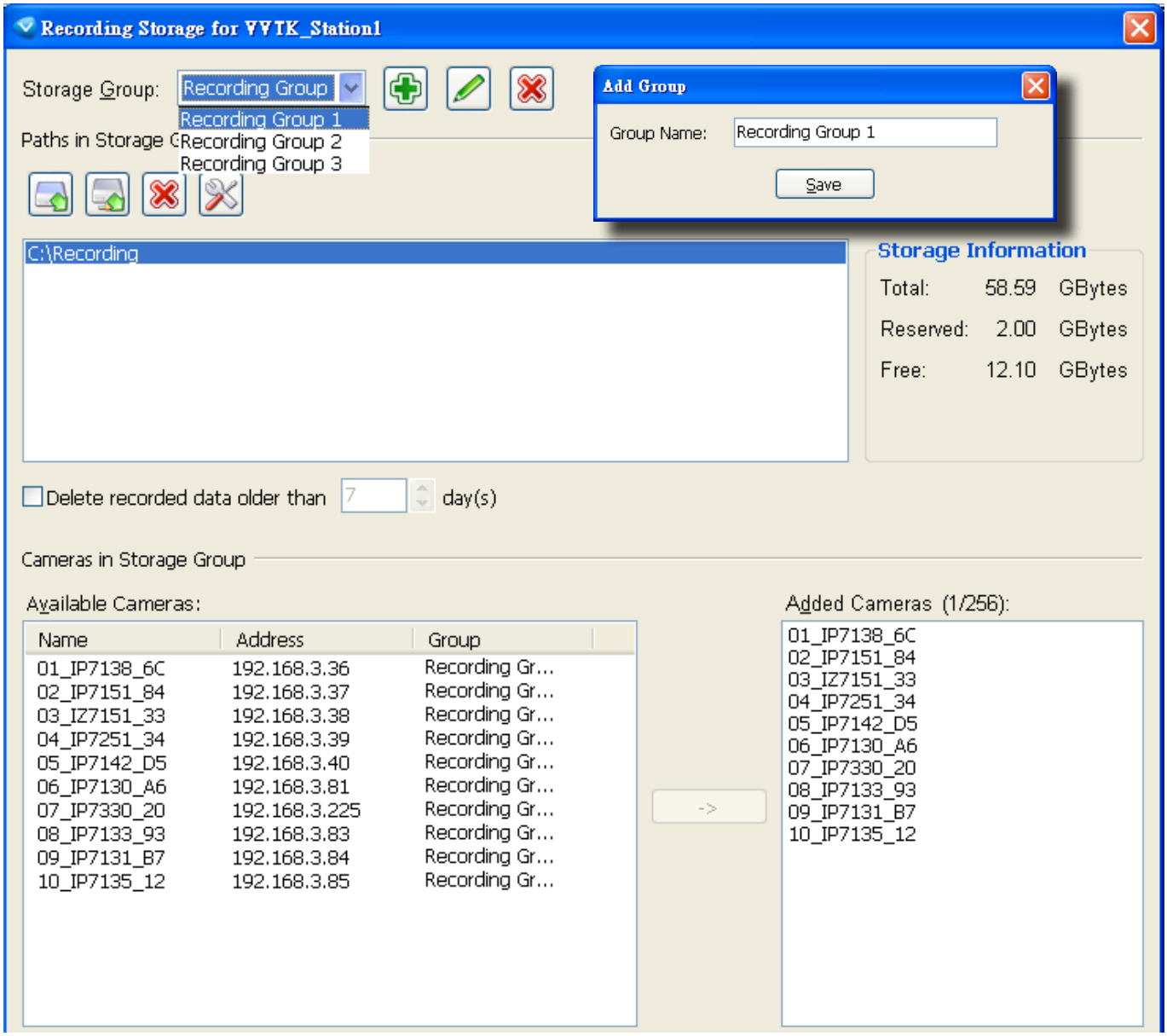
k. Delete recorded data older than the duration: If you only want to retain recorded data for a duration, check this item and enter a number of day(s). In addition, since VAST Server will do "cyclic recording" automatically, the oldest file will be overwritten by the latest one when the maximum capacity is reached.

l. When completed, click **Apply** to confirm and save your settings. If you want to cancel all of your editing, click **Restore** to return to the previous settings or click **close** to discard the settings.

Add New Recording Group(s)

If you want to add a new recording group, click **Add** to give a name to the new recording group, which will be displayed on the drop-down list.

The following is an example of recording group list.



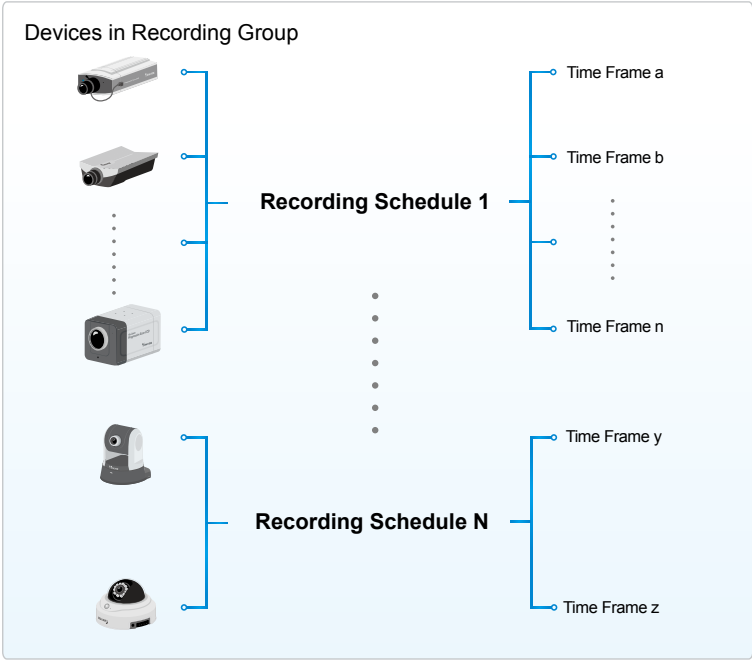
Please refer to the following limits when you set up recording group(s):

- *The maximum number of devices in a recording group is 64-CH. Please refer to the system requirements of the software.*
- *One recording group can be assigned with several recording paths and do cylic recording; while one recording path should only be assigned to one recording group.*

How to Edit Recording Schedules

After editing recording storage settings, you can begin to edit recording schedules for the devices in a recording group. By default, all devices are assigned to the default recording schedule (Please refer to the default time frame settings on page 165). Therefore, once you insert a device to the station, the VAST Server will begin to record live video according to the default recording schedule. You can also manually remove a device from the default recording schedule. Please note that **you cannot assign recording schedules to those devices which have been deleted from a recording group**.

The following is an illustration of a set of recording schedules, which are composed of several time frames. Each time frame has its own time segments, period of time, repeat interval, and recording mode. You can create different recording schedules with simple or complex time frames based on your needs.



In addition, you can arrange the priority of each time frame according to its importance. The recording schedule with the highest priority will be applied first. This capability is very useful because you can specify a new time frame with the highest priority temporarily without modifying the other time frames.

Features of the recording schedules:

- Each device can be assigned to only one recording schedule.
- Each recording schedule may contain many time frames.
- Each time frame has its own repeat frequency and recording mode.

To save time editing recording schedules and time-frames, we also provide a useful **template** function to save your time on schedules/time-frames settings. That is, you can save a specified schedule and download it as a template for future use or upload a well-arranged schedule template designed by others.

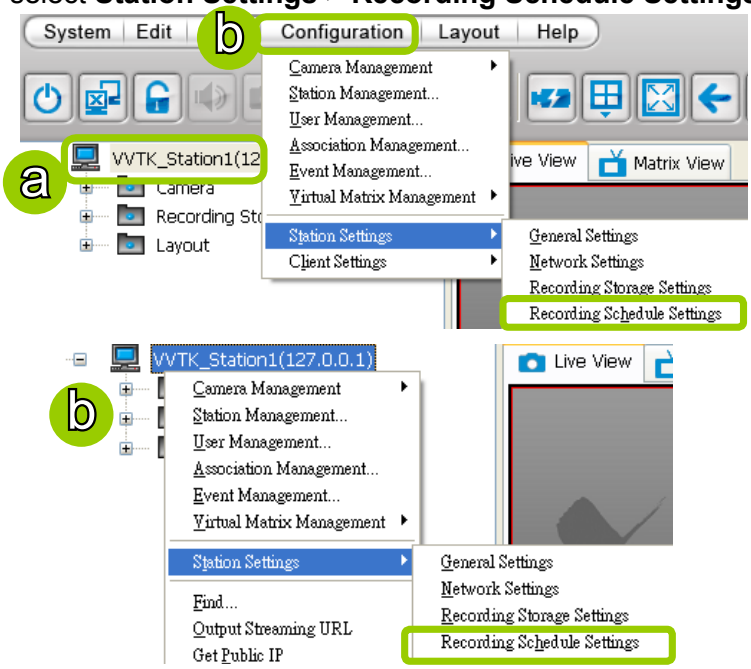
Please note that after you save the recording settings in the server, the recording schedule will begin automatically according to your settings.

Edit Schedule List

Please follow the steps below to set up the recording schedules:

a. Select the target station from the hierarchical management tree.

b. Click **Configuration > Station Settings > Recording Schedule Settings** on the menu bar (or **right-click** the station and select **Station Settings > Recording Schedule Settings**).



c. The **Recording Schedule Settings** window will pop up. By default, all cameras under the station are assigned to **Default Schedule**, **Default Time Frame**, and **Default Camera List**.

Add Schedules

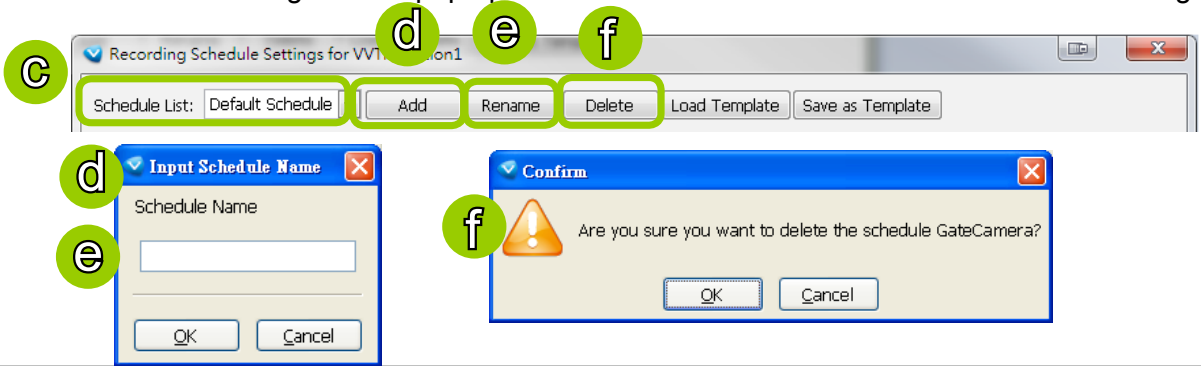
d. To add a new recording schedule, click **Add** to enter a name in the Schedule Name dialog box for the new schedule. Click **OK** to confirm the settings or **Cancel** to discard the settings. The new recording schedule will be displayed on the schedule drop-down list.

Rename Schedules

e. To rename an existing schedule, select the schedule from the schedule drop-down list and click **Rename**. A Schedule Name dialog will pop up for you to fill in a name for the new schedule. Click **OK** to confirm the settings or **Cancel** to discard the settings. The new recording schedule will be displayed on the schedule drop-down list.

Delete Schedules

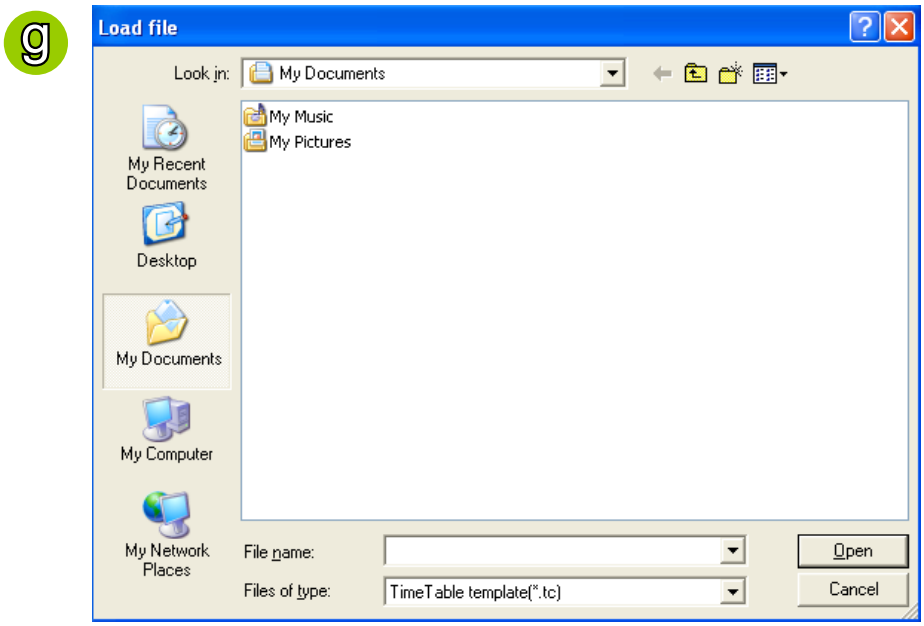
f. To delete an existing schedule, select the schedule from the schedule drop-down list and click **Delete**. A Remove Schedule dialog box will pop up. Click **OK** to confirm or **Cancel** to discard the settings.

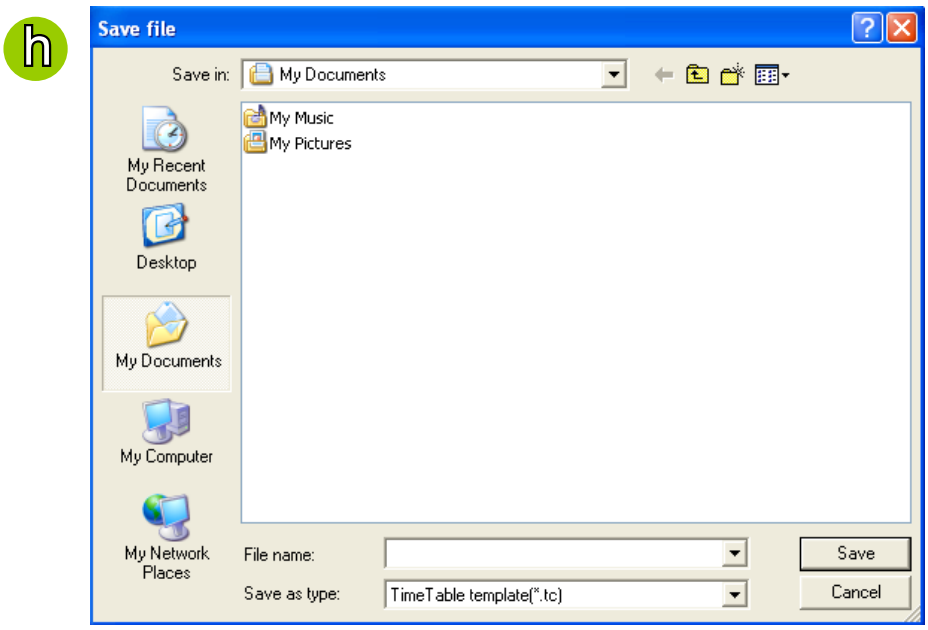


Load/Save Schedule Templates

g. If you have a schedule template with time frame settings, you can upload it to simplify the editing of the schedule. Click **Load Template**, and a **Load File** dialog box will pop up. Select the template file and click **Open** to load.

h. If you want to save a schedule as a template for future use, select the schedule from the schedule drop-down list and click **Save as Template**. A **Save File** dialog box will pop up for you to save the template file.





Edit Camera List

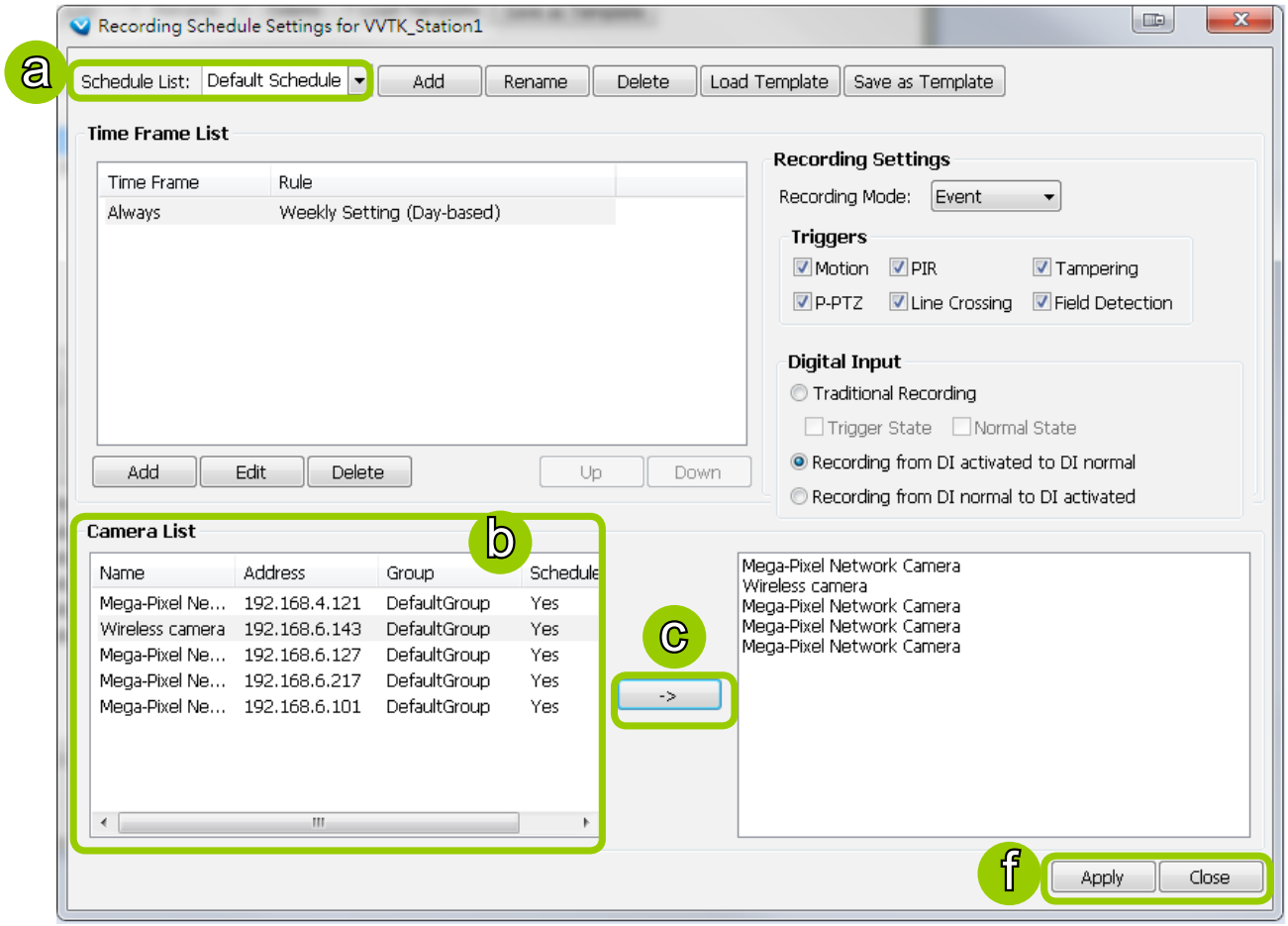
Please follow the steps below to assign a device to a recording schedule:

a. Select a recording schedule on the schedule drop-down list.

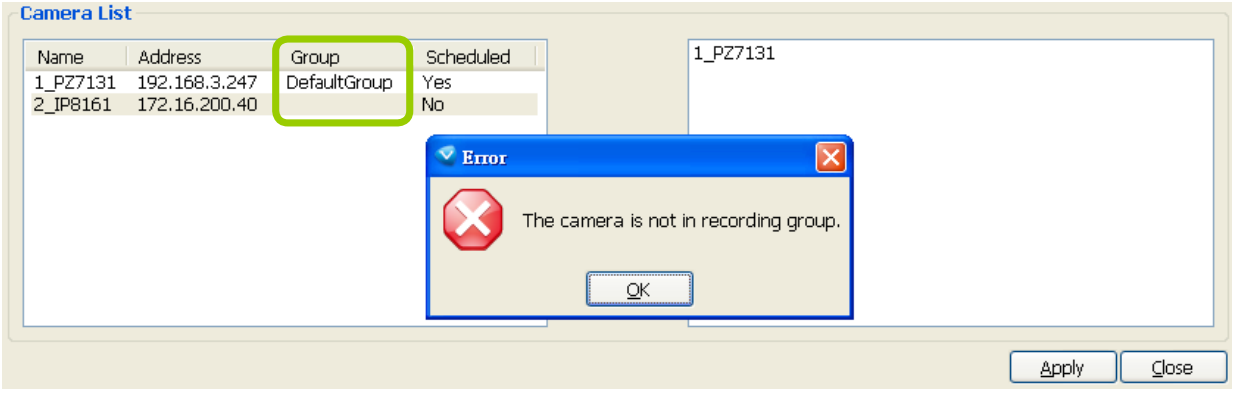
b. By default, all devices under the station are assigned to the **Default Schedule**.

c. Click **<<** to remove devices from the **Default Schedule**. Click **>>** to add devices to the **Default Schedule**.

d. Click **Apply** to confirm or **Close** to discard the settings.

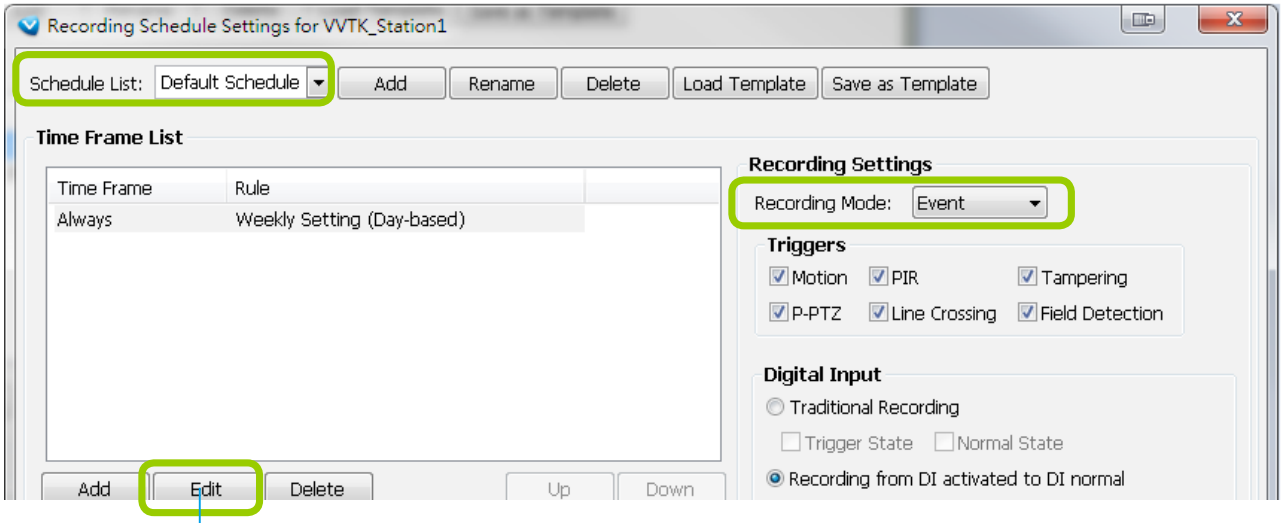


If you add a Network Device that does not belong to any Recording Group, a warning dialog will pop up as shown below. For more information about how to set up Recording Group(s), please refer to Recording Group Settings on page 157.

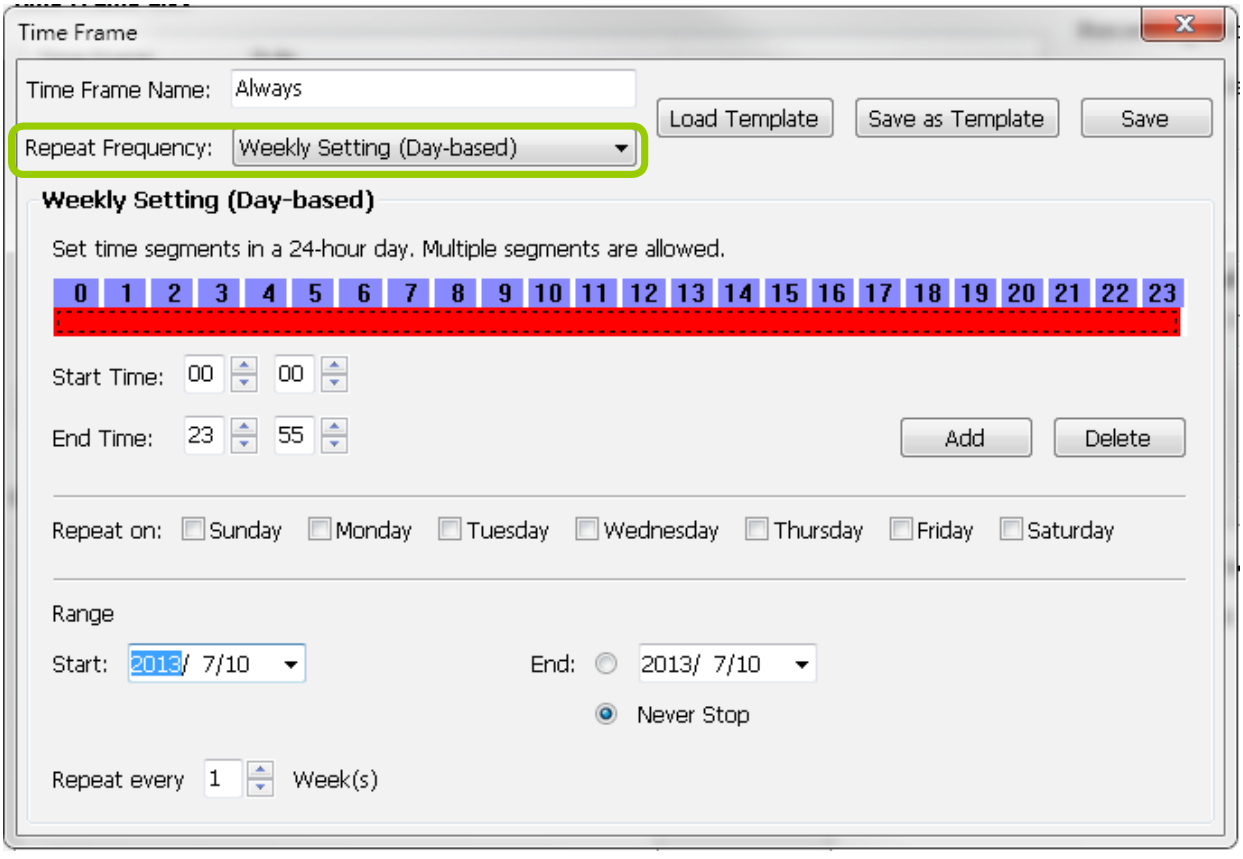


Edit Time Frame List

Default Time Frame: Weekly (Day-based), Mon.~Sun., 24-hour, continuous recording



Click **Edit** to open the Default Time Frame settings page as shown below.

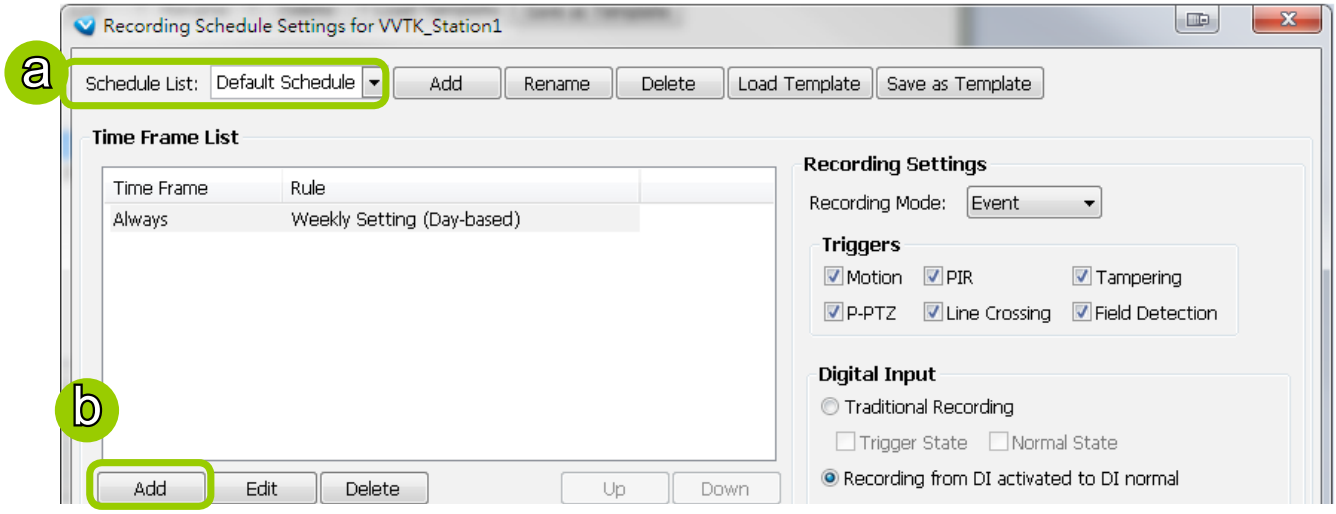


Add New Time Frames

Please follow the steps below to add new time frames to a schedule:

a. Select a recording schedule from the drop-down list.

b. Click **Add** to open the **Time Frame Settings** window.



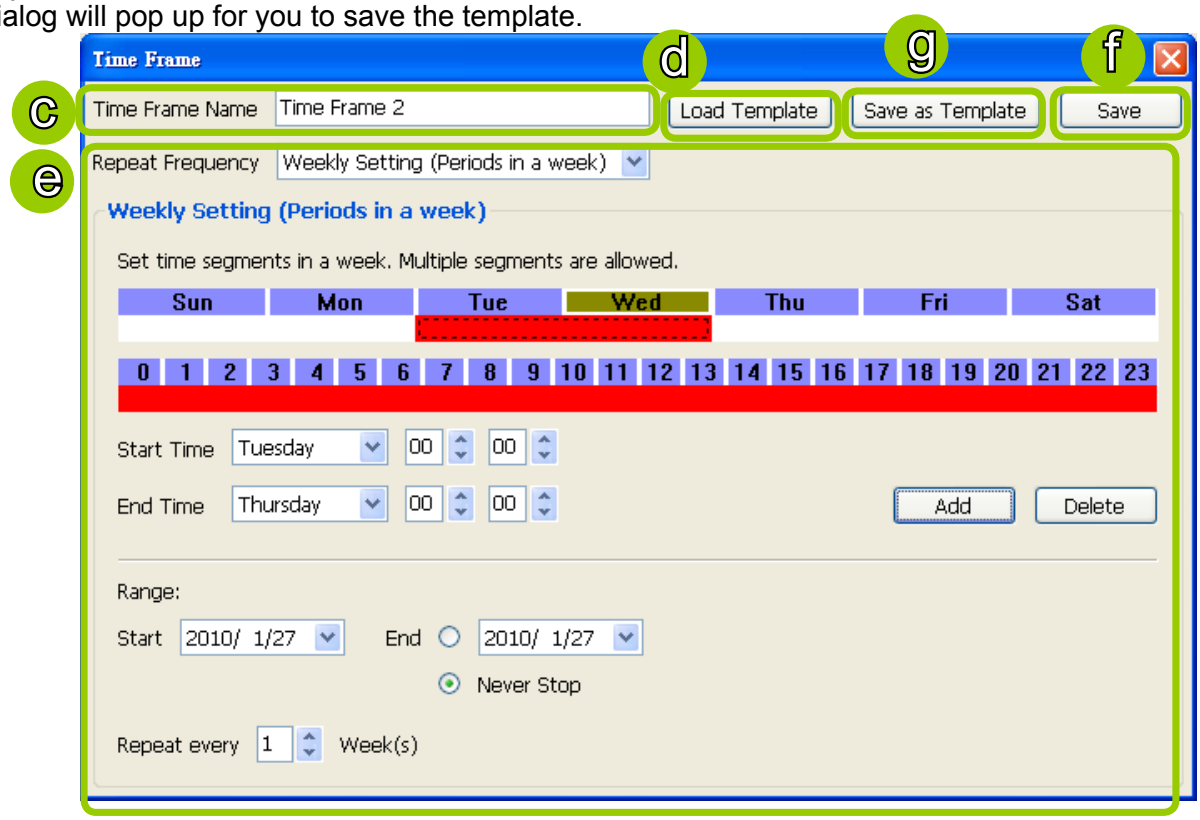
c. Enter a name for the new time frame.

d. If you have a time-frame template, you can upload it to simplify the editing of the schedule. Click **Load Template** and the **Load File** dialog box will pop up. Select the template file to load.

e. To edit the new time frame, select a **Repeat Frequency** from the drop-down list and edit the time segments, applicable days, applicable period of time, and repeat time interval. For the detailed settings of each repeat frequency, please refer to **The Concept of Repeat Frequency** on page 169.

f. When completed, click **Save** to enable the settings.

g. If you want to save this time frame as a template for future use, click **Save as Template**. A **Save file** dialog will pop up for you to save the template.



h. If you want to add additional time frames to the schedule, repeat the steps above.

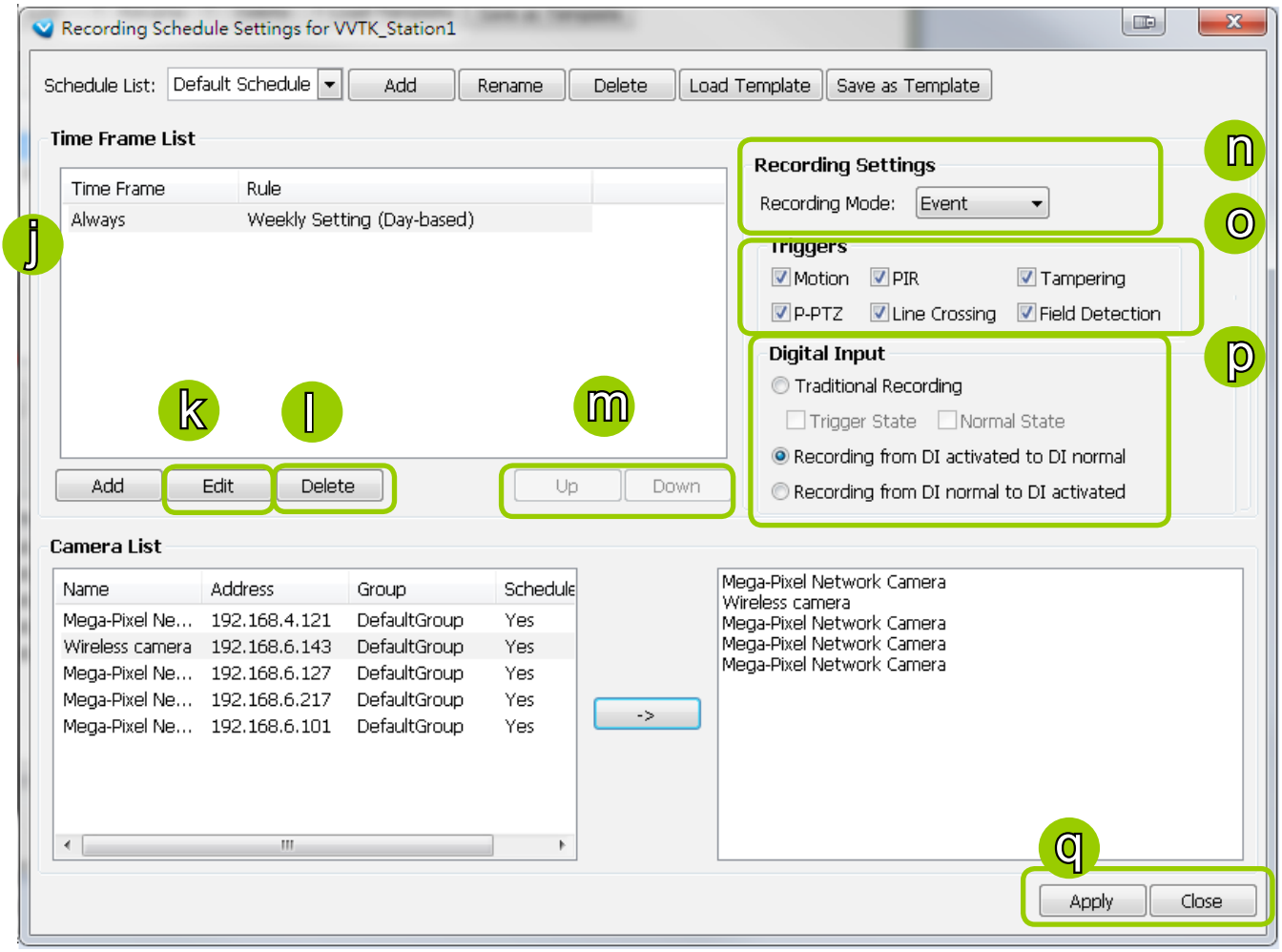
i. Close the window when you finish the time frame settings.

j. Back to the Recording Schedule Settings window, the new time frame will be displayed on the Time Frame List.

k. If you want to edit an existing time frame, select if from the Time Frame List and click **Edit** to set up.

l. If you want to delete an existing time frame, select if from the Time Frame List and click **Delete**.

m. If you want to change the priority of a time frame, select it from the Time Frame List and click **Up** or **Down** to shift its position. The time frame on the top of the list has the highest priority.



Recording Settings

n. Select one of the following Recording Modes for the time frame:

- **None**: No recording action.
- **Continuous**: 24-hours continuous recording. If you want to enable Activity Adaptive Streaming, please refer to page 160 for detailed illutration.
- **Event**: The server will start to record only when an event is triggered. The recording time length depends on the settings in Recording Storage Settings. The default time length is 20 seconds (10s pre-event time plus 10s post-event time). Please refer to page 159 for more information. For more information about event catagories, please refer to page 270 for detailed information.

o. Select Trigger Source(s): Motion Detection, Line Crossing, Field Detection, PIR, Tampering Detection, and P-PTZ (Auto Tracking).

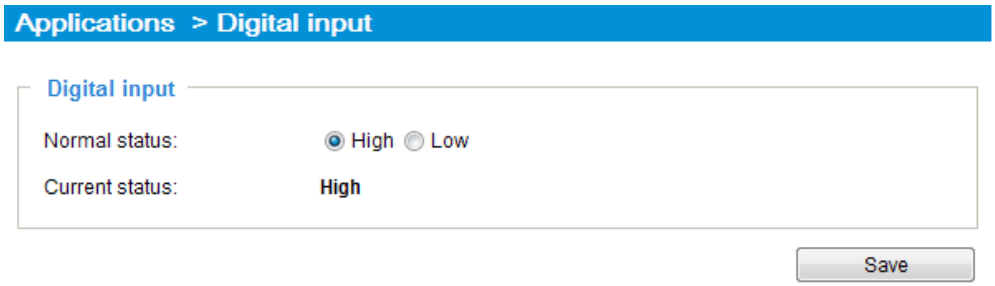
p. Digital Input: See next page for more information.

The Digital Input signal triggers can be configured as follows:

1. Traditional Recording: can be triggered when the DI enters the Trigger State or the Normal State. If thus configured, the recording task will end when the post-event recording time is reached.
2. The recording starts when DI is triggered, and will end when the DI signal returns to Normal.
3. The recording starts when DI is Normal, and will end when the DI signal returns to Triggered.

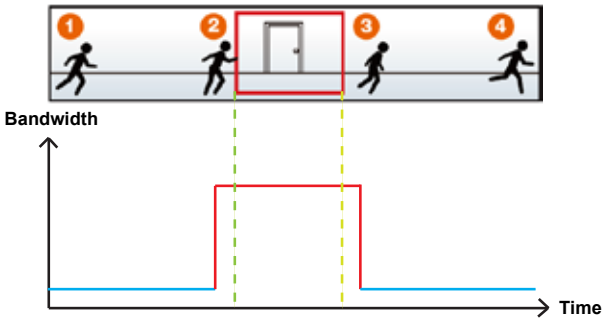
An example for the configuration can be: the recording starts when a door is opened (DI triggered), and the recording stops when the door is closed (DI returns to normal).

When connected, a camera's Digital input signal is automatically detected as pulled-high or pulled-low. Users should then designate the current state as Normal or Trigger. The configuration page is found in **Configuration** > **Application** > **Digital Input** on a web console.



q. Click **Apply** to confirm the settings. Then close the window when you finish the recording schedule settings.

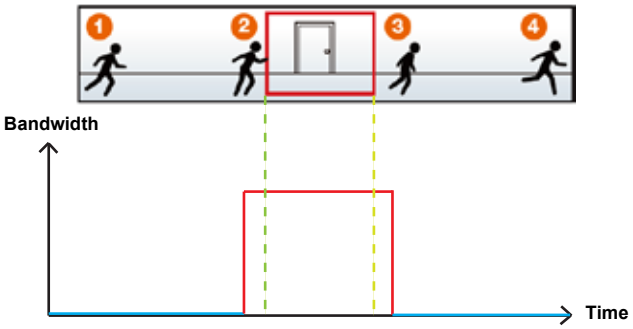
The following diagrams show the frame rate variation of two recording modes:
1. Continuous recording + Activity adaptive recording (helps save bandwidth and storage)



I frame ---> Full frame rate ---> I frame

Continuous Recording

2. Event recording



No recording data ---> Full frame rate ---> No recording data

Event Recording

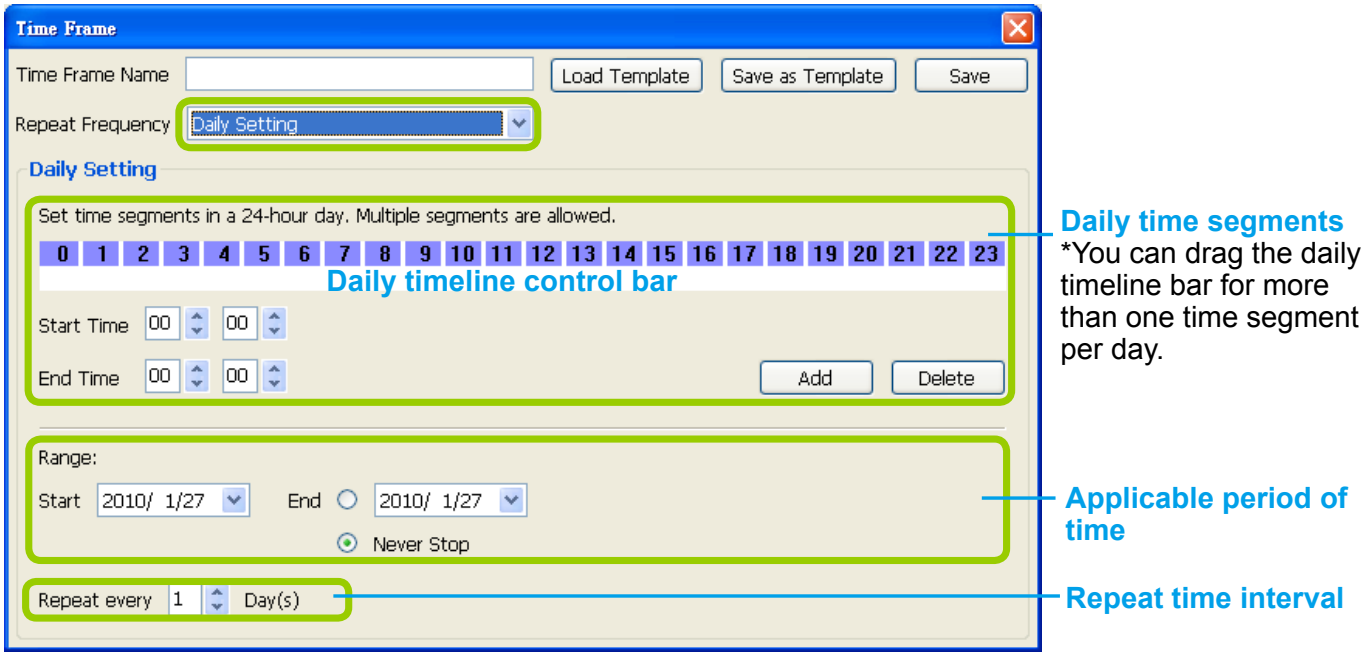
The Concept of Repeat Frequency

VAST offers the following types of repeat frequency. The definition of each type is listed in the following table:

Repeat Frequency	Discription
Daily Setting	■ Specify arbitrary time segments within a day, ■ Repeat the segments every N days in the specified period of time.
Weekly Setting (Day-based) (Default Time Frame)	■ Specify arbitrary time segments within a day, ■ Apply only on selected days of a week, ■ Repeat the segments every N weeks during the specified period of time.
Weekly Setting (Periods in a week)	■ Specify arbitrary time segments within a week, ■ Repeat the segments every N weeks during the specified period of time.
Monthly Setting (Day-based)	■ Specify arbitrary time segments within a day, ■ Apply only on selected days of a month, ■ Repeat the segments every N months during the specified period of time.
Yearly Setting (Day-based)	■ Specify arbitrary time segments within a day, ■ Apply only on selected days of a year, ■ Repeat the segments every N years during the specified period of time.

Repeat Frequency: Daily Setting

To set up daily repeat frequency, please configure the following items: Daily time segments, applicable period of time, and repeat time interval.



Set up daily time segments

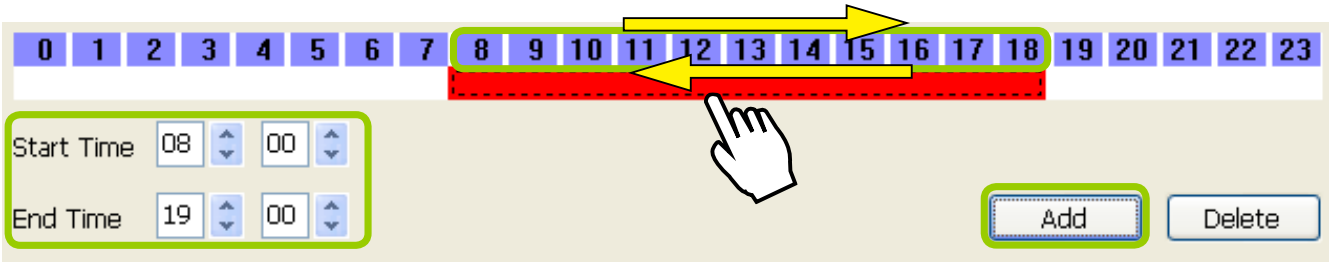
You can specify several time segments within a day. The numbers 0~23 on the **hourly timeline control bar** (the purple rectangles) represent the 24 hours in a day.

There are two ways to define time segments: one is to use the computer mouse to manipulate the timeline control bars; the other is to fill in the precise start and end time values in the corresponding fields.

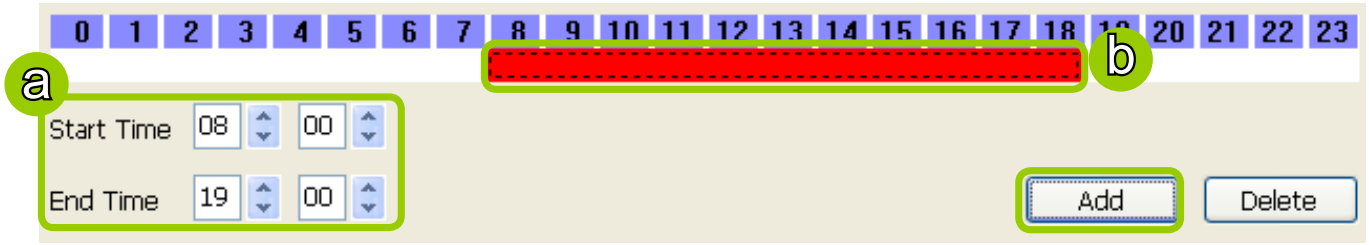
<u>Add time segments</u>: Choose either step 1 or step 2 to set up

1. Use the mouse to drag the timeline bars:
   a. **Left-click** the **daily timeline control bar** (the purple rectangles) and drag the mouse.
   b. The corresponding time segment will also appear in the Start Time and End Time fields. Click **Add**, then the red timeline bars representing new time segments will appear as shown below. You can drag multiple time segments within a day.

      In the following illustration, the yellow arrows show the dragging direction of the mouse. You can drag from left to right or the opposite.



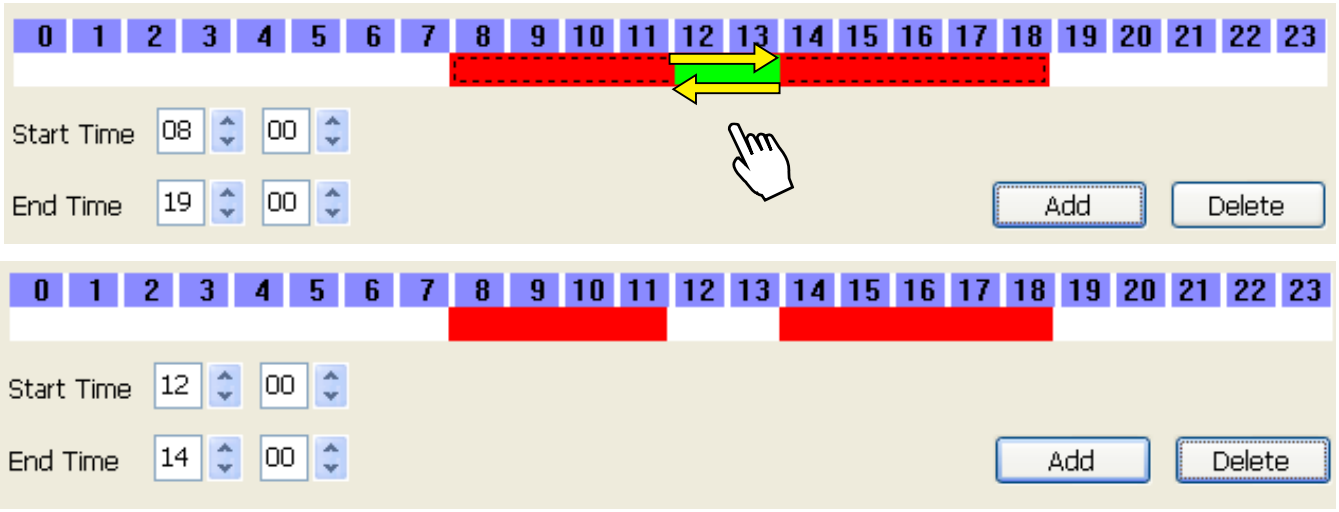
2. Fill in the precise Start Time and End Time:
   a. Directly enter the value in the Start Time and End Time fields, then click **Add**.
   b. The corresponding red timeline bar will automatically appear as shown below.



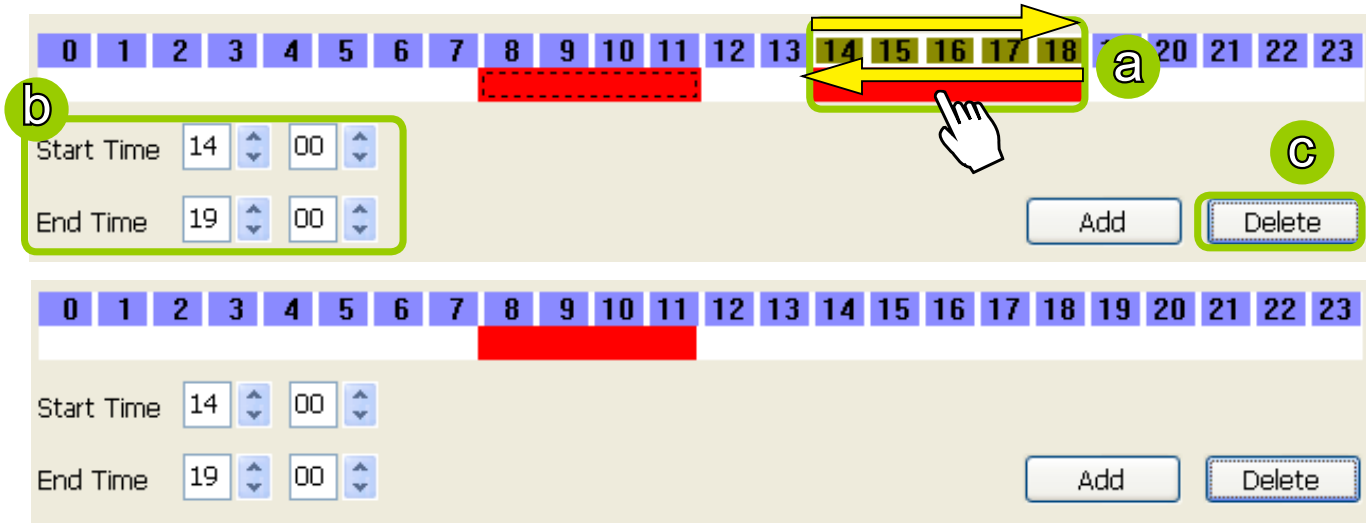
<u>Delete time segments</u>: Choose either step 1 or step 2 to set up

1. Use the mouse to erase the timeline bar: **Right-click** on an existing red timeline bar and drag the mouse. A green timeline bar representing the deleted part of the time segment will erase the red bar as shown below.

   In the following illustration, the green arrows show the dragging direction of the mouse. You can drag it from left to right or the opposite.



2. Use the delete button to remove the entire timeline bar:
   a. Click an existing red timeline bar or **left-click** the **daily timeline control bar** (the purple rectangles) and drag the mouse.
   b. The corresponding time segment will appear in the Start Time and End Time fields.
   c. Click **Delete**, and the selected timeline bar will disappear.

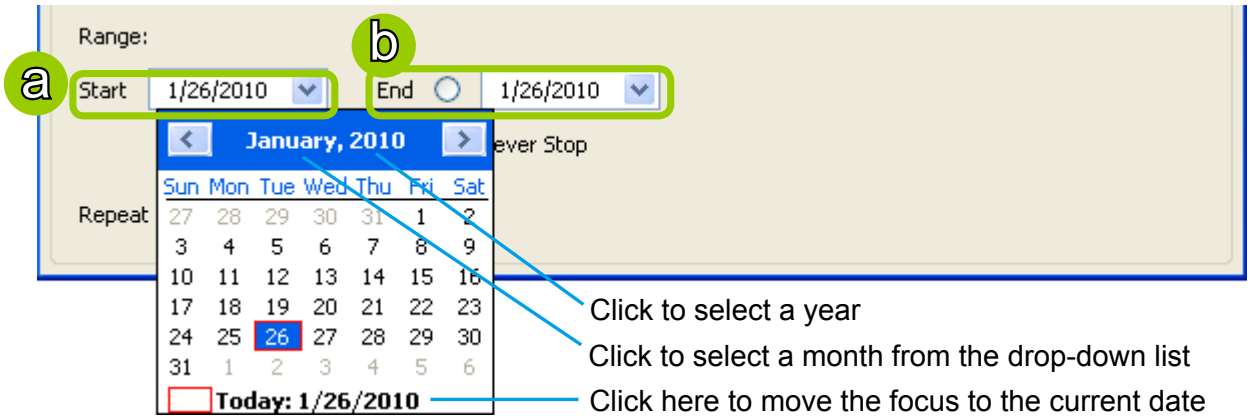


Set up applicable period of time

For repeat frequencies, you can set up the applicable date and period of time for the time frame.

a. Specify the start date and time in the **Start** field. A calendar date selector will appear when you click on the drop-down list of **date**. Click < or > to select the month, then pick a desired day in the calendar.

b. Specify the end date and time in the **End** field if you have an end time for applying this time frame. If you do not have a terminating time for this time frame, select **Never Stop**.

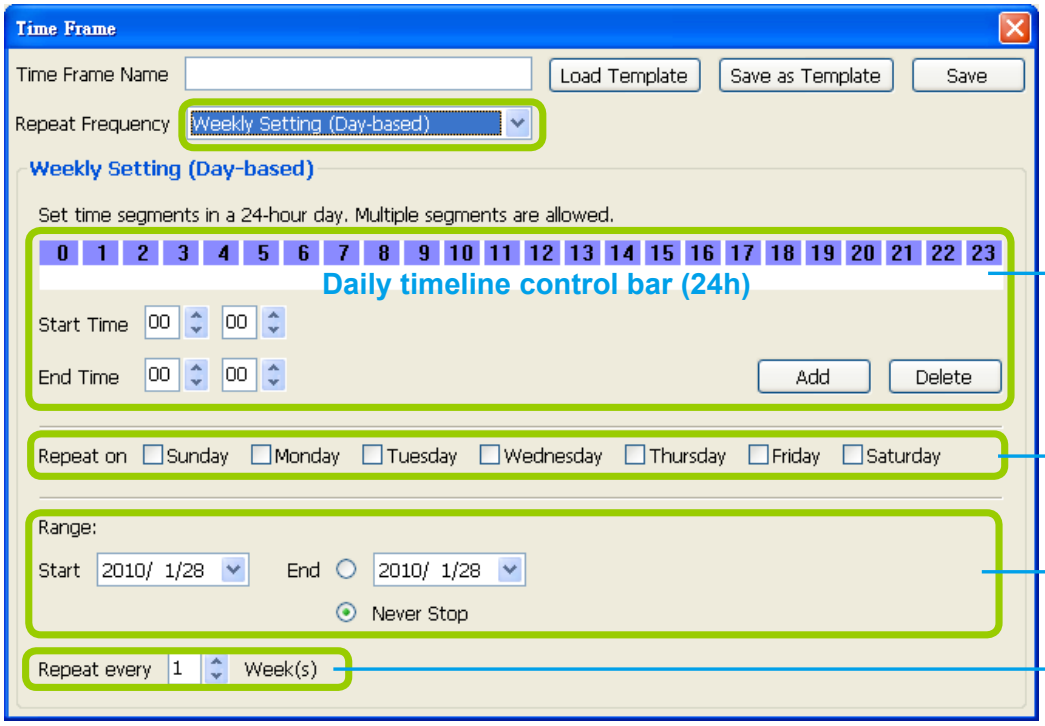


Set up repeat time interval

The repeat time intervals is "every N day(s)" as shown below. Repeat every 1 day means the time frame would apply for every day within the period of time.

Repeat Frequency: Weekly Setting (Day-based)

To set up Weekly (Day-based) repeat frequency, please configure the following items: Daily time segments, applicable days within a week, applicable period of time, and repeat time interval.



Set up daily time segments

Please refer to page 170 for detailed instructions.

Set up applicable days within a week

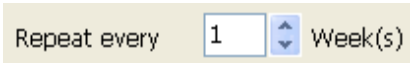
For repeat frequency--"Weekly (day based)", you can apply the time segments only on selected days of the week.

Set up applicable period of time

Please refer to page 172 for detailed instructions.

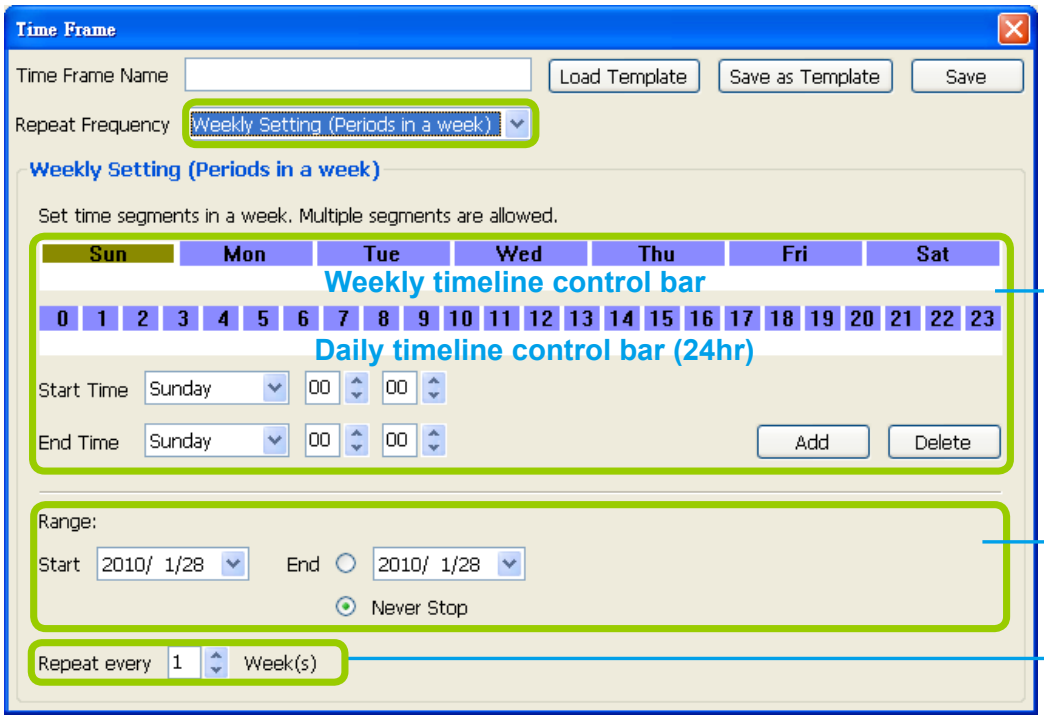
Set up repeat time interval

The repeat time intervals is "every N week(s)" as shown below. Repeat every 1 week means the time frame would apply for every week within the period of time.



Repeat Frequency: Weekly Setting (Periods in a week)

To set up Weekly (Periods in a week) repeat frequency, please configure the following items: Time segments within a week, applicable period of time, and repeat time interval.



Set up time segments within a week

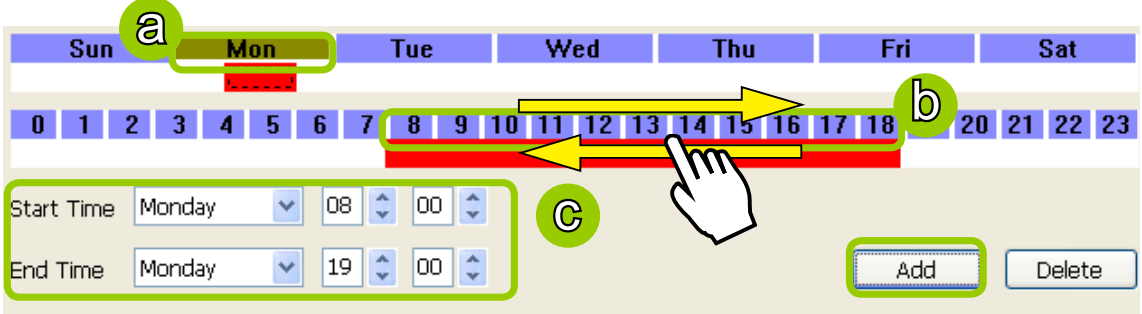
You can specify several time segments within a week. The **weekly timeline contol bar** represents the 7 days of a week, and the **daily timeline contol bar** represents the 24 hours in a day. The daily timeline control bar is only valid when one of the days on the weekly timeline control bar has been selected.

There are two ways to set up time segments: one is to use the computer mouse to draw the timeline control bars; the other is to fill in the precise start and end time value in the corresponding fields.

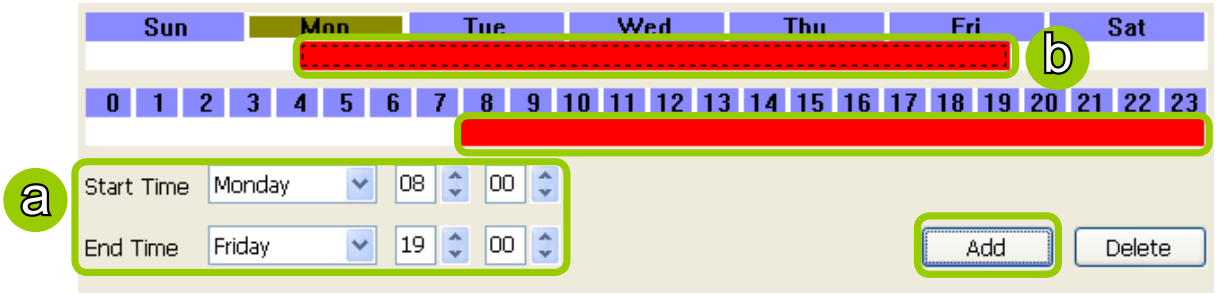
<u>Add time segments</u>: Choose either step 1 or step 2 to set up

1. Use the mouse to drag the timeline bars:
   a. Click on a day on the **weekly timeline control bar**. The selected bar will turn green.
   b. **Left-click** the **daily timeline control bar** and drag the mouse.
   c. The corresponding time segment will also appear in the Start Time and End Time fields. Click **Add**, then the red timeline bars representing new time segments will appear as shown below. You can drag multiple time segments within a day and a week.

      In the following illustration, the yellow arrows show the dragging direction of the mouse. You can drag from left to right or the opposite.



2. Fill in a precise Start Time and End Time:
   a. Directly select a day and enter the value in the Start Time and End Time fields, then click **Add**.
   b. The corresponding red timeline bars will automatically appear as shown below.
      The following is an example of an extended time segment from Mon. 8:00 to Fri. 19:00.



Delete time segments: Please refer to page 171 for detailed instructions.

Set up applicable period of time

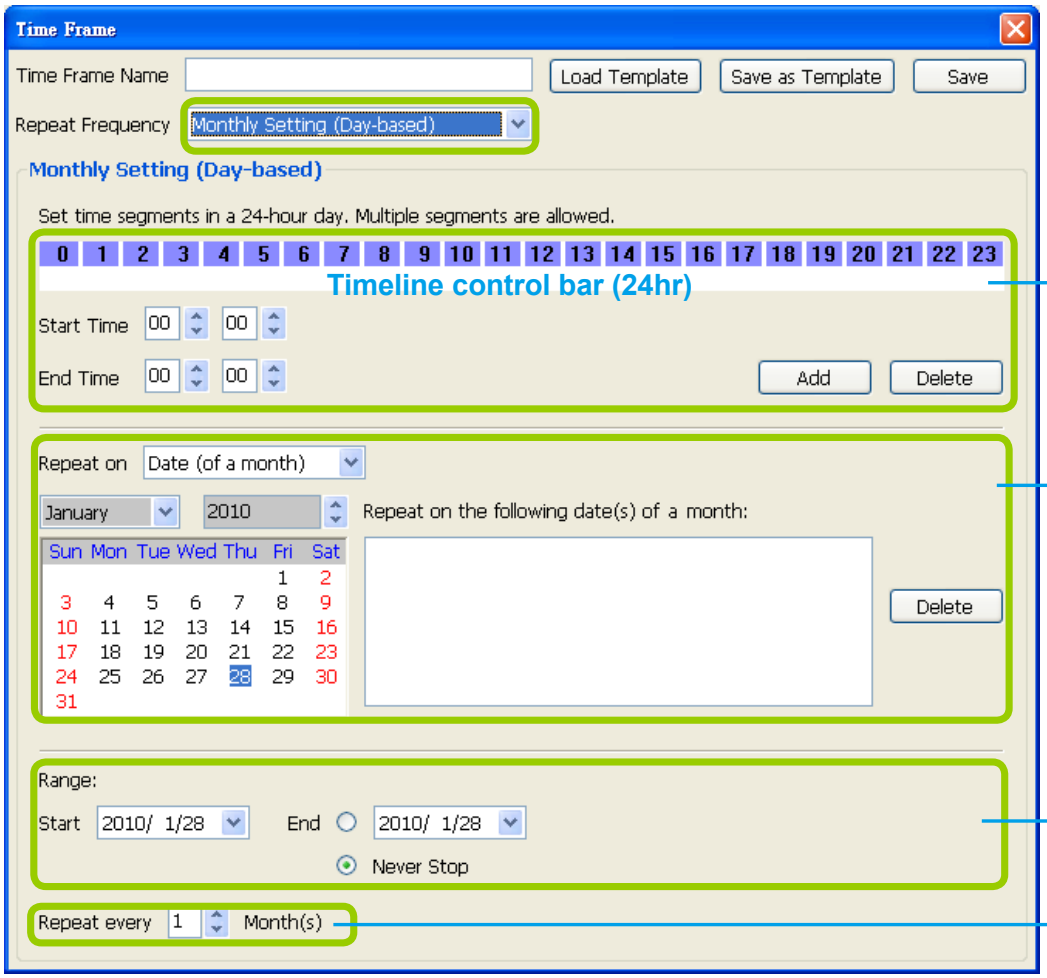
Please refer to page 172 for detailed instructions.

Set up repeat time interval

Please refer to page 173 for detailed instructions.

Repeat Frequency: Monthly Setting (Day-based)

To set up Monthly (Day-based) repeat frequency, please configure the following items: Daily time segments, applicable date(s) of a month/ day(s) of a week, applicable period of time, and repeat time interval.



Daily time segments
*You can drag more than one time segment per day.

Applicable date(s) of a month/ day(s) of a week

Applicable period of time

Repeat time interval

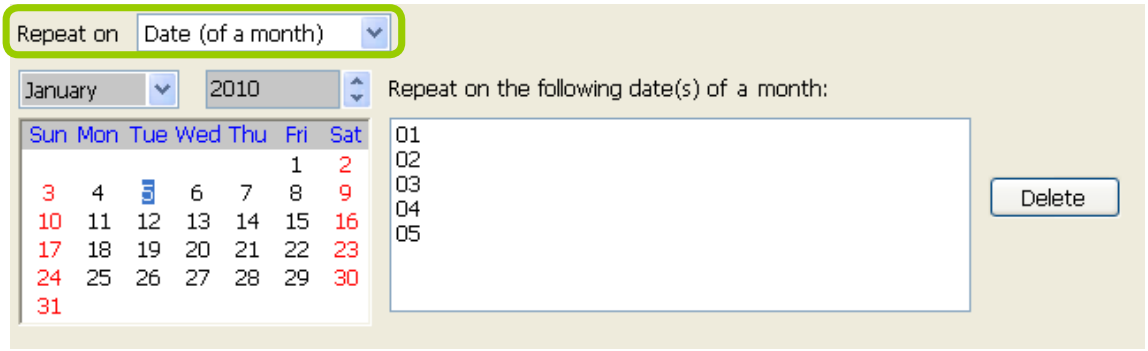
Set up daily time segments

Please refer to page 170 for detailed instructions.

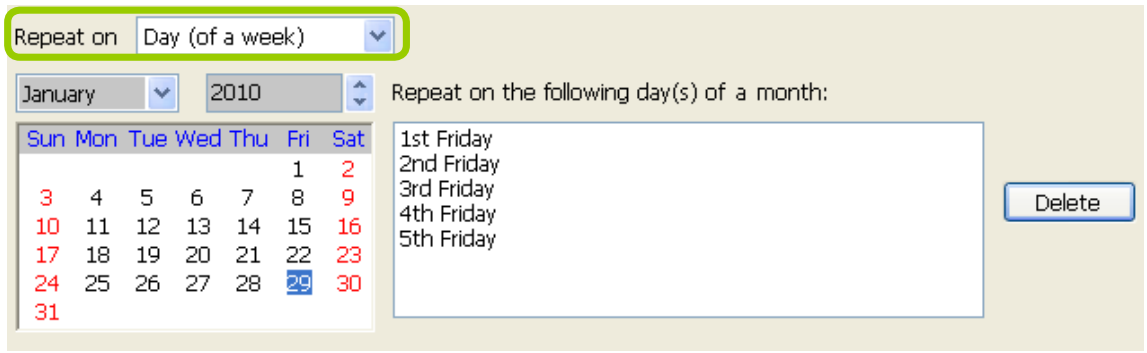
Set up applicable date(s) of a month/ day(s) of a week

For repeat frequency--"monthly (day-based)", you can apply the time segments only on selected days of a month. There are two types of repeat frequencies: Date(s) of a month and Day(s) of a week.

Repeat by date(s) of a month:
Select date(s) from the calendar, and it will be displayed on the right blank as shown below.
The following example refers to the 1st ~ 5th day of a month.



Repeat by day(s) of a week:
Select day(s) from the calendar, and it will be displayed on the right blank as shown below.
The following example refers to the 1st ~ 5th Friday of a month.

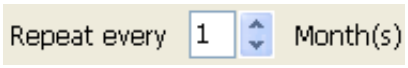


Set up applicable period of time

Please refer to page 172 for detailed instructions.

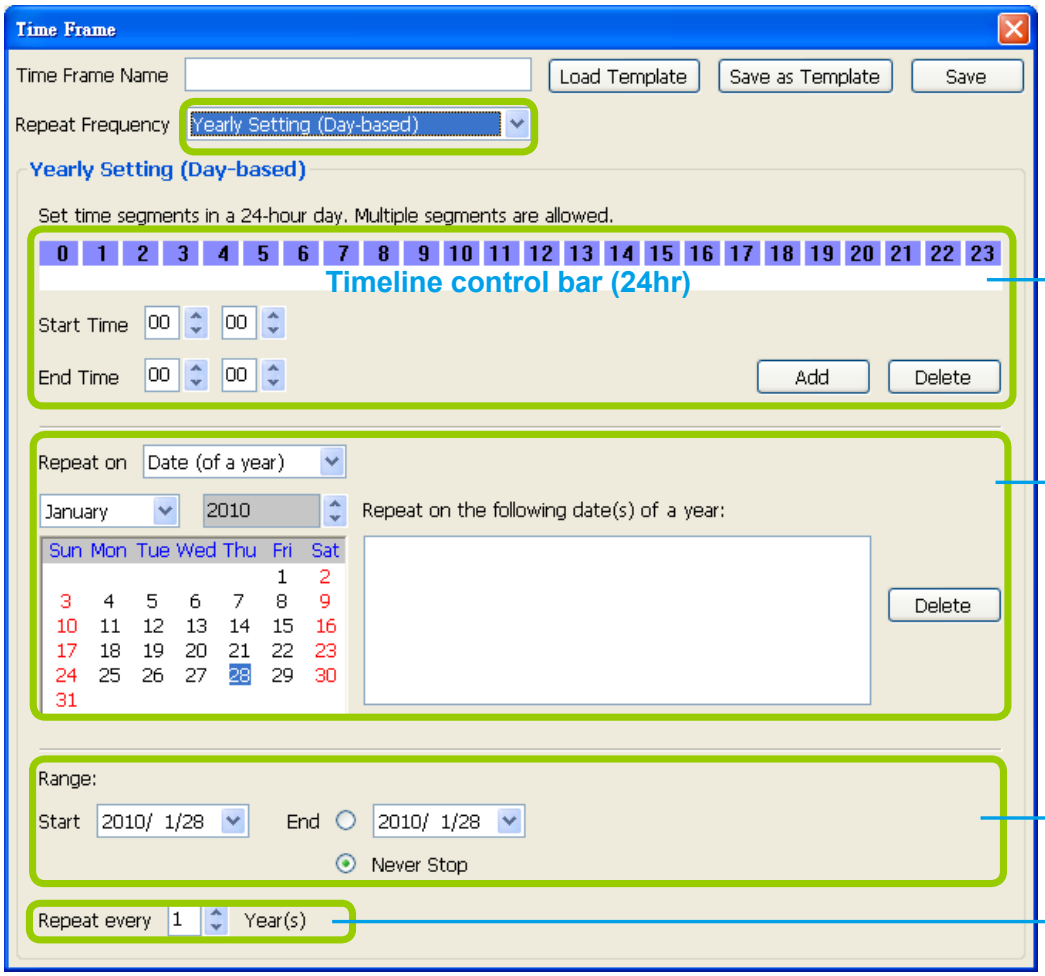
Set up repeat time interval

The repeat time intervals is "every N month(s)" as shown below. Repeat every 1 month means the time frame would apply for every month within the period of time.



Repeat Frequency: Yearly Setting (Day-based)

To set up Yearly (Day-based) repeat frequency, please configure the following items: Daily time segments, applicable date(s) of a year/ day(s) of a week, applicable period of time, and repeat time interval.



Daily time segments
*You can drag more than one time segment per day.

Applicable date(s) of a year/ day(s) of a week

Applicable period of time

Repeat time interval

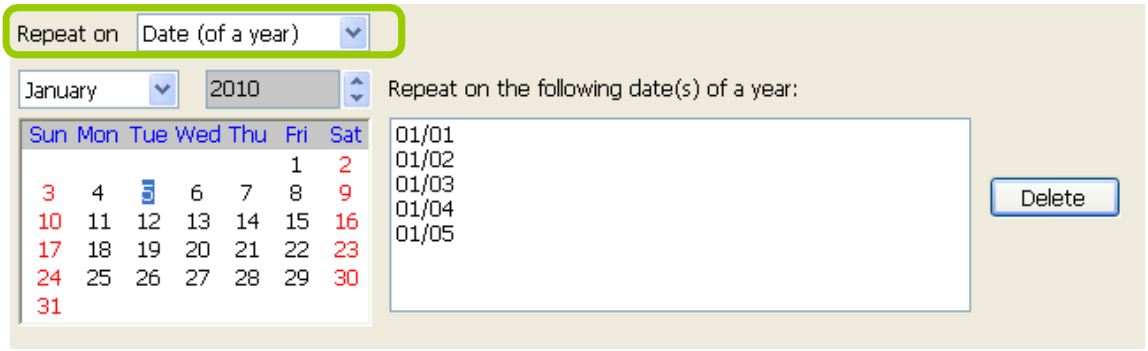
Set up daily time segments

Please refer to page 170 for detailed instructions.

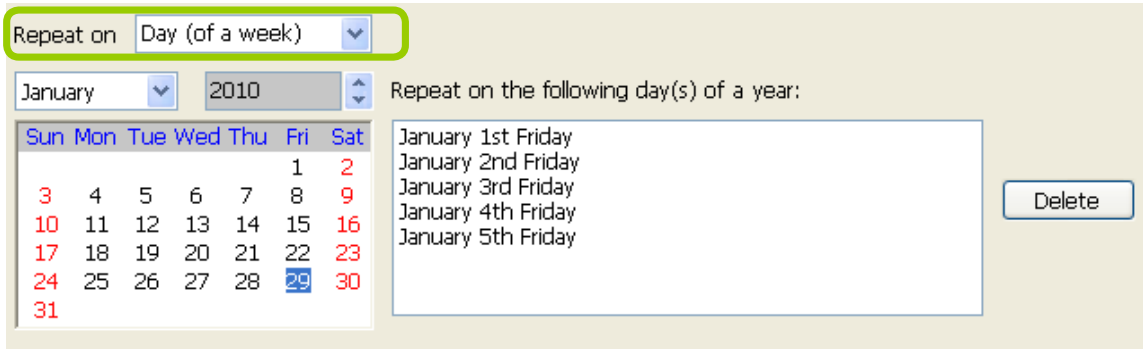
Set up applicable date(s) of a year/ day(s) of a week

For repeat frequency--"yearly (day-based)", you can apply the time segments only on selected days of a year. There are two types of repeat frequencies: Date(s) of a year and Day(s) of a week.

Repeat by date(s) of a year:
Select date(s) from the calendar, and it will be displayed on the right blank as shown below.
The following example refers to the 1st ~ 5th day of a year.



Repeat by day(s) of a week:
Select day(s) from the calendar, and it will be displayed on the right blank as shown below.
The following example refers to the January 1st ~ 5th Friday of a year.

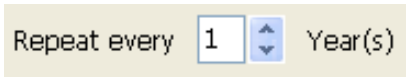


Set up applicable period of time

Please refer to page 172 for detailed instructions.

Set up repeat time interval

The repeat time intervals is "every N year(s)" as shown below. Repeat every 1 year means the time frame would apply for every year within the period of time.

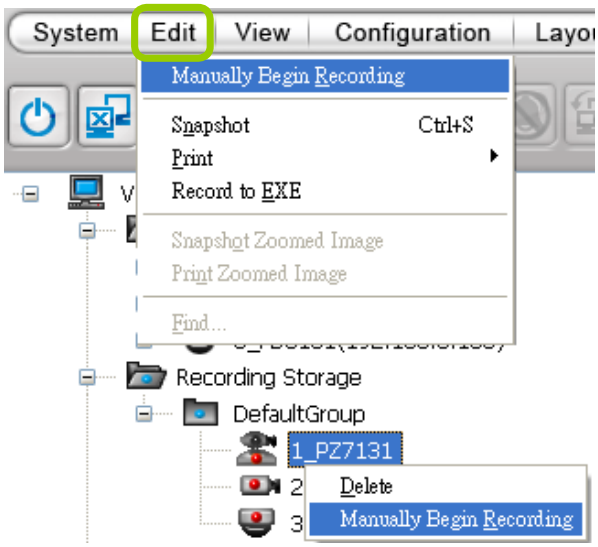


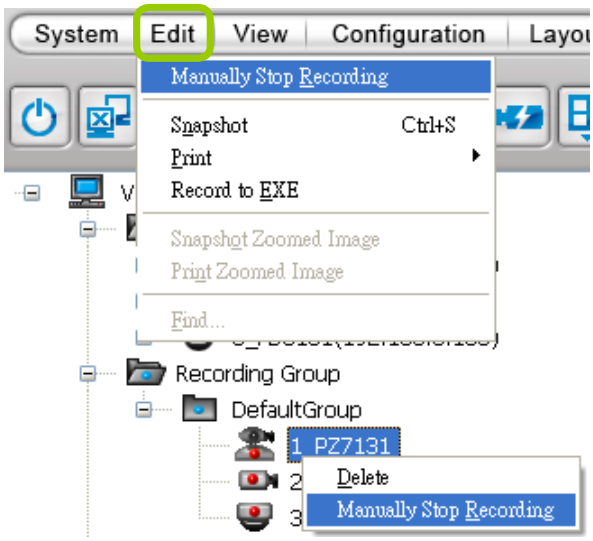
How to Manually Begin /Stop Recording

By default, all devices are assigned to the default recording storage and default recording schedule. Therefore, once you insert a device onto the station, the VAST Server will begin to record live video according to the default recording schedule. Please refer to **How to Edit Recording Schedules** on page 161.

However, if you have changed the default schedule, you can manually click **Manually Begin Recording** to enable a device without setting up a recording schedule. Please follow the instructions below to manually begin recording.

Select the device from the hierarchical management tree under Default Group, then click **Edit > Manually Begin Recording** on the menu bar (or **right-click** the device and select **Manually Begin Recording**). The string on the menu bar will turn into **Manually Stop Recording** as shown below and the VAST Server will start to record video from the target camera. Please note that its priority will be higher than the recording schedule, so it will continue unless you click **Manually Stop Recording.** After you click **Manually Stop Recording**, the device will then follow the preset recording schedule.



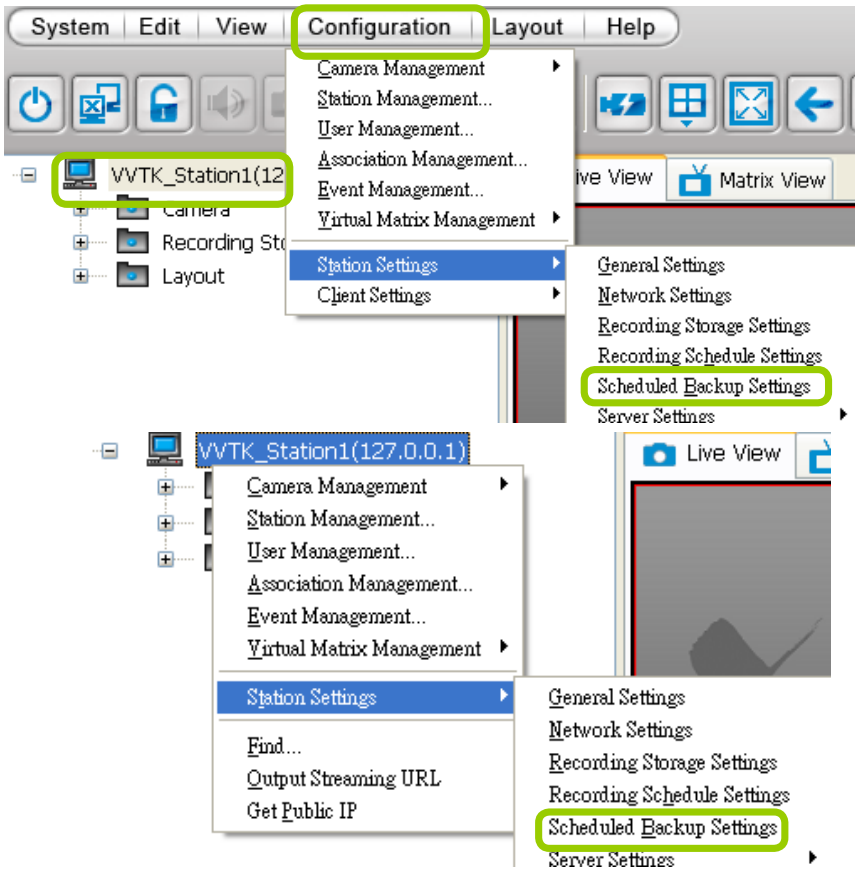


How to Edit Scheduled Backup Settings

VAST LiveClient supports scheduled backup which allows the user to back up the recorded data in another disk.
Please follow the steps below to enable scheduled backup settings:

a. Select the target station from the hierarchical management tree.

b. Click **Configuration > Station Settings > Scheduled Backup Settings** on the menu bar (or **right-click** the station and select **Station Settings > Scheduled Backup Settings**).

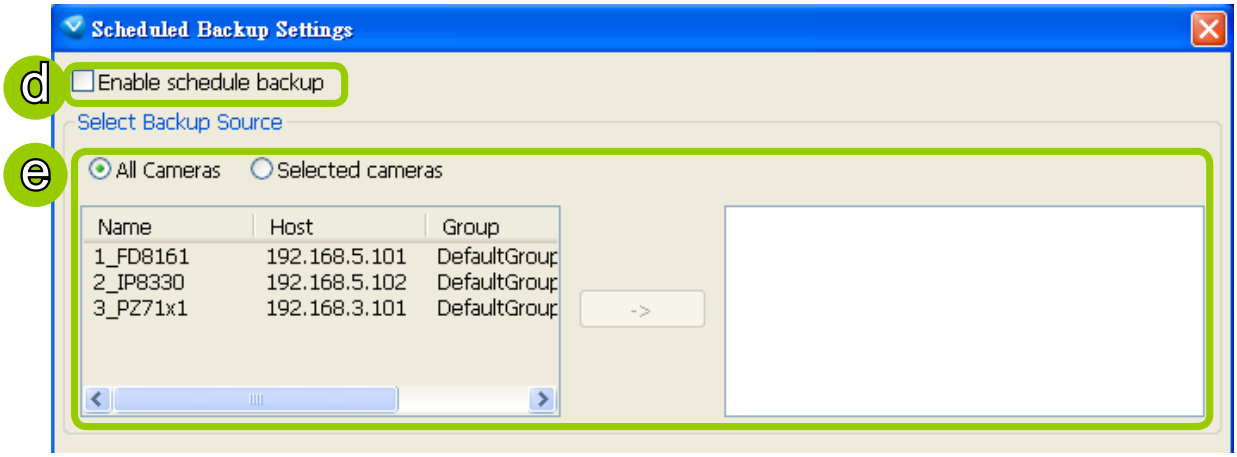


c. The **Scheduled backup settings** window will pop up.

Select Backup Source

d. Check Enable schedule backup.

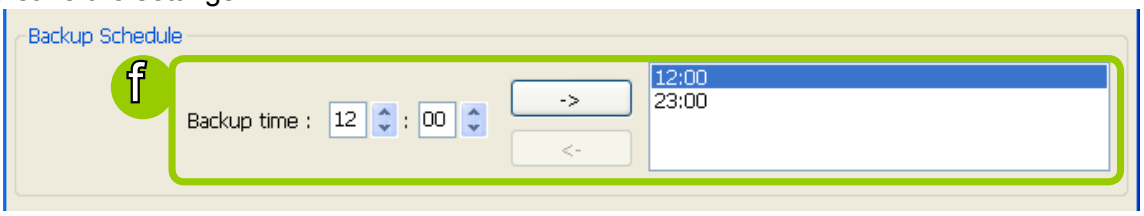
e. Select the data source you want to backup. If you check **Selected cameras**, you can click **>>** or **<<** to choose the data source that you want to backup.



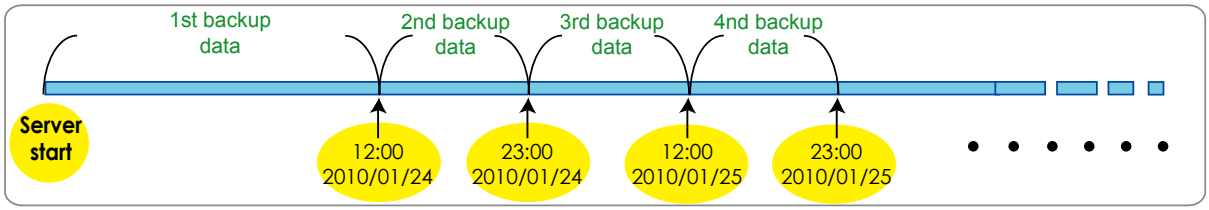
Setup Backup Schedule

f. Fill in a desired time and click **>>** to add the backup time. Please note that the backup time interval must not less than 1 hour. For example, 23:40 and 00:15 are not allowed to exist simultaneously.

In the following example, the server will backup the recorded data at 12:00 PM and 23:00 PM everyday once you save the settings.

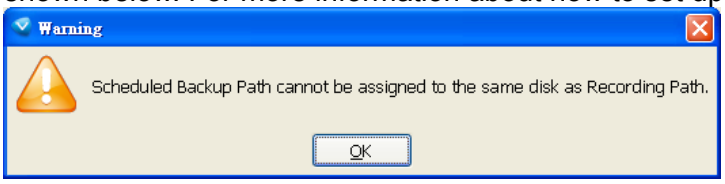


The following diagram shows the backup schedule and backup data:



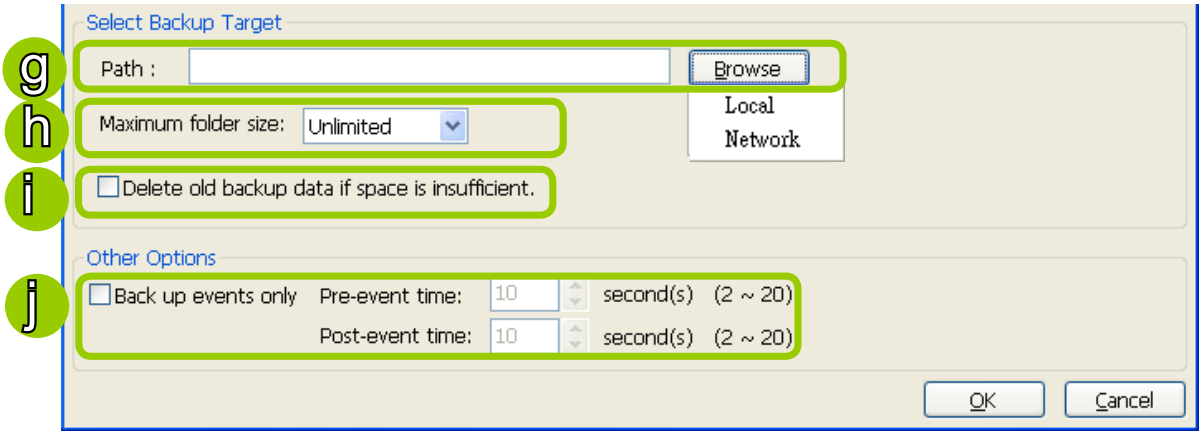
Select Backup Target

g. Click **Browse...** to select a path (local path or network storage) to store the backup data. Please note that the disk for backup data should be different from the original recording path, or a warning message will pop up as shown below. For more information about how to set up recording path, please refer to page 158.



h. Select a maximum size for backup folder. The server will divide backup data into the following size: VCD (650M), DVD (4.7G), Customize, or Unlimited size according to your choice.

i. Select **Delete old backups if space is insufficient** if you want to do cylic backup due to the limited size of the hard disk.



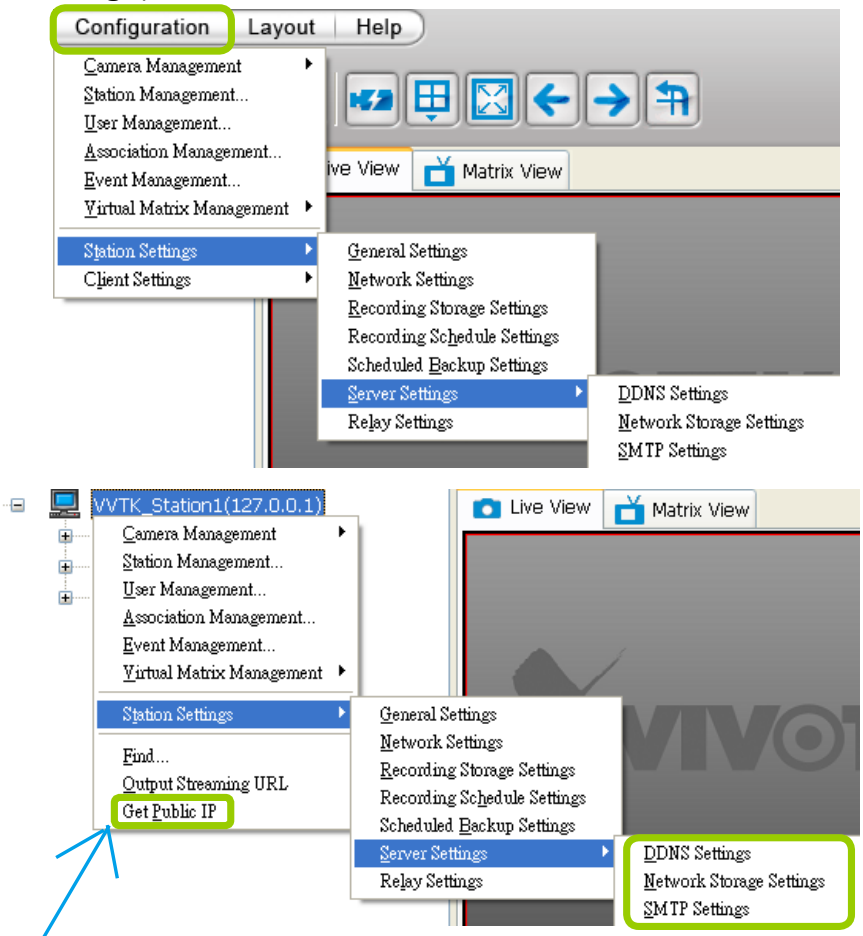
Other Options

j. If you only want to backup the recorded data of events, select **Backup only events** and fill in the pre- and post-event time.

How to Configure Station Server Settings

VAST LiveClient supports Server Settings including DDNS Settings, Network Storage Settings, and SMTP Settings.

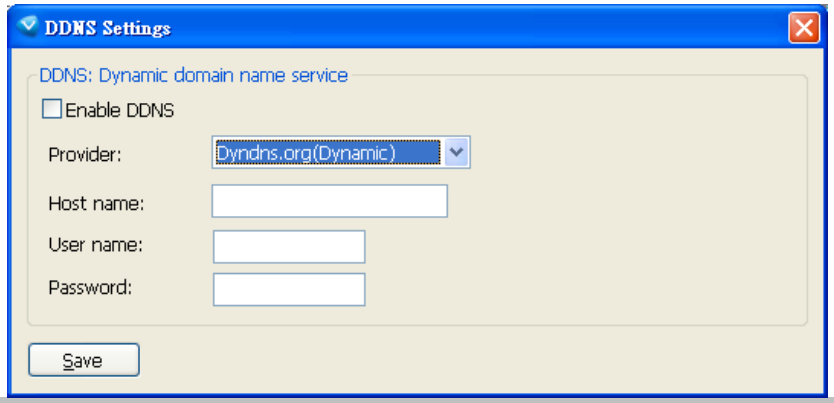
Select the station from the hierarchical management tree and click **Configuration > Station Settings > Server Settings** to open the page (or **right-click** the station and select **Station Settings > Server Settings**).



DDNS Settings

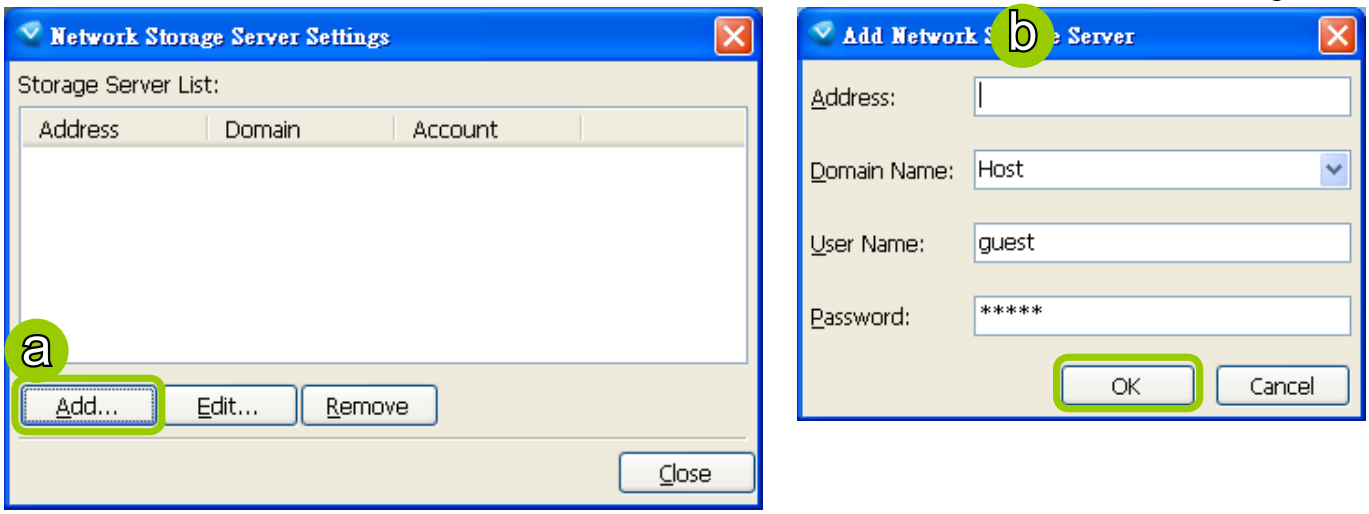
Since the public IP of VAST Server may be a dynamic IP address, DDNS service will give it a fixed domain name.

Select a DDNS provider from the provider drop-down list. VIVOTEK offers 2bthere.net (Safe100.net), a free dynamic domain name service, to VIVOTEK customers. Please refer to the user's manual of VIVOTEK's network camera for detailed DDNS settings.

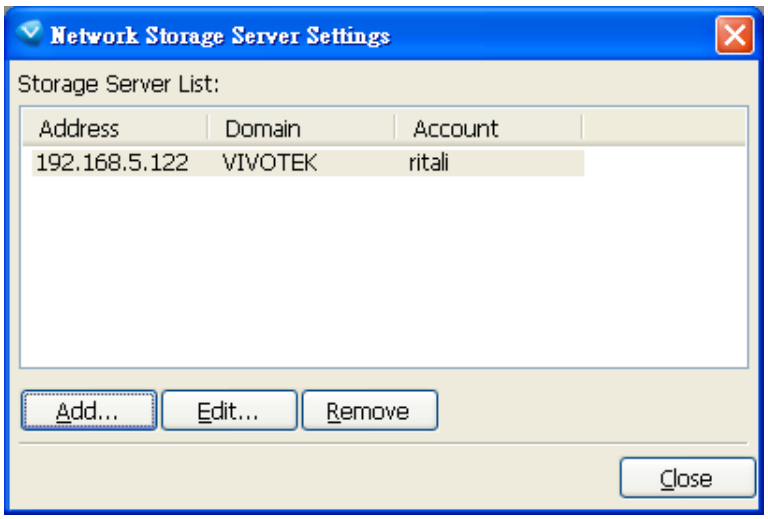


Network Storage Server Settings

The VAST Server allows user to set up network storage path(s) for recorded files. Please follow the steps below to add a new network storage path.
a. Click **Add** to open the Network Host Window.
b. Fill in the related information for the network host. Then click **OK** to save the new settings.



c. If you want to add more network host(s), please repeat step a. b.



SMTP Settings

VAST Server allows user to set up SMTP Server to send mail alert when event triggers. For more information about how to set up event management, please refer to page 139.

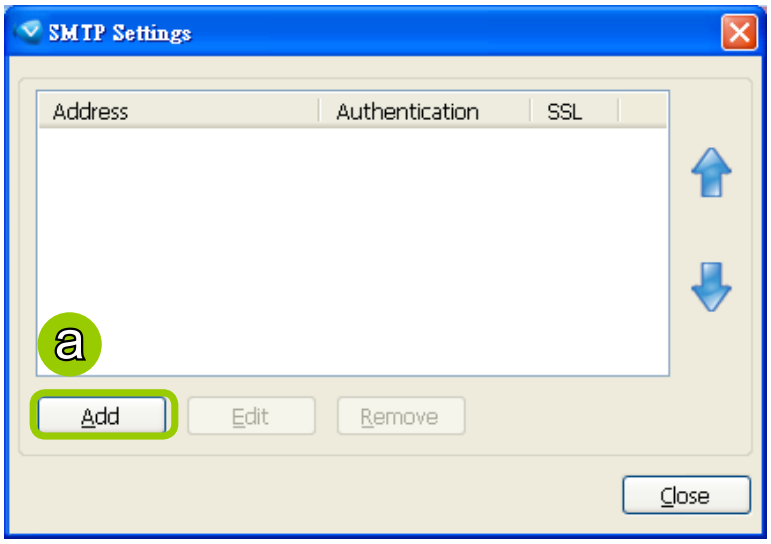
Please follow the steps below to configure the SMTP Server:

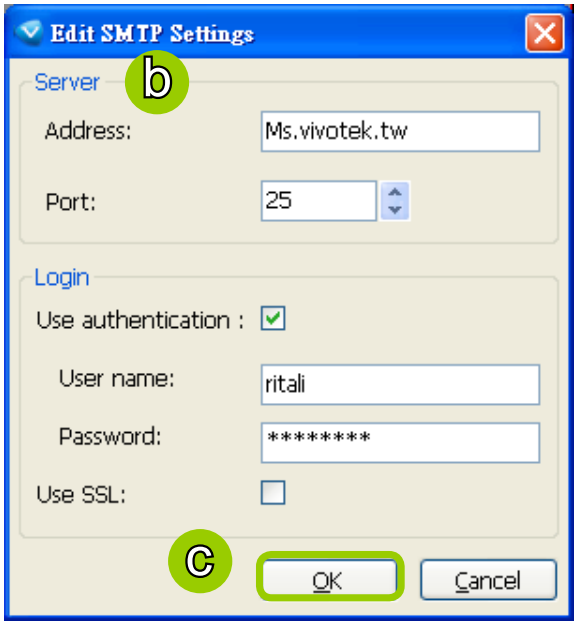
a. Click **Add** to open the SMTP Settings page.

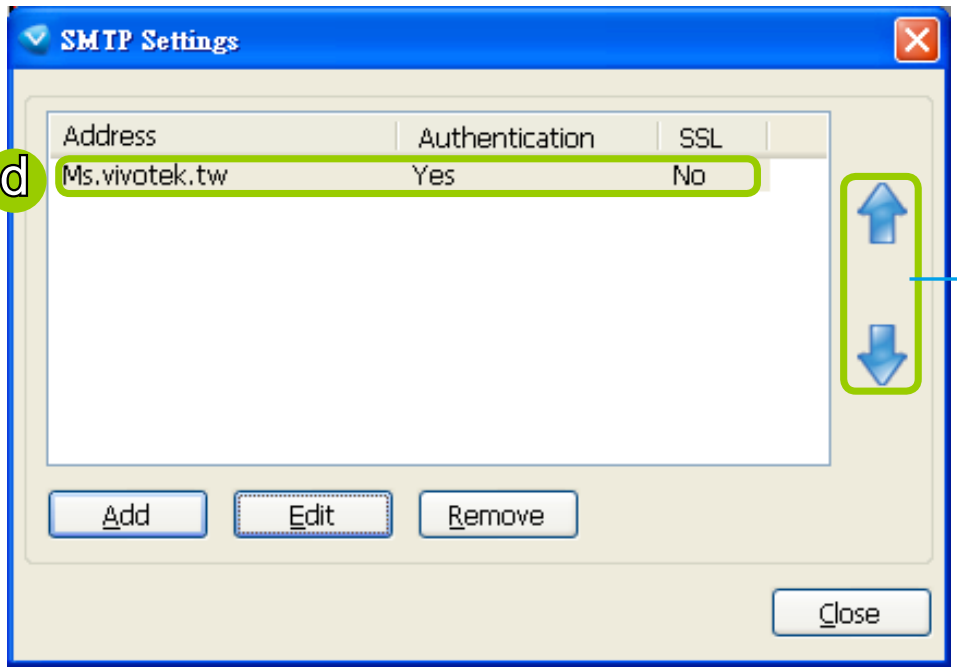
b. Enter the related information of your mail server. If your SMTP server requires a secure connection (SSL), check **Use SSL**.

c. Click **OK** to enable the settings.

d. Then the new information will appear on the SMTP Settings window as shown below.



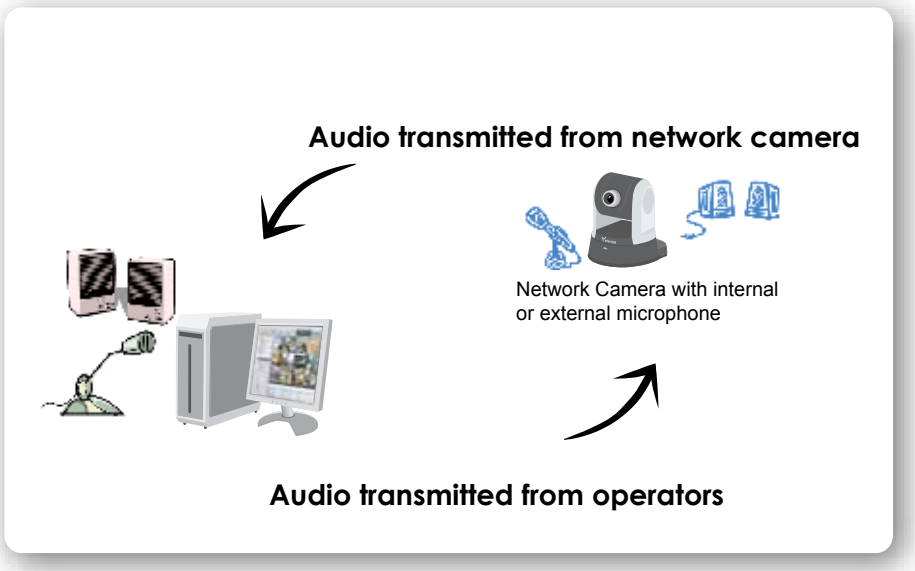




If you have more than one SMTP server, you can click to arrange the priority.

How to Use the Talk Panel

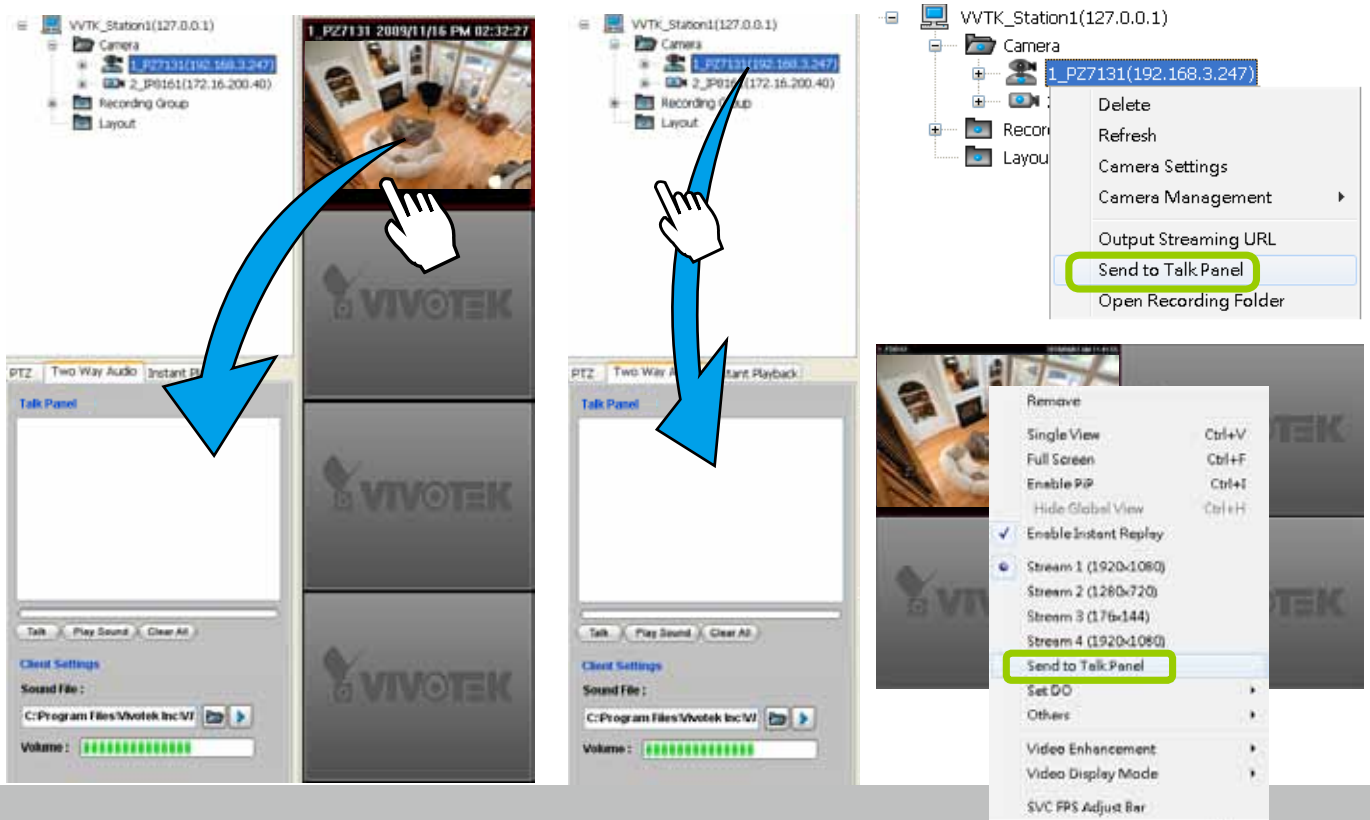
VAST LiveClient supports the two way audio function which allows the user to communicate with people around the network camera. Please enable the two way audio function on the camera side.
The following is an illustration of the two way audio function:



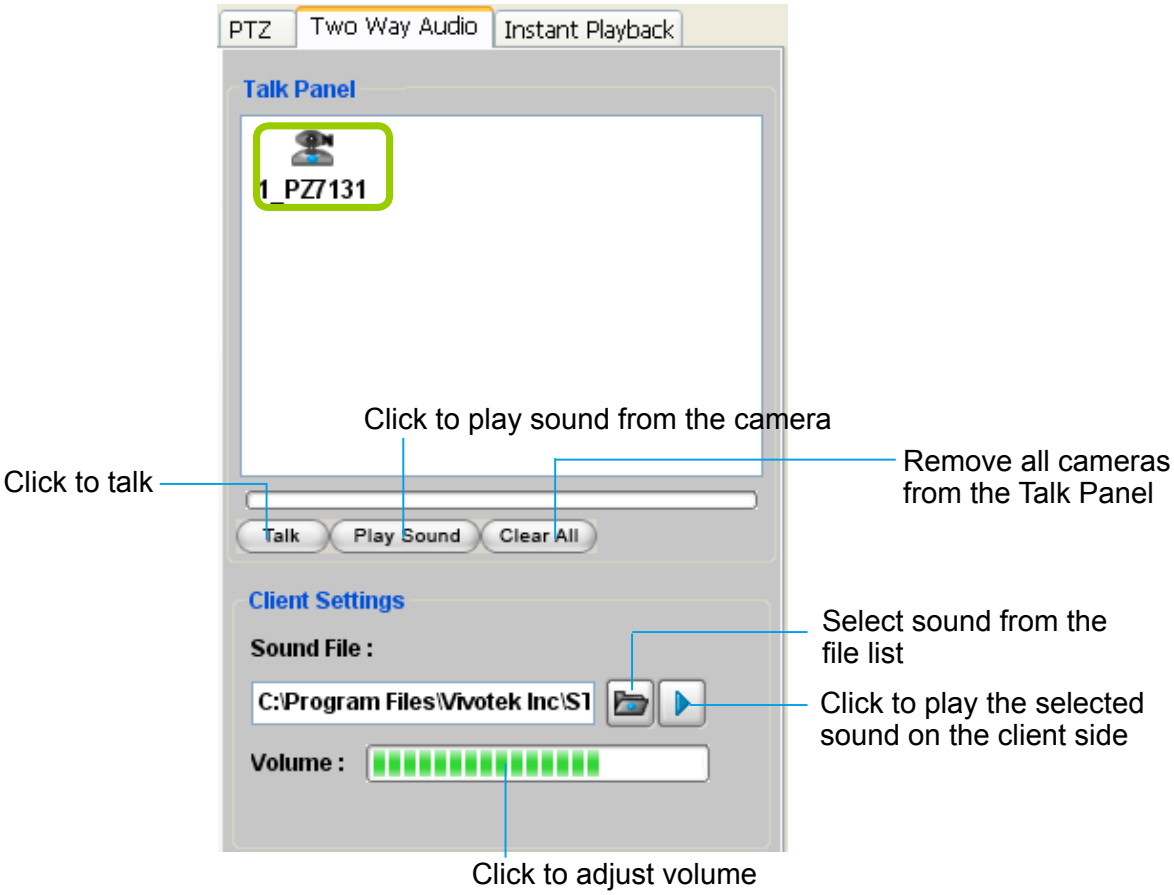
Add a Camera to the Talk Panel

■ There are several ways to add a Network Camera to the Talk Panel:

Drag-and-drop a camera from the video cell or from the hierarchical management tree to the talk panel as shown below. You can also **right-click** the target camera or the video cell, then click **Send to Talk Panel** on the popup menu.

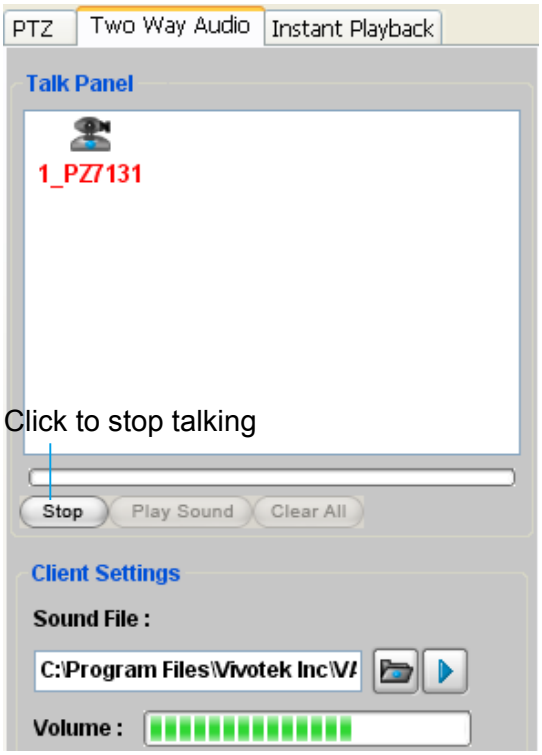


■ An icon with the camera name will be displayed in the Talk Panel.



■ *Please note that you cannot **Talk** and **Play Sound** at the same time.*

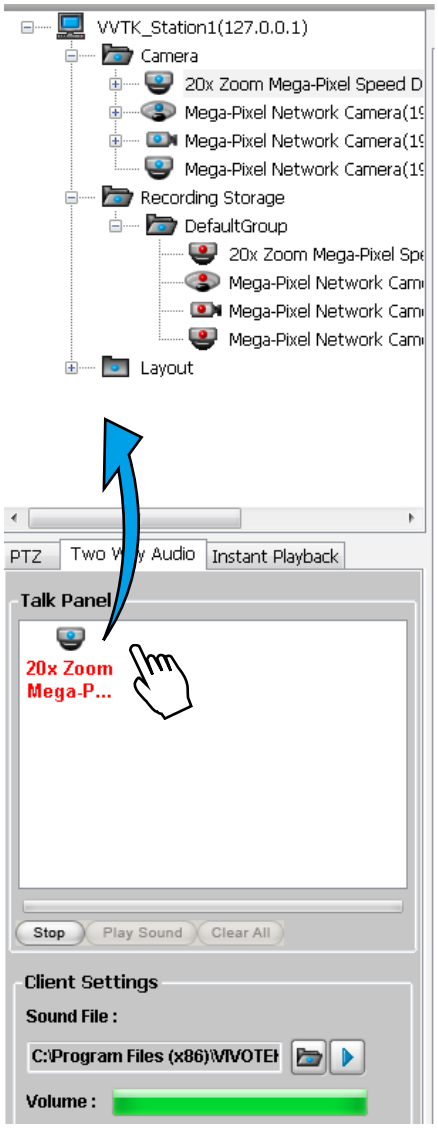
■ *When you are talking or playing sound, you cannot add other cameras to the Talk Panel. If you want to add more cameras to the Talk Panel, please **Stop Talking** and **Stop Playing** first.*



Remove a Camera from the Talk Panel

■ Remove a camera

Drag a camera from the Talk Panel and drop to the hierarchical management tree window as shown below. The camera icon will disappear.

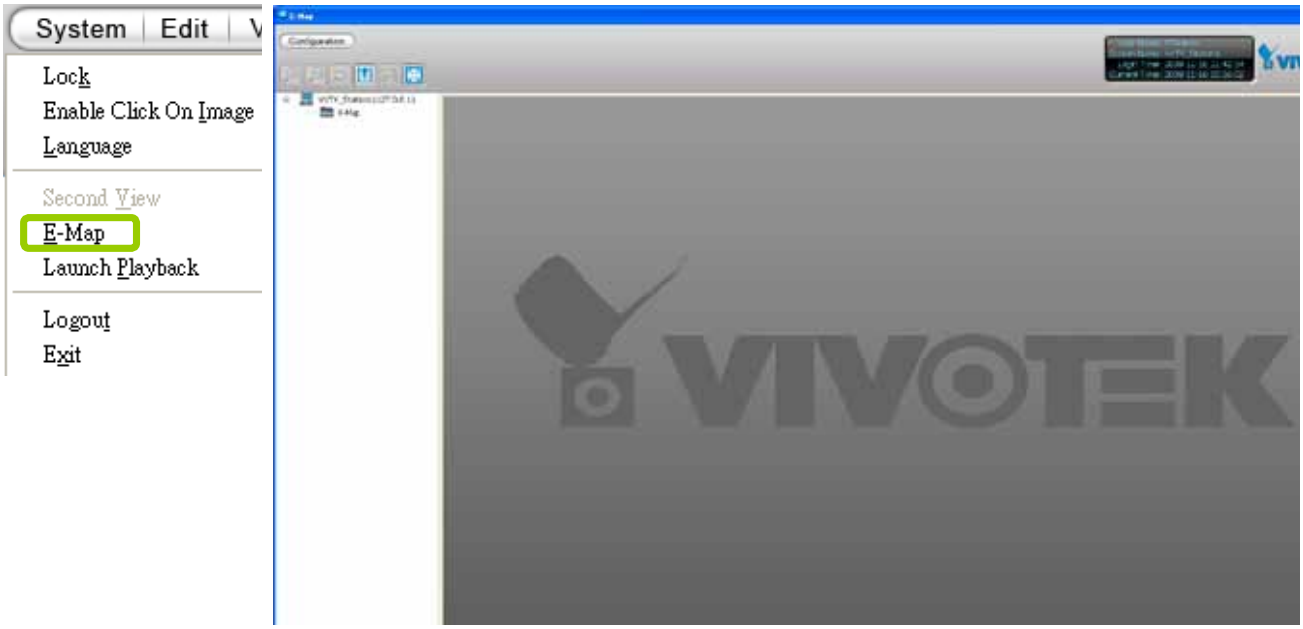


■ Remove all cameras

Click Clear All , all cameras in the Talk Panel will be removed.

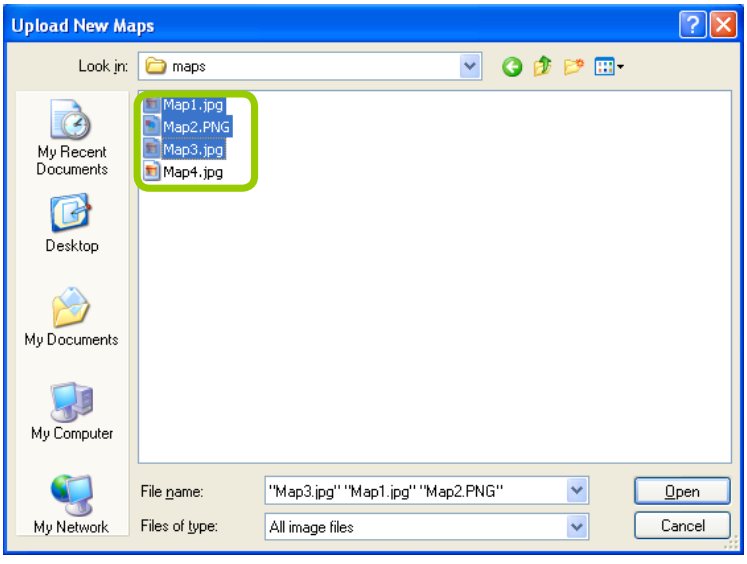
How to Configure E-map Settings

VAST LiveClient supports intuitive E-map function which allows users to upload E-maps for overall devices management.
Click **System > E-map** to open E-map Settings Page:



Upload an E-map

Click to search for E-map(s) to upload.

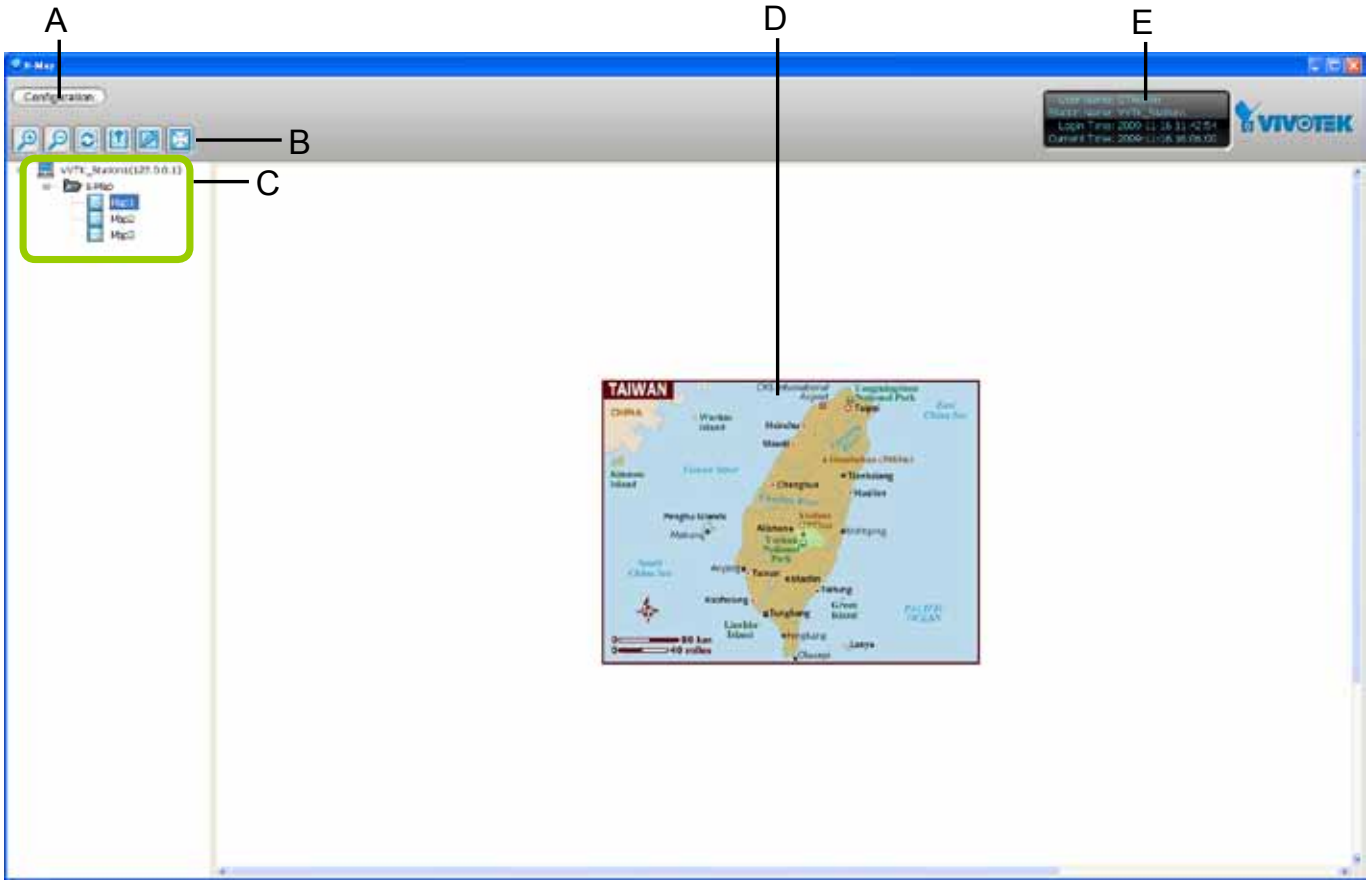


The uploaded E-maps will be listed under the E-map list tree.

If the uploading procedure fails, please compress the image size of your map (equal or smaller than 2MB) and try again.

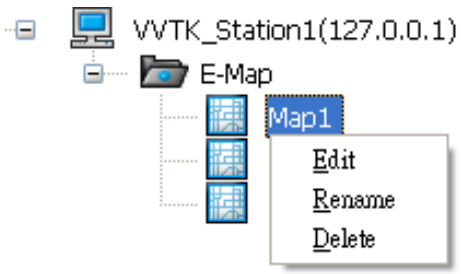
User Interface of E-map Settings Page (View Mode)

■ **Double-click** an E-map on the tree, it will be displayed on the E-map window as shown below. There are two operation modes of E-map settings page: "View Mode" and "Edit Mode". The following is the "View Mode" illustration.

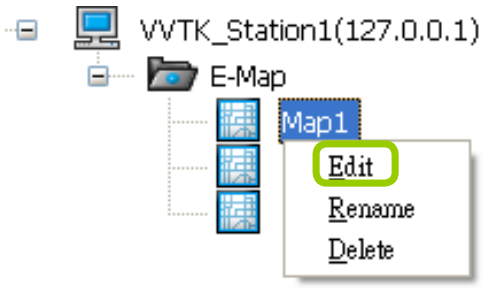


A. Menu bar B. Quick access bar C. E-map list tree D. E-map window E. Status panel

■ **Right-click** the E-map, then you can **Edit**, **Rename**, or **Delete** the E-map.



■ **Right-click** an E-map on the tree and click **Edit** or click on the Quick Access Bar, it will switch to edit mode.



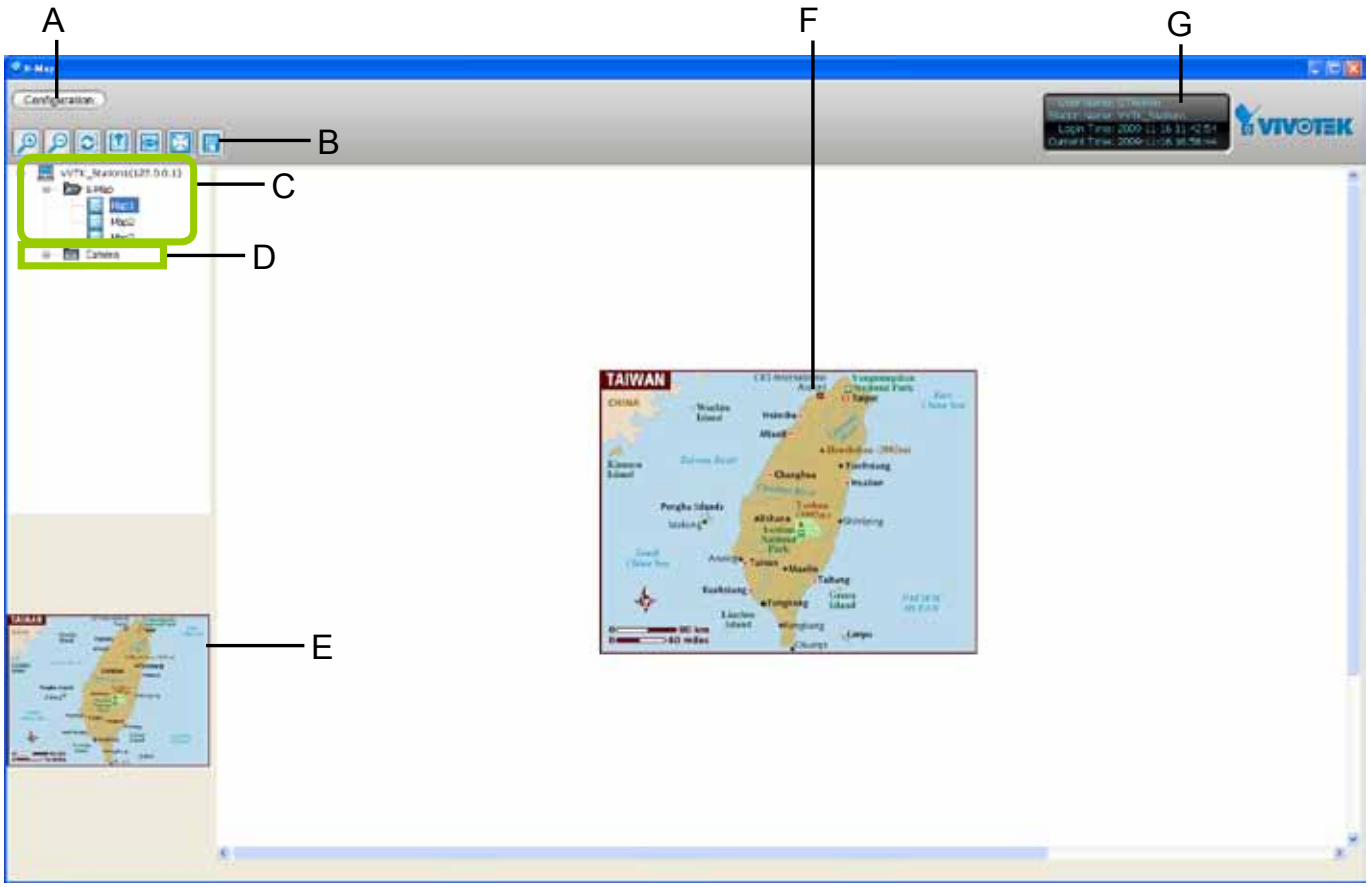
Quick Access Bar

Icon	Function	Description
	Zoom in	Zoom in the E-map
	Zoom out	Zoom out the E-map
	Default size	Adjust the E-map to default size
	Upload	Upload E-map to the login station
	View Mode	Click to switch to view mode
	Full Screen	Extend the E-map settings page to full screen
	Save	Save E-map settings

Status Panel

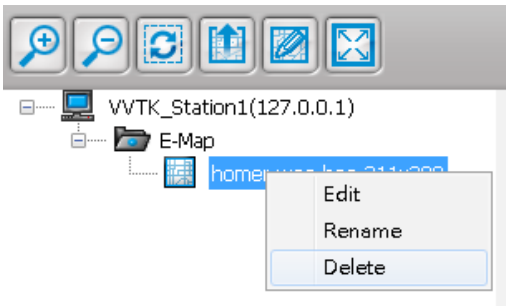
User Name
Station Name (IP Address)
Login Time (yyyy-mm-dd hh:mm:ss)
Current Time (yyyy-mm-dd hh:mm:ss)

User Interface of E-map Settings Page (Edit Mode)



A. Menu bar B. Quick access bar C. E-map list tree D. Device tree
E. Map preview F. E-map window G. Status panel

■ **Right-click** the E-map, you can **Edit, Rename**, or **Delete** the E-map.



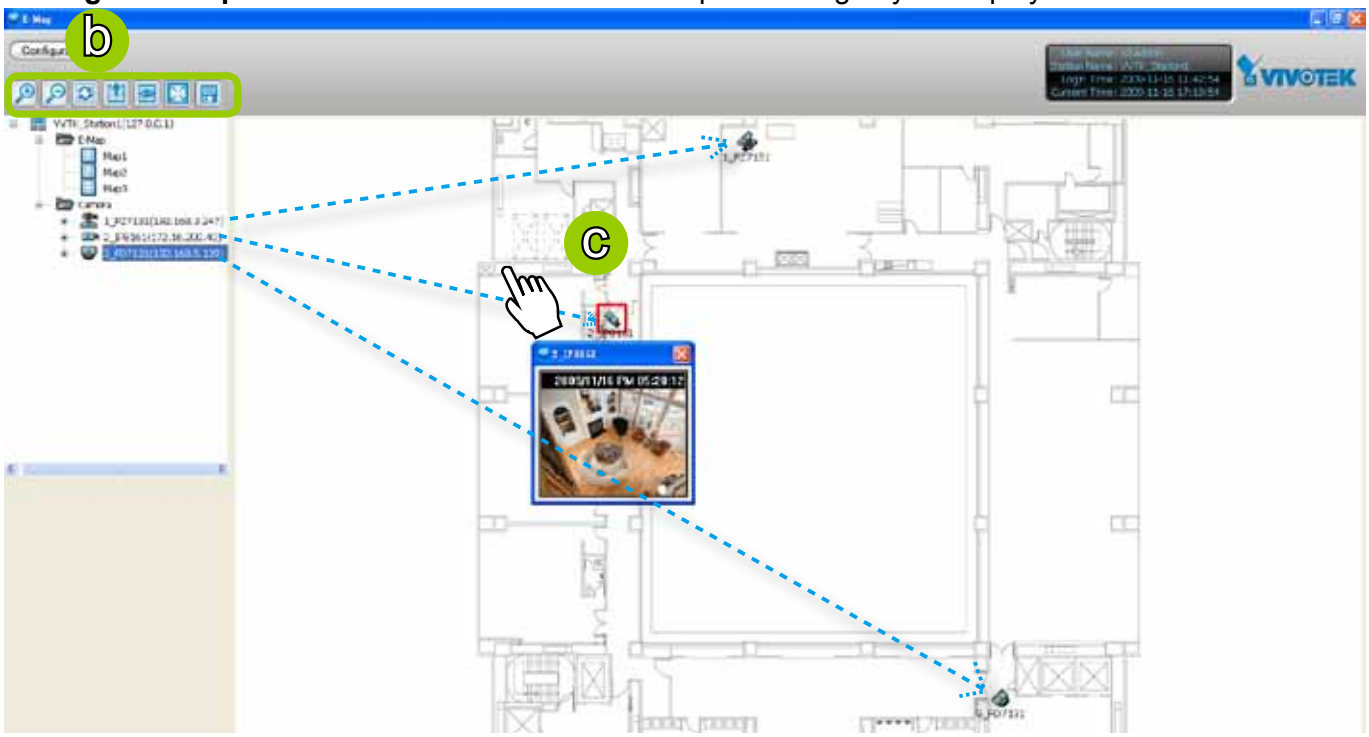
Device Management

Please follow the steps below to edit an uploaded E-map.

a. **Double-click** the E-map you want to edit, it will be displayed on the E-map window.

b. Use Quick Access Bar to adjust the size of the E-map. In edit mode, you can also use your mouse to drag the position of the E-map and zoom in or zoom out the E-map.

c. **Drag-and-drop** the connected devices to the E-map according to your deployment.



d. **Right-click** the device icon on E-map, you can **rotate** the direction or **delete** the device. The device can be rotated in 8 derections as shown below.

e. You can also drag the DI/DO device under the connected device onto the E-map. If you want to change the status of the **DO** device, **double click** the DO icon on E-map.

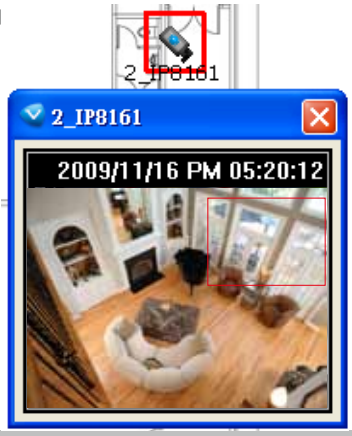
For more information about DI/DO settings, please refer to Association Management on page 137.

Digital input on / off

Digital output on / off

f. Click on the Quick Access Bar to save the new settings.

The red frame twinkling around the device means there is event trigger(s) going on. Meanwhile, a live view dialog will pop up beside the model.

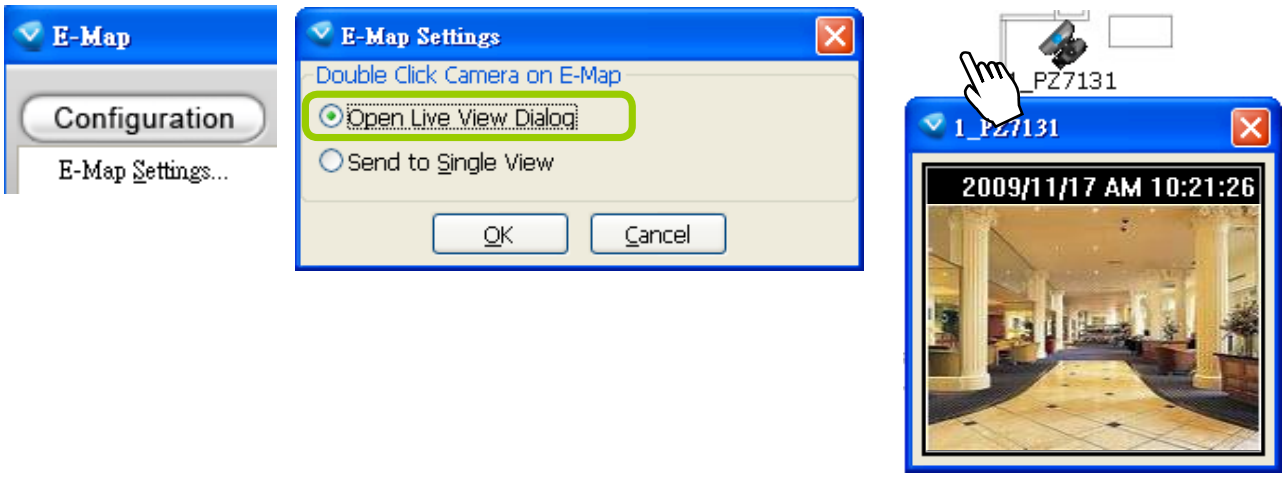


Live View Dialog Settings

Click **Configuration** > **E-map Settings** to open the E-map Settings dialog, then you can choose to **Open Live View Dialog** or to **Send to Single View** when you double-click the device deployed on the E-map.

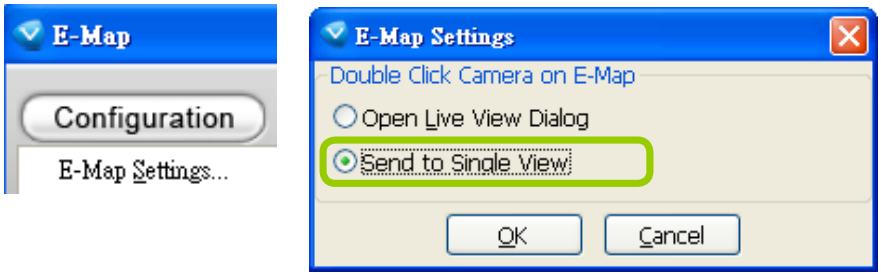
Open Live View Dialog

Select **Open Live View Dialog**: When you **double-click** the device icon on the E-map or when an event triggers, a live view dialog will pop up beside it. It is the default setting in E-map Settings window.

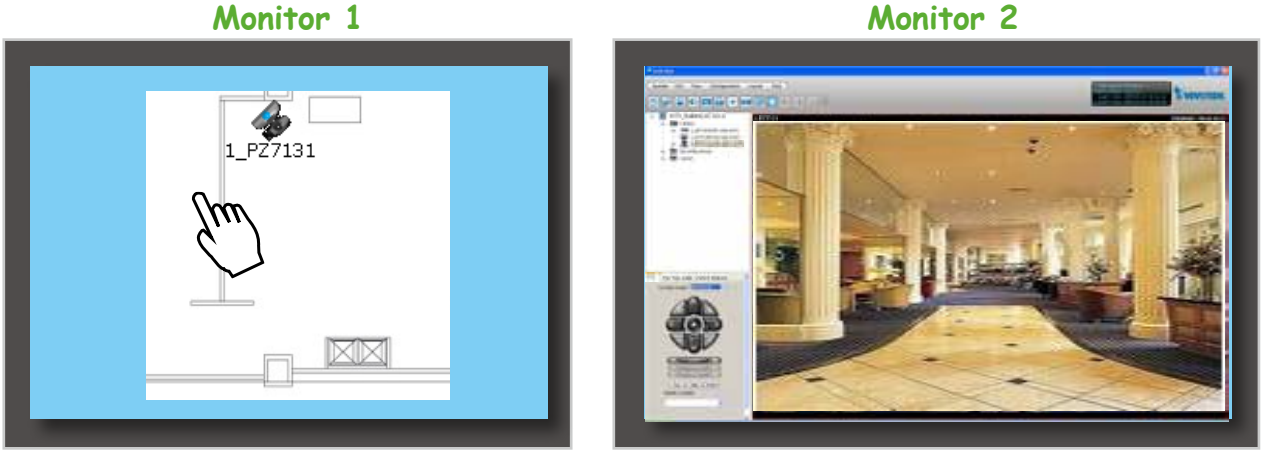


Send to Single View

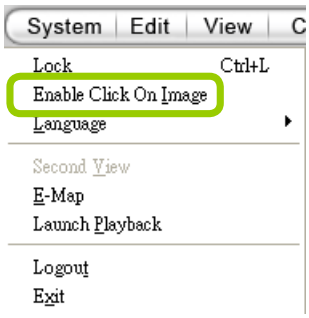
Select **Send to Single View**: When you **double-click** the device icon on the E-map, it will open a single view on the VAST LiveClient.



If you have set up dual monitor, it will be automatically sent a single view to the second monitor.



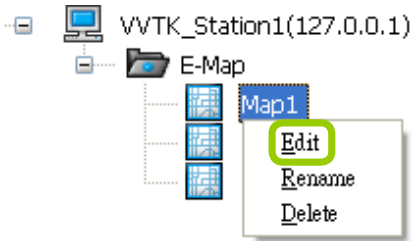
*The live view dialog also supports **click on image**, **PTZ**, and **e-PTZ** as long as the linked device supports and enables those functions. To enable those function on E-map, please check the item "Enable click on image" on the menu bar of LiveClient as shown below. Then an icon will appear in the live view dialog for you to control the cameras.*



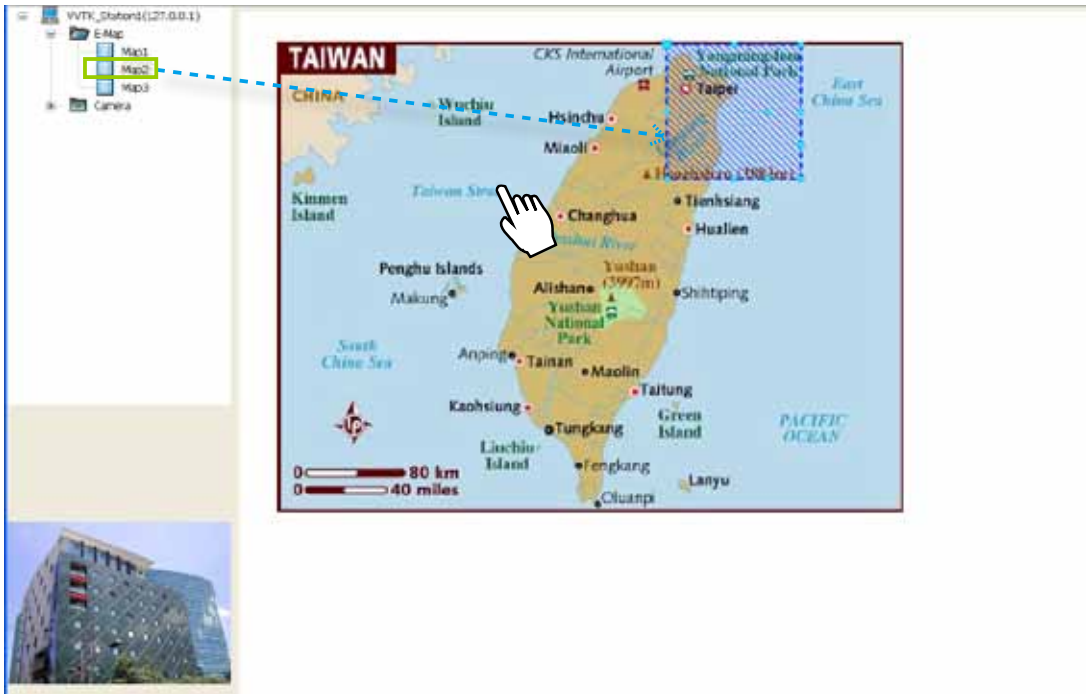
E-map Link

After completing device deployment on your E-map, you can link an E-map to another E-map. Please follow the steps below to configure E-map link:

a. Select a map you want to edit and enter **Edit Mode**.



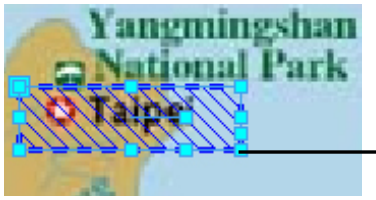
b. **Drag-and-drop** another E-map onto current E-map. A blue frame will appear as shown below.
For example: Link Map1 to Map2 by dargging Map2 onto Map1



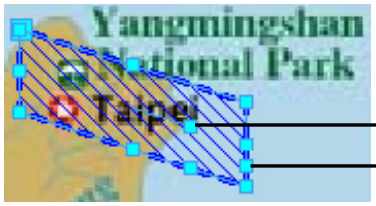
c. Use to move the position of the blue frame.

d. **Right-click** the blue frame to **Resize** or **Delete** it.

Click **Resize**, some nodes will appear around the blue frame. Then You can drag the nodes to move the position, rotate the direction, adjust the size, and change the shape.



resize



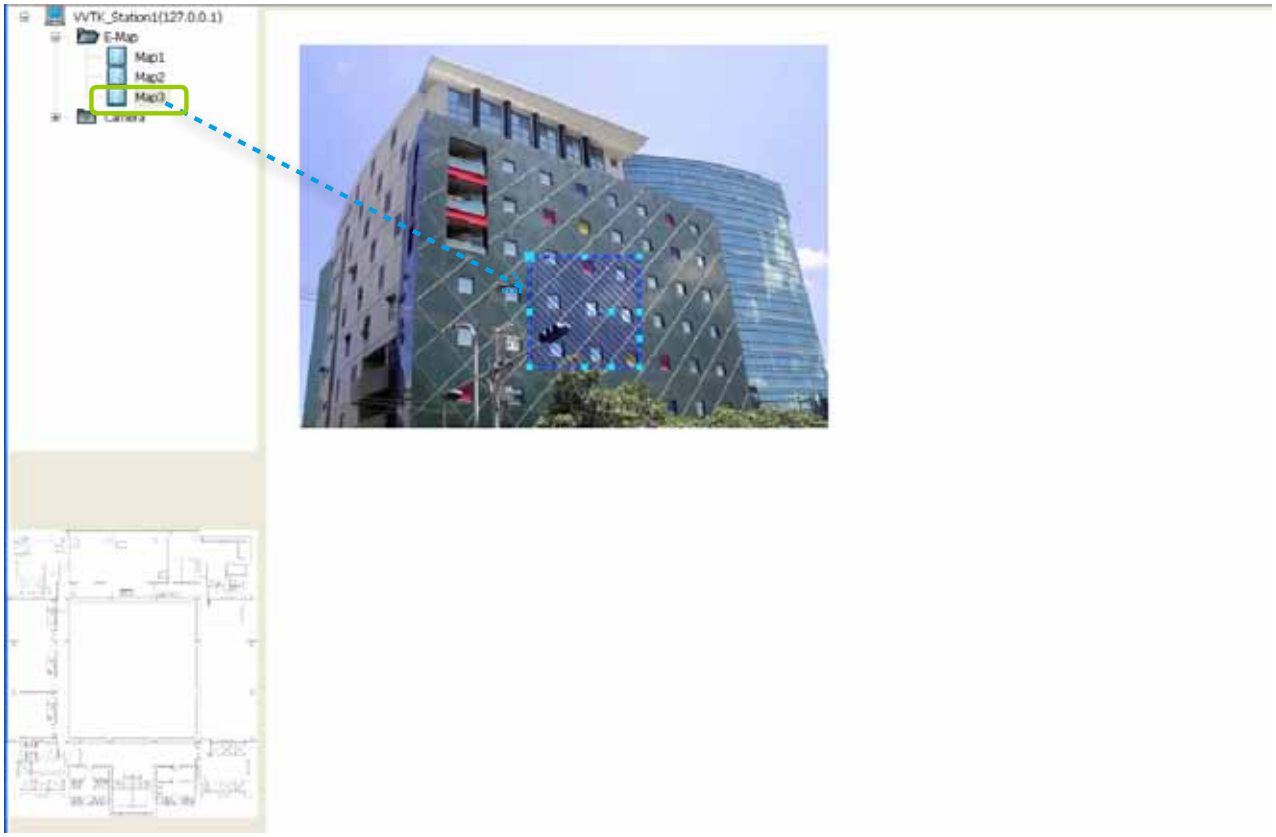
rotate the direction

change the shape

move the position

e. Click on the Quick Access Bar to save the new settings.

f. If you want to set additional map links, please repeat steps a. ~ e.
For example: Link Map2 to Map3 by dargging Map3 onto Map2



g. Click on the Quick Access Bar to save the new settings.

h. Test the web links. Click on the Quick Access Bar to switch to view mode.
Double-click the blue frame on Map1, it will automatically switch to map2. Then **double-click** the blue frame on Map2, it will automatically switch to map3.

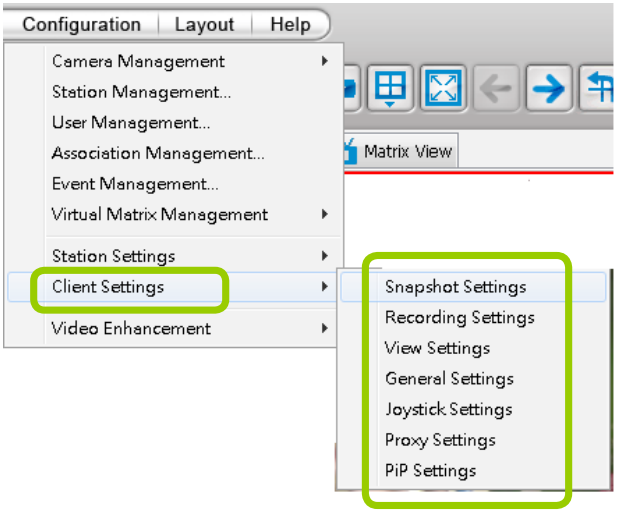
Map 1

Map 2

Map 3

How to Configure Client Settings

In Client Settings, you can configure Snapshot Settings, Recording Settings, View Settings, General Settings, Joystick Settings, Proxy Settings, and PiP Settings.



Snapshot Settings

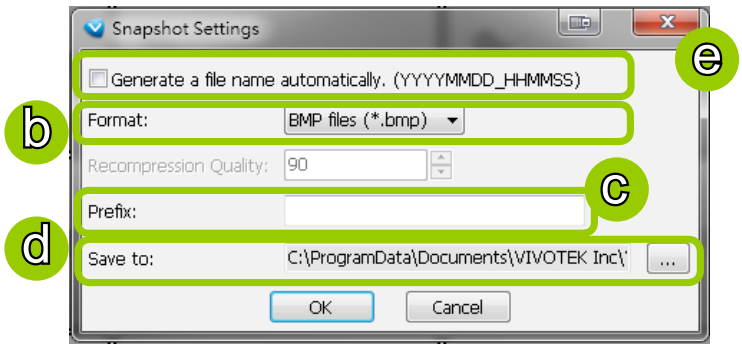
Please follow the steps below to configure snapshot settings:

a. Click **Configuration > Client Settings > Snapshot Settings** on the menu bar to open the **Snapshot Settings** window.

b. Select a picture format for snapshots (**BMP** or **JPEG**). If you select **JPEG** format, you can adjust the recompression quality (from 1 to 100). Note that a higher value would generate higher picture quality but lower compression rate.

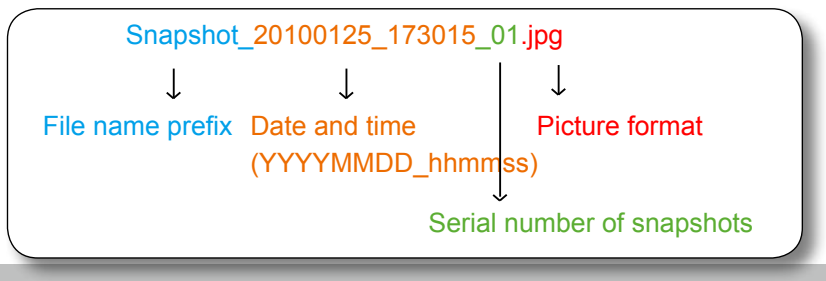
c. Fill in a filename prefix for the snapshots.

d. The default storage path for snapshots is C:\Users\Public\Documents\VIVOTEKInc\VAST\Client\LiveClient. If you want to change the storage path, click **Browse** ... to select another folder.

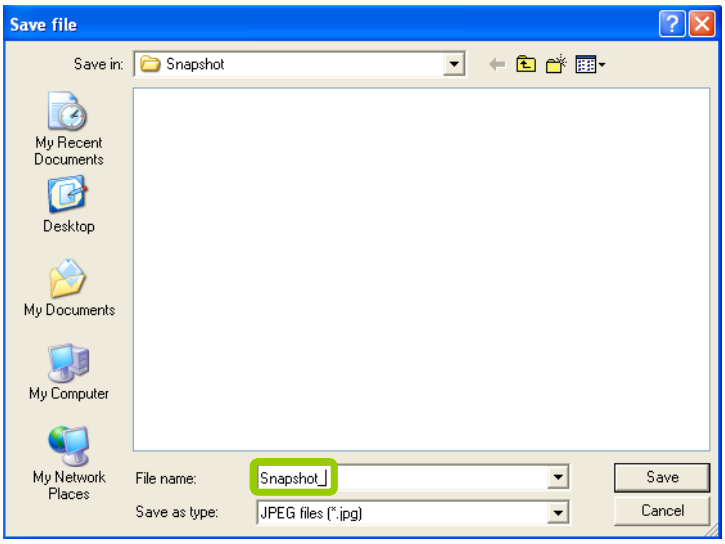


The recompression quality is only enabled in MPEG-4 streaming. If your stream source is MJPEG, the system will directly save the JPEG image without recompression.

e. If you check **Generate a file name automatically**, VAST will directly save snapshots with the following filename format to the storage folder.



If you uncheck **Generate a file name automatically**, the **Save file** dialog box will pop up when you take a snapshot. The file name prefix will automatically be displayed in the Save File dialog box.

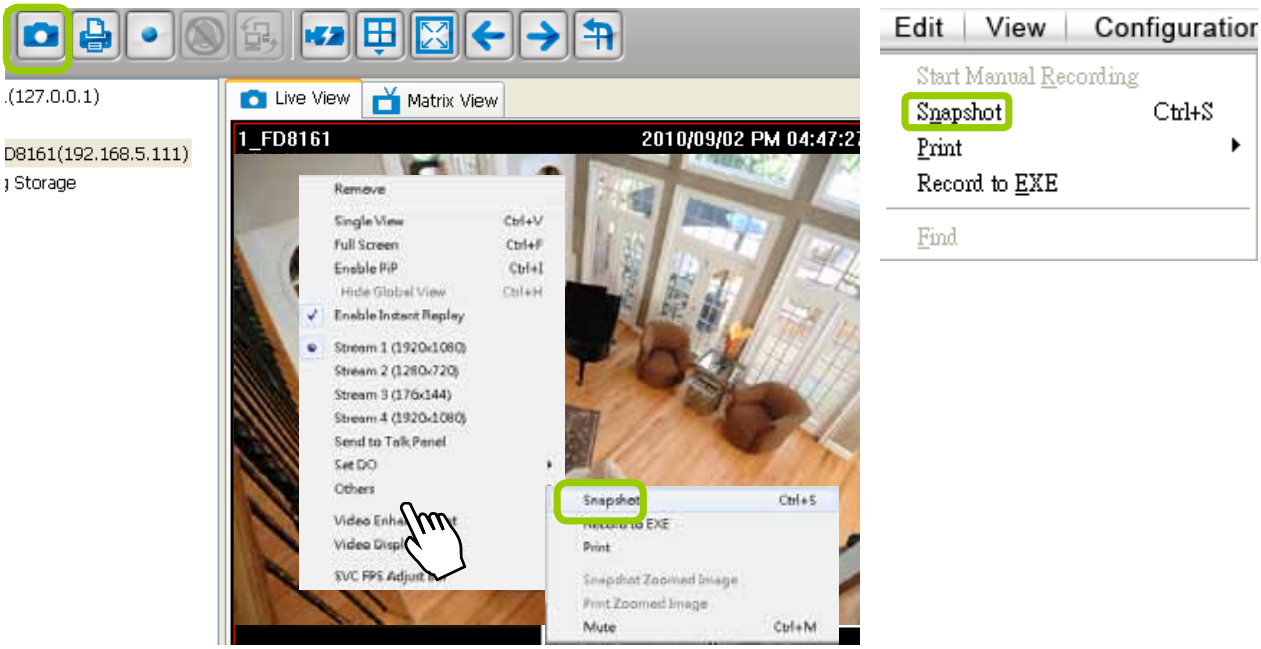


Take a Snapshot

Please follow the steps below to take a snapshot of the live video stream:

a. Select the video cell of which you want to take a snapshot.

b. Click **Snapshot** on the quick access bar, or **right-click** the video cell and select **Others > Snapshot** from the popup menu. You also can click **Edit > Snapshot** to take a snapshot.



c. The snapshots will be found in the preset storage folder on your local computer.

Recording Settings

The VAST Server allows you to record the live video in EXE, 3GP, or AVI format to your storage folder.

Type 1: Record to EXE

Record video as an EXE file. The EXE is not only a media file but also a built-in media player. When user execute the EXE, the media file will be played automatically. There is no need to install any other program. For more information about how to use the EXE player, please refer to page 204.

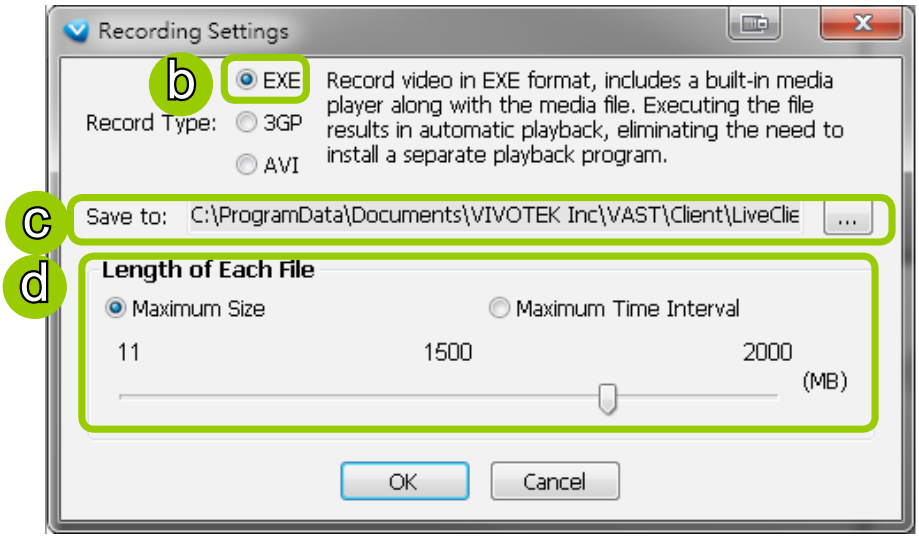
Please follow the steps below to configure EXE record settings:

a. Click **Configuration > Client Settings > Recording Settings** on the menu bar to open the **Recording Settings** window.

b. Select **EXE** as the Record Type.

c. The default storage path is C:\Users\Public\Documents\VIVOTEK Inc\VAST\Client\LiveClient\Record. If you want to change the storage path, click **Browse** ... to select another folder.

d. Select the Length of each file-- **Maximum Size** (11~2000MB) or **Maximum Time Interval** (1~150 min).



e. Click **OK** to enable the settings.

Type 2: Record to 3GP

Record video as a 3GP file. 3GP file is a standard MP4 format compatible with players such as VLC player. Choose this type if you has already installed one of these players.

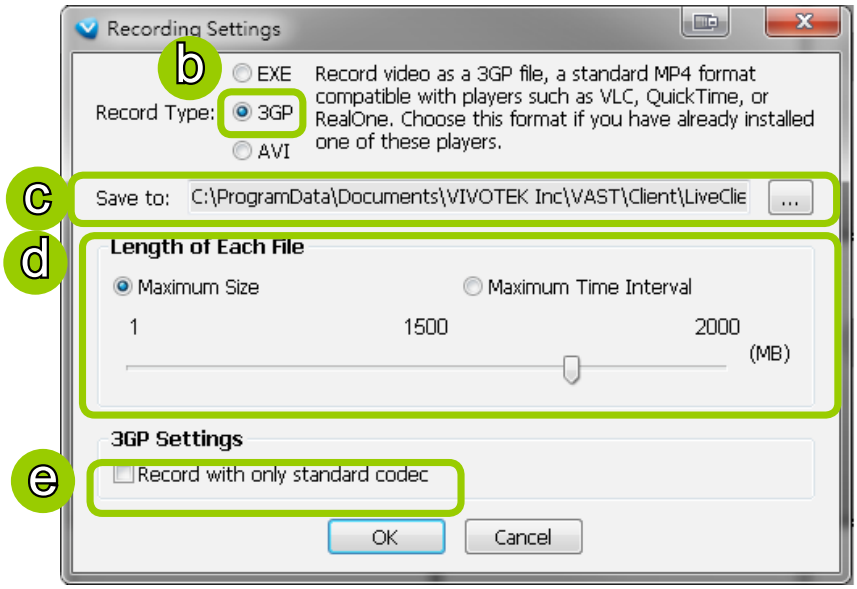
Please follow the steps below to configure 3GP record settings:

a. Click **Configuration > Client Settings > Recording Settings** on the menu bar to open the **Recording Settings** window.

b. Select **3GP** as the Record Type.

c. The default storage path is C:\Users\Public\Documents\VIVOTEK Inc\VAST\Client\LiveClient\Record. If you want to change the storage path, click **Browse** ... to select another folder.

d. Select the Length of each file-- **Maximum Size** (1~2000MB) or **Maximum Time Interval** (1~150 min).



e. If you check "Record with only standard codec", the video from old models (VIVOTEK 6000-series products) using H.263 codec will not be recorded.

f. Click **OK** to enable the settings.

Type 3: Record to AVI

Record video as an AVI file, which uses the popular codecs pre-installed in the Windows OS. Please note that the speed may be slower due to the need of decoding the video/audio and re-encoding both into a compatible codec.

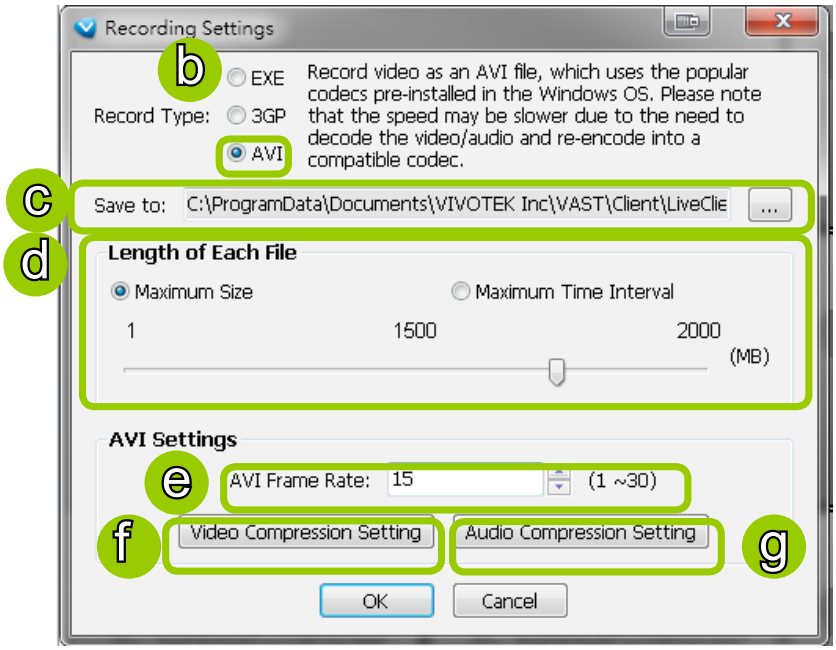
Please follow the steps below to configure AVI record settings:

a. Click **Configuration > Client Settings > Recording Settings** on the menu bar to open the **Recording Settings** window.

b. Select **AVI** as the Record Type.

c. The default storage path is C:\Users\Public\Documents\VIVOTEK Inc\VAST\Client\LiveClient\Record. If you want to change the storage path, click **Browse** ... to select another folder.

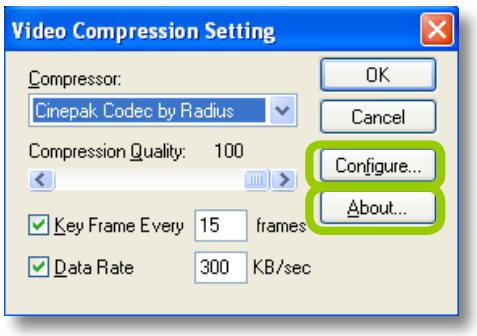
d. Select the Length of each file-- **Maximum Size** (1~2000MB) or **Maximum Time Interval** (1~150 min).



Due to the AVI file has a limitation on the maximum file size of 2G bytes, if the setting "time length" generates data larger than 2G bytes, several files will be created.

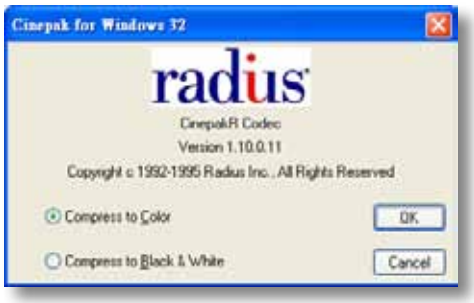
e. Select the frame rate/ per second.

f. To modify the video compression settings, click **Video Compression Setting** to open the AVI Video Compression Setting window. Select the desired **video compression algorithm, compression quality, key frame intervals,** and **data rate** in the corresponding fields.



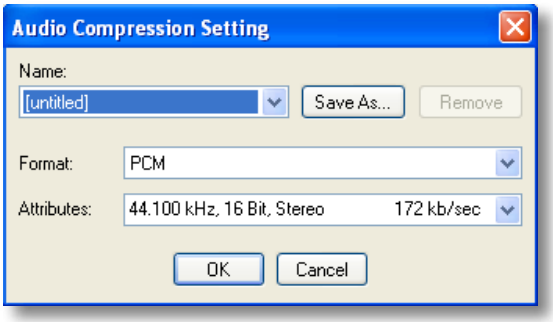
If you do not choose to compress the video, the generated AVI will be very large in file size.

- To modify the settings of the compression algorithm: Click **Configure**, then a dialog box will pop up for you to modify the settings. The dialog box will be different according to the compressor you select.



- To read the information of a compression algorithm (its version for instance): Click **About,** and a dialog box will pop up showing the related information. The dialog box will be different according to the compressor you select.

g. To modify the audio compression settings, click **Audio Compression Setting** to open the AVI Audio Compression Setting window. Select the desired **audio quality, format**, and **attributes** in the corresponding fields.

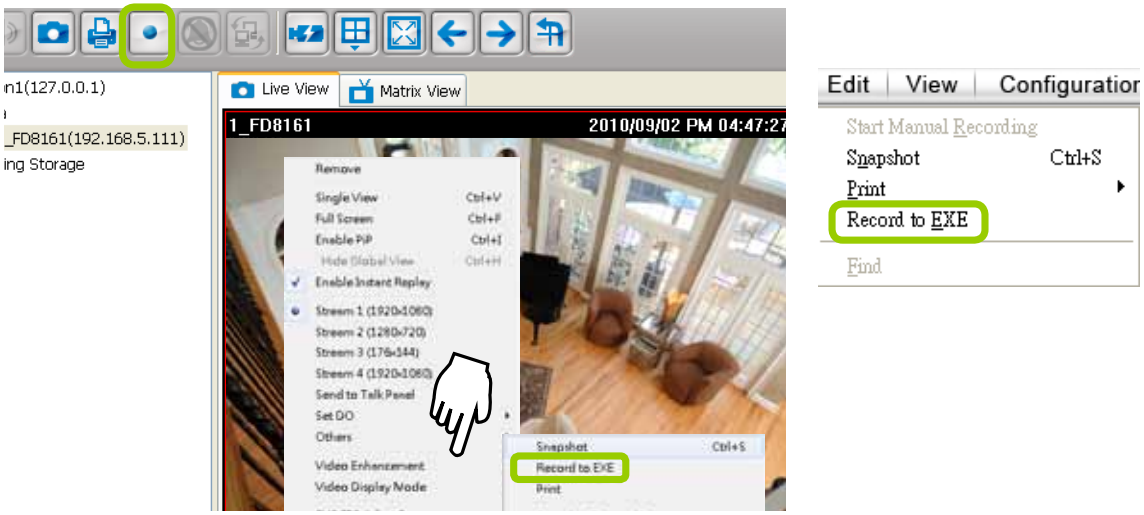


Record an EXE/3GP/AVI File

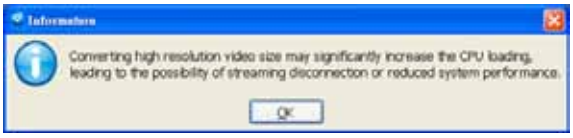
Please follow the steps below to record an EXE/3GP/AVI file of a live video stream:

a. Select a video cell or a device from the heirarchical management tree which you want to record to media file.

b. Click **Record to EXE/3GP/AVI** on the quick access bar, or **right-click** the video cell and click **Record to EXE/3GP/AVI**. You can also click **Edit > Record to EXE/3GP/AVI** on the menu bar. (The UI string will change according to your Recording Settings.)



c. For recording a high-resolution video (1600 x 1200) in AVI type, a dialog box will pop up as shown below to remind you that the CPU loading will increase. Click **OK** to continue the process.



d. The icon will then change to **Recording EXE/3GP/AVI**, and a red text string (**EXE/3GP/AVI**) will appear at the bottom right of the video cell. Note that only one video channel can be recorded at a time.

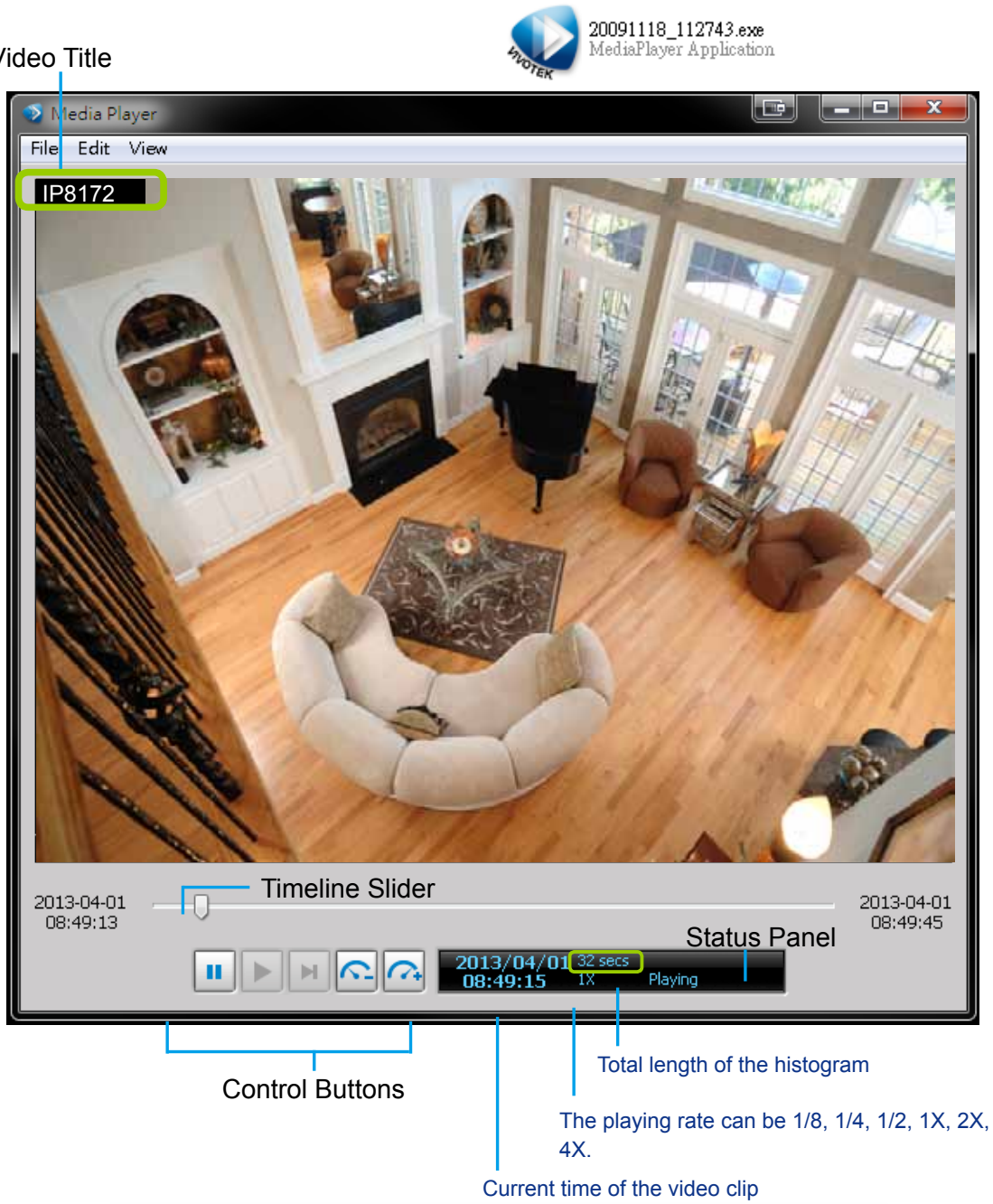
*If you save your video via a LiveClient installed on another computer, the videos will be placed in where you installed the LiveClient utility: e.g., **C:\VAST\Client\LiveClient\Record.** On Windows XP: C:\Documents and Settings\All Users\Documents\VIVOTEK Inc\VAST\Client\LiveClient\Record*

e. When you want to terminate the AVI Recording, click the icon on the Quick Access Bar. The export process will then terminate and the button will change from to . The recorded media files will be found in the preset storage folder on your local computer as shown below.

Below is the file name format for AVI files:

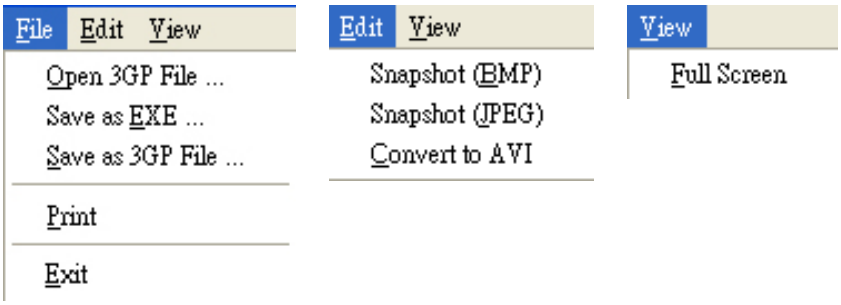
Built-in Media Player--EXE

Below is the icon of footages saved as EXE files. Double-click on it, the recorded video will be played automatically as shown below. You may also open the built-in Media Player in the default location: C:\Program Files\VIVOTEK Inc\VAST\Client\LiveClient. On Windows XP: C:\Documents and Settings\All Users\Documents\VIVOTEK Inc\VAST\Client\LiveClient\Record.



Icon	Function	Description
	Pause	Pause playback of the focused video clip
	Play	Start playback of the focused video clip
	Next Frame	Go to the next video frame of the focused video clip
	Slow Down	Slow down the playback rate
	Speed Up	Speed up the playback rate

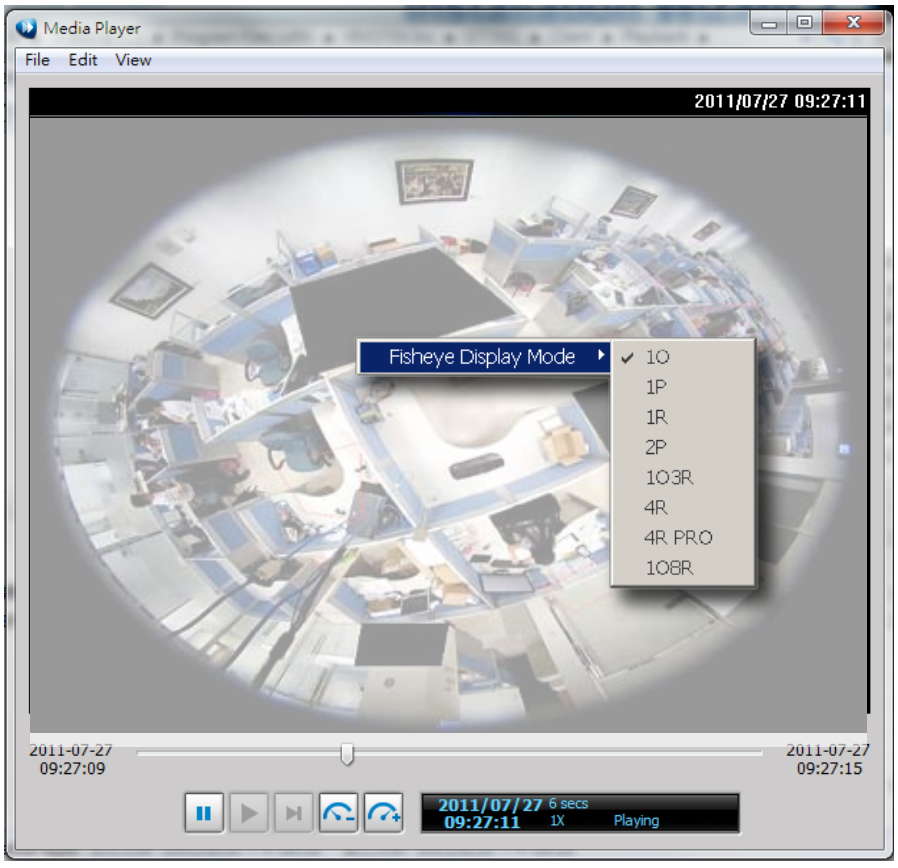
The function menu of the built-in media player are displayed as shown below:



- The built-in player is able to playback 3GP and EXE files.
- The built-in player is able to save 3GP files as EXE files.
- The built-in player is able to save EXE files as 3GP files.
- The built-in player is able to convert EXE and 3GP files into AVI files.
- The built-in player also supports snapshot and print functions.

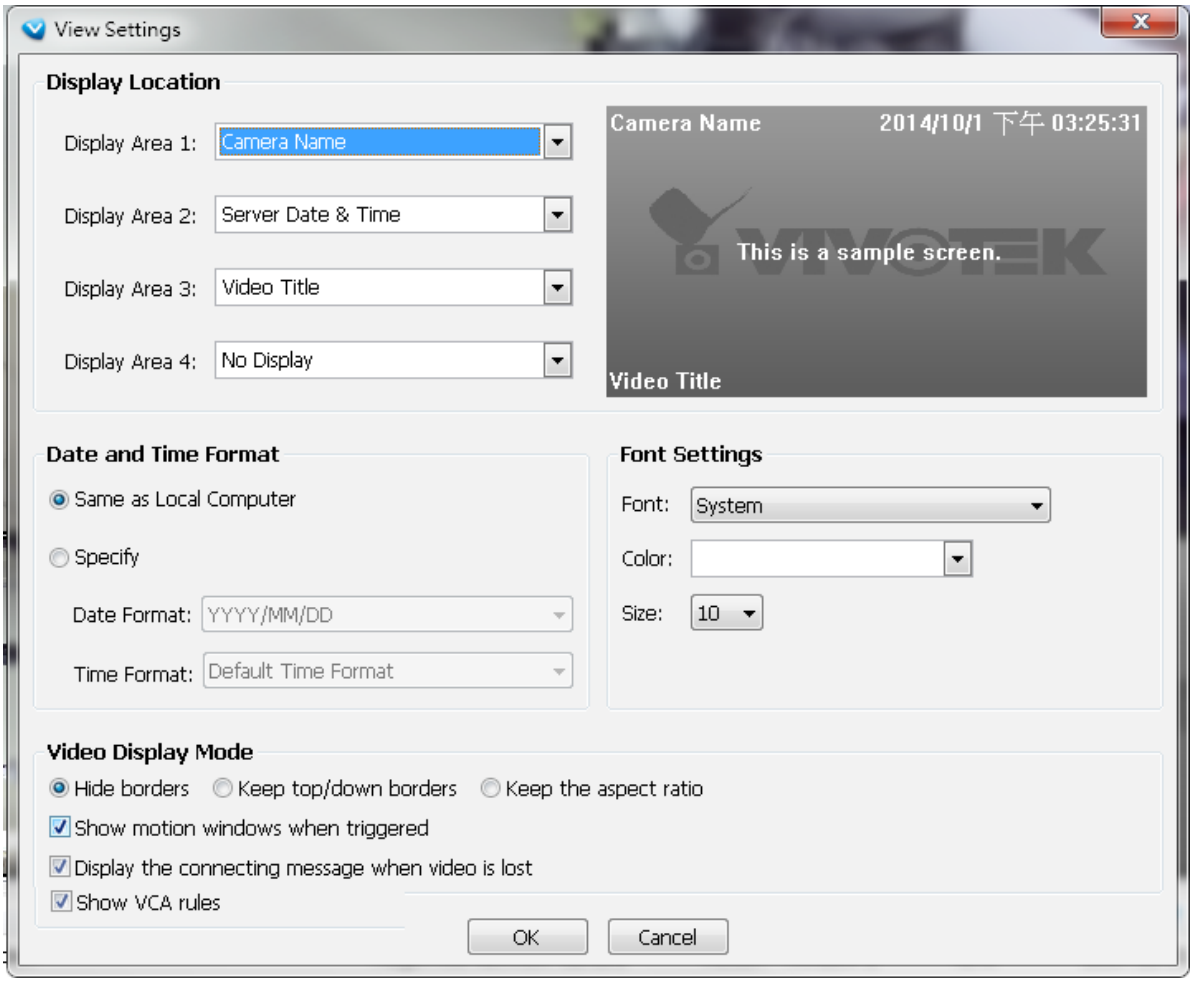
Below are special notices related to video recording with the fisheye cameras:

- For recorded videos from the fisheye cameras, only the built-in Media Player can playback the **Regional** or **Panoramic** views. If you access the recorded videos using other playback software, you will end up seeing the circular-shape Original view.
- When recording videos from fisheye cameras, Regional and Panoramic views can only be preserved in the EXE and 3GP format. If you save the dewarped views, i.e., Regional and Panoramic, as AVIs, only the circular Original view will be preserved.
- Currently the video playback on the Emap window displays the Original view only.
- To display a Regional or Panoramic view, right-click on the Media Player window.

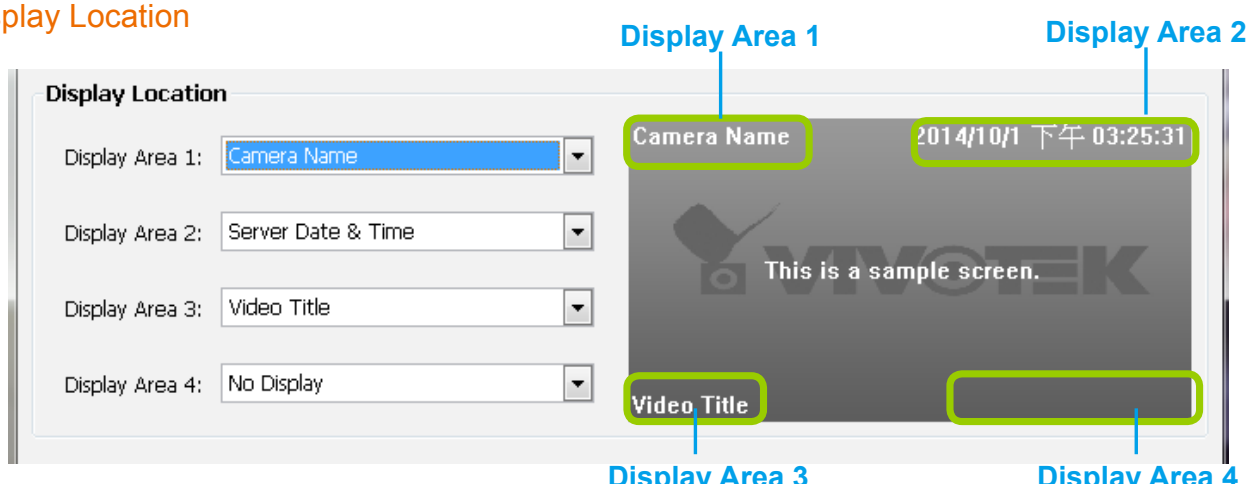


View Settings

This section allows you to set the display mode of a video cell, including **Display Location, Date and time Format, Video Display Mode,** and **Font Settings**. When you change the settings, the sample window will change accordingly for you to preview the settings.

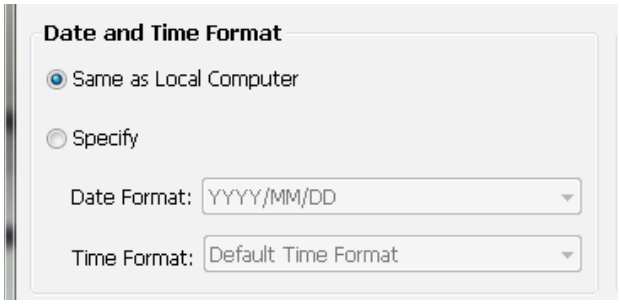


Display Location



As the illustration shows, there are 4 display areas for you to input information about the live video. Each drop-down list includes many options for you to select: **No display, Camera Name, Video Title, Camera Date & Time, Camera DateTime, Server Date & Time, Codec & Resolution, Address,** and **Network throughput & FPS.**

Date and Time Format

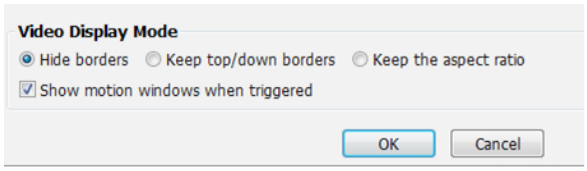


- Same as local computer: Select this option and then the date and time format will synchronize with the local computer.
- Specify: Select a desired format for the date and time from the drop-down list.

  Date format: Select YYYY/MM/DD or MM/DD/YY.

  Time format: Select the default time format (synchronize with the local computer), 12h AM/PM, or 24h.

Video Display Mode



- Keep the aspect ratio: In the default settings, the size of the video window will change according to the layout of the live view window you choose. However, the frame size may be distorted.
- Keep top/down borders: the camera name, video title, and time will be displayed on the black borders instead of displaying floating text on the screen.
- Keep the aspect ratio: If you select **Keep the aspect ratio**, the video window will be adjusted to the same frame size as the preview window. This function is disabled as default.
- Show motion window when triggered: If you select this option, the red frame of the motion detection window will appear in the video window when motion is triggered. This function is enabled as default.
- Display the connecting message when video is lost:indow will appear in the video window when motion is triggered. This function is enabled as default.
- Show VCA rules: VCA rules refer to the Line Crossing and Field Detection lines drawn on individual video screens. These VCA functions are configured on the web consoles with cameras, not on the VAST LiveClient.

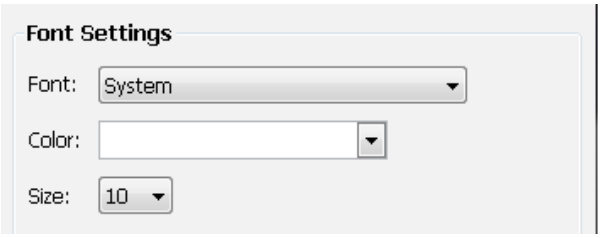
The Display options can also be accessed by a right-click on the view cell.

For detailed information about how to set up the layout of the live view window, please refer to **How to Change Video Viewing Mode** on page 114.

Font Settings

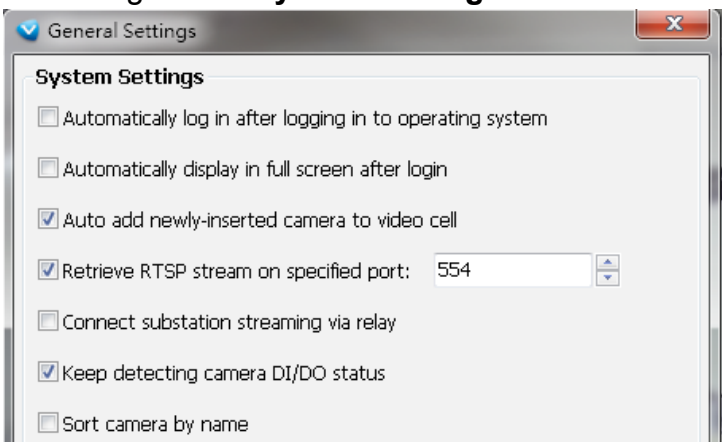
This function allows you to change the font on the video cell.

- Font: Automatically lists all fonts installed on your operating system. Select the desired type.
- Color: Select a desired font color (white, red, green, blue).
- Size: Select a desired font size (8, 10, 12, 14).



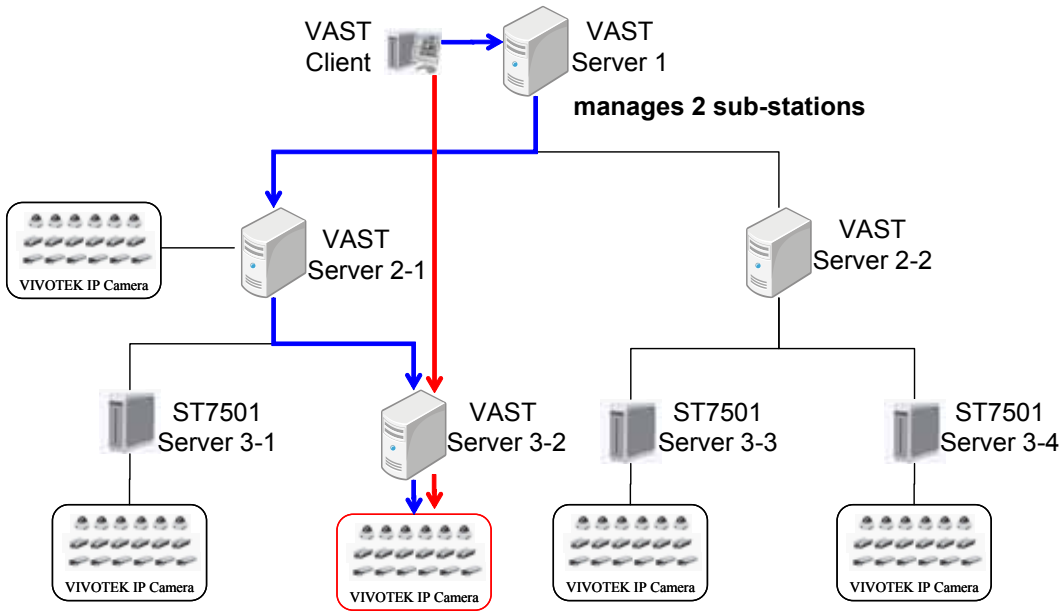
General Settings

This section allows you to configure the **System Settings** and **Rotation Settings**.



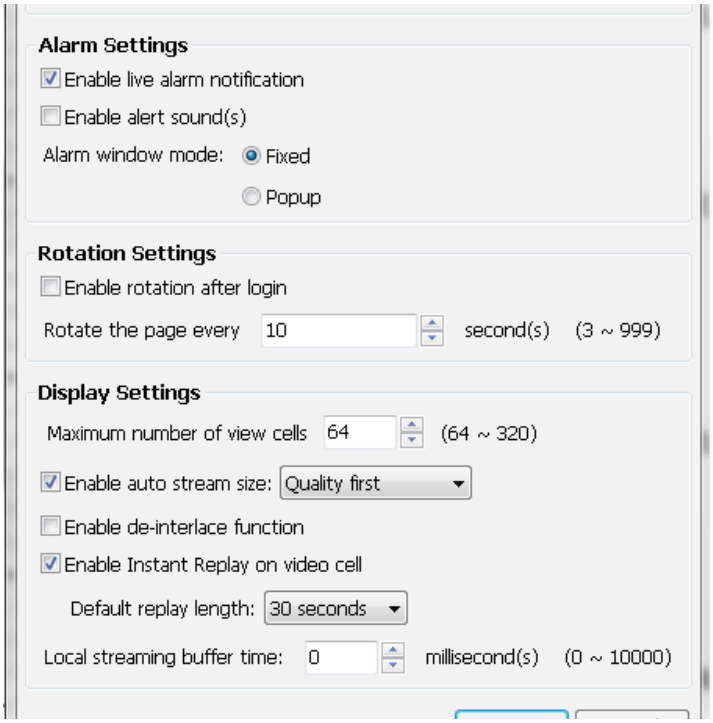
System Settings

- Auto login after logging in to operating system: If you check this option, VAST LiveClient will automatically login after you login to Windows without filling in the user name and password. This function is disabled as default.
- Automatically display in full screen after login: If you check this option, the video cells will be displayed in full screen without showing the menu bar or the control panels.
- Auto add newly-inserted camera to video cell: If you check this option, VAST LiveClient will automatically add the newly-inserted device to a video cell. This function is enabled as default.
- Retrieve RTSP streaming on specific port: The default port for RTSP streaming is 4543. If you want to change this port, please check this item and fill in a desired port number.
- Setup substation streaming via relay: This option is not checked by default. As the following diagram shows, VAST Client might directly connect to the streaming under VAST Server 3-2 without requesting the connection via VAST Server 1 and Server 2-1. If you want to get streaming through relaying, please check this option.



- *If the VAST Server 3-2 is set up behind a firewall, the VAST Client will not be able to access the VAST Server 3-2 directly. You have to get the connetion by relaying.*

- Keep detecting camera DI/DO status: The default for this option is enabled. This option enables the VAST server to monitor the DI/DO status from the configured cameras. You may also disable this option.
- Sort camera by name: The positions of cameras on the device tree will be sorted by their camera names.



Alarm Settings

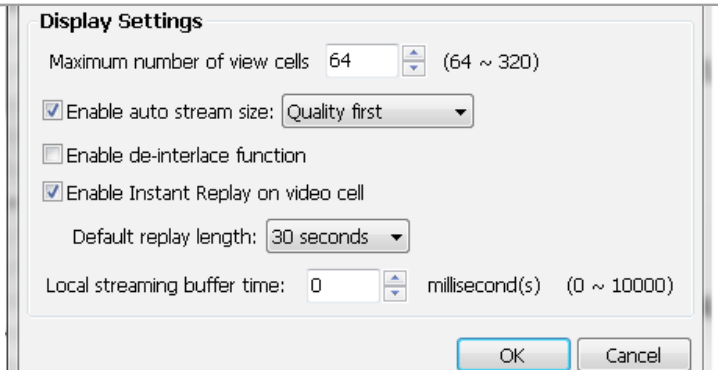
- Enable live alarm notification: Select this option to activate real-time event notification. For example: the event notification of DI/O status on the hierarchical management tree, the event list in the event window, motion detection windows in video window, or the event notification on E-map settings page, etc. This function is enabled as default.
- Enable alert sound(s): If you enable this option, you will hear alert sound on the client side when the event is triggered..
- Alarm window mode: Select **Fixed** or **Popup** mode for the event window. For more information about event window, please refer to page 75.

Rotation Settings

- Enable rotation after login: If you check this option, the video cells will start to rotate after you login to the VAST LiveClient. The default setting of this function is disabled.
- Rotate the page every ☐ second(s): Fill in a desired interval time for video page rotation. The maximum value is 99 seconds. The default value is set at 6 seconds.

For detailed information about how to set up the layout of the monitoring window and rotation functions, please refer to **How to Change Video Viewing Mode** on page 114.

Display Settings



- **Maximum number of view cells**: This determines the number of view cell on window, and also takes effect with the number of layout pages. For example, if there are 320 channels using the 1+31 layout, there will be 10 layout pages in the LiveClient window. The configuration changes take effect after the LiveClient is re-started.

- Enable **auto stream size**: The Auto Stream Size feature dynamically adjusts the stream sizes of video feeds from network cameras in order to reduce CPU load and bandwidth consumption.

  It is often the case that in surveillance deployments the physical dimensions of monitors, the effectiveness of visual stimulus, and the operators' regions of interest can all be very limited. Streaming large-size videos at all times will be a waste of bandwidth and system computing power. CIF and VGA size videos are usually sufficient for the operators watching surveillance screens.

  When enabled, your LiveClient station automatically requests smaller-size streams as video feeds (any from streams #1 ~ #4) from the network cameras. For example, the frame size of video stream #4 will be reduced to 320x240 (CIF). Depending on the actual size of view cells on the LiveClient monitoring screen, the VAST server automatically requests different video streams.

  When the size of view cells is manually expanded, a VAST server requests a different stream. This is called **Stream Jump**. Shown below are the details of the corresponding stream jumps.

View cell size	Stream jump to...
4:3 resolutions	
<= 320x240	stream #4 (CIF)
> 320x240 or 640x480	stream #1
16:9 resolutions	
<= 384x216	stream #4 (CIF)
> 384x216 or 640x360	stream #1
1:1 (fisheye cameras)	
<= 384x384	stream #4 (CIF)
> 384x384 or 640x640	stream #1

  Facts about Auto Stream Size:

  - The Auto Stream Size takes effect when,
    1. The size of view cell is changed.
    2. Inserting a new camera, or when the "Auto add newly-inserted camera" feature is applied.
    3. Double-click or click-and-drag cameras into view cells.
    4. When Auto Stream Size feature is enabled (the configuration on this window).
    5. Through the layout change.
  - The LiveClient utility automatically adjusts stream selection according to the size of view cells, no user's configuration is required.

- The frame size of stream #1 is user-configurable. The VAST server only resizes stream #4.
- If a user disables the Auto Stream Size function later, the frame size of stream #4 will not be restored to the previous configuration. Stream jump takes place on the display of all connected cameras once the function is enabled.
- The Auto Stream Size function does not apply to the Matrix view.
- If users configured a region of interest before the Auto Stream Size function is applied, e.g., via the ePTZ control, the view cell might display a different live view.
- Below is the general rule for stream selection:

	stream # configured into VGA	stream # configured into CIF
4 streams cameras	Stream 2	Stream 4
3 streams cameras	Stream 2	Stream 3
2 streams cameras	none	Stream 2

- When a smaller stream is selected, the video quality is set to fixed quality as Good.
- The Maximum frame rate is not configured.
- The VAST server automatically selects a video resolution of a specific aspect ratio that best fits the current view cell, and places the video into the view cell.

Limitations:

- For older, single-stream cameras, the Auto Stream Size feature does not take effect.
- When the Auto Stream Size feature is enabled, the NR and ND series NVR configured under the VAST server will be considered as substations. The stream configuration of cameras managed by these NVR substations will not be changed. Only the video codec, bit rate, and frame rate of the video feeds directed through these NVR substations will be changed into a more economic setting.
- For the NVR, the Auto Stream Size function may not fully apply. For cameras managed by the NVR, the following will apply:

  Large view cell: default viewing stream.

  Medium view cell: stream #2.

  Small view cell: the last stream.
- a user disables the Auto Stream Size function later, the frame size of stream #4 will not be restored to the previous configuration.

- Enable de-interlace function: Select this option if your connected device does not support de-interlace function. For example: VS7100.
- Enable Instant Replay on video cell: Here you can change the duration of a playback that happened immediately before a user utilizes the instant playback function.
- Local streaming buffer time: Video frames can be temporarily stored on the cache memory of the VAST server for a short, configurable period of time before they are displayed on the Liveview. If the networking condition is less than ideal, this can help delivering a smooth video stream. Note that this feature is not available on a Matrix view and the web console.

Joystick Settings

This section explains how to remote control connected network devices with a USB joystick. It's easy to install and configure via the USB interface.

Enable Joystick

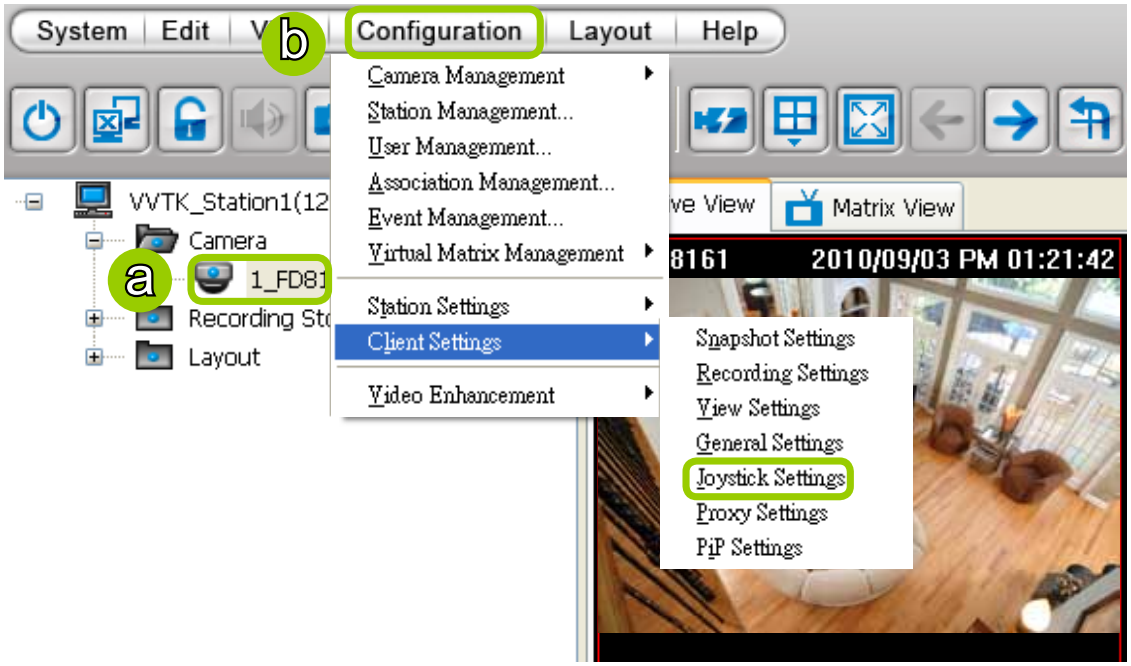
Connect to the USB plug of the joystick to a USB port on your computer. Supported by the plug-in in the main page (Microsoft's DirectX), once the plug-in in the main page is loaded, it will automatically detect if there is any joystick on the computer. The joystick should work properly without installing any other driver or software.

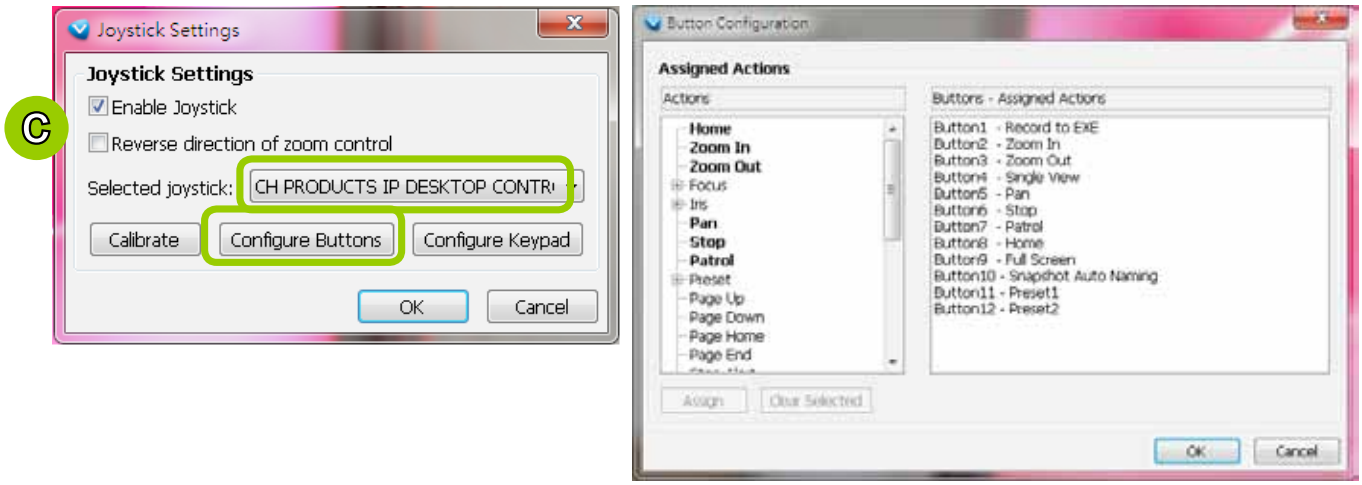
Then you can begin to configure the joystick settings of connected devices. Please follow the instruction below to enable joystick settings.

a. Select the target device from the hierarchical management tree.

b. Click **Configuration > Client Settings > Joystick Settings** on the menu bar to open the **Joystick Settings** window. If your joystick is working properly, it will be displayed on the drop-down list.

c. Select the joystick you want to configure. Check **Enable Joystick**, then click **Configure Buttons** to open Buttons configuration window.





Reverse direction of zoom control

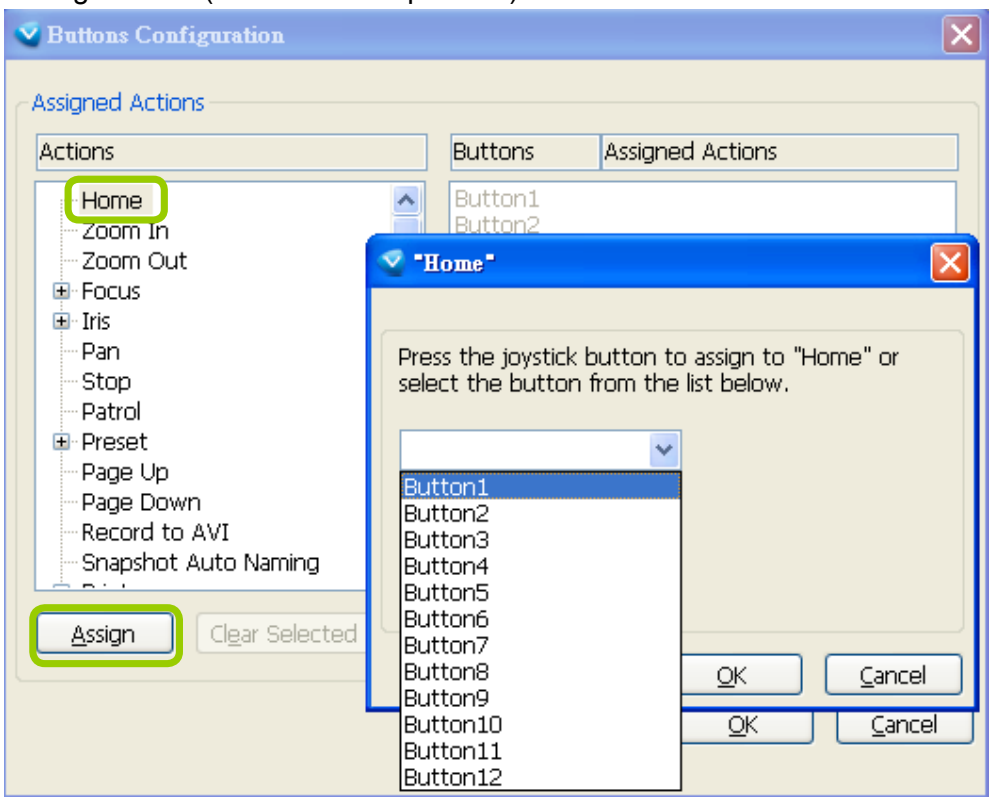
Due to different designs in joystick zoom wheel, you can select this checkbox to reverse the zoom in/out directions.

Buttons Configuration

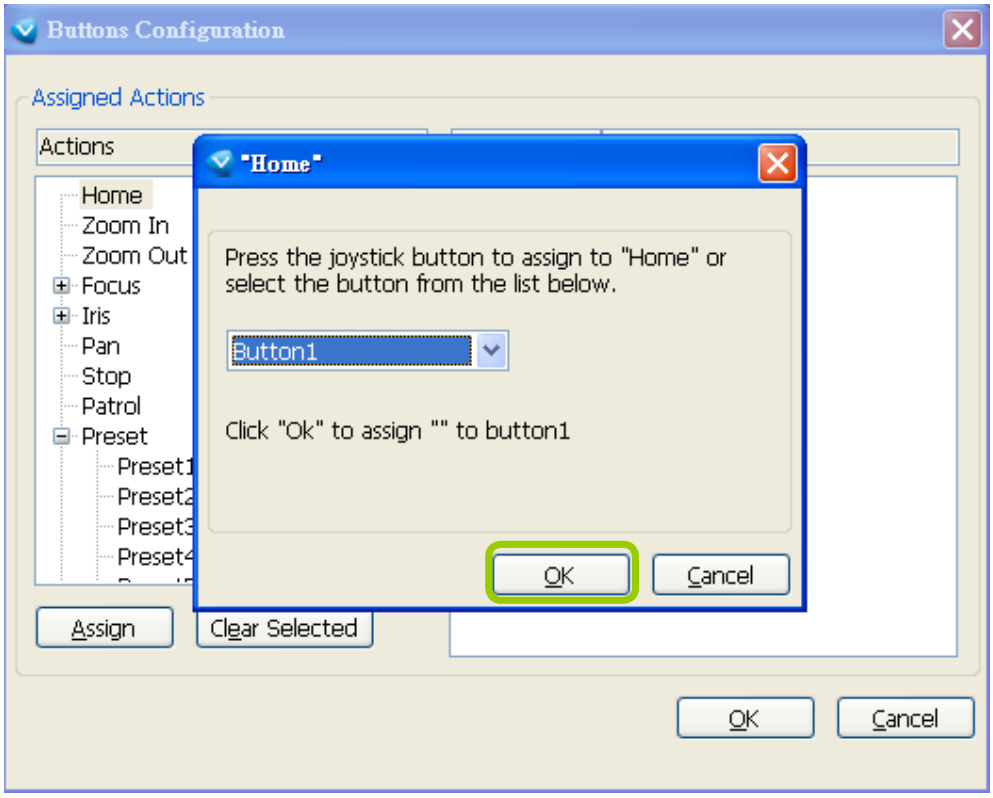
In Button Configuration window, the left column shows the actions you can assign, and the right column shows the functional buttons and assigned actions. The number of buttons may differ from different joysticks.

Please follow the steps below to configure your joystick buttons:

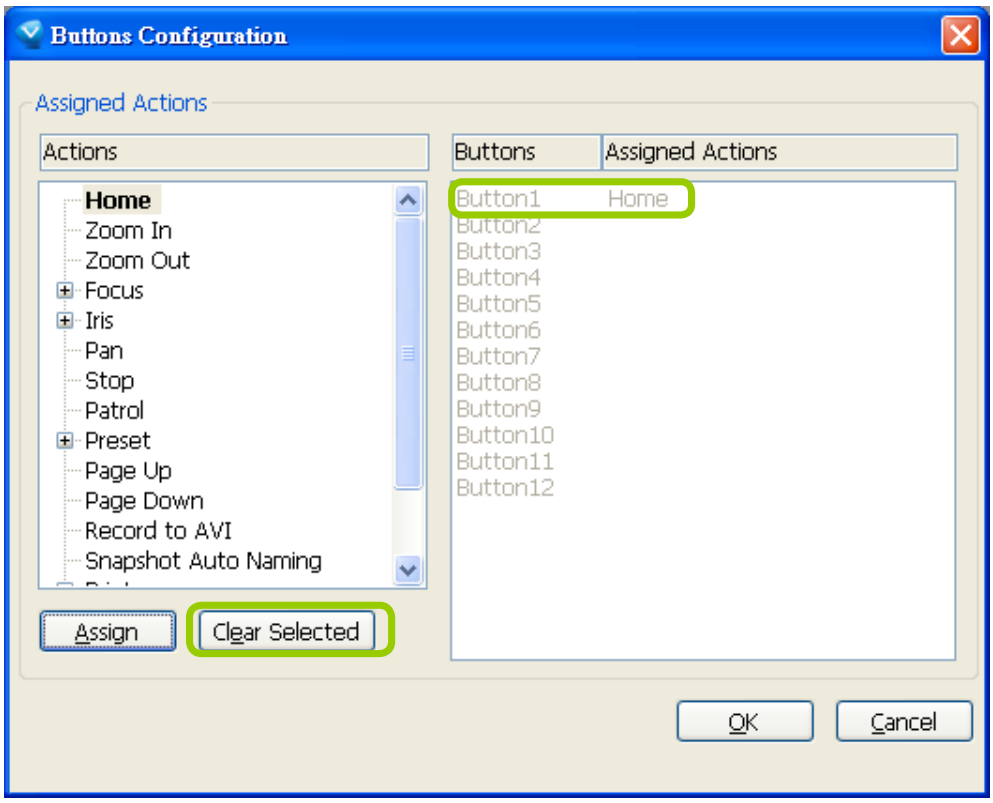
a. Choosing one of the actions and click **Assign** will pop up a dialog. Then you can assign this action to a button by pressing the joystick button or select it from the drop-down list.
For example: Assign **Home** (move to home position) to Button 1.



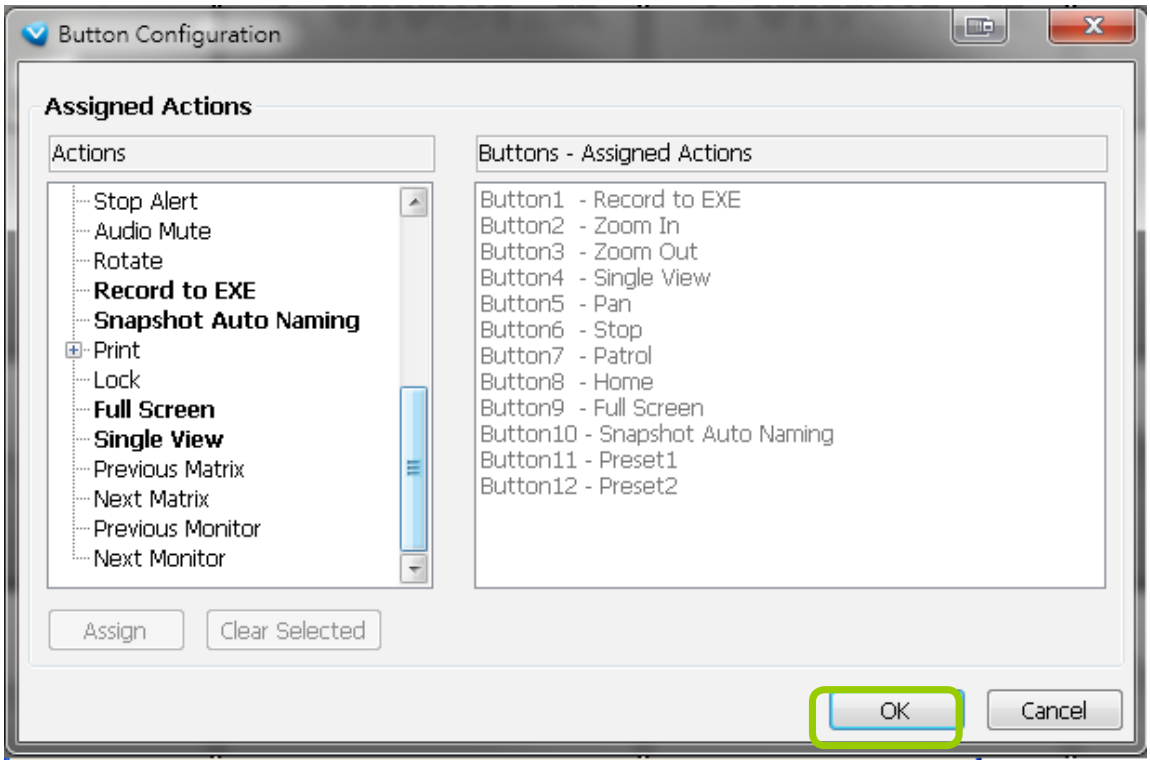
b. Click **OK** to confirm the configuration.



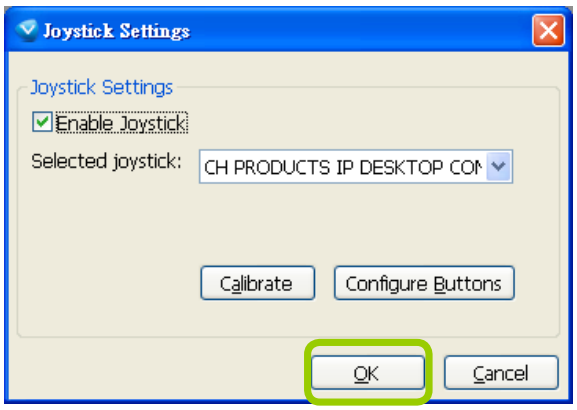
c. The Assigned Action will appear beside Button 1 in the right column as shown in the following diagram. Note that a button can only be assigned with an action. If you want to modify the settings, select the action on the list and click **Clear Selected**.



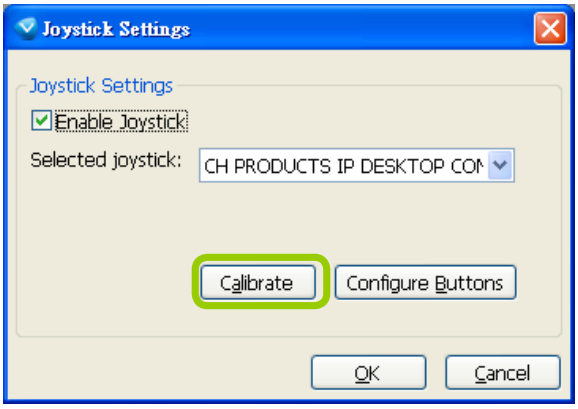
d. If you want to assign additional actions, repeat step a.~c. When all settings are complete, click **OK** to save the settings or click **Cancel** to discard the settings. You may also assign buttons to jump around matrix screens.



e. Click **OK** to save the settings or click **Cancel** to discard the settings.



- *If you want to assign Preset actions to your joystick, the preset locations should be set up in advance.*
- *If your joystick is not working properly, it may need to be calibrated. Click **Calibrate** to open the Game Controllers window located in the MS Windows control panel and follow the instructions for trouble shooting. For more information, please refer to the MS Windows help files for details.*



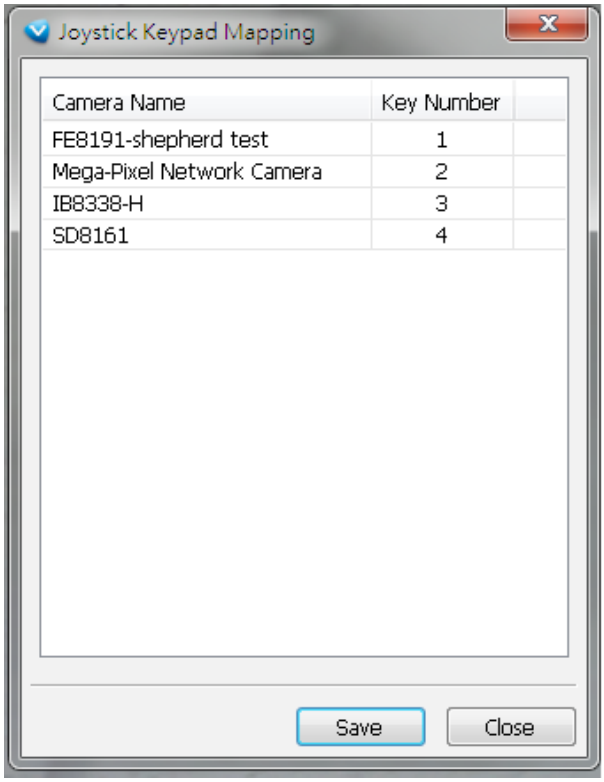
- *The joystick will appear in the Game Controllers list in the Windows Control Panel on your computer. If you want to check out your device, go to the following page: Open Start > Control Panel > Game Controllers.*

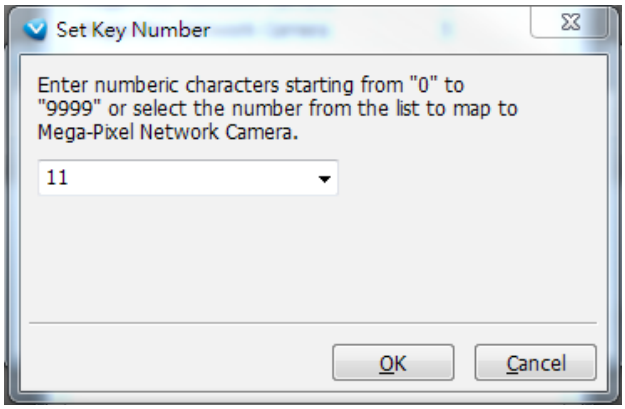
Configure keypad

For joysticks that come with a keypad, you can use the combination of a number assigned to a camera and the Enter key on keypad to quickly move to the camera's current view. The current view will be displayed in a single view. To configure the number representative of each camera, double-click to open a configuration window. The number used for quick switch must be mapped to an existing channel.

Also note the following:

1. The keypad key representative can be a 4-digit numeric combination.
2. If a number key is pressed without pressing the Enter key within 3 seconds, the command is cancelled.
3. You should have at least ONE EMPTY view cell.
4. A Rotation operation will be halted when using the keypad quick switch function.
5. This quick switch function does not take effect on the cameras managed by VAST substations.





PTZ/ E-PTZ Function

In addition to using the PTZ control panel, you may also control the rotation handle of the joystick to remote control a PTZ/ E-PTZ network camera with ease.

Pan/Tilt: Move the rotation handle of the joystick; you can pan the camera to the desire position. There will be blue line displaying the moving direction in the center of the video image as the diagram 1 below.

Zoom in/Zoom out: Shift the rotation handle clockwise to zoom in the camera on an image or go counterclockwise to zoom out the camera on an image. There will be a circle and four vectors in the center of the video image as the diagram 2, 3 below.

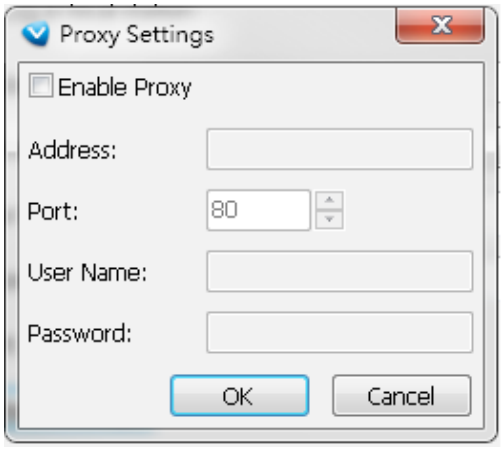
Pan/Tilt
(Move the rotating handle back and forth)

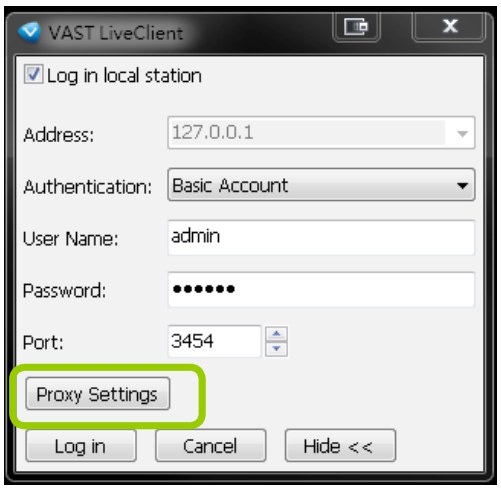
Zoom in
(Turn the rotating handle clockwise)

Zoom out
(Turn the rotating handle counter-clockwise)

Proxy Settings

In this section, you can enable, modify, or cancel **Proxy Settings** for client if your VAST Server is under a proxy. If you change the proxy settings, please fill in the new value next time you login the LiveClient next time.



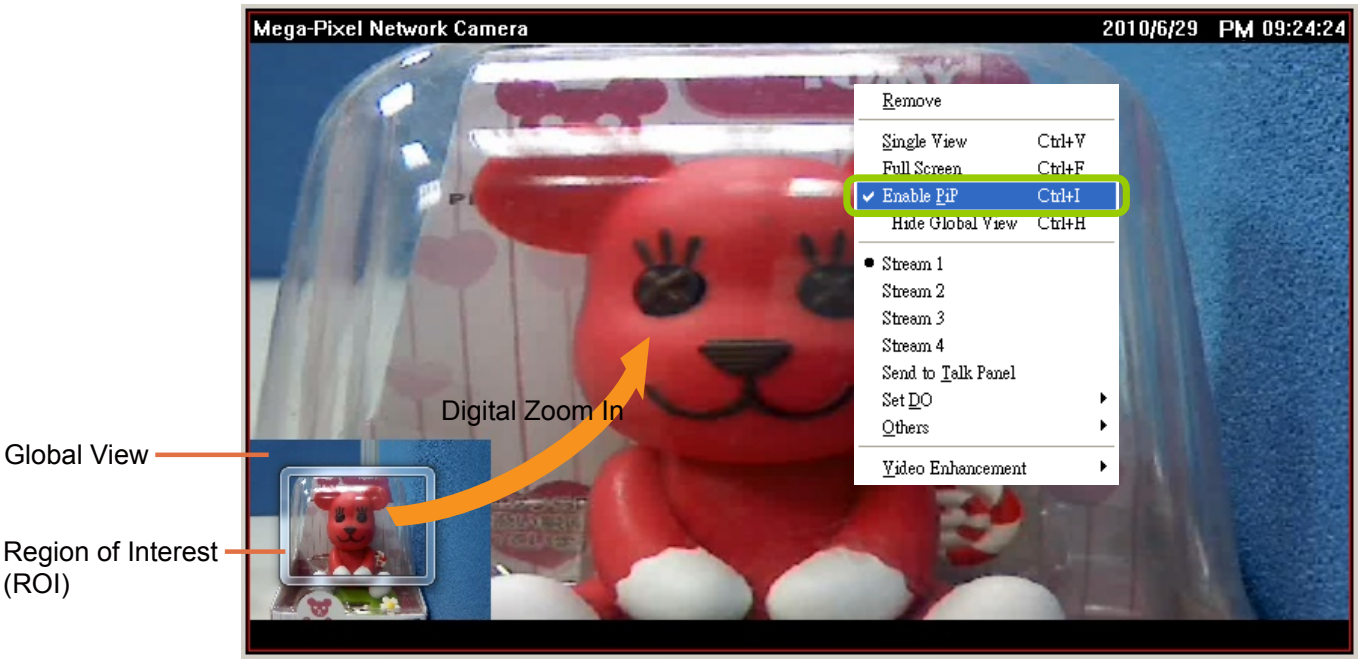


How to Use PiP (Picture-in-Picture)

PiP (Picture-in-Picture) is an intuitive function for user to simultaneously view a Global View and ROI (Region of Interest) for live monitoring. The digital zoom in function can only focus on the interested area and represent the details of megapixel video. Moreover, the multi-touch mode is a very user-friendly interface for digital zoom in.

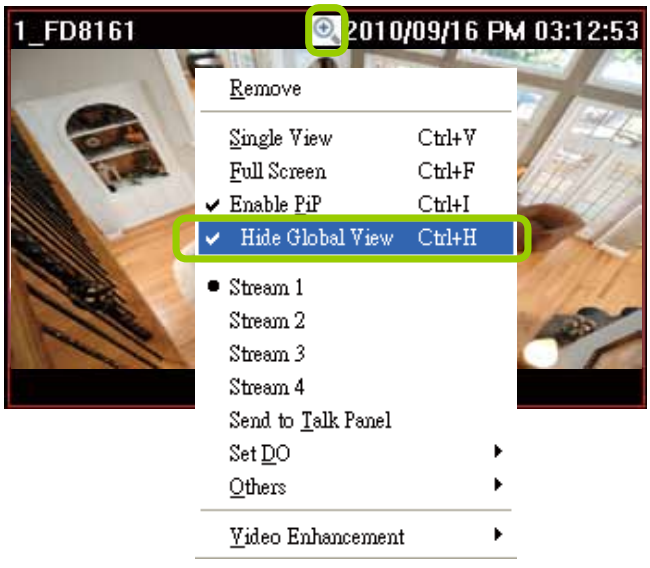
Enable PiP

Right-click the video cell and select **Enable PiP**. If you want to disable PiP, click the option again to uncheck it. After you enable the PiP function, a movable global view window and a ROI frame will be displayed as shown below.



Global View

The global view is the original view with the size scaled down to 160x120. It is movable and you can drag it anywhere in the live view window. If you want to hide the global view, **right-click** the video cell and select **Hide Global View** from the menu. An icon will appear on top of the live view window.



ROI (Region of Interest)

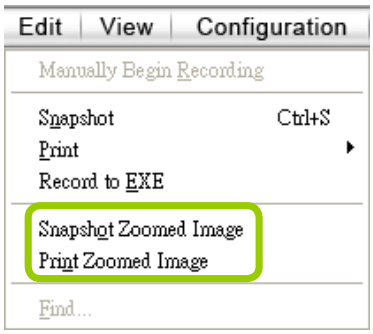
The ROI frame is capable of being resized and dragged in any direction upon the global view window as e-PTZ function.

Digital Zoom In

Through digital zoom in, the live view window will be filled with the zoomed in ROI image. The maximum magnification of the ROI frame is 16x zooming. The zoomed in area will change as the ROI frame is dragged and resized. You can also easily zoom in and zoom out the ROI frame by rolling the mouse back and force.

Snapshot & Print Zoomed In Image

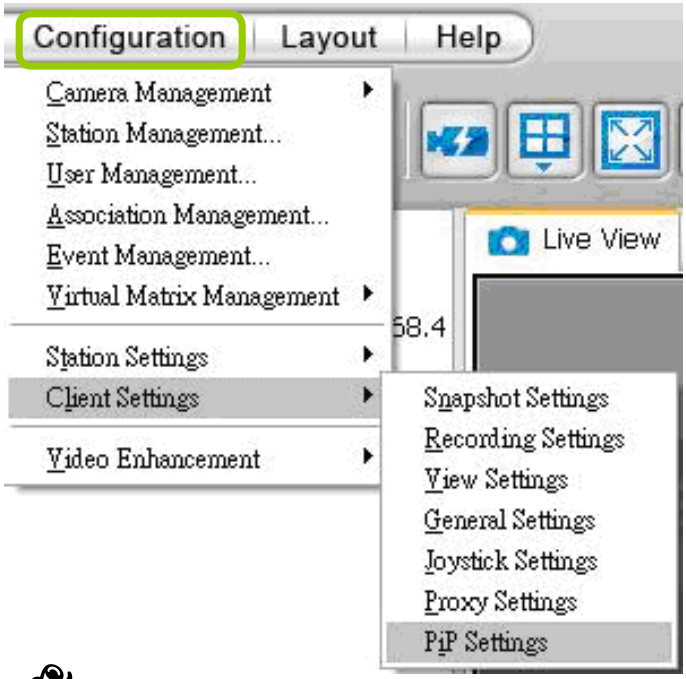
You can snapshot and print the zoomed in image.

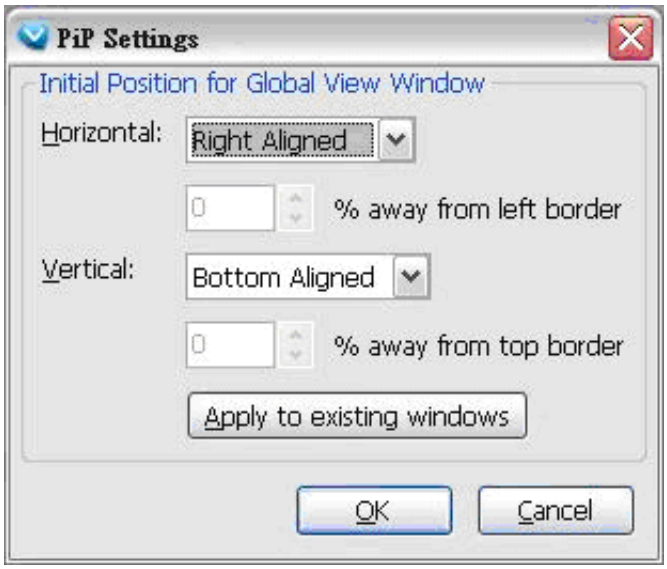


PiP Settings

The PiP Settings is for you to adjust the initial position of the global view window.

Click **Configuration > Client Settings > PiP Settings** to open the window. On top of it, you may choose the horizontal position with left / middle / right side of the live view window, or you can customize the percentage of space distance from the border of the live view window as an option. It is also fully applied for vertical position with top / middle / bottom side of the live view window. When it's done, you may click on **Apply to existing windows** to enable the settings.

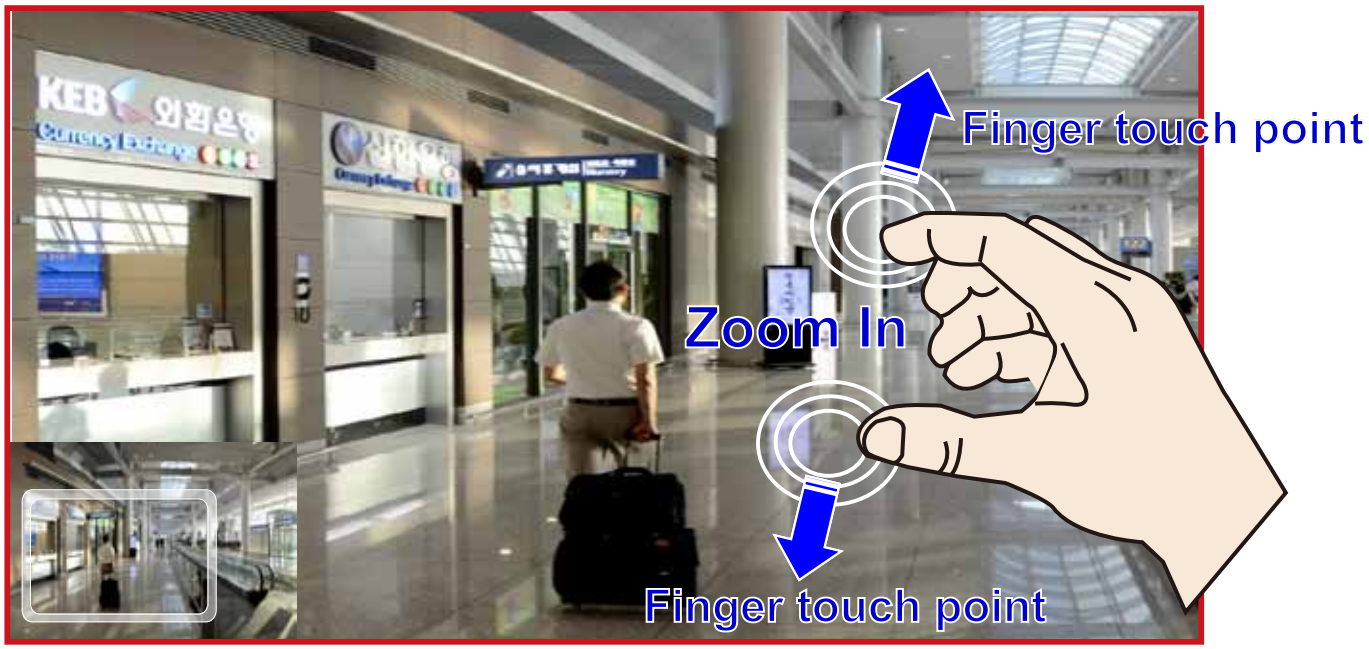




- *If the position of ROI and global view will be saved and applied for the next open. It will be removed when the live view cell is removed.*
- *The PiP function is also applied in VAST Playback.*

Multi-touch Mode

VAST also supports advanced multi-touch mode for PiP. You can easily zoom in or zoom out the image by touching the multi-touch monitor with two fingers.



How to Configure Video Enhancement

The LiveClient allows you to enable post-image enhancement and defog for video live view.

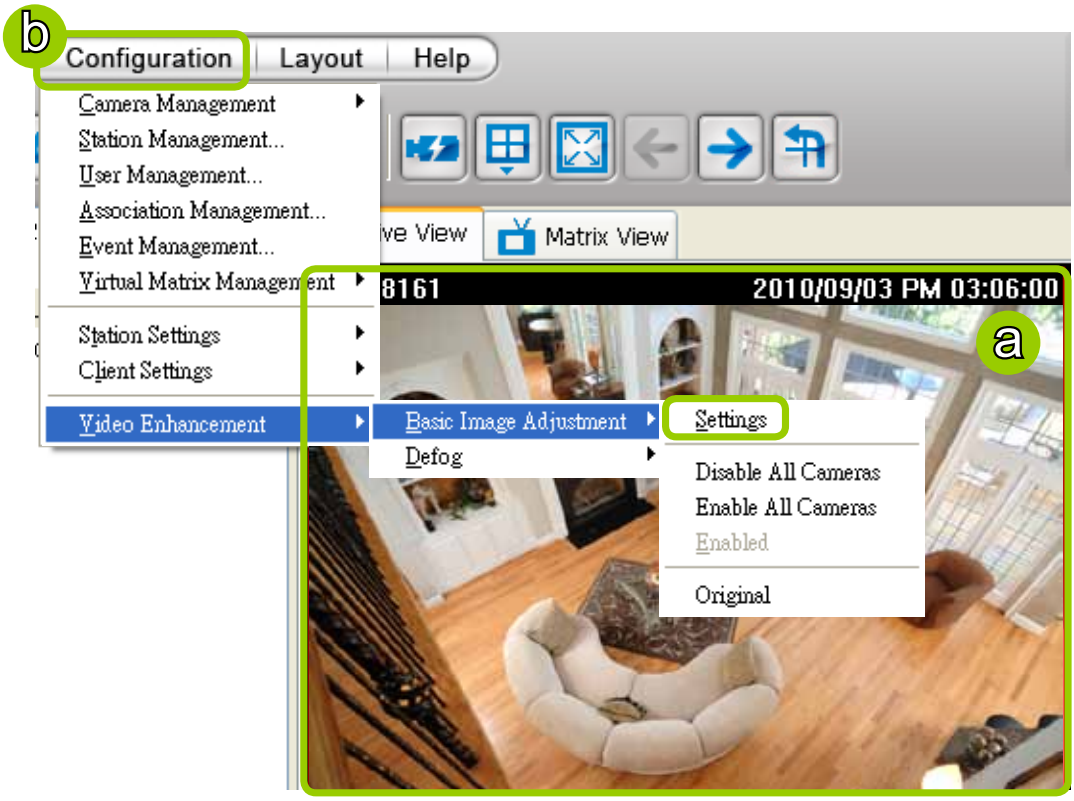
Basic Image Adjustment

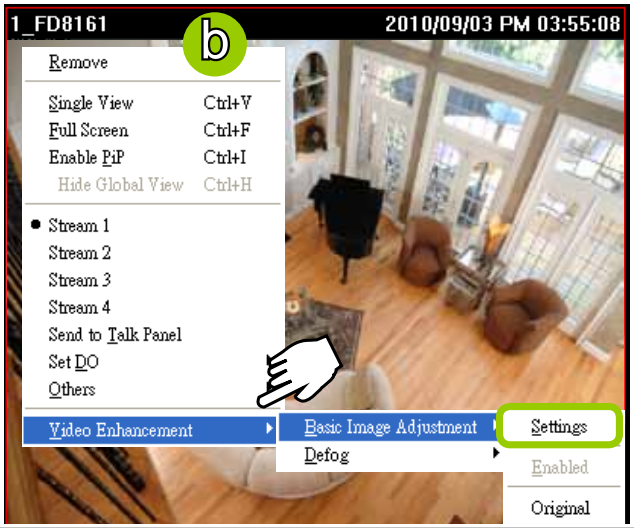
This function allows you to configure basic image adjustment including Brightness, Contrast, Saturation, and Hue.

Please follow the steps below to set a profile for post-image adjustment settings:

a. Select the target video cell.

b. Click **Configuration > Video Enhancement > Basic Image Adjustment > Settings** on the menu bar to open the **Profile Settings** window. (Or you can **right-click** the video cell and select **Video Enhancement > Basic Image Adjustment > Settings** from the popup menu.)



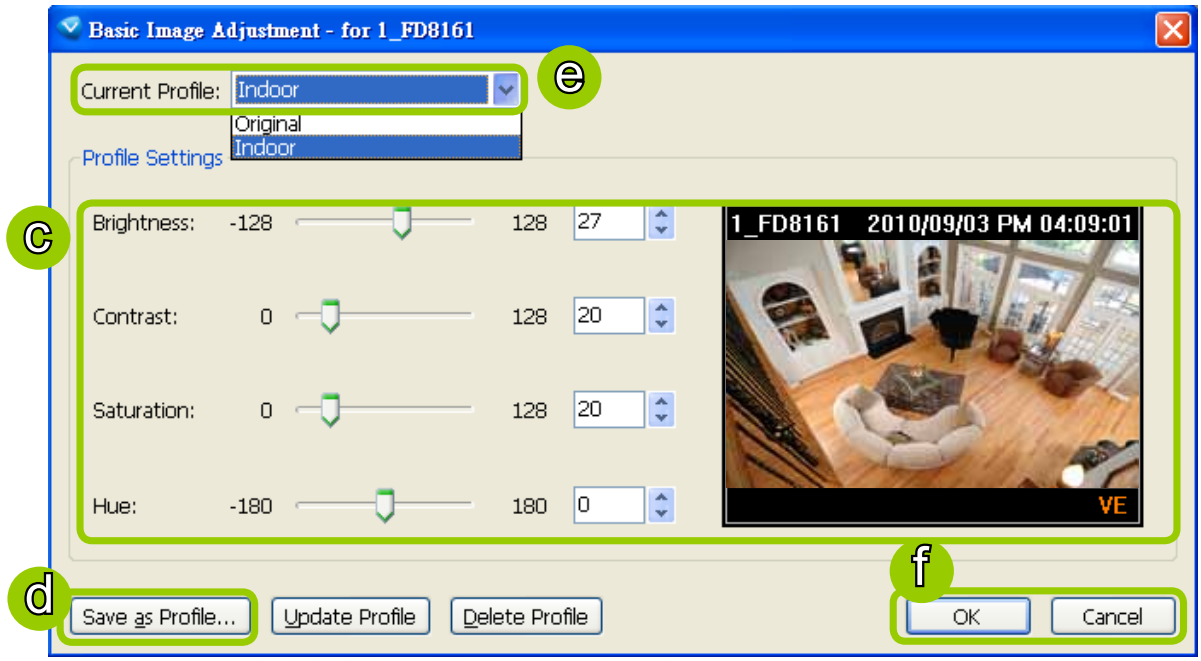


c. Adjust the values of Brightness, Contrast, Saturation, and Hue. You can preview the image from the window on the right. A “VE (Video Enhancement)” text string will appear at the bottom right of the preview window.

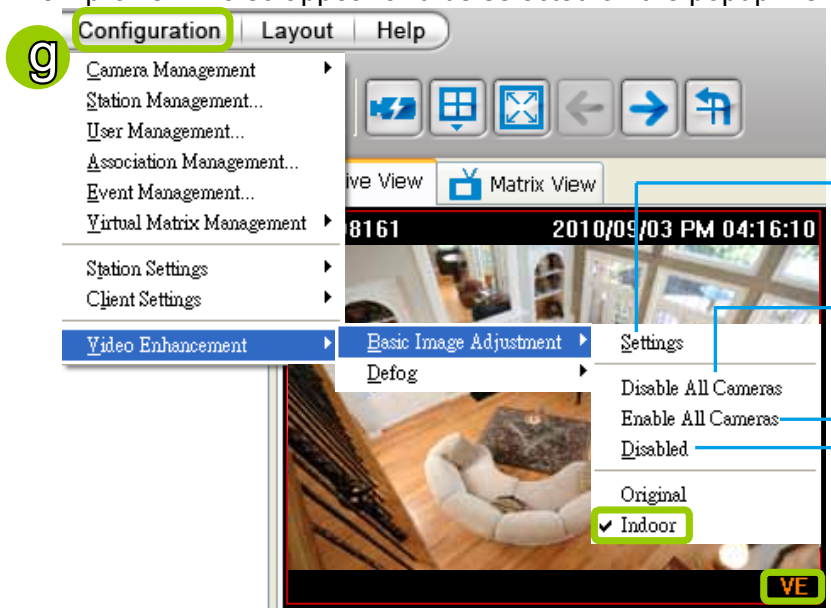
d. When completed, click **Save as Profile** and enter a name for the new profile.

e. The new profile will be displayed on the drop-down list. This profile can be applied to all video cells.

f. If you decide to apply the selected profile to the target video cell immediately, click the **OK** button. Otherwise, click **Cancel** to close the window.



g. Back to the main page, a “VE” text string will also appear at the bottom right of the video cell and the new profile will also appear and be selected on the popup menu as shown below.

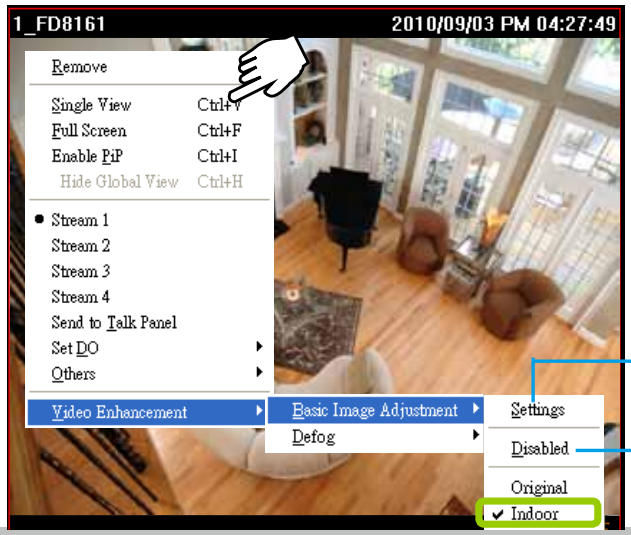


Click to create a new profile, edit or delete a customized profile

Click to disable VE on all linked devices

Click to enable VE on all linked devices

Click to enable/disable VE on the target video cell



Click to create a new profile, edit or delete a profile

Click to enable/disable VE on the target video cell

Defog

This function allows you to configure post-image defog.

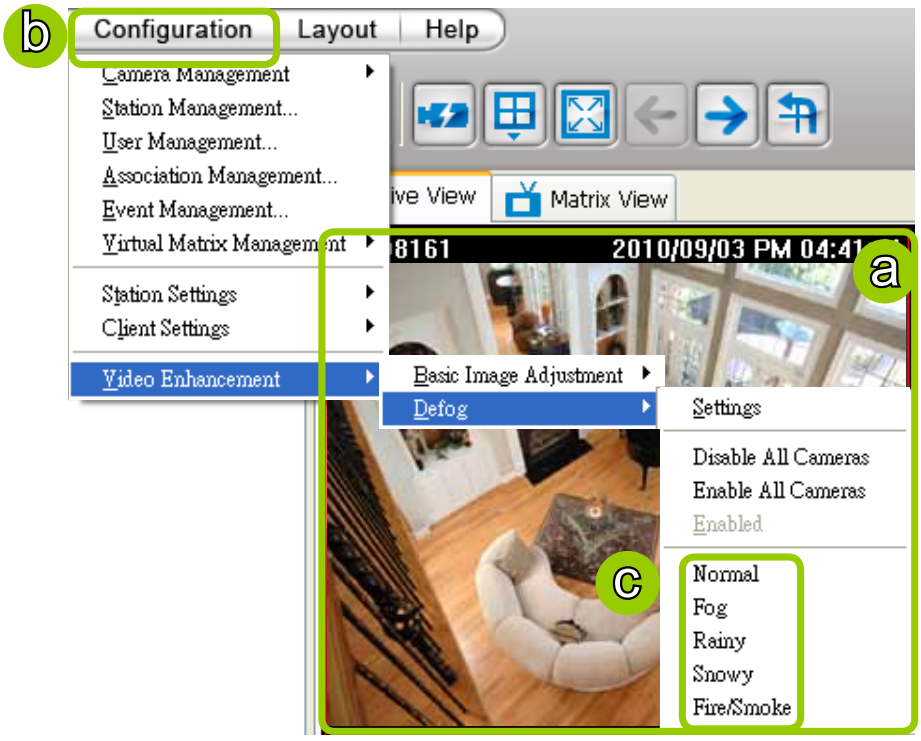
Apply a Preset Defog Profile

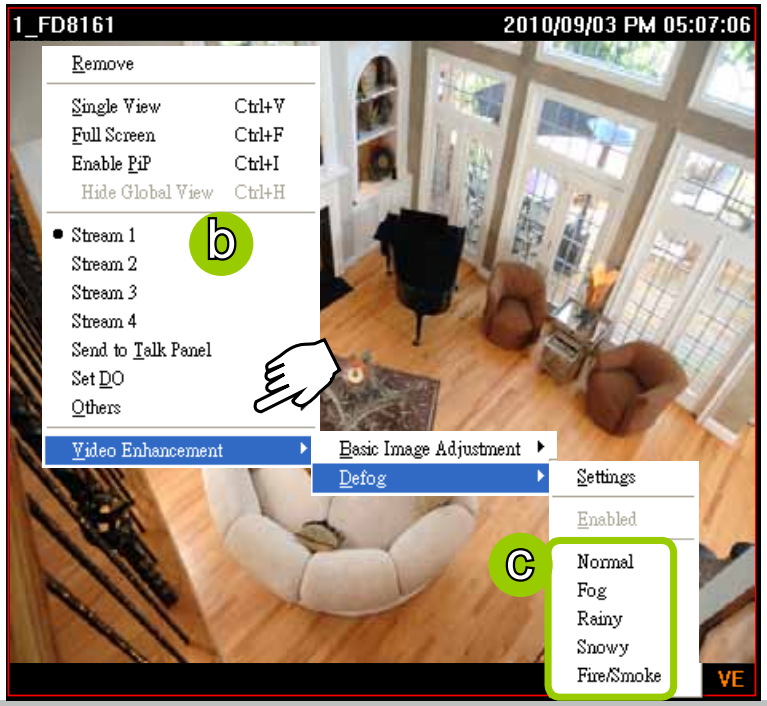
Please follow the steps below to set post-image defog settings:

a. Select the target video cell.

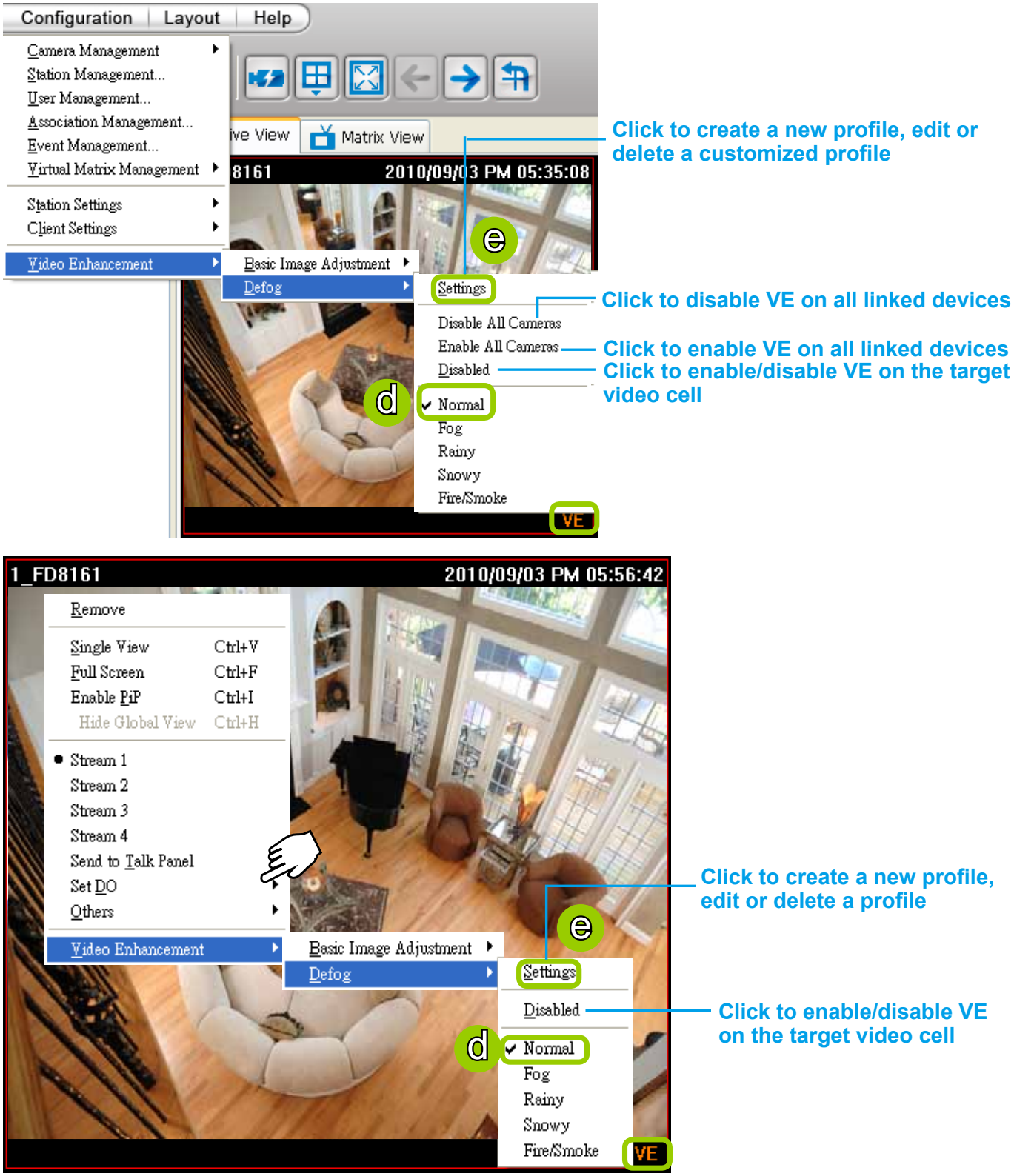
b. Click **Configuration > Video Enhancement > Defog** or **right-click** the video cell and select **Video Enhancement > Defog**.

c. There are some preset profiles for you to apply to the target video cell. You can select one from the list accoding to the environment.



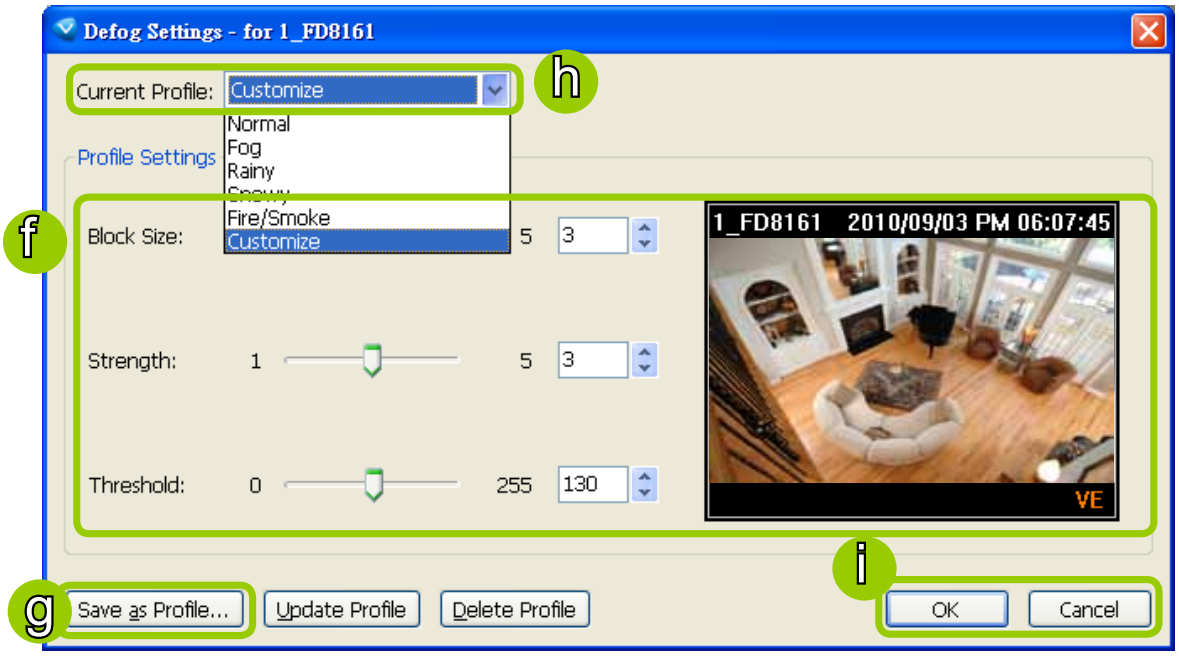


d. The string of the selected profile will be selected as shown below. A “VE” text string will also appear at the bottom right of the video cell.



Create a New Defog Profile

e. Click **Settings** on the popup menu to open the **Profile Settings** window.



f. Adjust the values of Block Size, Strength, and Threshold. You can preview the image from the right window. A “VE (Video Enhancement)” text string will also appear at the bottom right of the preview window.

Block Size: Brush diameter from thick to thin (Value 1~5)

Strength: Brush stroke from soft to strong (Value 1~5)

Threshold: Brush pixel from loose to dense (Value 0~225)

g. When completed, click **Save as Profile** and enter a name for the new profile.

h. The new profile will be displayed on the drop-down list. This profile can be applied to all video cells.

i. If you decide to apply the selected profile to the target video cell immediately, click the **OK** button. Otherwise, click **Cancel** to close the window.

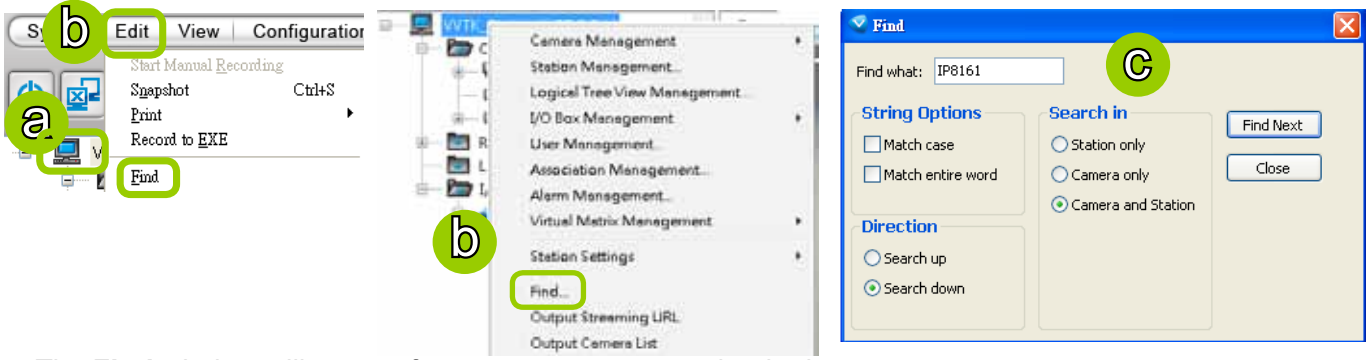
How to Search for a Device on the Hierarchical Management Tree

This function allows you to conveniently search for an inserted device, which is useful when many devices have been inserted.

Please follow the steps below to find a device on the camera list:

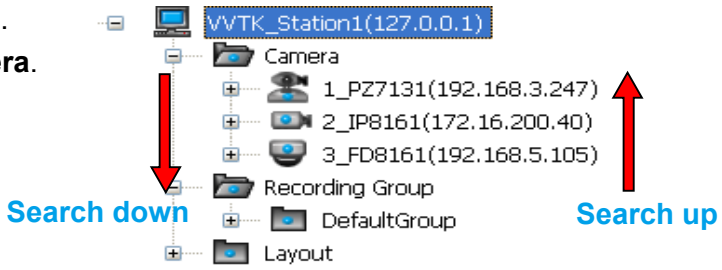
a. Click the station on the hierarchical management tree.

b. Click **Edit > Find** on the menu bar (or **right-click** the station and click **Find**).

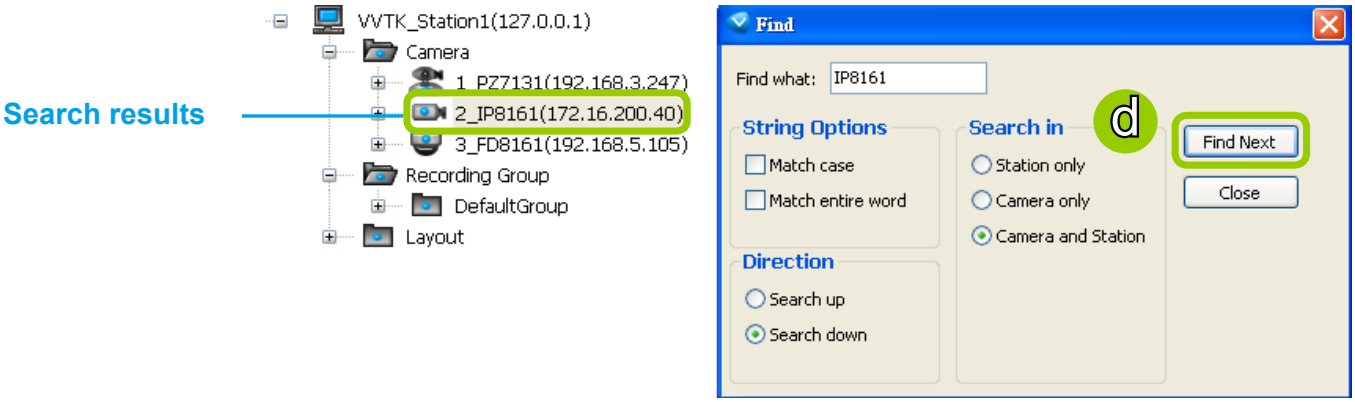


c. The **Find** window will pop up for you to set your search criteria.

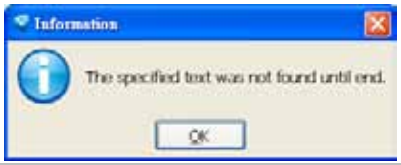
- Find what: Enter a string in the blank. The string can be the full or partial name of the device you want to search for.
- String Options: **Match case** represents that the search results should be identical to the string in lower-case or upper-case letters, the string can be part of a word. **Match whole word** means that the search results should be identical to the string for every character, and that the string should be a complete word or phrase. If you select both options, the search results should conform to all criteria listed above.
- Direction: Select **search up** or **search down**.
- Search in: Select **search in station or camera**.



d. Click **Find Next**, the seaching result will be marked as shown below.



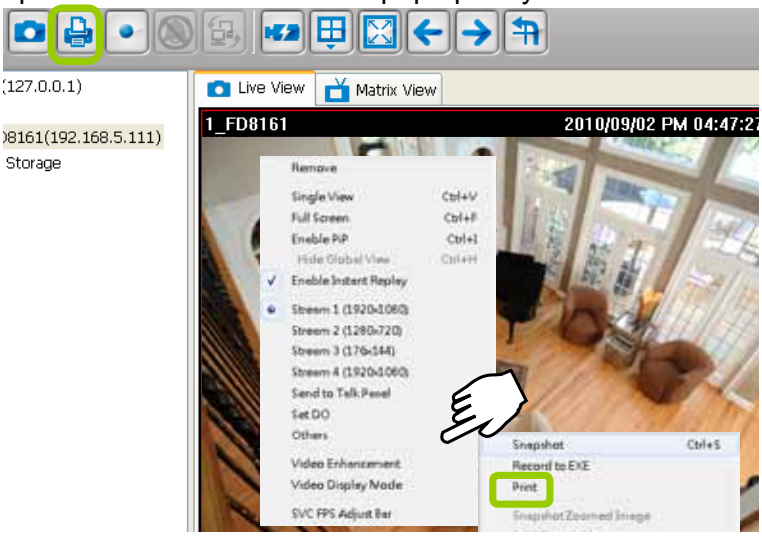
e. If there is nothing found in the camera list, a message will pop up as shown below:



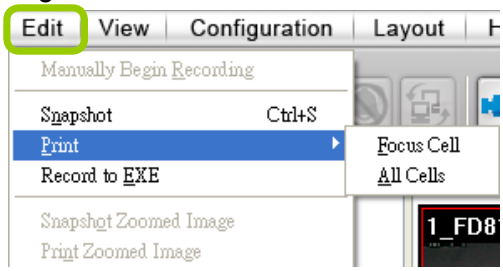
How to Print a Video Image

There are two ways to print out an image of live video:

1. Select a video cell, then click **Print** on the quick access bar, or **right-click** the video cell and select **Print** from the popup menu. A Print window will pop up for you to choose the printer.



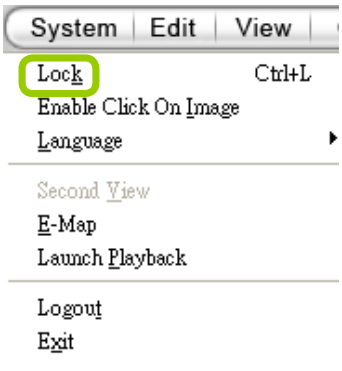
2. You can also click **Edit > Print** to print out an image from a video.
   - Focus Cell: Print out an image of the target video.
   - All Cells: Print out an image with all video cells in the monitoring window.

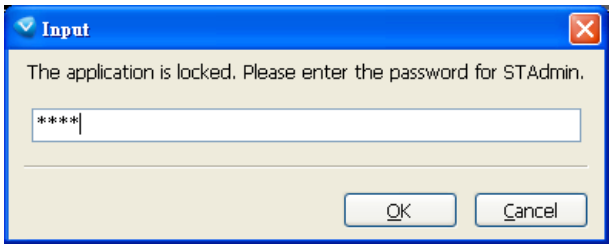


How to Lock LiveClient for Security Concerns

If you are away from your computer, for security reasons, we suggest you lock the program. When LiveClient is locked, the user must fill in the correct password to unlock and access the program again.

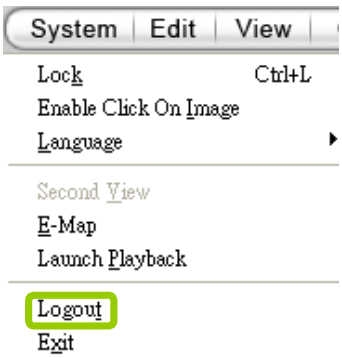
- To lock LiveClient, click **Unlock** on the quick access bar or click **System > Lock** on the system menu. The **Unlock** icon will then turn into **Lock** .
- To unlock LiveClient, fill in the correct password in the popup window.

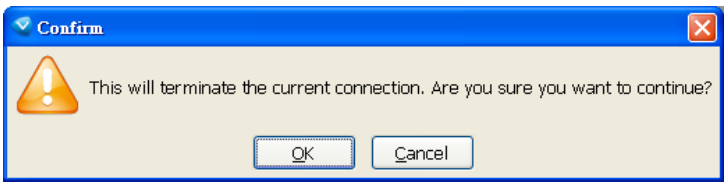




How to Log out from the VAST Server

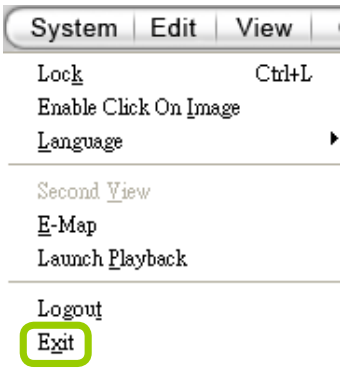
To logout from the current server, click **Logout** on the quick access bar or click **System > Logout** on the menu bar. A confirmation window will pop up. Click **OK** to confirm or **Cancel** to return to the VAST LiveClient window.

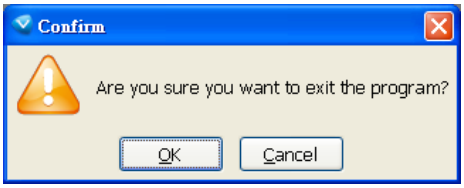




How to Exit VAST LiveClient

To exit VAST LiveClient, click **Exit** on the quick access bar or click **System > Exit** on the menu bar. A confirmation window will pop up. Click **OK** to confirm or **Cancel** to return to the VAST LiveClient window. When you exit the program, your user account will be automatically logged out from the current server.

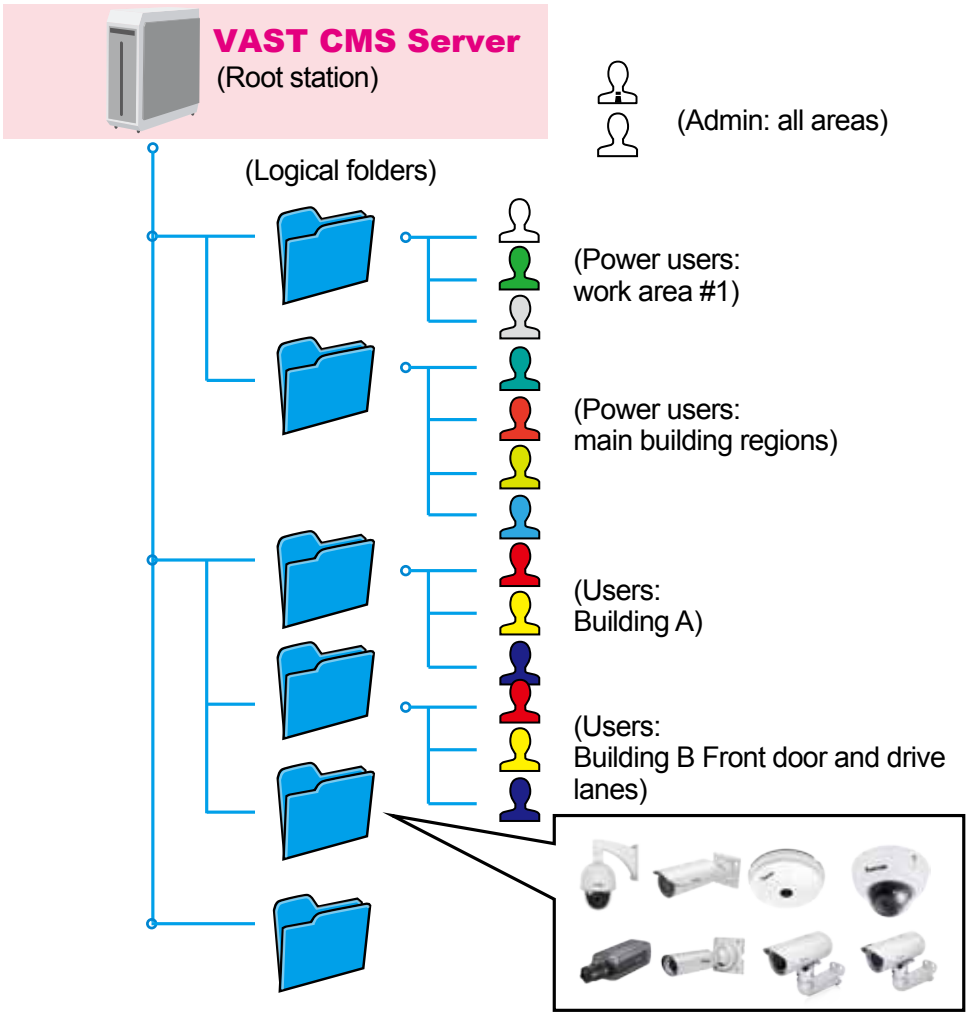




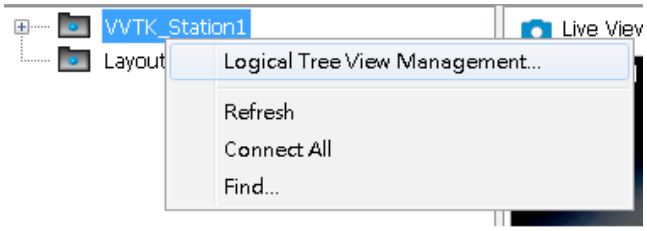
How to Configure a Logical Tree

A Logical Tree view is available since rev. 1.10 for both LiveClient and Playback. The Logical Tree view allows you to re-define the logical relationships between the real-world deployment and the physical devices (cameras). For example, according to your deployments, you can designate several cameras to be listed under a logical sub-directory named as "Building A," and the other cameras into "Building B." In this way, you can re-arrange your cameras and devices on a tree view that is geographically accurate.

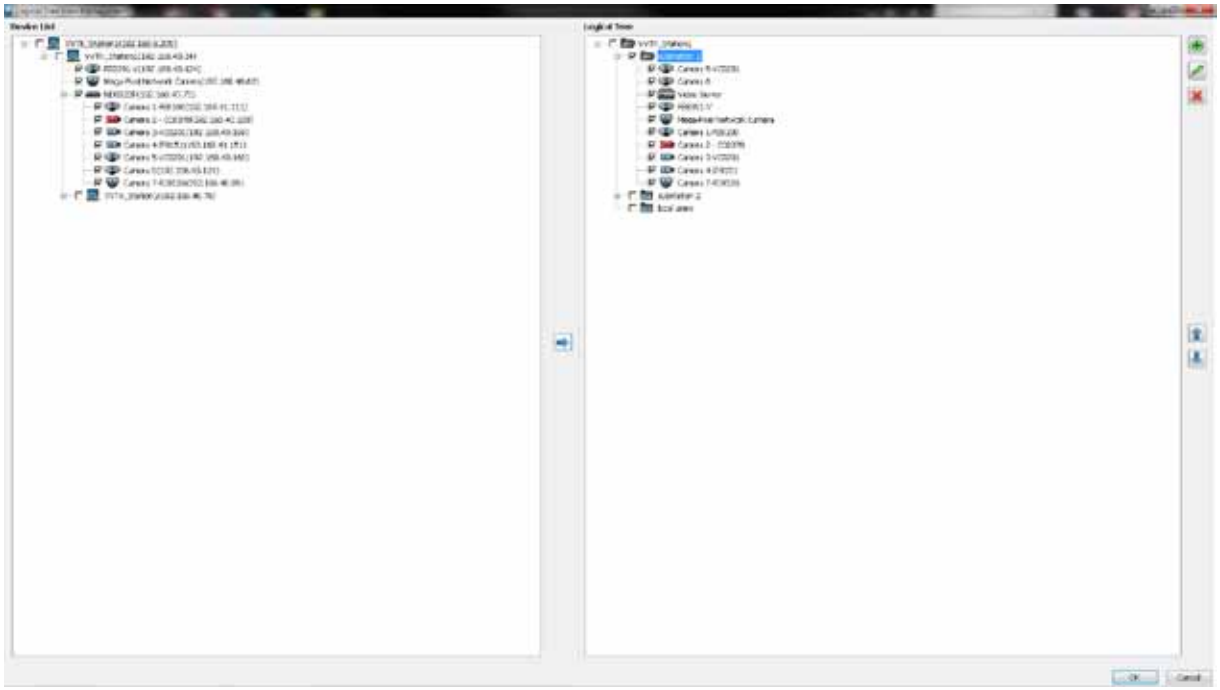
In addition to this, the logical folders can also be used to create privilege groups for users with different access rights. This enables an administrator to easily and flexibly align user privileges with his camera deployments.



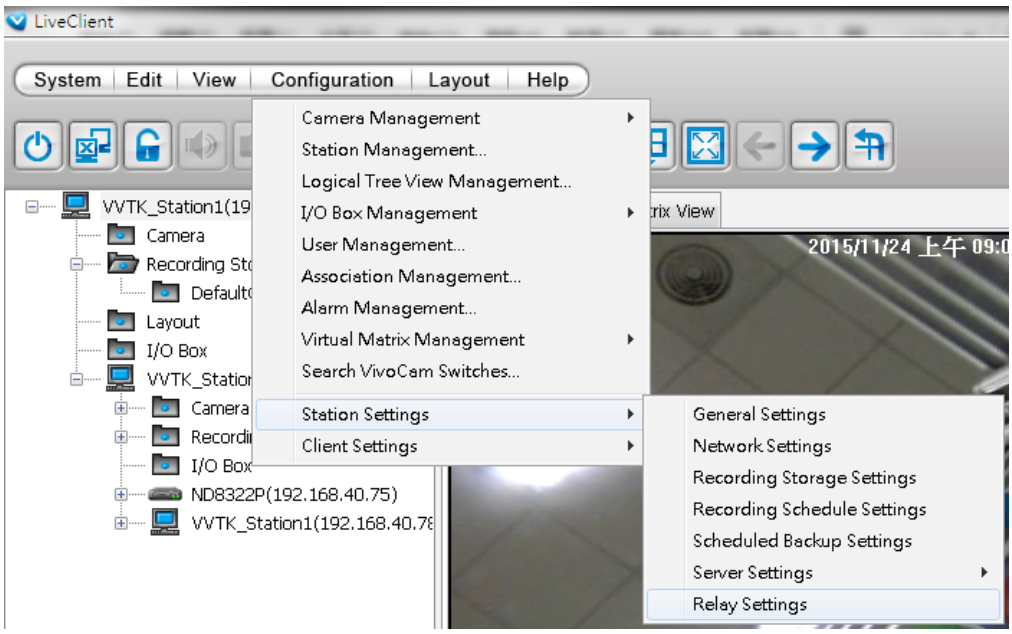
To configure a Logical Tree, either right-click on the Device list root entry (VVTK_Station1), or visit the top menus through **Configuration** > **Logical Tree View management**.

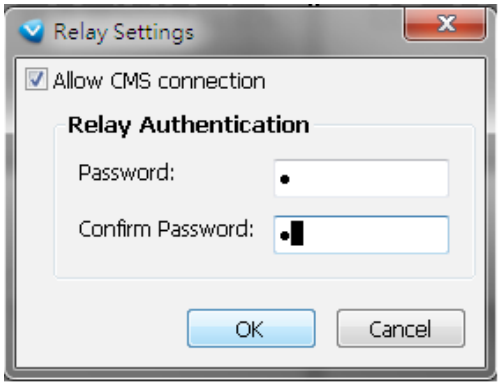


You will then enter the **Logical Tree View** management window. Left click on the root directory, and then right-click to display the **Add** command.

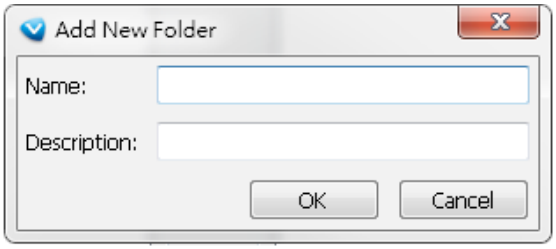


A Logical tree can also display and include the cameras from VAST substations. To enable connection with substations, make sure the **Relay Settings** is enabled both on the VAST Root and substations.

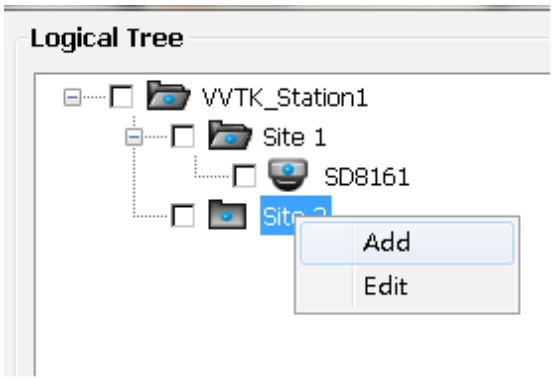




To create a logical folder, enter a name for the sub-directory. The name can be a geographical indicator or whatever name your prefer; such as Building A, Site 1, etc. Add a short description.

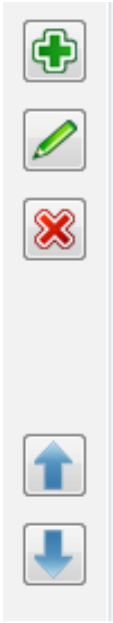


You can also create logical folders under sub-directories, e.g., a "Corridor" under "Building A." Do this by selecting a sub-directory with a left-click and then right-click on it.



Note that the root directory can not be edit.

You may also left-click to select a sub-directory, and use the **Add**, **Edit**, and **Delete** buttons to create, edit, or remove sub-directories. Use the arrow buttons to change the positions of sub-directories or devices on the logical tree.

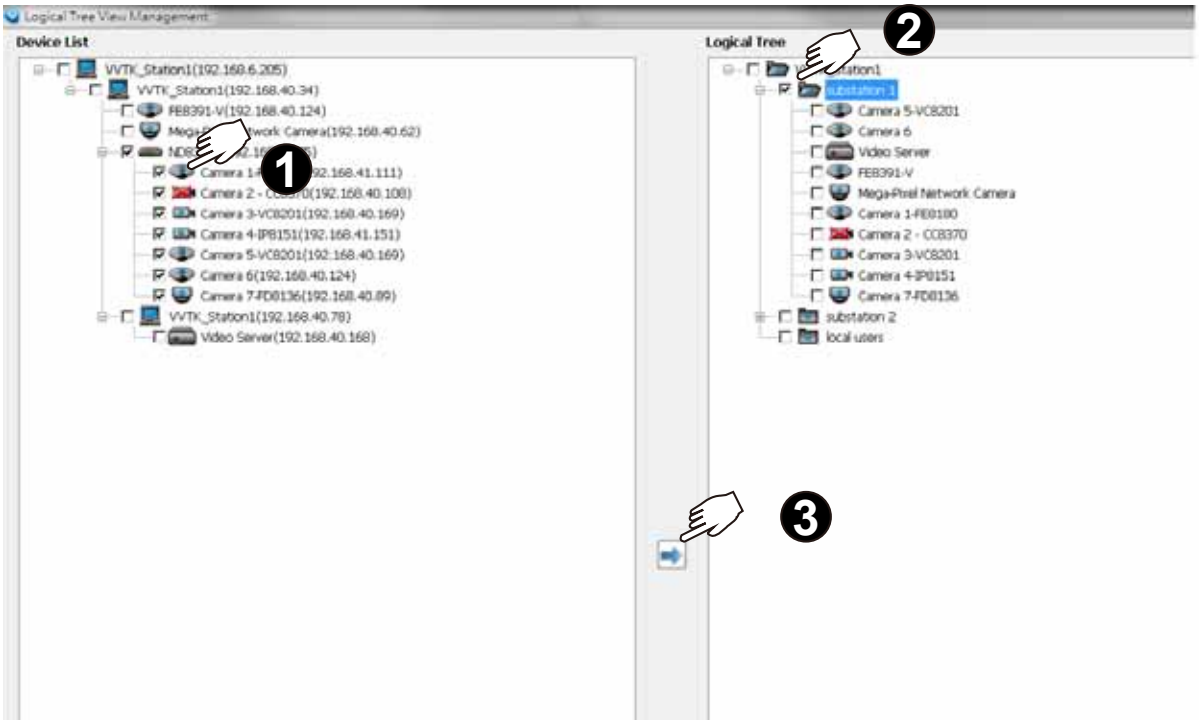


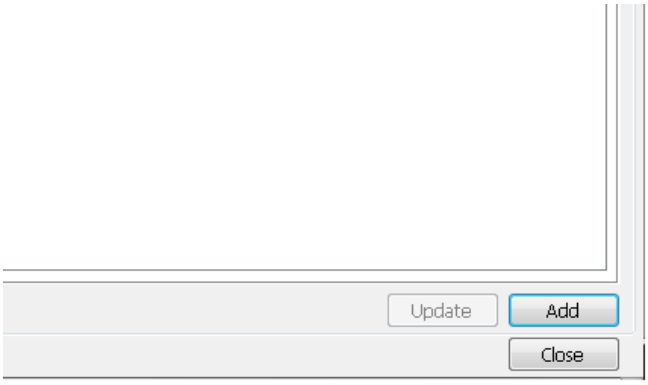
When done, click the **OK** button at the low right corner of the window. Configuratio changes will be preserved.

You should then insert cameras to a preferred directory:

1. Open the device tree to select camera. Left-click to select the checkboxes in front of cameras.
2. Select the checkbox of a preferred sub-directory. Make sure the checkbox is selected and the directory is highlighted.
3. Click the **Move** button in the middle of the screen.

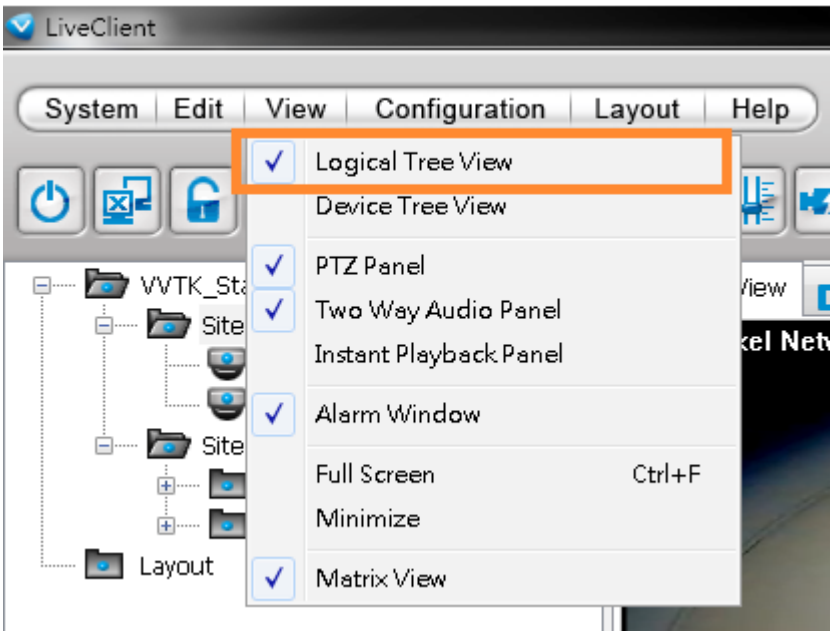
Cameras will be listed under the target sub-directories.





Use the Sort and Find functions on the Device List on the left panel if it is hard to locate a device.

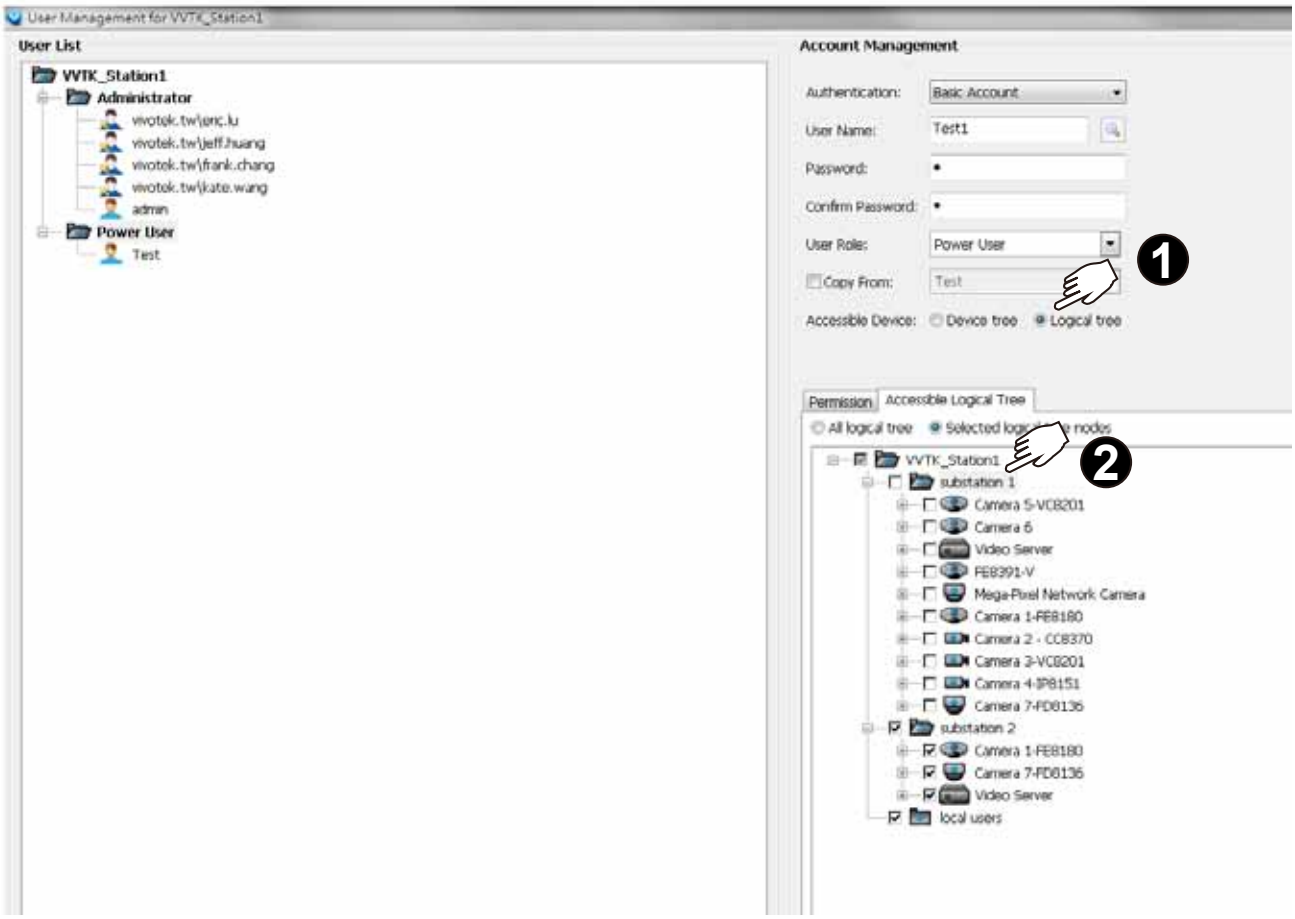
When done with the configuration, click the OK button, and select from the top menus **View** > **Logical Tree View**. The Logical Tree View will become the standard display for your VAST configuration.



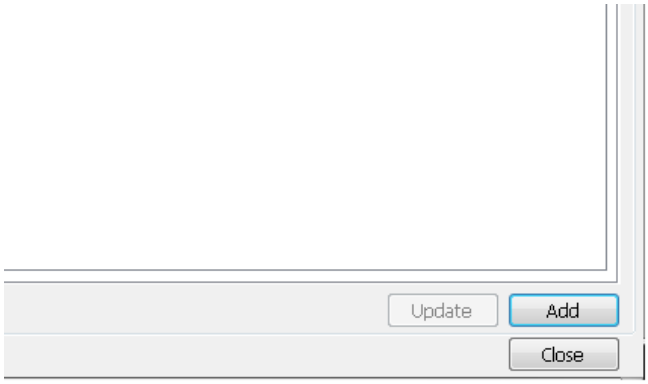
When done with the creation of logical folders, you can move to the **User Management** window. You can then define users' access rights using the logical folders you created. For example, you may let a user access a specific logical folder while forbidding him from the others.

1. When you assign Accessible Devices for a user, select the **Logical tree** button on the lower right.
2. Select the "**Selected logical tree nodes**" button. You can then select or deselect logical folders to confine the accessible devices for a user.

   Note that an administrator has access to all devices, and hence the selection is not available for an administrator.



3. Click the **Add** button on the lower right.



4. The User account information will prompt. Click **OK** to proceed.

5. You can repeat the above steps to create more user accounts using the limited access configuration via the use of logical folders.

- The Refresh, Camera Settings, Output Streaming URL, Send to Talk Panel commands are available for cameras listed in the Logical Tree View.
- The DI/DO, Recording Storage, and I/O Box are not available on a Logical Tree View.
- The root directory (default VVTK_Station1) can not be edited or removed.
- A camera can be added to different sub-directories; however, it can not be added twice into the same sub-directory.
- A camera managed by a sub-station can be added into the Logical Tree.
- The Logical Tree View can not be edited through a web console with the VAST server.
- Cameras added to the VAST configuration will not be automatically added to the Logical Tree View.
- By default, only the administrator and power user are authorized to configure the Logical Tree View.

VAST Playback Configuration

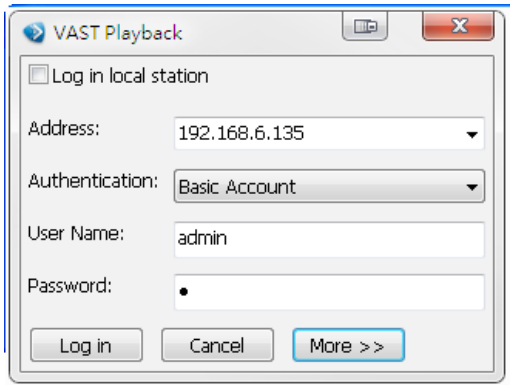
Activating VAST Playback and Logging in to a Server

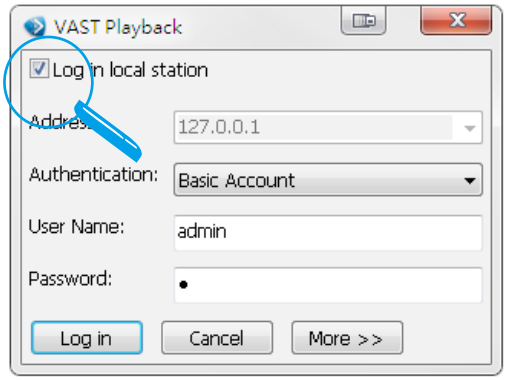
VAST Playback allows you to search and playback recorded media data from VAST Server.

Once you insert a device into the hierarchical management tree of VAST LiveClient, it will automatically be displayed on the hierarchical management tree of VAST Playback. You can then begin to use VAST Playback to view recorded or backup video clips.

After installing the VAST Playback program, please follow the steps below to activate VAST Playback:

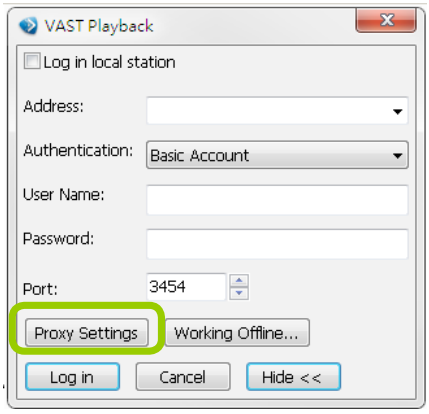
1. Run the **VAST Playback** program. If you have already run VAST LiveClient, you can also click **System > Launch Playback** to activate VAST Playback.
2. A **Login** window will pop up. Fill in the information as shown below:
   - If you want to login to a remote VAST Server, enter the **IP address**, **user name**, **password** and **communication port** of the server. Click **Log in** to login the target server or **Cancel** to exit the system.
   - If you want to login to your local host which is running VAST Server, check the **Login local station** checkbox, and the local **IP Address** will be displayed automatically. Enter the **User Name**, **Password**, and **Communication Port** of the local server to log in. Click **Login** to log in to the target server or **Cancel** to exit the system.

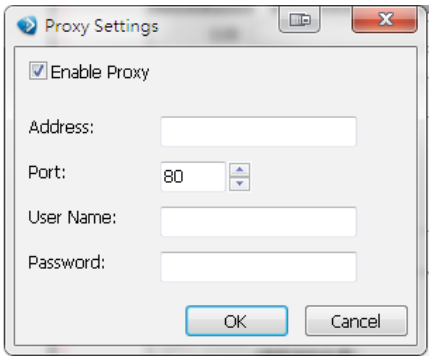




3. The VAST Playback main window will be displayed.

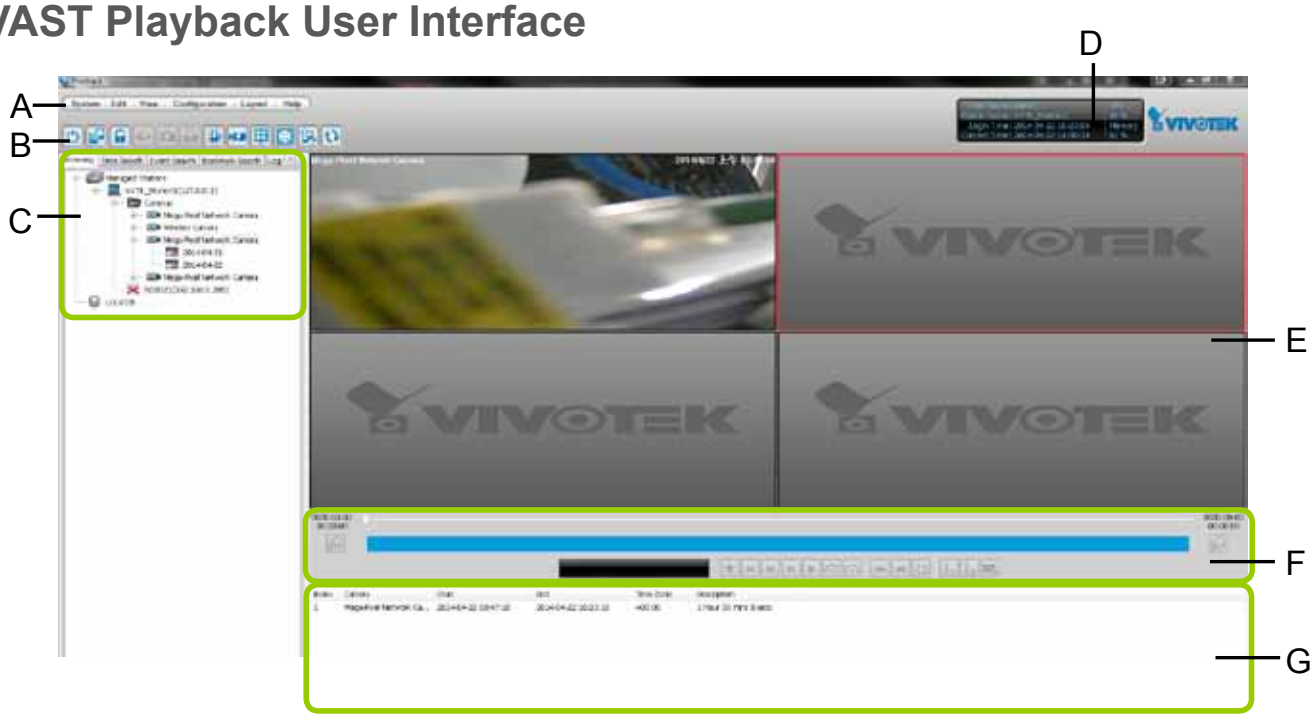
- *If your network environment need to set up proxy, click **More >>** to extend the login window, then click **Proxy Setting** to open the dialog. Then enter related information to link to your proxy server.*





- *Available functions of the VAST Playback program will be enabled according to the role of your login account. For more details about the privileges of the user account, please refer to **How to Manage User Accounts** on page 129.*

VAST Playback User Interface



A. Menu bar B. Quick access bar C. Query panel (Browsing / Time search / Bookmark search / Event search / Alarm search / Log viewer) D. Status panel E. Recorded video playback window
F. Playback control panel
G. Video clips list

Menu Bar

Menu Item	Drop-down Options
System	Lock / Language / Launch LiveClient / Logout / Exit
Edit	Snapshot / Print / Snapshot zoomed image / Print zoomed image / Find
View	Logical Tree View / Device Tree View / Backup Status /Exporting Status / Browsing / Time Search / Event Search / Bookmark search / Alarm search / Log Viewer / Full Screen / Minimize / Query Panel / Video Clips List
Configuration	Client Settings (Snapshot Settings / Export Settings / View Settings / Proxy Settings / General Settings / PiP Settings)
Layout	Change Layout
Help	About

Status Panel

User Name
Station Name (IP Address)
Login Time (yyyy-mm-dd hh:mm:ss)
Current Time (yyyy-mm-dd hh:mm:ss)
CPU and memory usage in percentage

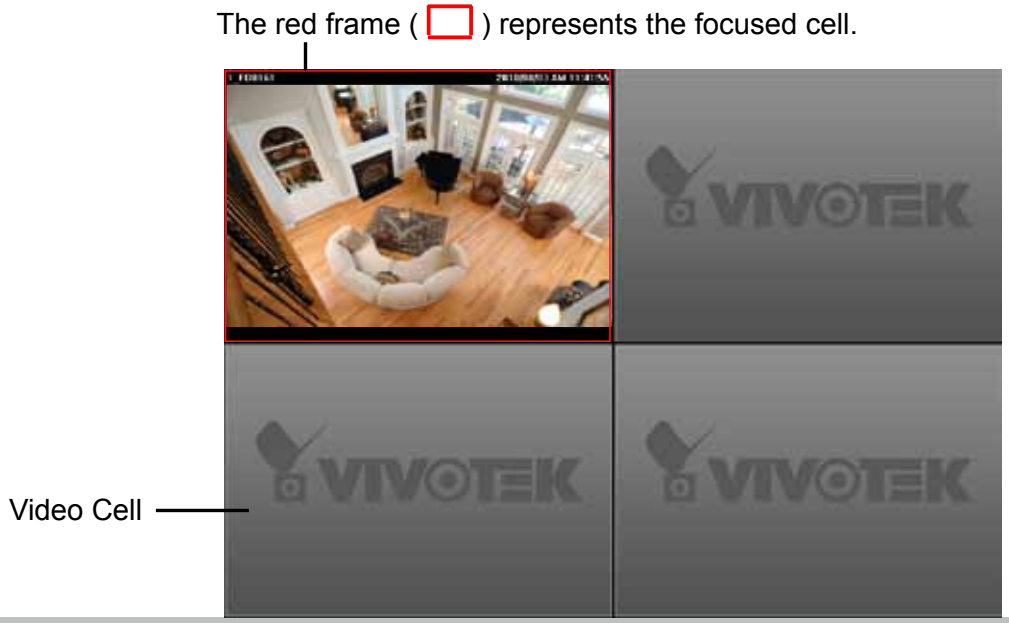
Quick Access Bar

Icon	Function	Description
	Exit	Exit the system
	Logout	Logout from the current station
	Lock	Click to Lock the system for security concerns (Unclock the system)
	Volume	Adjust the audio volume of the target video (Mute)
	Snapshot	Capture the picture of the target video
	Print	Print out the picture of the target video
	SVC Level	Exert SVC control of video playback frame rate
	Remove All Connection	Remove all live videos from the live video monitoring window
	Layout	Change the layout of video monitoring window
	Full Screen	Maximize the live video monitoring window
	Switch Screen	Switch to another screen
	Synchronous Playback	Click to enable synchronous playback for multiple channels

Some buttons will be disabled if the selected device does not support those functions.

Recorded Video Playback Window

The "VIVOTEK" logo indicates that no camera has been assigned to the video cell.



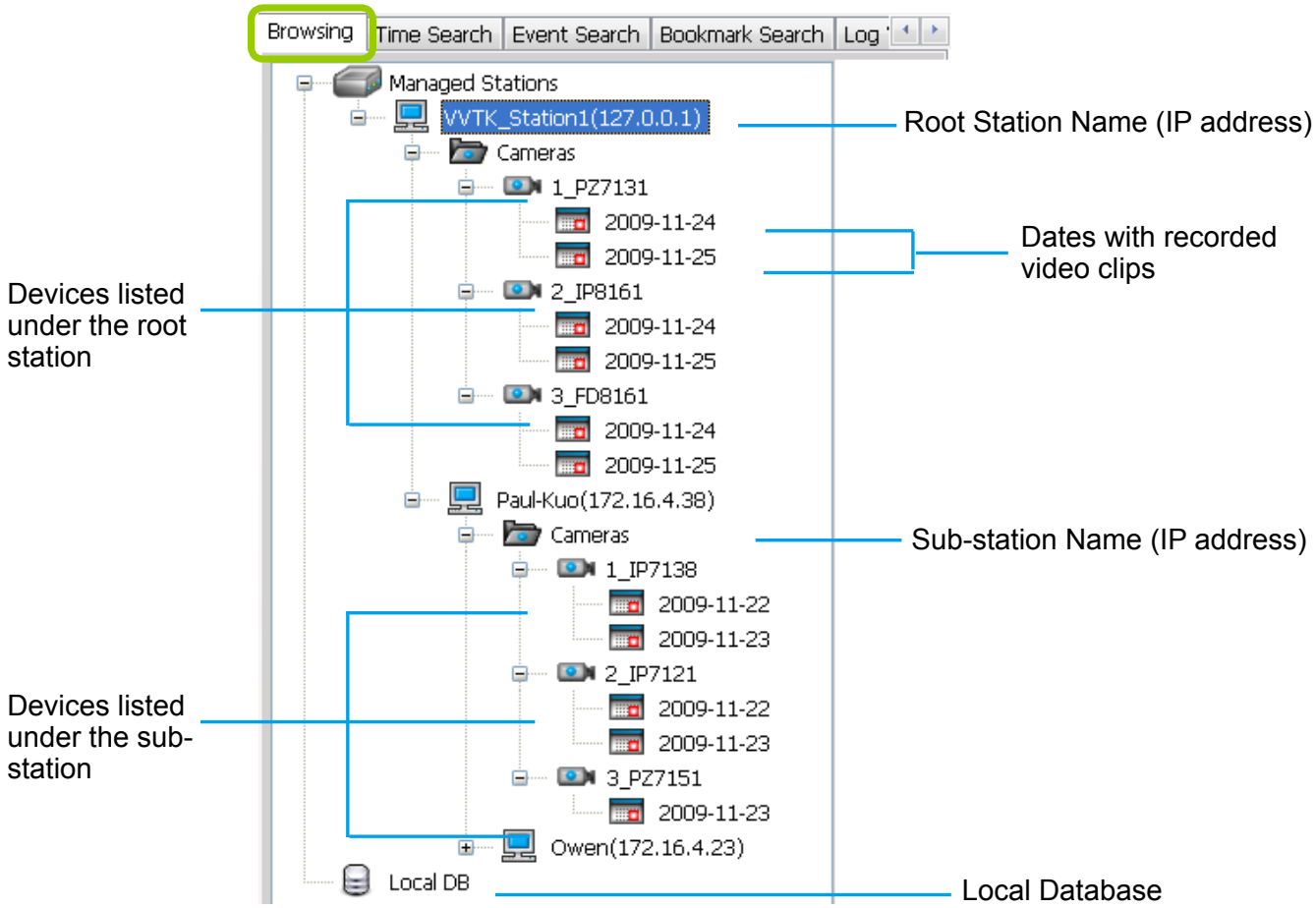
Language Selection

VAST current supports user interfaces in multiple languages; and language options are availabe in: English, Deutsch, Español, Français, Italiano, 日本語, Português, 簡体中文, and 繁體中文. If you want to select another language for the interface, please click **System > Language** on the menu bar to select a desired language. Please note that if you want to change the language option, a message will remind you to restart the system.

If you want to use "User Defined" language, please prepare images and language strings, and upload the files to the following folders:

...\VAST\Client\Playback\language\zz_UD (language string)
...\VAST\Client\Playback\image (images)

Query Panel-- Browsing Page

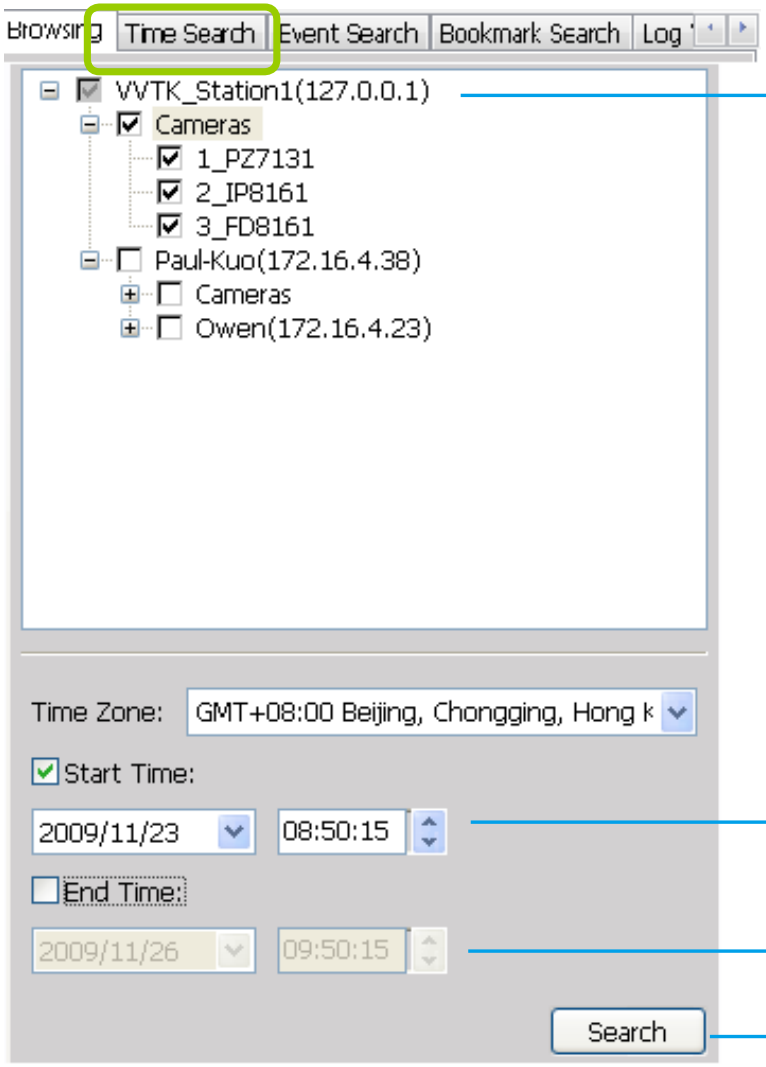


You can hide this panel in order to maximize the single playback view from the **View** menu.

Icon	Description
	Station list including server and local database
	A station (a computer that has installed VAST Server)
	A station (a computer that has installed ST7501 Server)
	The camera that exists on the hierarchical management tree of LiveClient.
	The camera that has been removed from the hierarchical management tree of LiveClient (off-line). However, its recorded video (if any) is still accessible from the server.
	Dates with recorded video clips.
	Local database for backup data. For more information about how to upload backup data to the list, please refer to page 263.

See page 231 for how to configure a Logical Tree View.

Query Panel--Time Search Page



Select station(s)/ device(s) that you want to search for recorded files

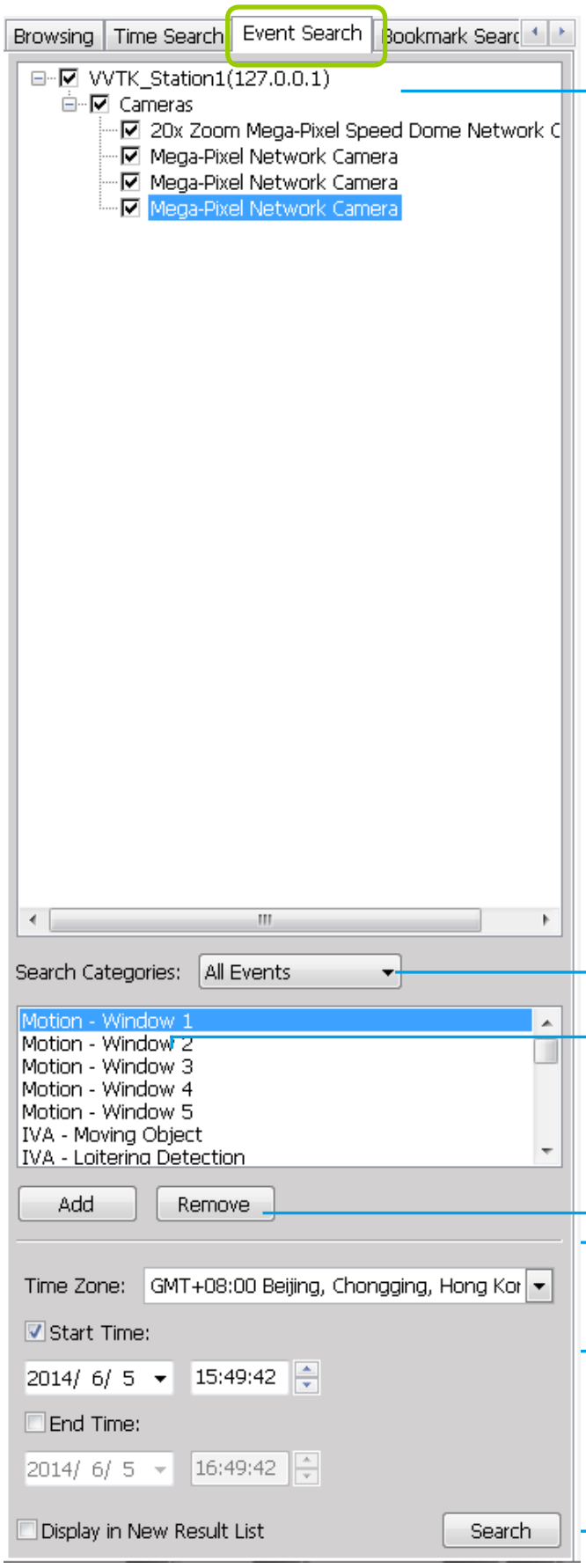
Specify search period of time

Click to start to search, the results will be shown on the video clips list

You can hide this panel in order to maximize the single playback view from the **View** menu.

*The **Time Zone** setting is automatically synchronized with that on your client computer.*

Query Panel--Event Search Page



Select station(s)/ device(s) that you want to search for recorded files

Select an Event Category

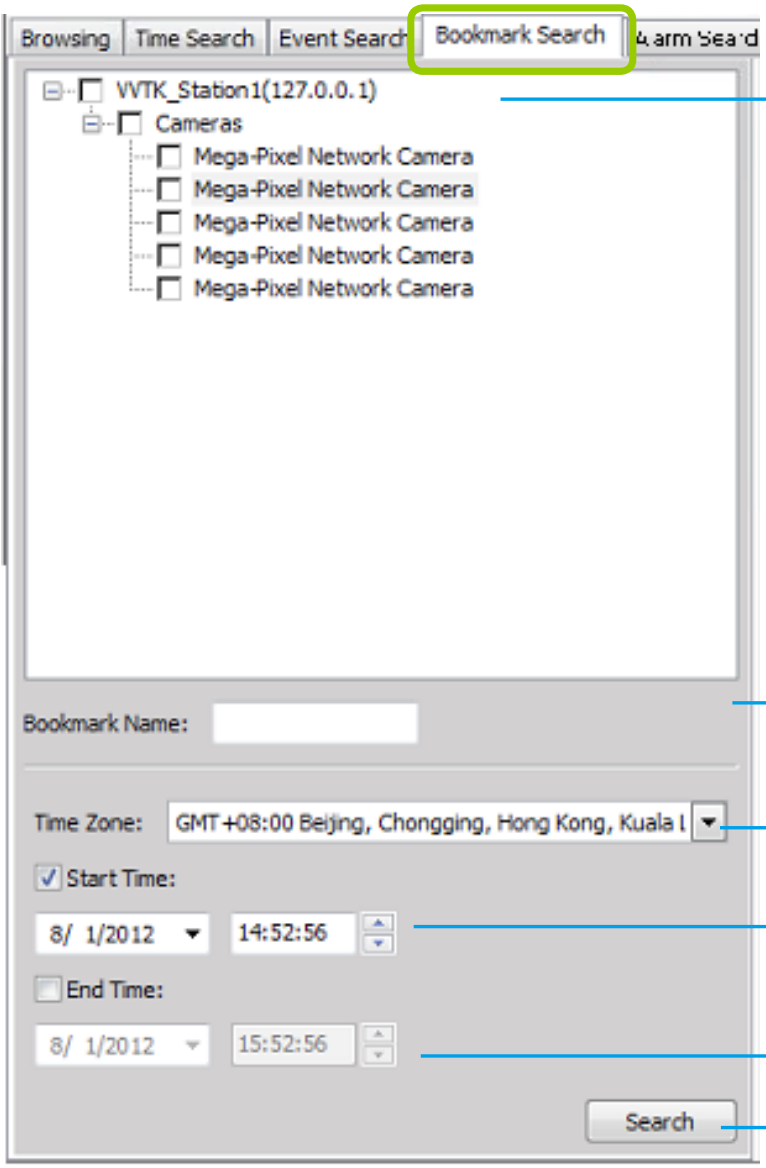
Click to add search criteria

Click to remove search criteria

Specify search period of time

Click to start to search, the results will be shown on the video clips list

Query Panel--Bookmark Search Page



Select station(s) that you want to search for bookmarks

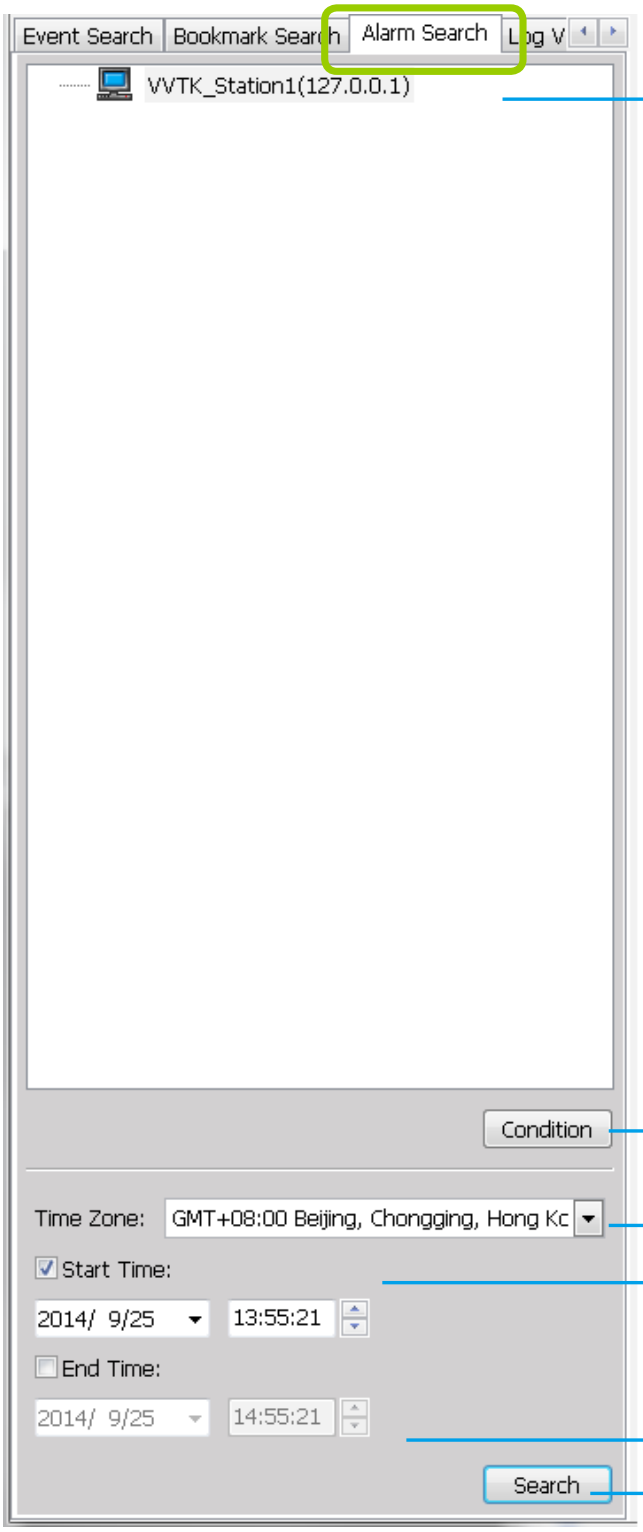
Select a name to serach for

Select a time zone

Specify search period of time

Click to start to search, the results will be listed on the video clips list

Query Panel--Alarm Search Page



Select station(s) that you want to search for bookmarks

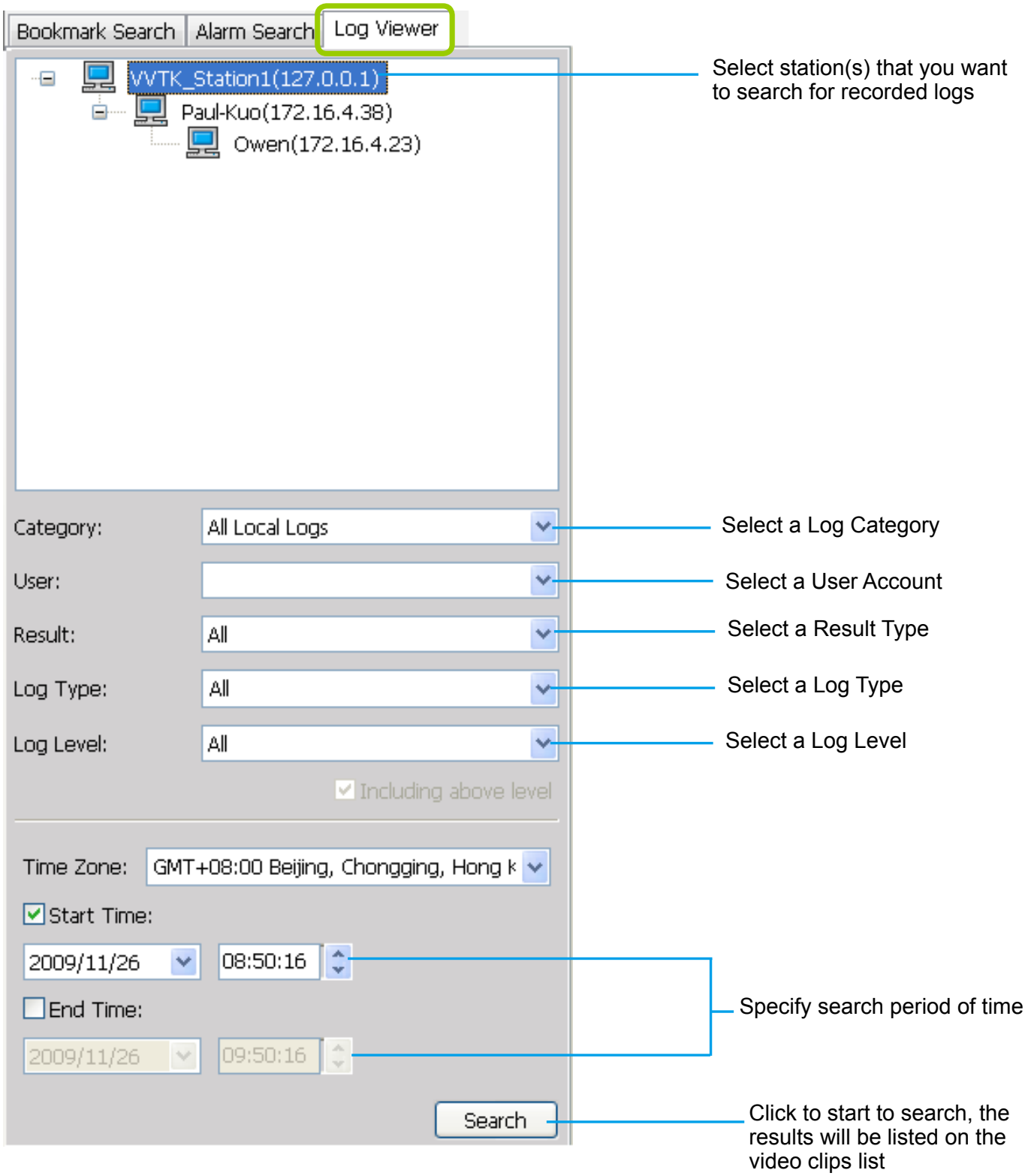
Click to configure the search conditions

Select a time zone

Specify search period of time

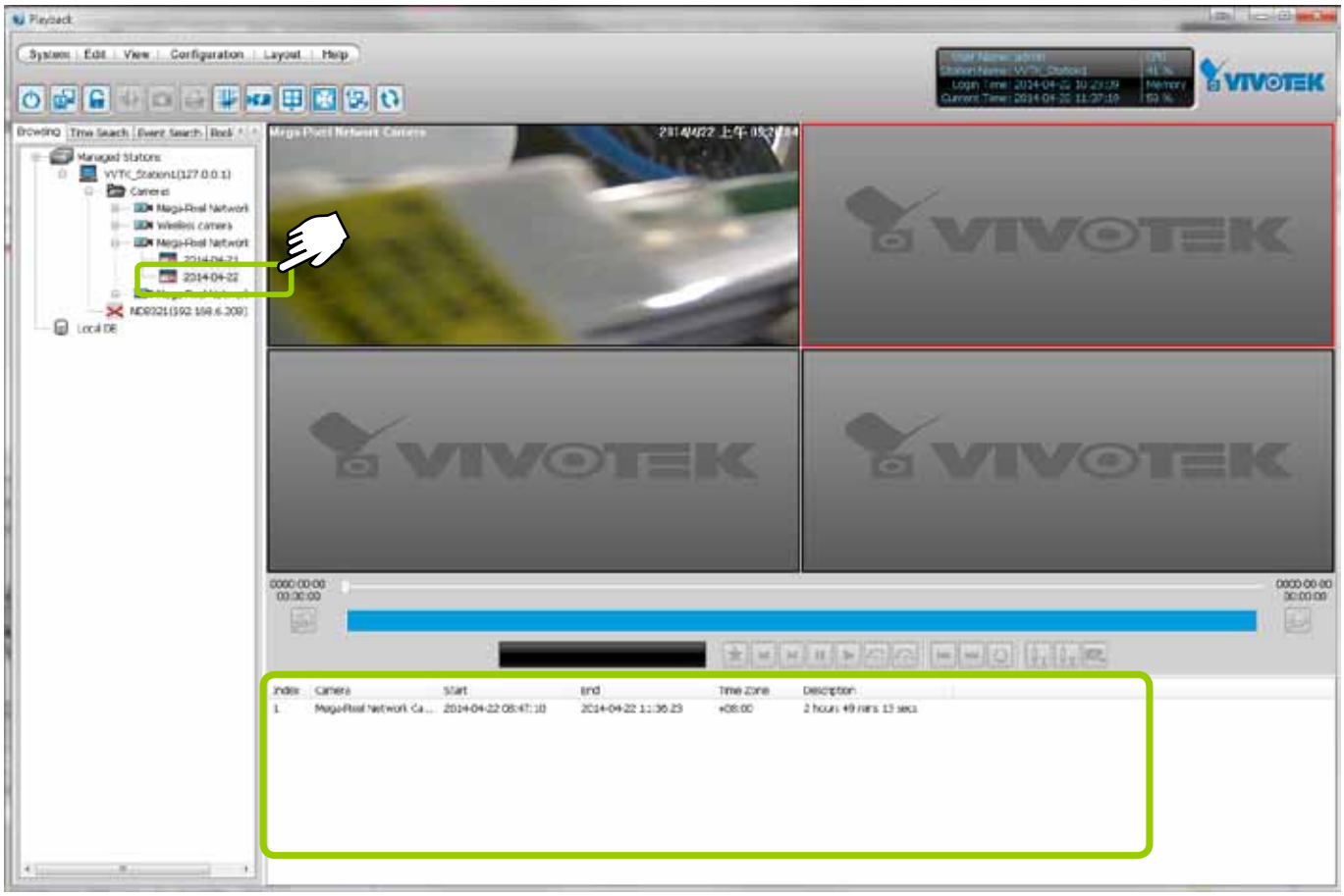
Click to start to search, the results will be listed on the video clips list

Query Panel--Log Viewer Page



Video Clips List Window

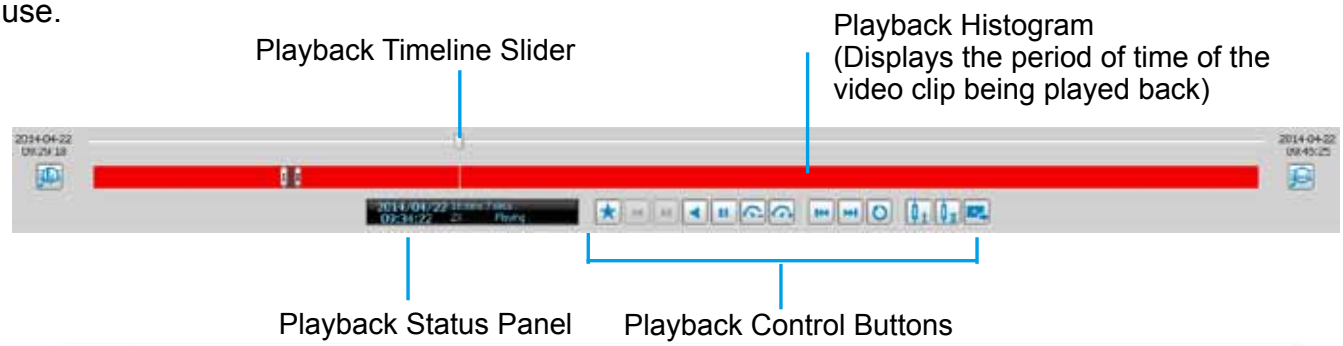
If you select an **option "date"**, the video clips will be displayed in the video clips list window. An option "date" may contain more than one video clip.



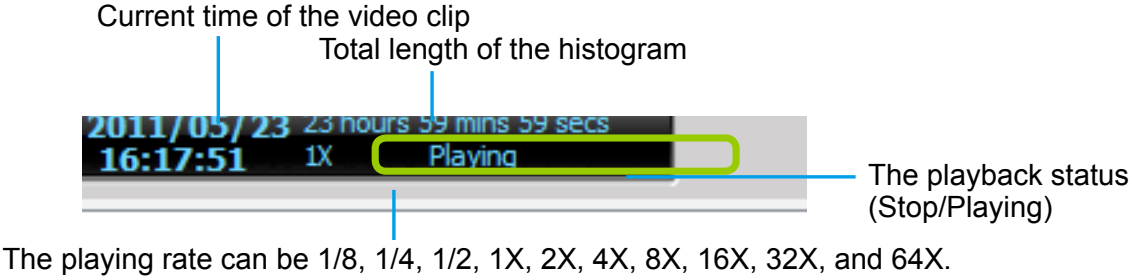
You can hide this panel in order to maximize the single playback view from the **View** menu.

Playback Control Panel

When you double-click a video clip to play, the playback control panel will be enabled for you to use.



Icon	Function	Description
	Add Bookmark	Manually add a bookmark to pinpoint and extract a 20-second video clip from an existing recording
	Histogram Zoom In	Zoom in on the displayed period of time of the histogram
	Histogram Zoom Out	Zoom out of the displayed period of time of the histogram
	Marker I	If you want to export part of the recorded video clip, click to set marker I on the histogram, which will be the start time of the exported media
	Marker II	If you want to export part of the recorded video clip, click to set marker II on the histogram, which will be the end time of the exported media
	Export Media	Click to export the selected section of video clip
	Last Time Interval	Go to the previous video clip on the video clips list
	Pause	Pause playback the selected video clip
	Play	Start to playback the selected video clip
	Rewind	Reversely plays back the current video
	Next Frame	Go to the next video frame of the selected video clip
	Previous Frame	Displays the previous frame
	Next Time Interval	Go to the next video clip on the video clips list
	Repeat Mode	Playback the selected video clip repeatly
	Slow Down	Slow down the playback rate
	Speed Up	Speed up the playback rate



Rewind

The Rewind function enables users to reversely playback from a specific point in time on a video playback window. Once the occurrence of an event is ensured, this function can facilitate the process of finding the evidences that appeared before the occurrence.

The Rewind function also applies to the Synchronous Playback mode. The following also apply:

1. The maximum playback speed is 64x. (I-frame only when speed is higher than 16x)
2. When you pull the time slider during the Rewind playback, short interruptions may occur.
3. When switching from the playback mode to the Rewind playback, the playback speed remains the same. The same applies when switching from Rewind to the playback mode.

Limitations:

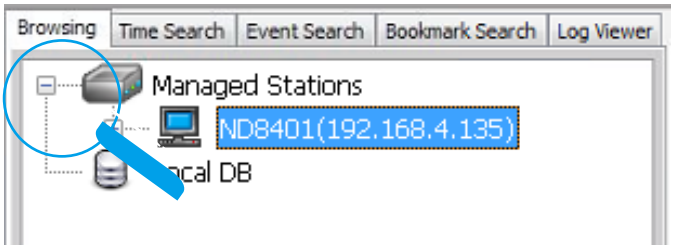
1. Short delays may occur when switching from playback to rewind, due to limitations by the hard disk access speed and network speed.
2. When doing the forward playback, the previous frame function is not available. When doing the rewind playback, the next frame function is not available.
3. The Rewind playback on multiple streams requires system performance resources.

How to Playback Recorded Video

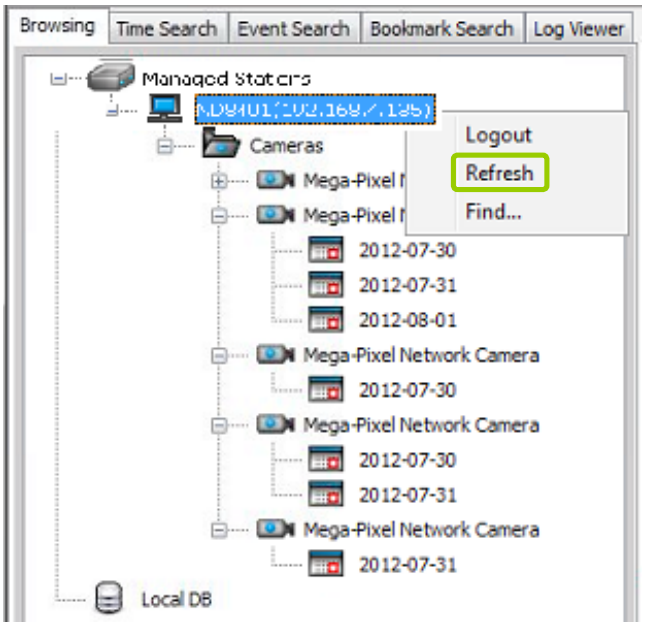
Select a Recorded Video Clip

Please follow the steps below to select a video clip:

1. On the **Bowsing** page, click the plus sign (+) to expand the hierarchical management tree.



2. **Right-click** a station, device, or option “date” on the hierarchical management tree and click **Refresh** to display the recorded video clips.

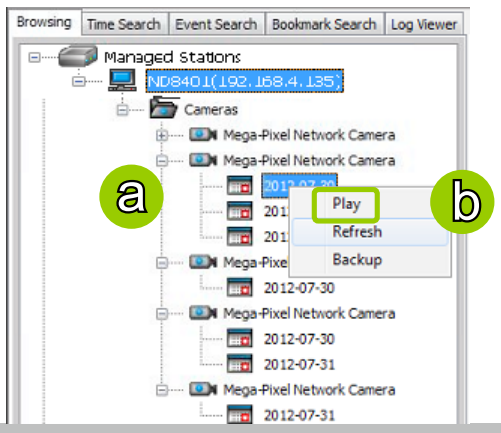


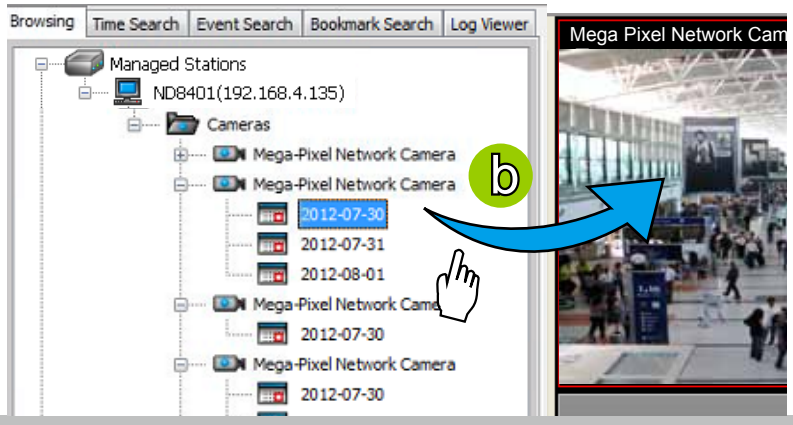
3. There are two ways to view the video clips of a date.

- View all video clips of a date:

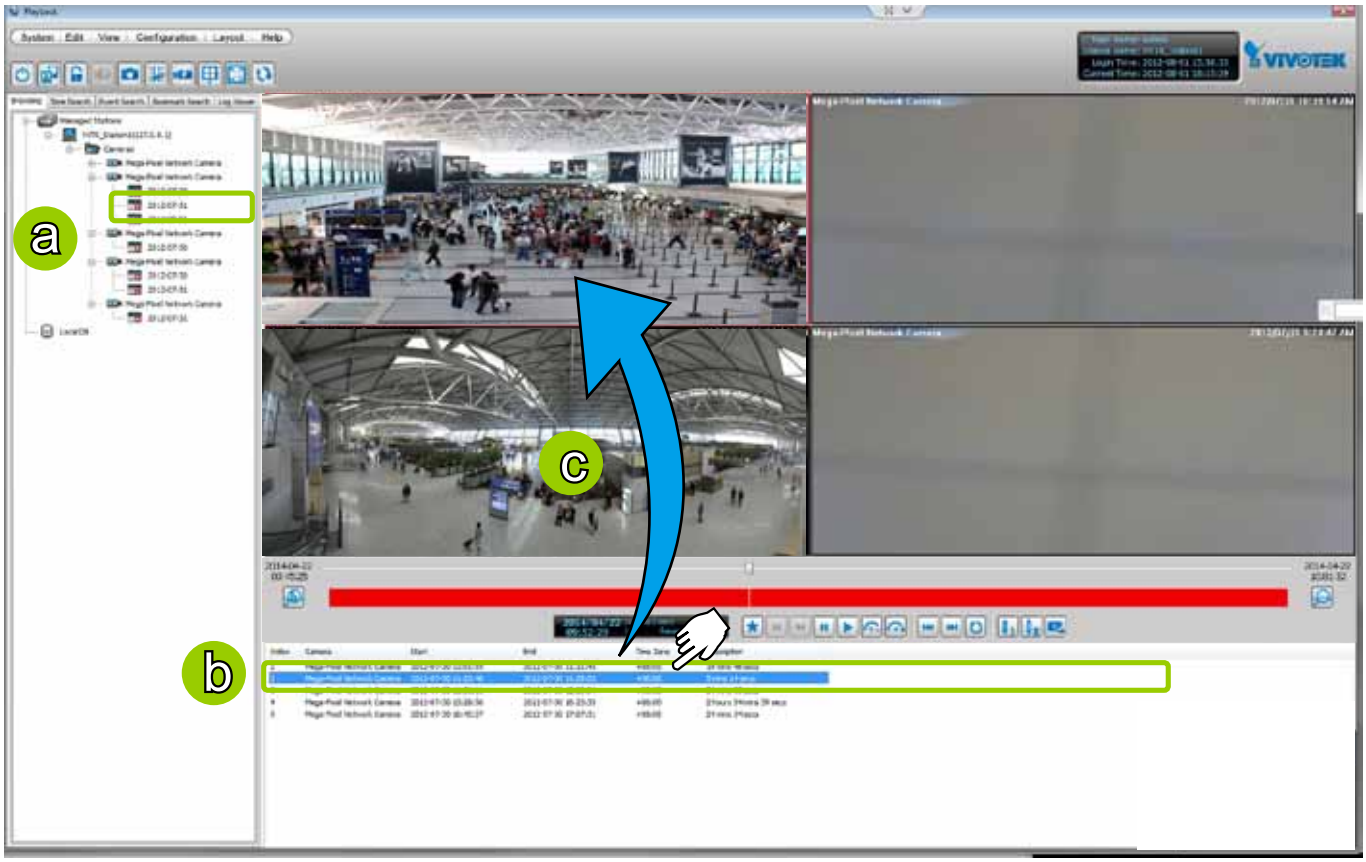
  a. Select a **option** “date” from the hierarchical management tree.

  b. **Double-click** the option “date” or **right-click** the option “date” and click **play**, and it will start to play in an available video cell. (You can also directly **drag-and-drop** the **option** “date” to a desired video cell in the recorded video playback window. The video clip will start to play.)





- View only one of the video clips of a date:
  a. Click on a “date” on the hierarchical management tree. The corresponding video clips will be listed in the video clip list window.
  b. Select a video clip from the video clip list window.
  c. **Double-click** the video clip, then it will start to play in an available video cell. (You can also directly **drag-and-drop** the video clip to a desired video cell in the recorded video playback window. The video clip will start to play.)

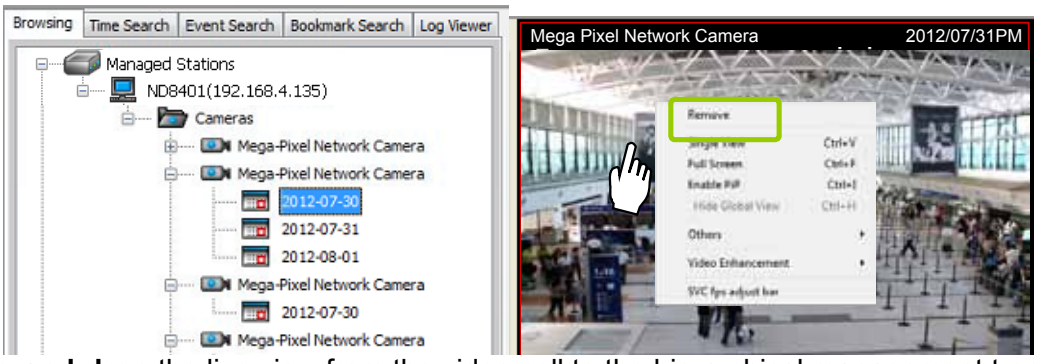


4. Then you can make use of the playback control panel to playback the selected video clip. Please refer to **Playback Control Panel** on page 249.

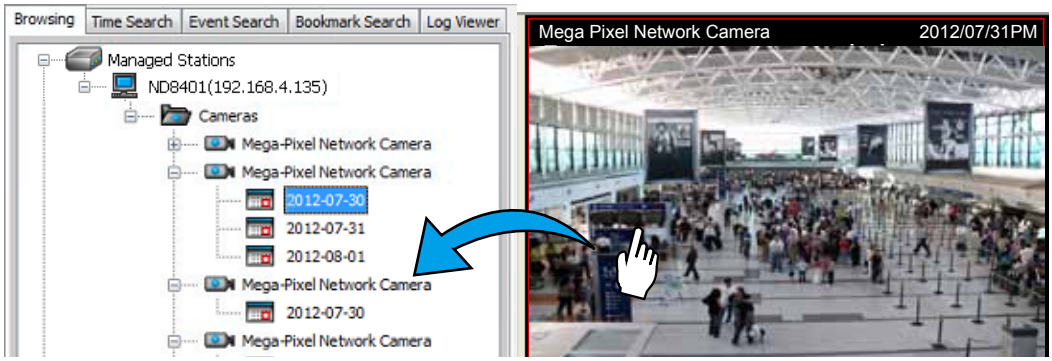
Remove Recorded Video Clips from Video Cells

There are two ways to remove a recorded video clip from the video cell:

1. **Right-click** the video cell and select **Remove**.



2. **Drag-and-drop** the live view from the video cell to the hierarchical management tree window.



If you want to remove all live videos from the video cells, please click on the menu bar.

Timeline Slider Bar and Histogram

The red part of the histogram shows the period of time of a video clip. The timeline slider bar will move forward as the video is on playback. You can manually move forward/backward the **Timeline Slider Bar** to the desired position as shown below.

Start time of the histogram

End time of the histogram

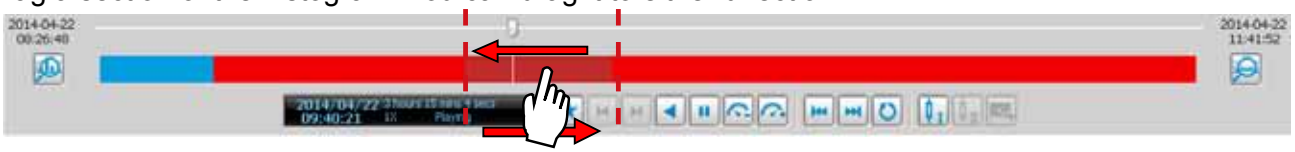
The current time of the video clip will be displayed on the status panel. It will change according to the current position of the timeline slider bar.

Zoom in / out of the Histogram

As the second picture shows, by clicking **Histogram Zoom In**, the total time of the histogram will shorten to half of the original period of time, while the red part of the histogram that shows the period of time of the video clip will extend to twice the original time span.

In addition to clicking and to zoom in/ out of the histogram, you can use the mouse directly to drag the histogram to zoom in part of the focused video clip.
For example:

a. Drag a section of the histogram. You can drag it to either direction.



b. The section will be extended as shown below.

For more functions of the playback control buttons, please refer to page 249 for detailed description.

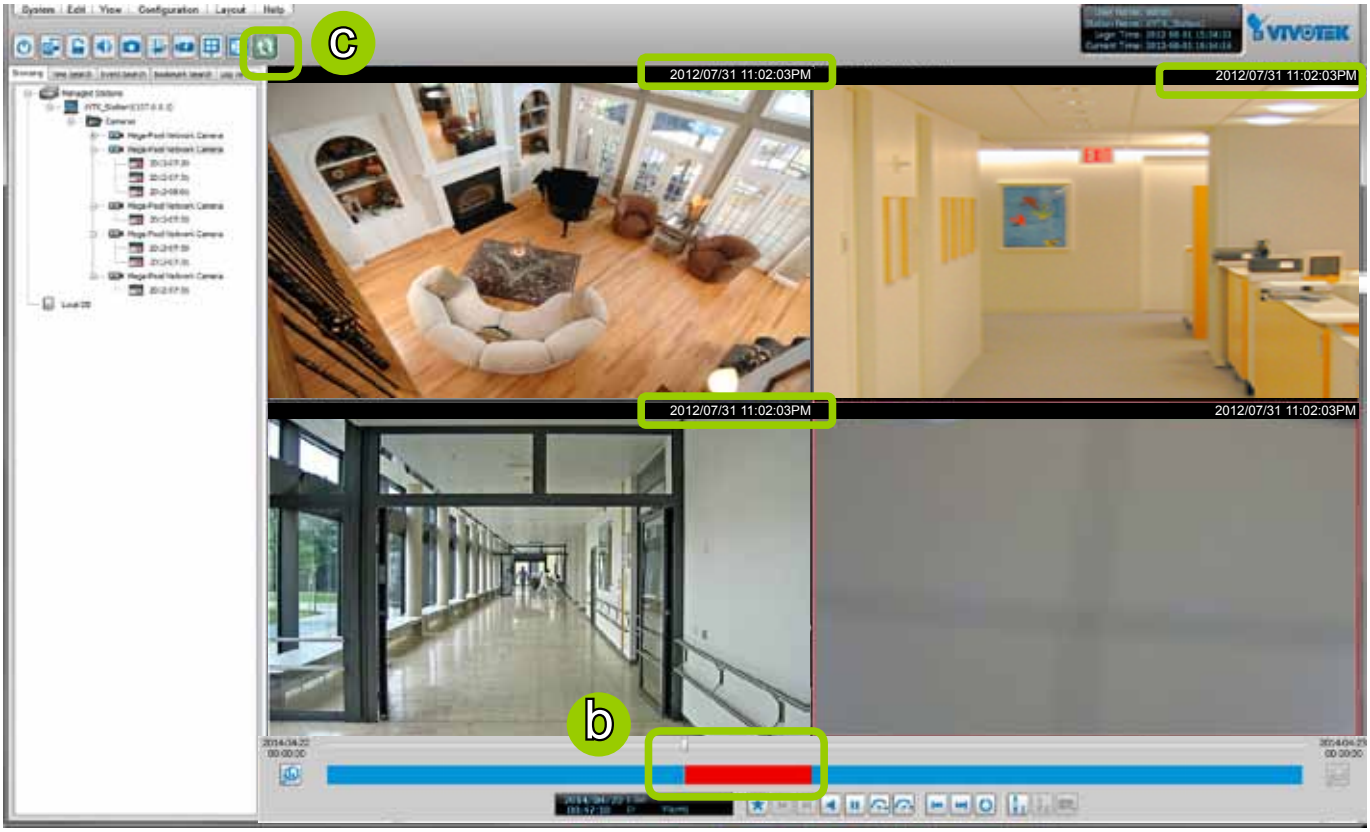
Synchronous Playback

VIVOTEK VAST Playback supports synchronous playback, which allows you to review up to 16-channel video clips simultaneously during the specific time point.
Please follow the steps below to enable synchronous playback:

a. Drag-and-drop the option “date”s to the video cells.

b. Drag the Timeline Slider Bar to the specific time point.

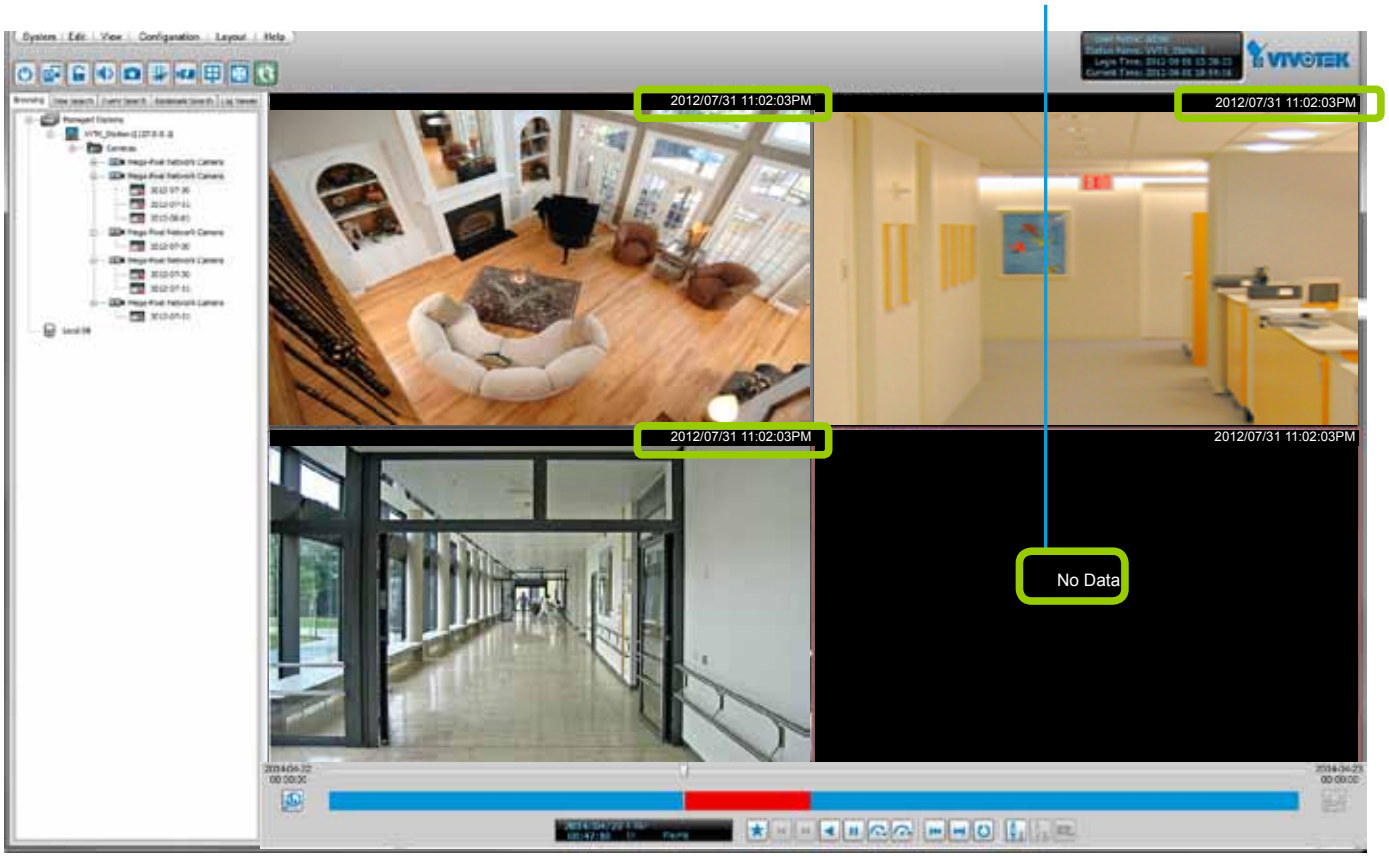
c. Click the synchronous playback button on the quick access bar. The selected channel will start to sychronously playback as shown below.



d. You can move forward/backward the Timeline Slider Bar to another time point, and all of the time stamps on the video cells will change accordingly.

e. If you want to stop synchronous playback, click the non-synchronous playback button again.

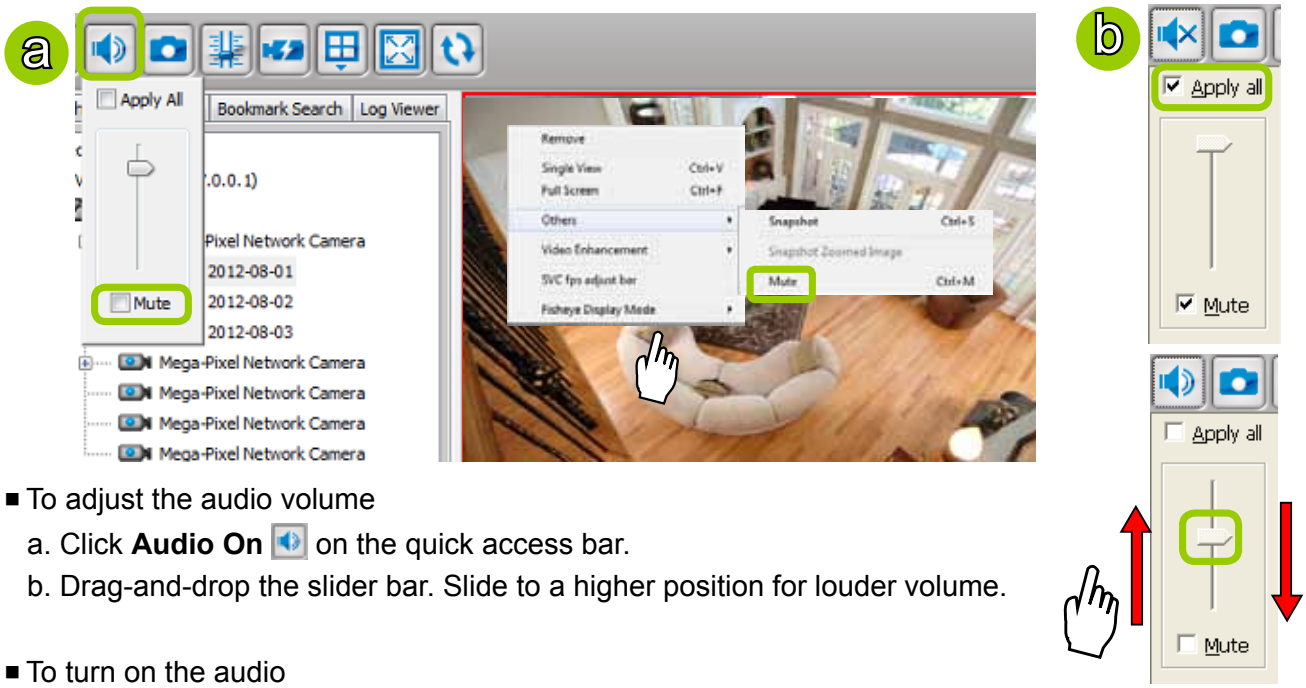
The following illustration shows that during the specific time, there is no recorded video on the camera.



Audio Control

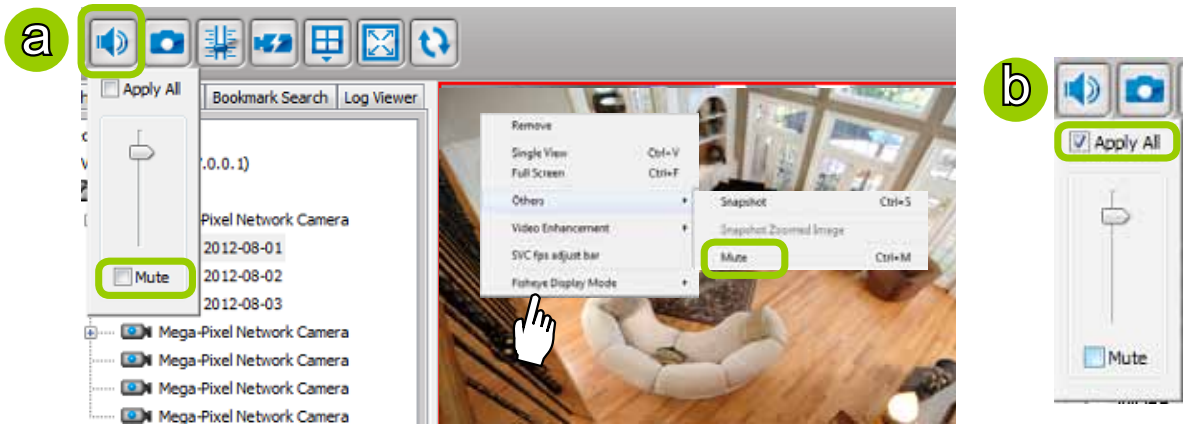
The audio function will be enabled if the device is equipped with an internal or external microphone. Please follow the steps below to adjust the volume or turn on/off the audio of the focused video:

- To turn off the audio (Mute Mode)
  a. Click **Audio On** on the quick access bar and check **Mute**. Or you can **right-click** on the video cell to open the popup menu, then click **Others > Mute**. The mute option in the popup menu will then be selected.
  b. If you want to turn off the audio of all live video, select **Apply all**.
  c. The Audio icon will then change from to .



- To adjust the audio volume
  a. Click **Audio On** on the quick access bar.
  b. Drag-and-drop the slider bar. Slide to a higher position for louder volume.

- To turn on the audio
  a. Click **Mute** on the quick access bar and uncheck **Mute**. Or you can **right-click** on the video cell to open the popup menu, then click **Others > Mute**. The mute option in the popup menu will then be unchecked.
  b. If you want to turn on the audio of all live video, select **Apply all**.
  c. The Audio icon will then change from to .



How to Change the Playback Layout

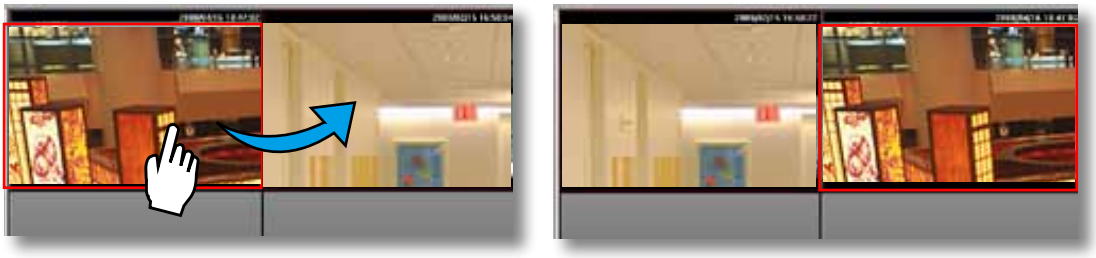
Changing the Layout of the Recorded Video Playback Window

VIVOTEK VAST Playback supports up to 16-CH simultaneous recorded video playback on a single monitor and allows you to change the layout of the recorded live video playback window based on the number of inserted devices.

Switch Video Channels

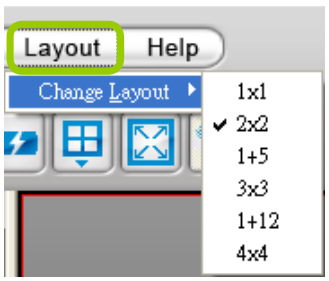
Drag-and-drop a video channel to another empty video window.

To switch two channels, **drag-and-drop** one view to the other, then the two channels will switch positions.



Configure Layout Mode

Click the **Layout** button on the quick access bar or click **Layout > Change Layout** on the menu bar. Select a desired layout mode and the layout window will change accordingly. Below we illustrate 6 types of layout modes:

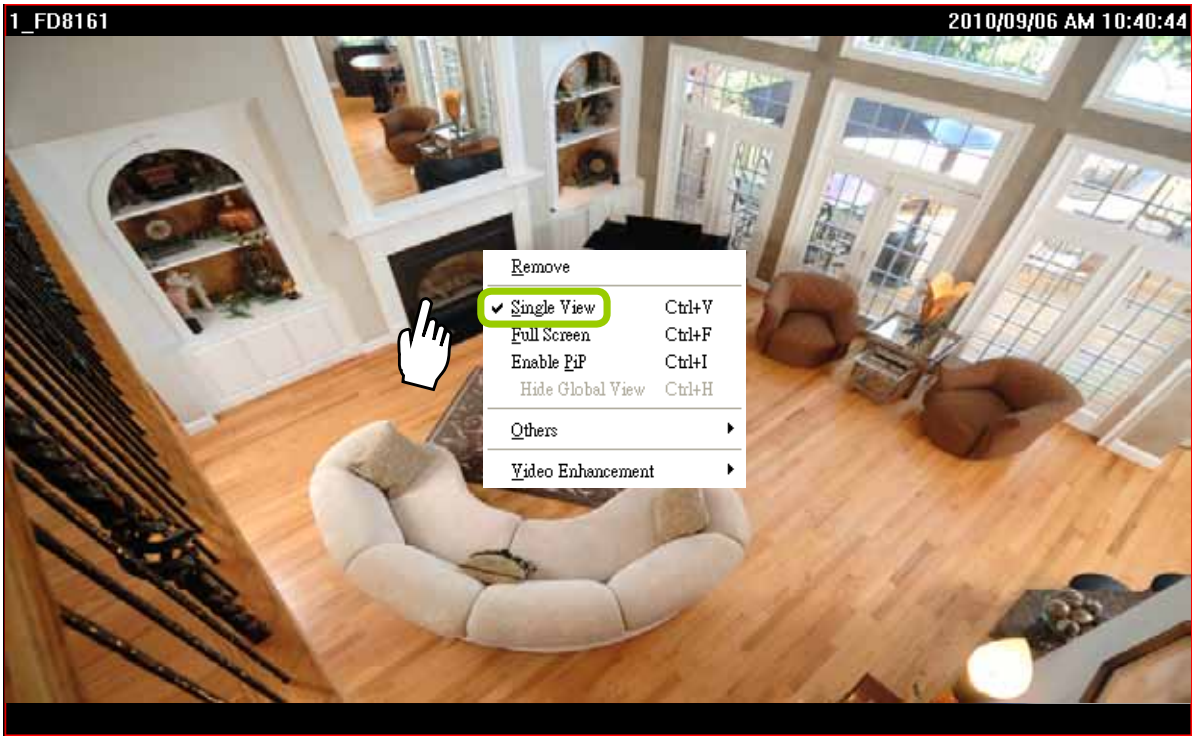


Layout mode	Description
1 x 1	
2 x 2	
1 + 5	
3 x 3	
1 + 12	
4 x 4	

Maximize/Minimize the Recorded Video Playback Window

- Single View: to maxmize a video cell to the entire video playback window

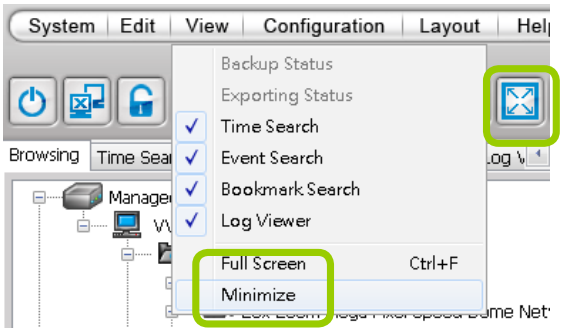
Double-click the video cell, or **right-click** the video cell and selec **Single View**. The focused video will occupy the entire Playback window as shown below.



To restore to the original layout, **double-click** the video cell or **right-click** the video cell and uncheck **Single View.**

- Full Screen: to maxmize the video playback window to the entire screen

Click **Full Screen** on the quick access bar or **right-click** the video cell and select **Full Screen**. In addition, you can also click **View > Full Screen** on the menu bar to maximize the recorded video playback window.



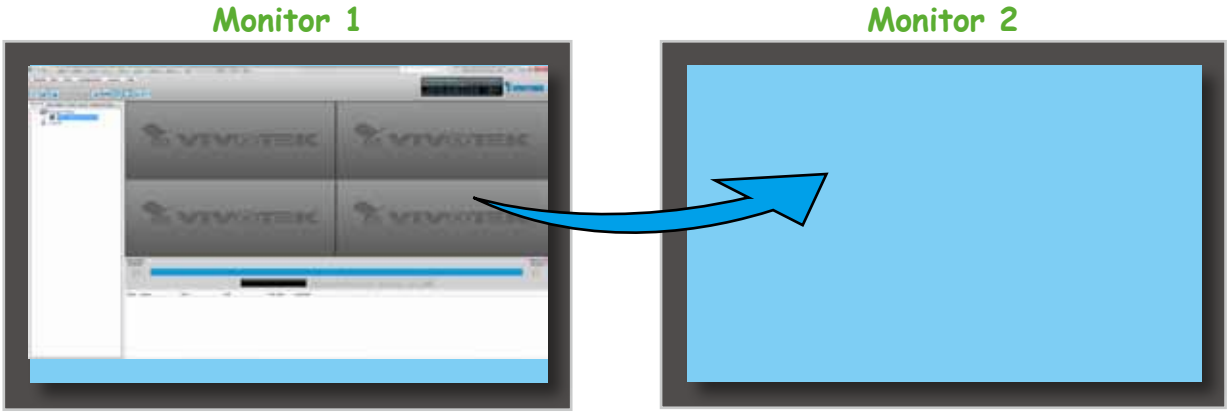
To restore to the original layout, **right-click** the video cell and uncheck **Full Screen**. You also can press the **Esc** button on the keyboard to leave the full screen mode.

- Minimize: If you click **View > Minimize** on the menu bar**,** the Playback window will minimize to the Windows tool bar.

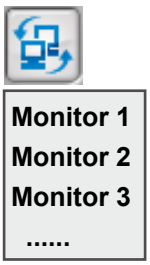
View Recorded Video with Multiple Monitors

If you have multiple screens in your control center, you can switch the VAST Playback Window among these screens.

- If you have two monitors, click **Switch Screen** on the menu bar, the Playback window of monitor 1 will switch to monitor 2.



- If you have three or more monitors, a drop-down list will be displayed when you click **Switch Screen** on the menu bar. The number of options on this list depends on the number of your screens. Select a desired screen from the drop-down list and the Playback Window will then switch to the specified screen.

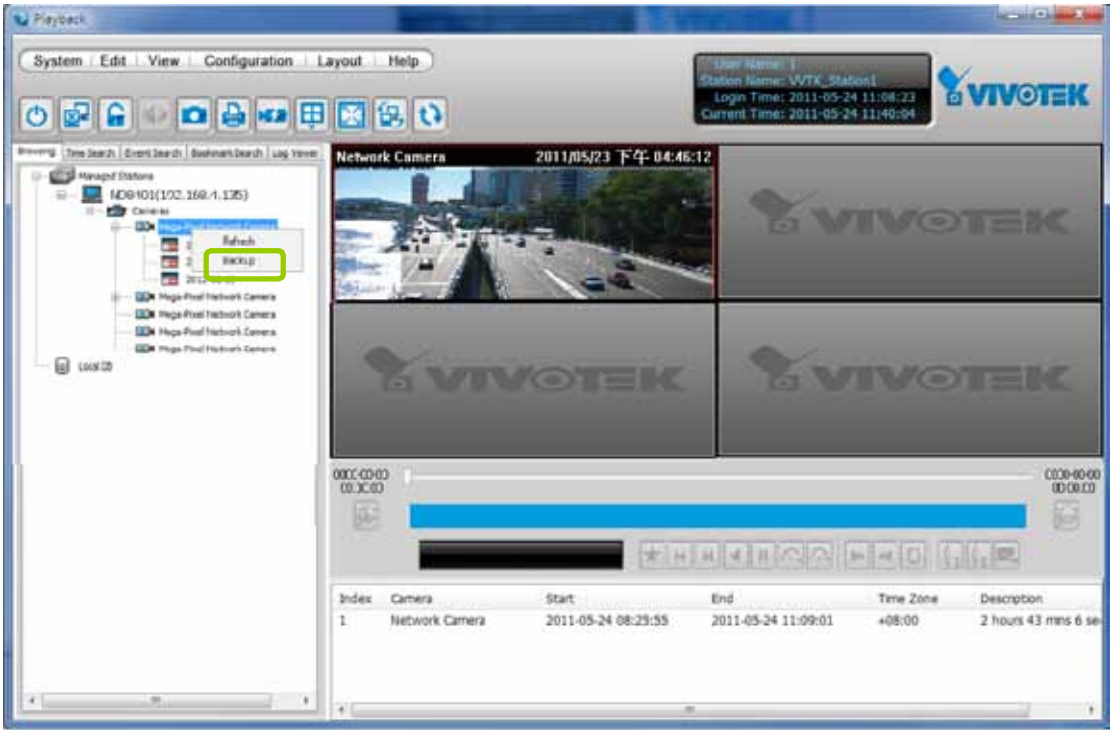


How to Backup Recorded Video

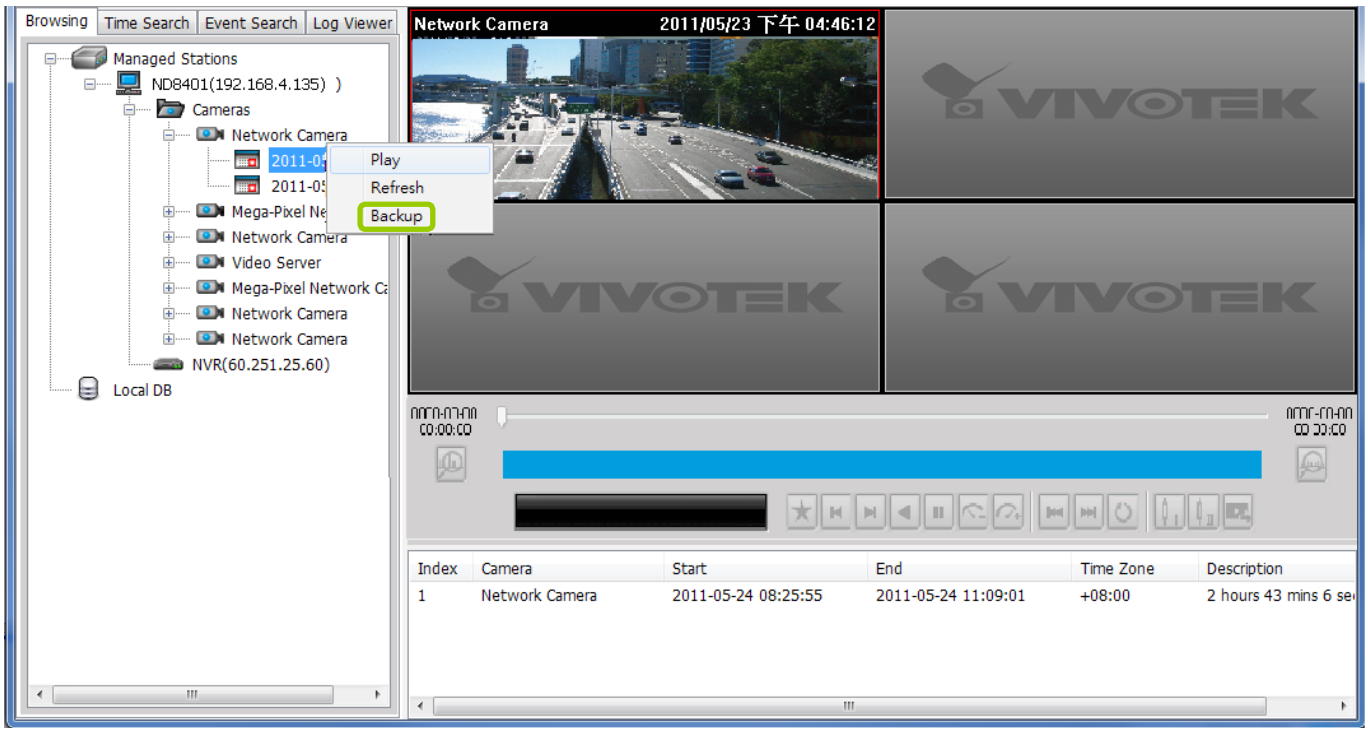
In addition to the Schedule Backup function of VAST LiveClient introduced on page 61, the VAST Playback also features to backup recorded video clips from the **local database**. Please open the **Browsing** page and follow the steps below to backup recorded video:

a. Select the target files.

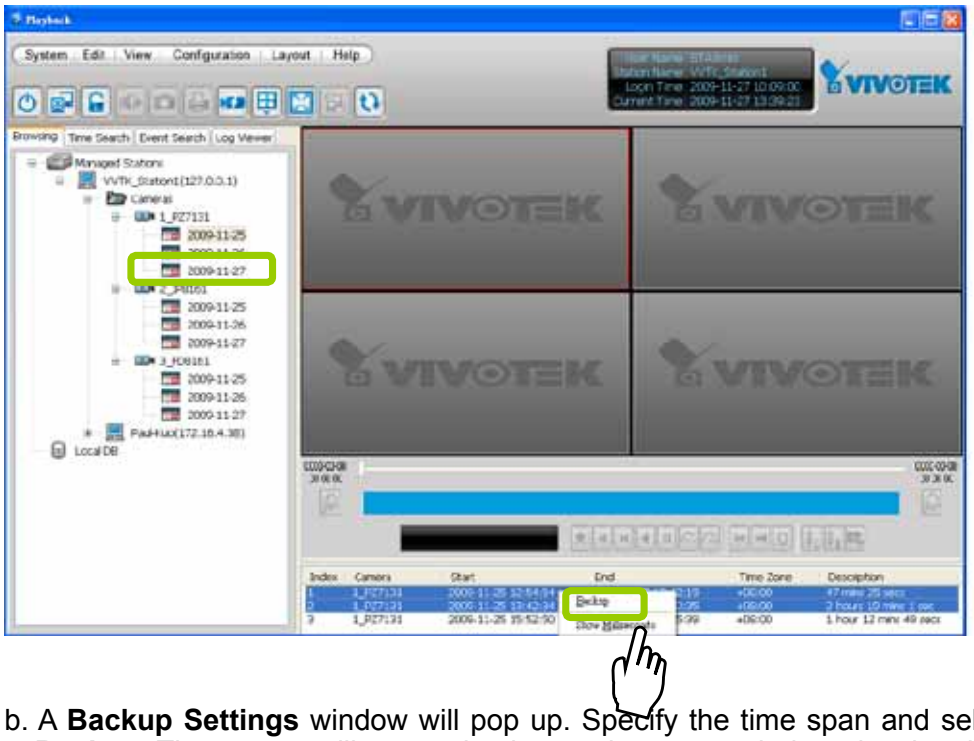
- To backup all recorded video of a selected device: **Right-click** the device and click **Backup**.



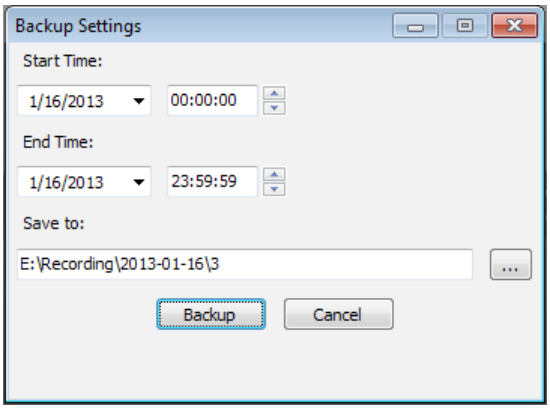
- To backup all recorded video of the day: **Right-click** the option “date” and click **Backup** (or select the date and click the **Backup** button below).

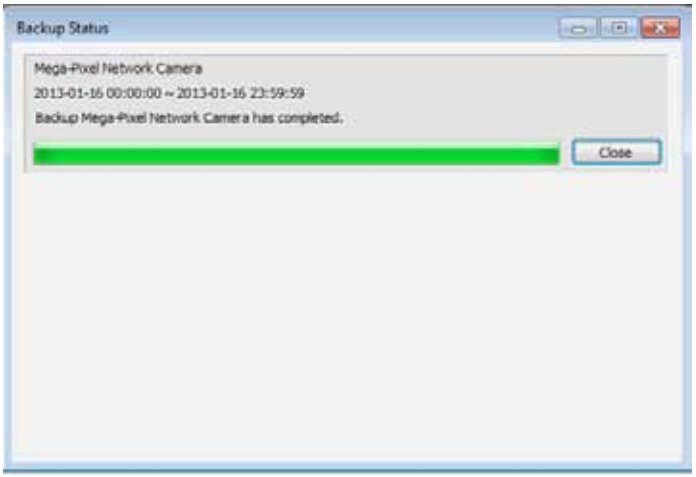


- To backup part of the recorded video of the day: Select the date and choose the video clip(s) from video clip window. Then **right-click** the selected option(s) and click **Backup**. Note: Use the combination of the **Shift** key and left mouse click to select multiple video clips.

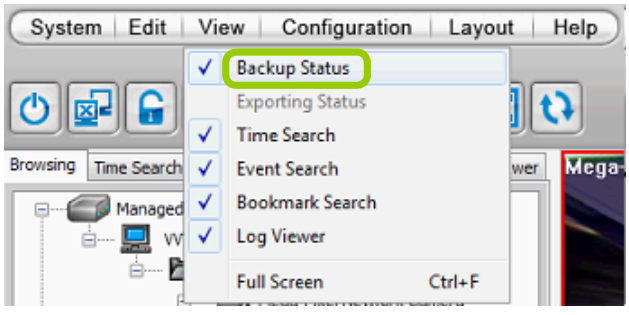


b. A **Backup Settings** window will pop up. Specify the time span and select a storage path, then click **Backup**. The system will start to backup and popup a window showing the backup status.





If you close the status window, you can also open it again by clicking **View > Backup Status**.



d. When the backup is complete, you will see an information dialog. The recorded data will be restored in the specific folder.

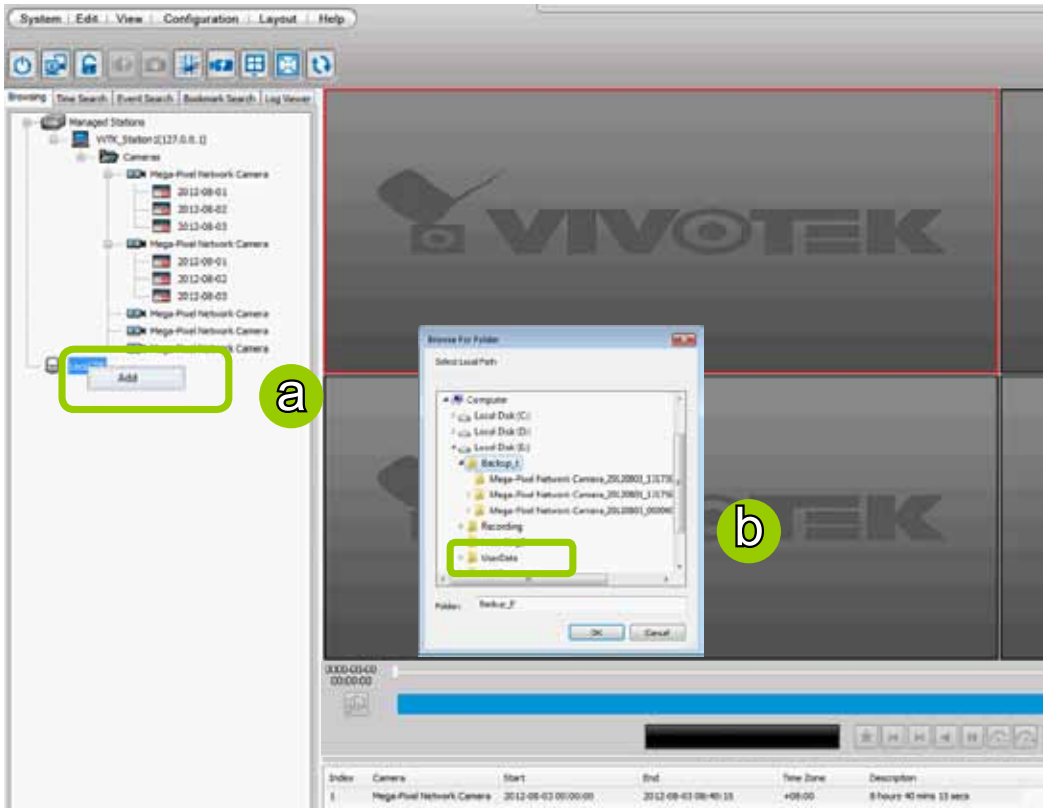
How to View Backup Files

The VAST Playback also allows users to playback backup files, including **Schedule Backup** by VAST LiveClient and **Recorded Data Backup** by VAST Playback.

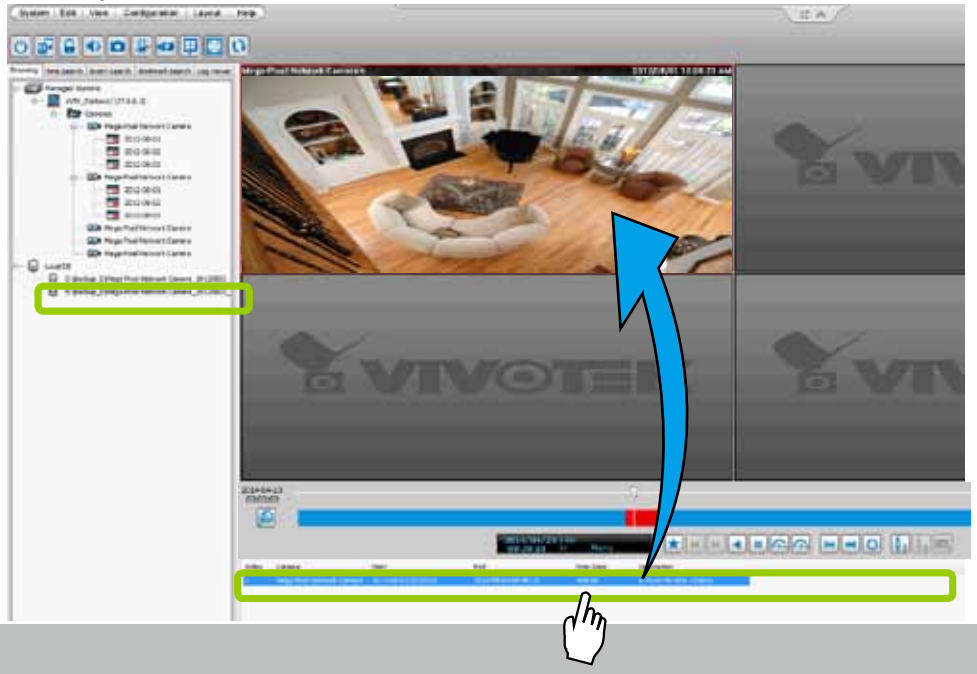
Please follow the steps below to view backup files:

a. **Right-click** Local DB and click **Add**.

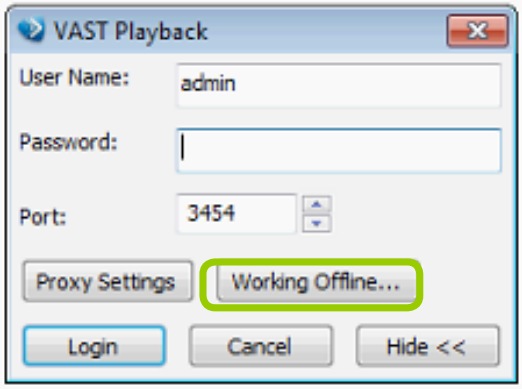
b. A **Load Backup File** window will pop up as shown below. Select the ***.dif file** to upload.

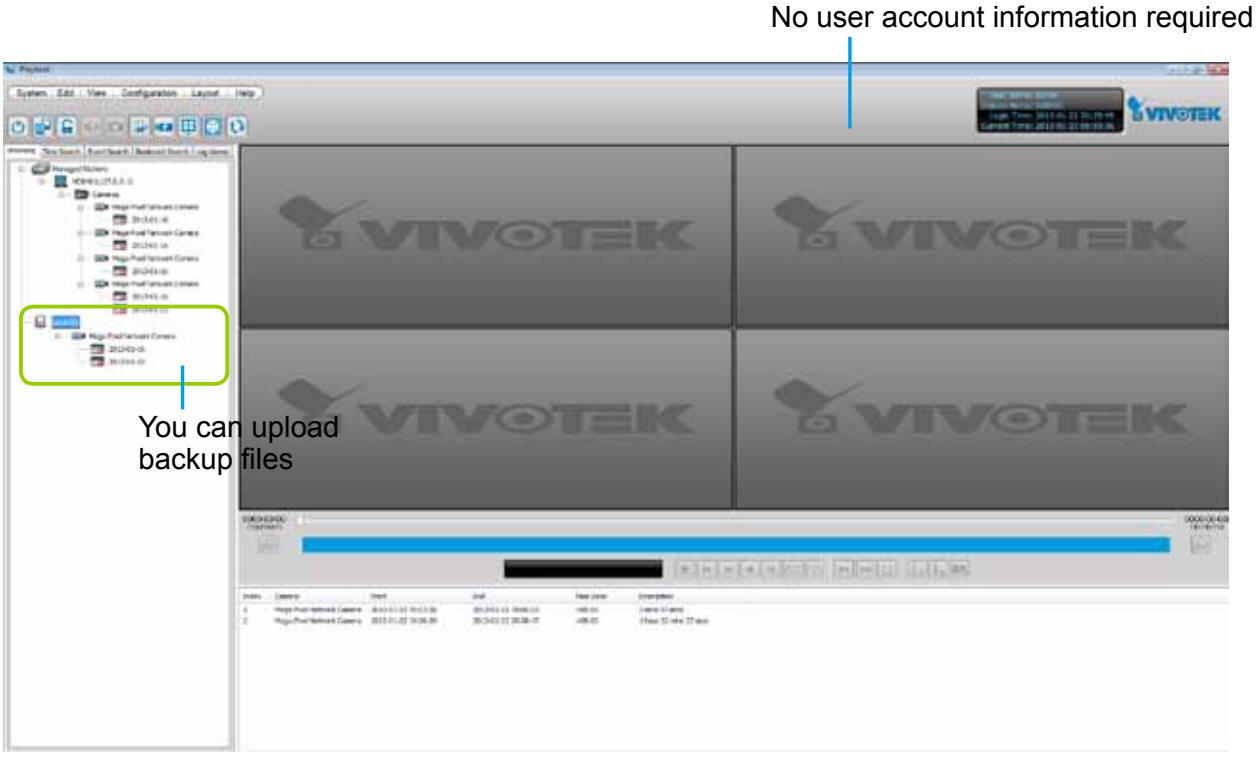


c. The following is an example of uploaded file, and you can **double-click** it or **drag-and-drop** it to a video cell to playback.



*If you want to playback the backup files from the local database, you can also click **Working Offline** in the Login Window without the account information. The VAST Playback will launch as shown below.*



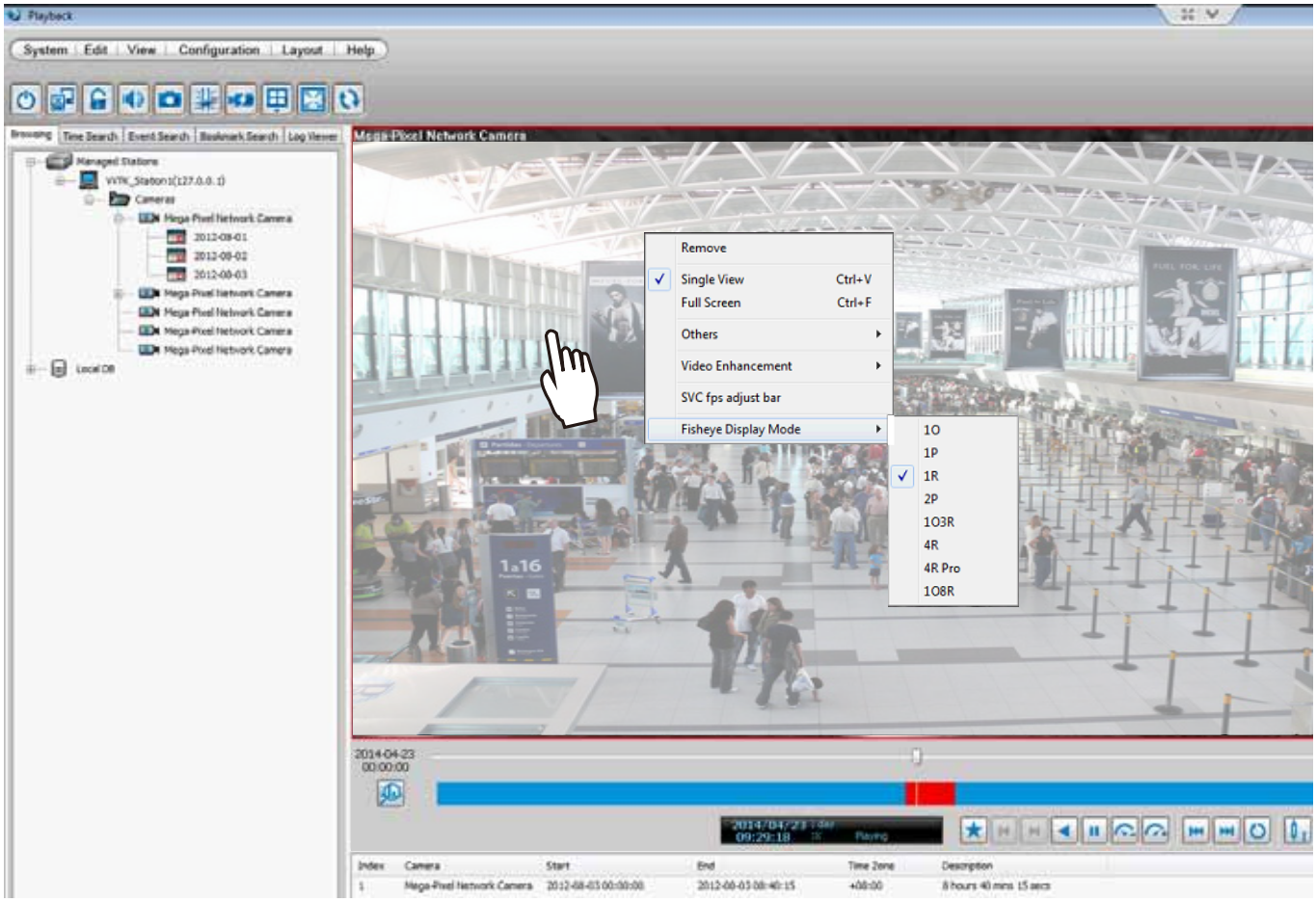


Model-specific Functions (FE Series Fisheye)

The VAST Playback program offers model-specific functions through a right-click menu. For example, if you playback a video clip made from an FE8171V fisheye camera, a right-click on the playback screen will bring up the Display mode options. You can even exert mouse control while playing a recorded video. You can zoom in, zoom out, and change the view angle as if you are investigating a 3D scenario kept in a recorded point in time.

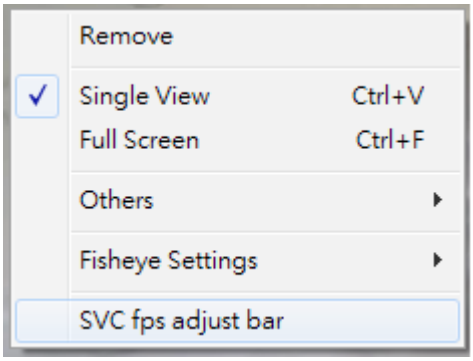
Note that ePTZ functions via the mouse control only takes place in a Regional view, e.g., the 1R or 1O3R mode.

The **Display mode** options and **mouse control** methodologies are identical to those described on page 107 and the following pages.



To configure the SVC-related feature:

1. Right-click on the playback window of an SVC-enabled camera. Select **SVC fps adjust bar**.



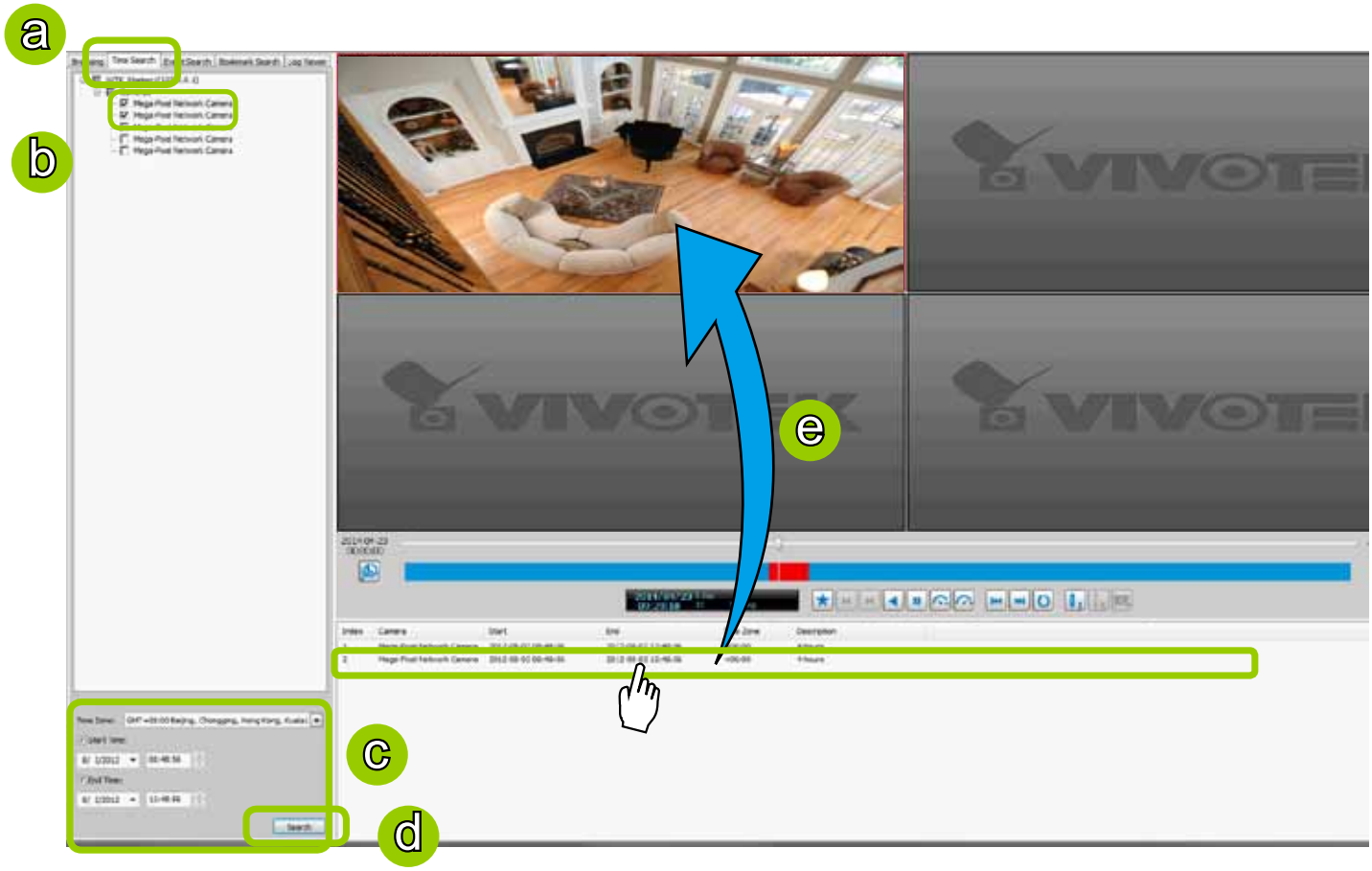
2. A slide bar will appear above the view cell. Click and drag the slide bar. A numeric indicator will display the current selection. See below for the frame rates represented by the numeric indicator. Please refer to page 87 for the introduction of this feature. Changing the SVC vaule takes immediate effect on the number of frames per second shown with the video being played.

Indicator	Frame rate per second (fps)
Maximum	**30**
7	**26**
6	**22**
5	**18**
4	**12**
3	**8**
2	**4**
1	**1**
Minimum	**1/4**

How to Search for a Video Clip in a Specific Period of time

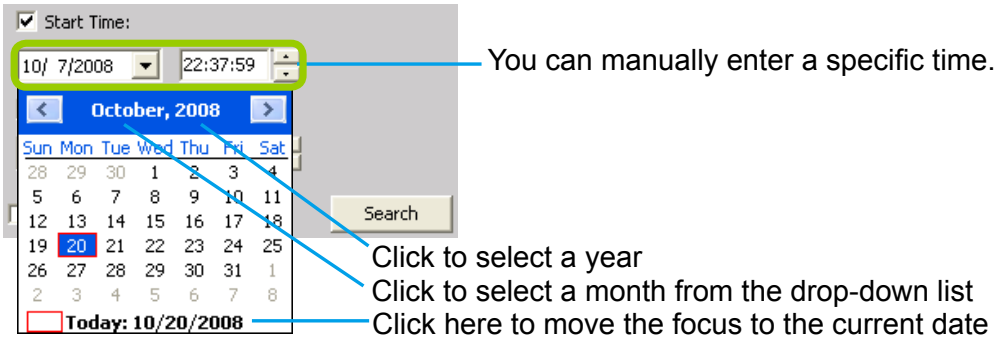
Please follow the steps below to use **Time Search** function:

a. Open the **Time Search** page.



b. Select the target station(s)/device(s) that you want to search for video clips.

c. Specify the time span. You can choose to set up the start time only, the end time only, or both the start time and end time. The search results will only include the video clips within the time span. If you uncheck both the start time and end time, the search results will include all video clips recorded by the selected device(s).



d. Click **Search** to start time search.

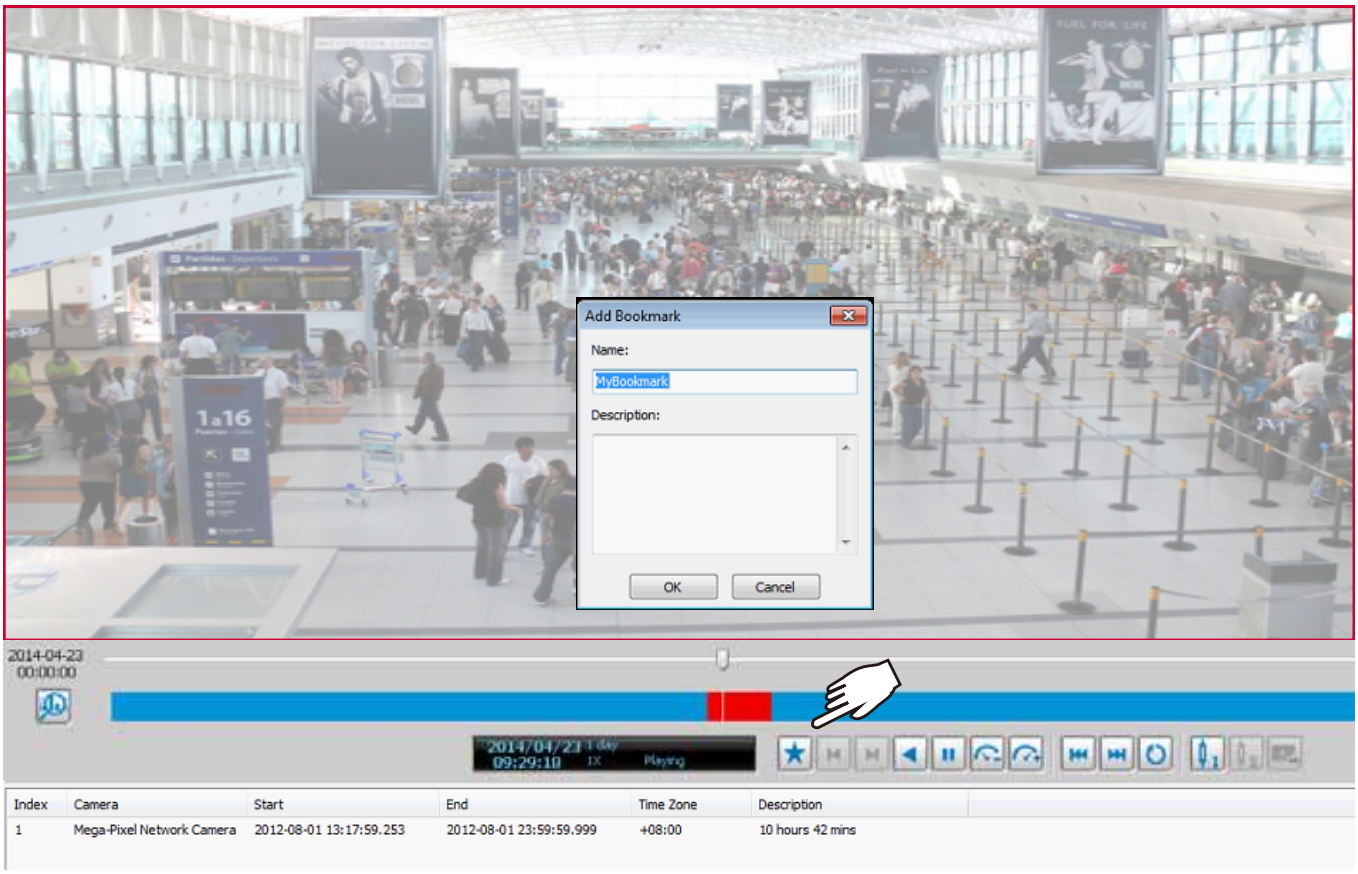
e. View the retrieved video clips.

How to Add a Bookmark

Bookmark is a convenient tagging function that allow your to pinpoint and extract a 20-second video clip from out of a video recording. When you see somehting of your interest while browsing through a recorded video

1. Click on the Bookmark button,
2. Enter a name for the bookmark, such as "thief spotted."
3. You may enter a short description in the Description field. You may also search for the bookmarks you created later on.

A bookmark comprises a video clip starting from 10 seconds of before and ends at 10 seconds after the point in time you selected.



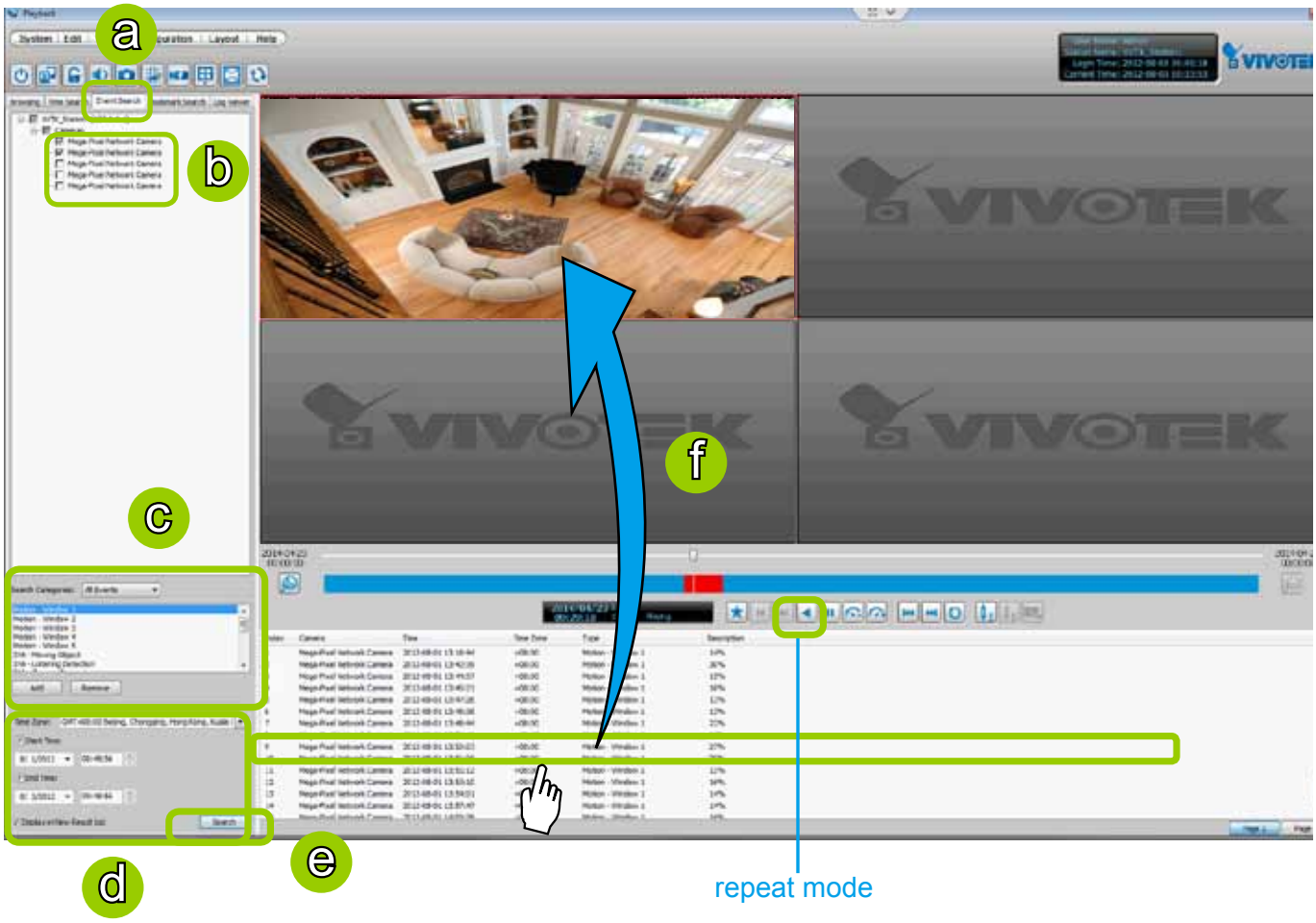
Please refer to page 245 for how to search for bookmarks.

How to Search for Events

The VAST Playback program offers users an intuitive event search engine for retrieving video clips from the database of recorded videos based on different search criteria such as motion, IVA, or DI events.

Please follow the steps below to search for recorded events:

a. Open the **Event Search** page.



b. Select the target station(s)/device(s) that you want to search for events.

c. Specify the **Event Category**. For detailed information, please refer to **Select Event Category** on the following page.

d. Specify the time span for event search. You can choose to set up the start time only, the end time only, or both the start time and end time. The search results will only include the events within the time span. If you uncheck both the start time and end time, the search results will include all events from the selected device(s). Please refer to step c. on the previous page for detailed information.

e. Start event search. Please refer to page 273 for detailed information.

f. View the retrieved video clips. **Double-click** on it or **drag-and-drop** it to the video cell. It will playback in repeat mode.

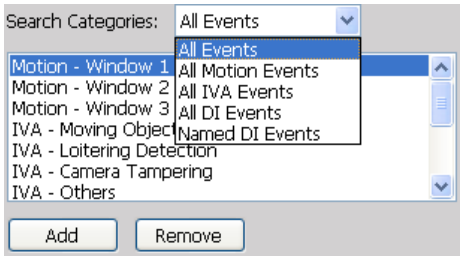
Note: The length of each video clip will depend on your settings of pre-event time & post-event time for the recording storage. The default setting is **20 seconds**. For more infromation, please refer to page 159 for detailed information.

Select Event Category

The following introduces the event search categories: **All Events**, **All Motion Events**, **All IVA events**, **All DI Events**, **Named DI Events, PIR, Tampering, Tamperature, Video Loss/ Restore, IR Trigger/Normal, and P-PTZ**. You can also add or remove customized events from the list.

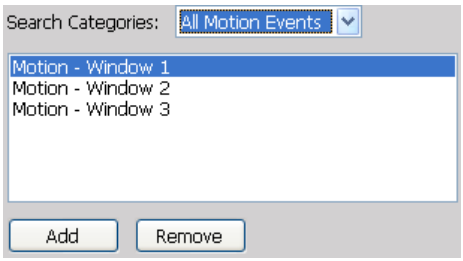
Event Category- All Events

If you select the **All Events** category, all of the events including motion detection, digital input, and intelligent video analysis, PIR, tamper detection, and tamperature alarm will be listed in the search results. You can click **Add** or **Remove** to change the search criteria options.



Event Category- All Motion Events

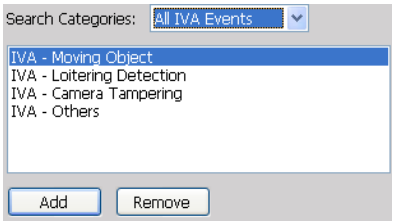
If you select the **All Motion Events** category, all detected motion events will be included in the search. You can click **Add** or **Remove** to change the search criteria options.



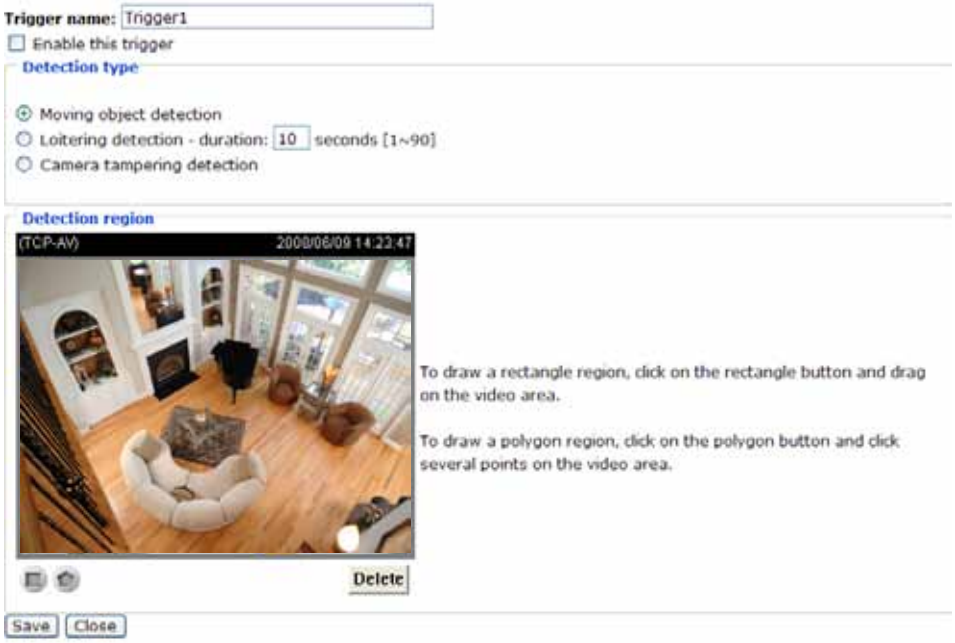
The parameters of the motion detection windows, such as motion percentage and the time of occurrence are also recorded in the database of the server. If you wish to change the parameters of the motion detection windows such as the position, size, detection sensibility, and motion percentage, please link to the camera's Configuration page to modify the values.

Event Category- All IVA events

If you select the **All IVA events** category, all detected IVA events will be included in the search. Cameras with embedded intelligent video content analysis are capable of detecting IVA events such as moving objects, loitering, and tamper detection.
The embedded video content analysis, superior to the conventional motion detection function, is capable of distinguishing between creature's motions, static backgrounds or natural movements such as swaying trees, waves or sunsets to prevent false alarms from environmental noises.
With camera tamper detection, it can detect incidents such as camera redirection, blocking or defocusing of cameras, or even spray-paint. Additionally, a suspicious object in the pre-defined detection region will trigger alarms once the dwell time of the object is longer than the given time.
You can click **Add** or **Remove** to change the search criteria items.

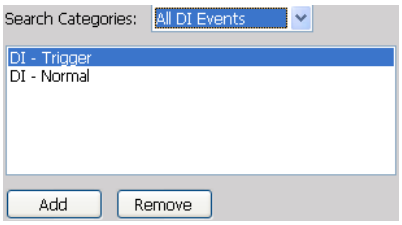


If you want to change the parameters of IVA, such as the detection region, loitering duration, etc, please link to the camera's Configuration page to modify the values.



Event Category- All DI Events

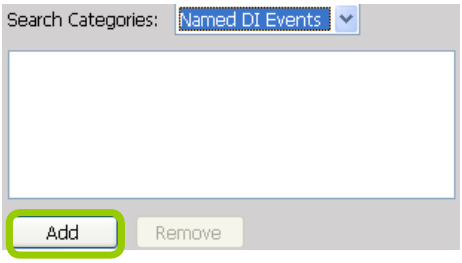
If you select **All DI Events** category, all triggered DI signals will be included in the search. The DI events signify that there is a Digital-Input signal detected by the camera; its corresponding information such as DI-Trigger or DI-Normal signal and the time of occurrence are also transmitted and recorded in the database of the server.
You can click **Add** or **Remove** to change the search criteria options.

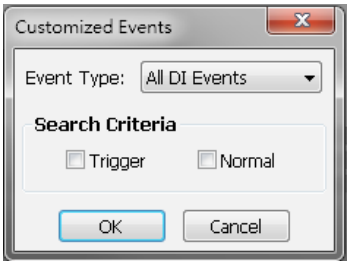


For more information about DI/DO settings on the connected devices, please refer to page 137 for detailed illustration.

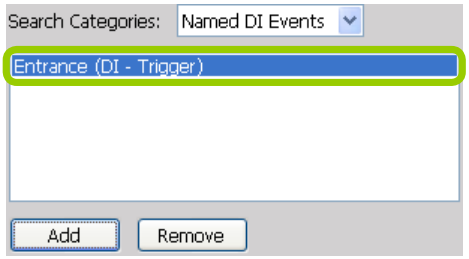
Event Category- Named DI Events

This category allows you to select only **Named DI Events**--the DI device which you have renamed in the LiveClient. Please refer to Association Management on page 137 for more information about how to rename DI device.
Click **OK** and fill in the name you want to search on the left window.





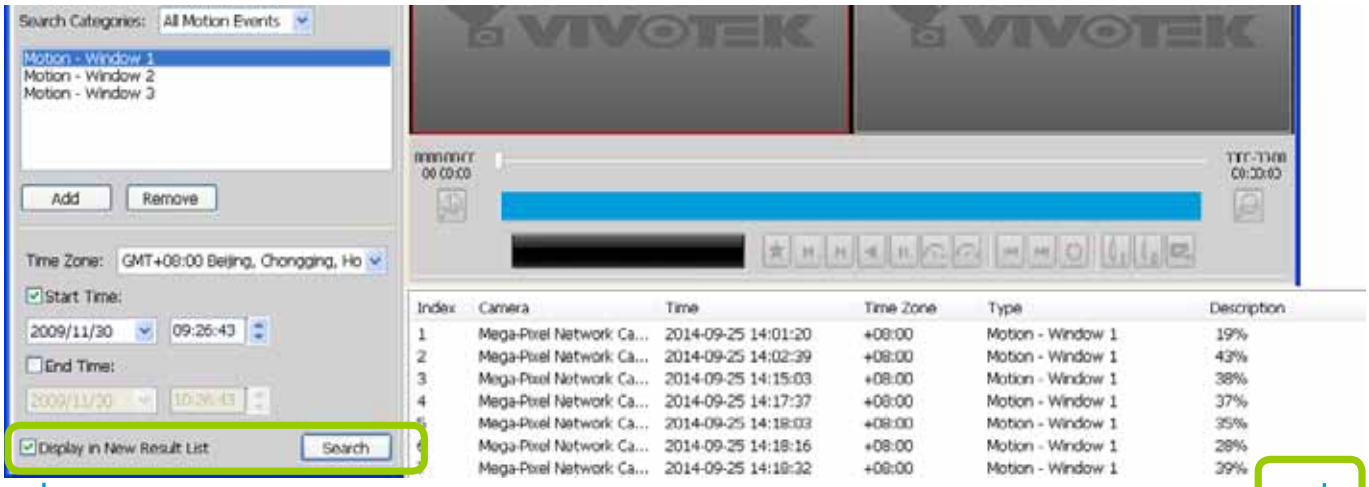
The new search criteria will be displayed in the search categories column as shown below.
You can click **Add** or **Remove** to change the search criteria options.



Start Event Search

After you specify all of the search criteria mentioned above, check/uncheck **Display in new result list** and click **Search** to begin event search.

- If **Display in new result list** is unchecked, all search results will be displayed on the original event list window as shown below.

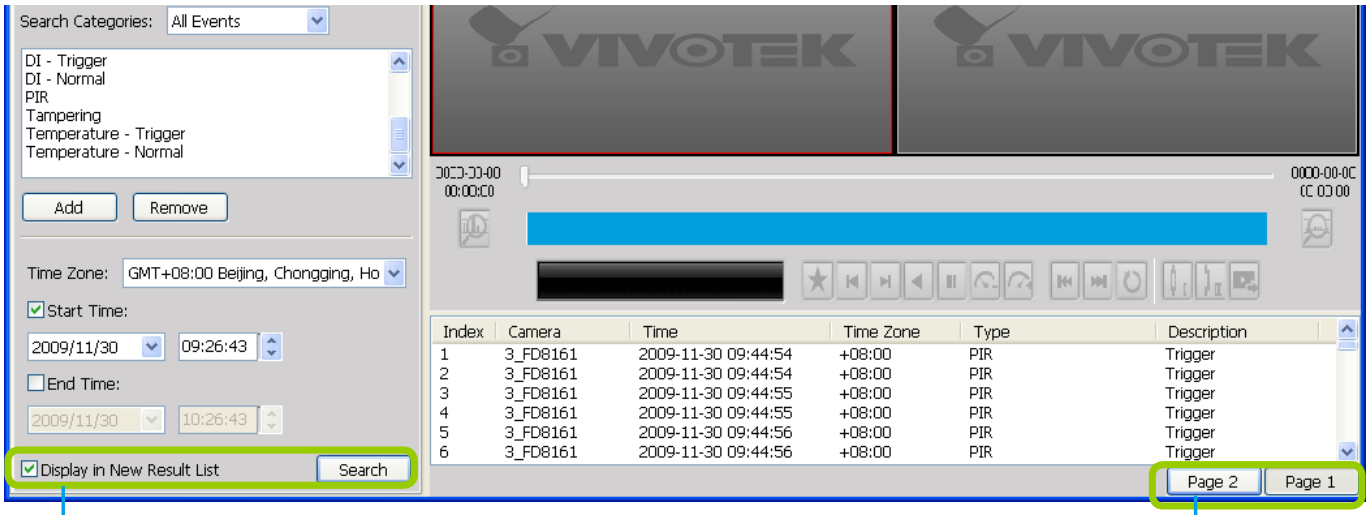


Unchecked

Only one page

- In the above picture, The **Type** field in the search result page shows the event category, and the **Description** field displays the motion **percentage** of the detection window. Please refer to page 270 for more information about Motion Events.

- If you select **Display in new result list** and click **Search**, the search results will be displayed on a new page as shown below. This allows you to place the search results of each search category on an individual page. You can set up to 5 pages in the event list window.



Checked

You can set up to 5 pages.

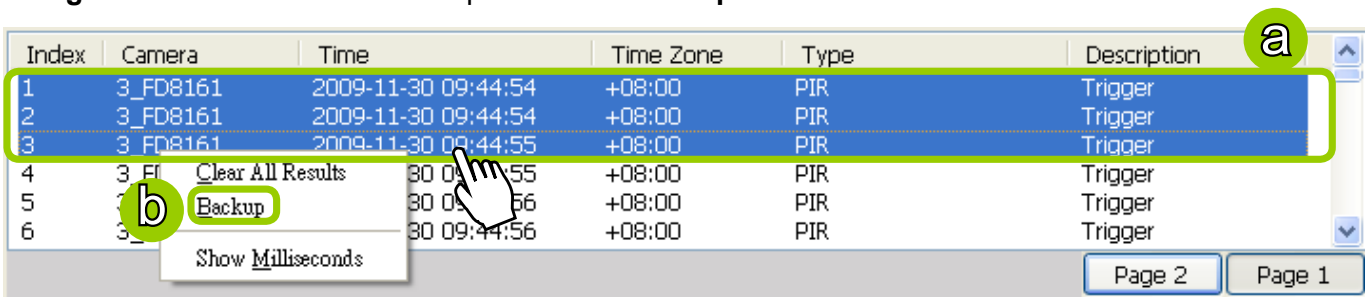
The P-PTZ event type refers to those triggered by the Auto Tracking actions.

Backup the Event Videos

Please follow the steps below to backup the evnet videos on the results list:

a. Select the video clips you want to backup. You can select more than one video clip.

b. **Right-click** the selected video clips and click **Backup**.



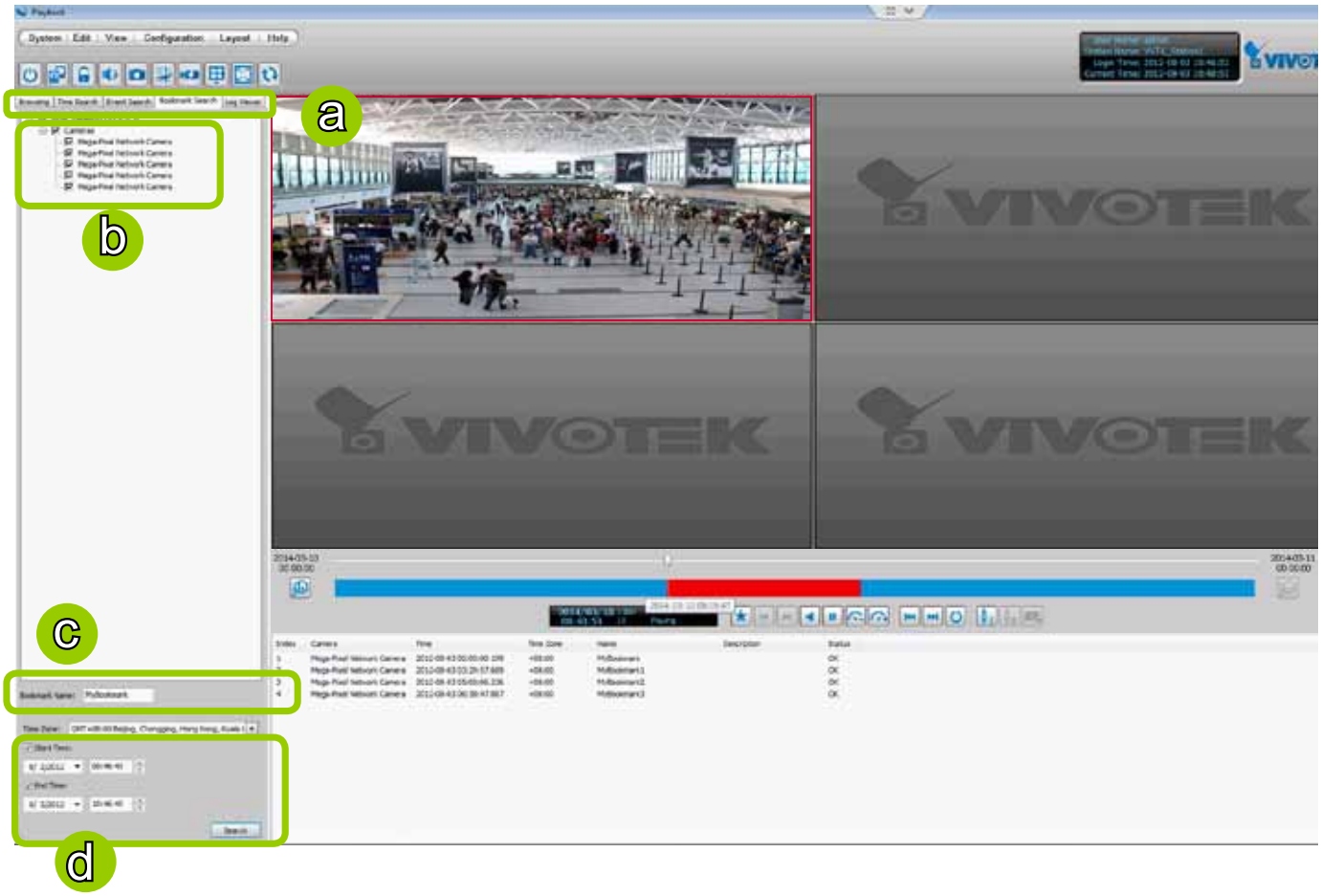
c. A **Backup Settings** window will pop up. For more information about how to set up the Backup Settings, please refer to page 261. For more information about how to view backup files, please refer to page 263 for detailed illustration.

How to Search for a Bookmark

Please follow the steps below to use **Bookmark Search** function:

a. Click on the tabbed menu to open the **Bookmark Search** page.

b. Select the cameras which have video clips you have placed bookmarks on.

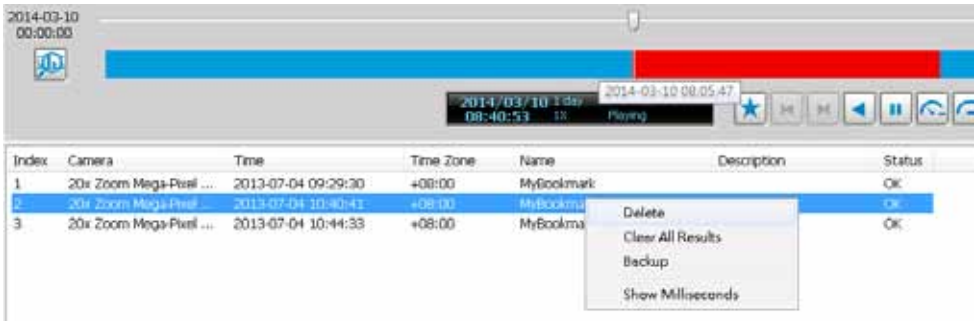


c. Enter the name of bookmark.

d. Specify a range of time during which the video streams were recorded and its points in time were bookmarked.

Click **search**. You can then click on a bookmark to display the short video clip extracted from within the recorded video.

To remove an existing bookmark, left-click to select an entry, and then right-click to display the Delete button. Bookmarks will be indicated as "Invalid" if the videos where the bookmarks were appended were erased, e.g., when the original recording was erased by cyclic recording.



How to Search Logs

The VAST Playback program offers a convenient log engine for searching all local logs based on different search criteria such as log category, log type, and log level. The search results will be displayed in the log viewer window along with the detailed log history.

Please follow the steps below to search logs:

a. Open the **Log Viewer** page.

b. Select the target station where you want to search logs.

c. Specify the **Log Category**. For detailed information, please refer to **Select Log Category** on page 277.

d. Specify the **User Account**. If you have added other user accounts to the station, you can select one to search its login history. For detailed information about user account, please refer to **How to Manage User Accounts** on page 129.

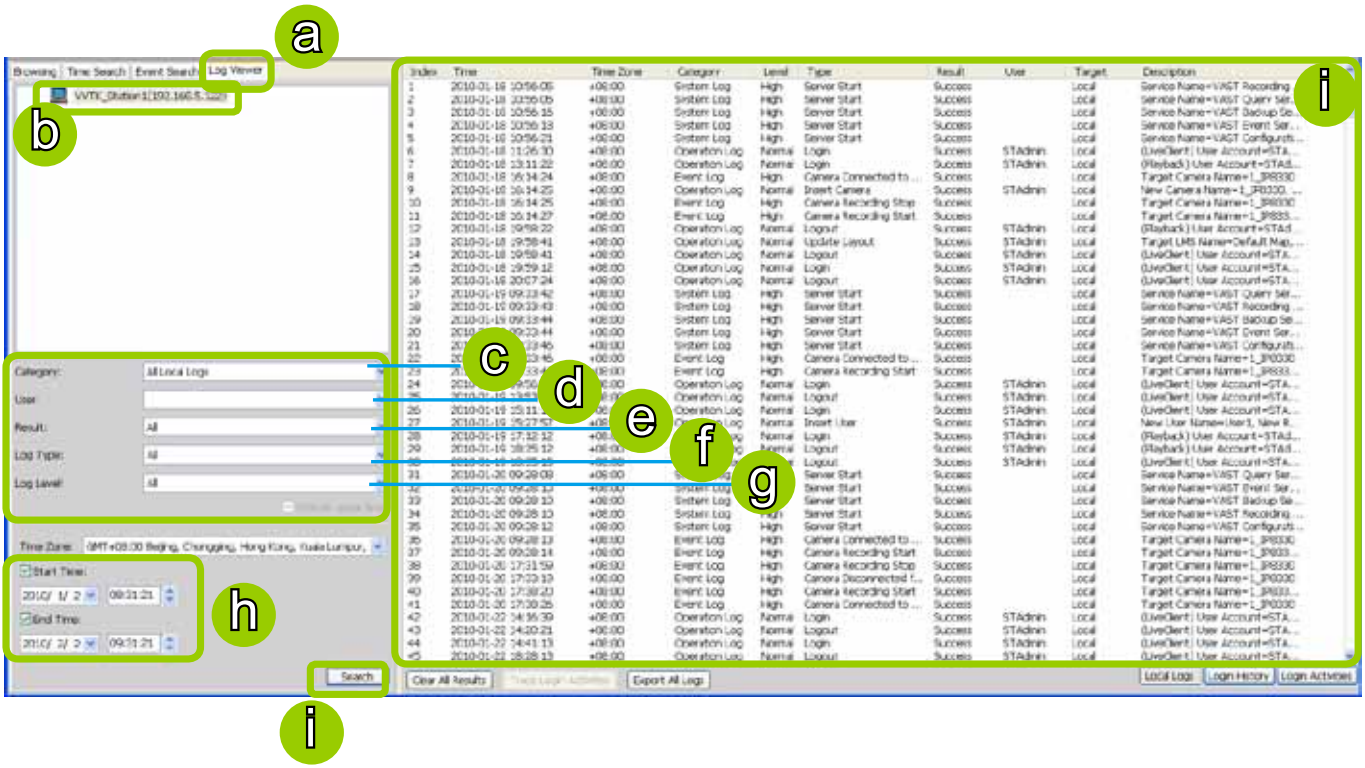
e. Specify the **Search Result**. Select **All** to display all search results; select **Success** to display successful log activities only; select **Fail** to display failed log activities only.

f. Specify the **Log Type**. For detailed information, please refer to **Select Log Type** on page 277.

g. Specify the **Log Level**. For detailed information, please refer to **Select Log Level** on page 277.

h. Specify the search time span. You can check the start time only, the end time only, or both the start time and end time. The search will only include the events within the time span. If you uncheck both the start time and end time, the search will include all events saved by the server. Please refer to page 267 for detailed information.

i. Start the log search and the results will be displayed on the log list window.



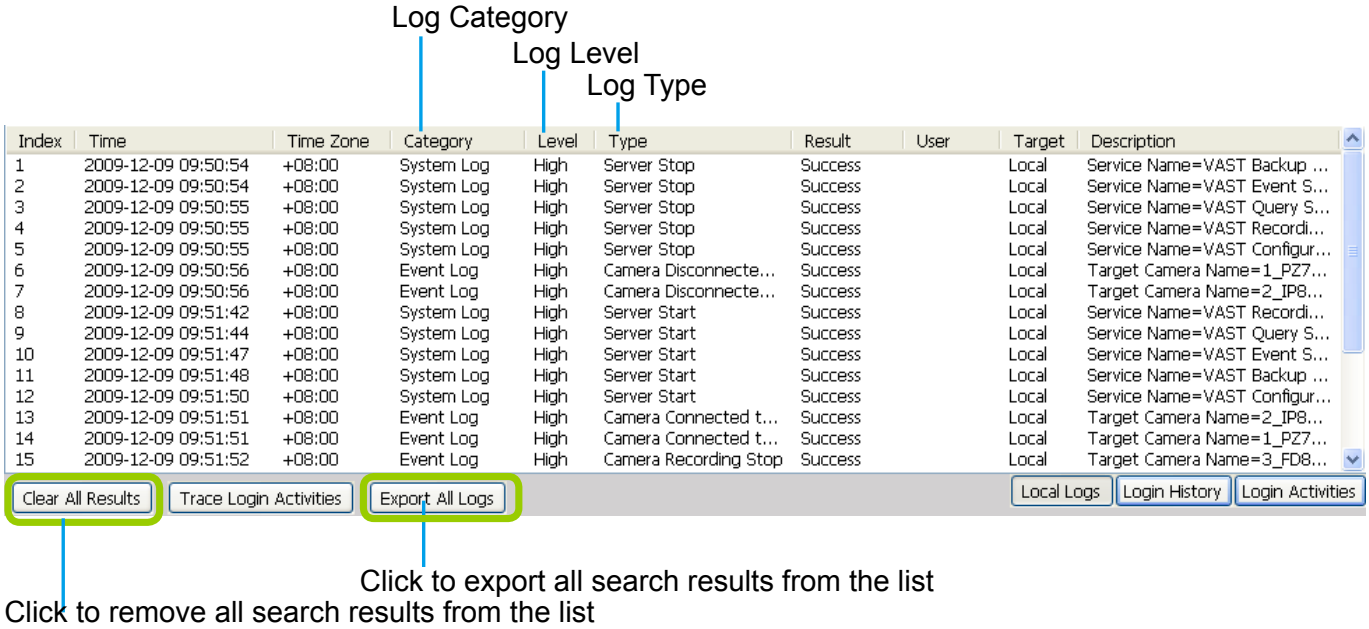
Select Log Category/Log Type/Log Level

The following table shows the breakdown of log category, level, and type. The search results will be different according to your selections.

Log Categories	Log Levels	Log Types
Operation Log	Normal	Login / Logout Insert User Update User Name Update User Password Update User Privilege Delete User Insert Station Update Station Information Update Station Name Delete Station Insert Camera Update Camera Information Delete Camera Set Recording Group Insert Recording Schedule / Update Recording Schedule / Delete Recording Schedule Insert Event Management / Update Event Management / Delete Event Management Insert Recording Group / Update Recording Group / Delete Recording Group Insert Recording Path / Update Recording Path / Delete Recording Path Insert Camera to the Recording Group Update Camera information in the Recording Group Delete Camera from the Recording Group Move Recording Path Move Camera to another Recording Group Insert Layout / Update Layout / Delete Layout Set Digital Output Update Scheduled Backup Update Server Port Set Proxy Server Set UPNP Set DDNS Server Create Directory / Rename Directory / Delete Directory Insert SMTP Server / Update SMTP Server / Delete SMTP Server Insert Network Storage Device / Update Network Storage Device / Delete Network Storage Device Set GSM Modem Set DI/DO Rename Set Relay Settings Update License Information Update Web Access Information Insert Matrix Recipient / Insert Matrix Recipient Information / Delete Matrix Recipient
	High	Manually Begin Recording Manually Stop Recording
	Low	Camera PTZ, Iris, Focus, Pan, Patrol Control Click on Image Select Preset Location
System Log	High	Server Start / Server Stop Trial Expired Key Dongle Lost Virtual Memory Low Network Lost / Storage lost

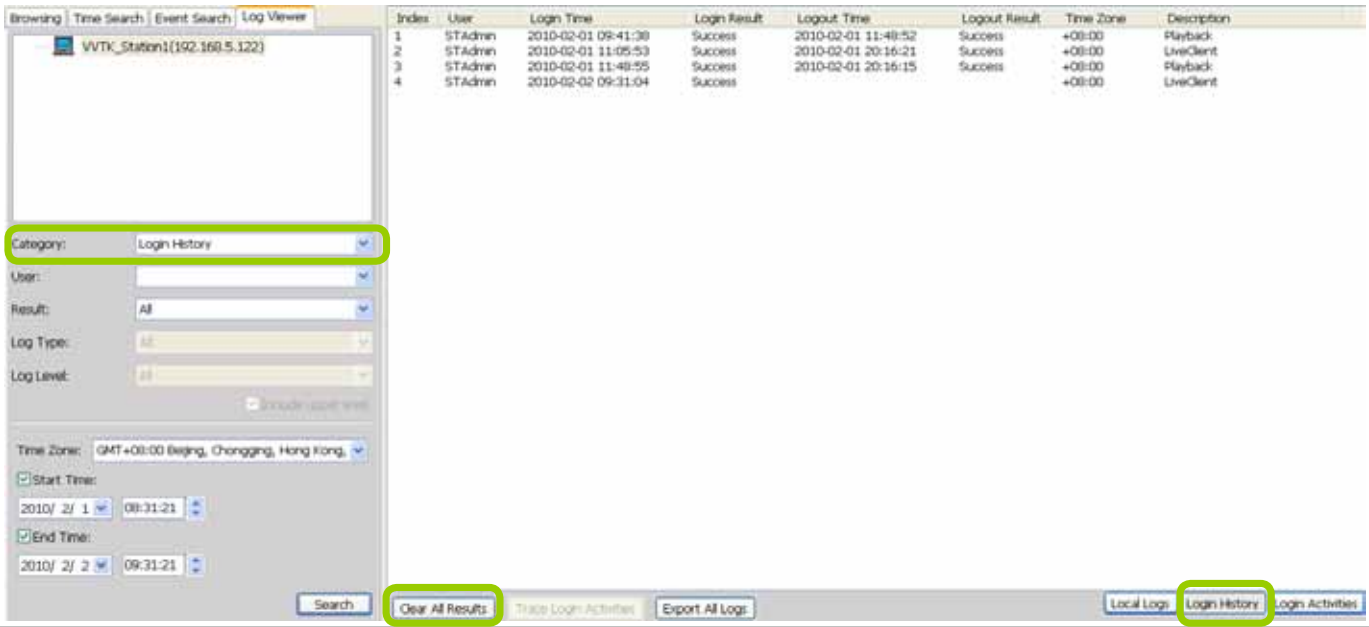
Log Categories	Log Levels	Log Types
Event Log	High	Camera Disconnected from the Server / Camera Connected to the Server Parent Station Connection Lost / Parent Station Connection Restore Sub-station Disconnected / Sub-station Connected Camera Recording Start / Camera Recording Stop Start Scheduled Backup / Stop Scheduled Backup Event Trigger

Search All Local Logs



Search Login History

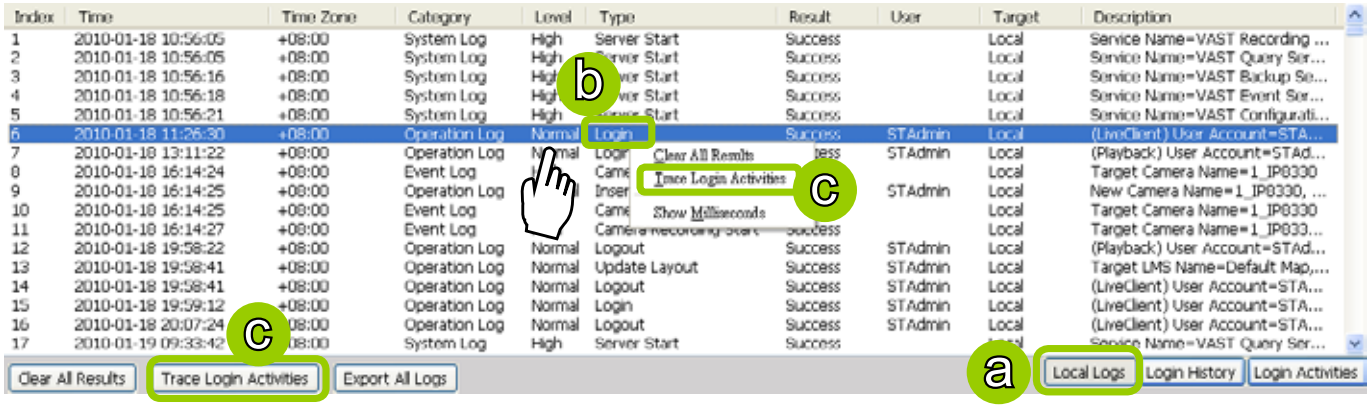
Select **Login History** from the log category field and click the **Search** button below, the search results, including all login logs, will be displayed on the Login History page.



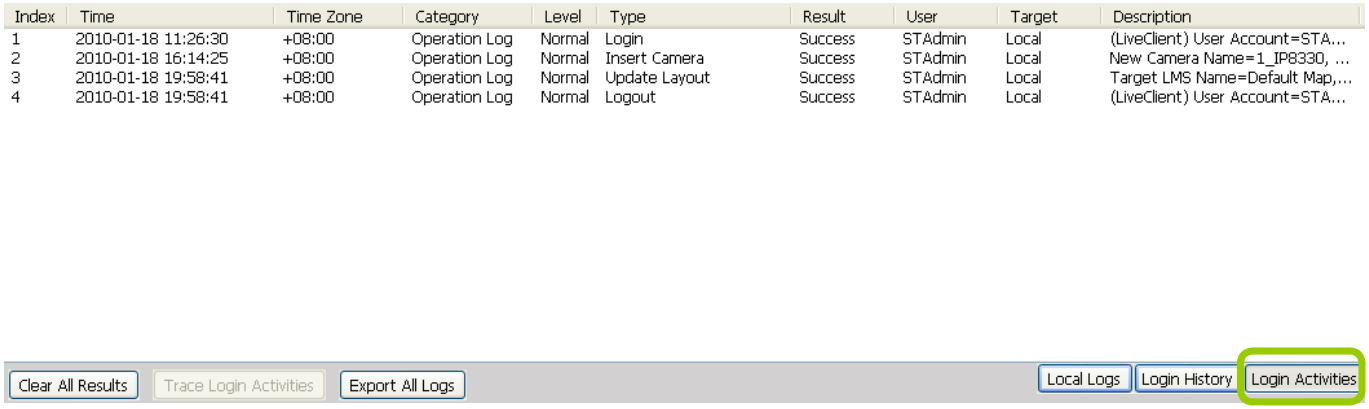
Search Login Activities

This function allows you to search the operations the user performed during the login period of time. You can search for login activities on the Local Logs or Login History page.

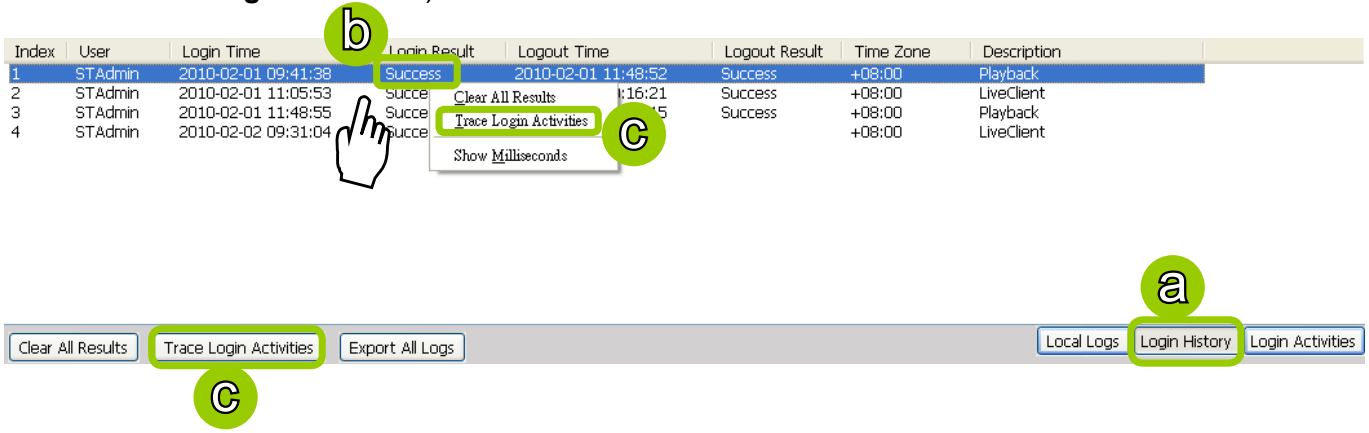
- Search Login Activities on the Local Logs page:
  a. Click on the **Local Logs** page.
  b. Select a login/logout option from the list.
  c. Click **Trace Login Activities** (or you can **right-click** the selected login/logout option on the list, then click **Trace Login Activities**).



d. The search results of the login activities will be displayed on the Login Activities page as shown below.



- Search Login Activities on the Login History page:
  a. Click on the **Login History** page.
  b. Select a login/logout option from the list.
  c. Click **Trace Login Activities** (or you can **right-click** the selected login/logout item on the list and click **Trace Login Activities**).



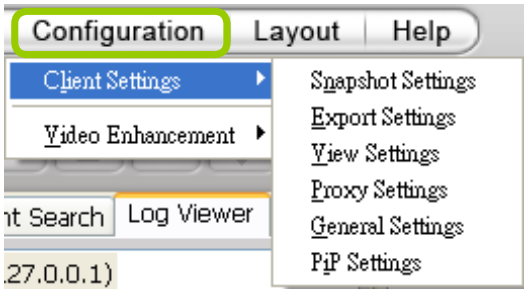
d. The search results of the login activities will be displayed on the Login Activities page as shown below.

Index	Time	Time Zone	Category	Level	Type	Result	User	Target	Description
1	2010-02-01 11:05:53	+08:00	Operation Log	Normal	Login	Success	STAdmin	Local	(LiveClient) User Account=STA...
2	2010-02-01 20:16:21	+08:00	Operation Log	Normal	Logout	Success	STAdmin	Local	(LiveClient) User Account=STA...

*When you select **All** in the **Log Level** field, the search results will include all log levels. If you select Low in the **Log Level** field and select **Including above level** as shown in the picture on the left below, the search results will include all levels of logs. But if you select **Normal** in the **Log Level** field and select **Including above level** as shown in the picture on the right below, the search results will only include **Normal-level** and **High-level** logs.*

How to Configure Client Settings

On Client Settings, you can configure Snapshot Settings, Export Settings, View Settings, Proxy Settings, and General Settings. It allows you to save snapshots and media files on the local computer.



Snapshot Settings

When you play a recorded video, VAST Playback also allows you to take snapshots. For detailed information about **Snapshot Settings**, please refer to page 198.

Export Settings

When you playback a recorded video, the VAST server allows you to export part of the recorded video in EXE, 3GP, or AVI format to your local computer. Before exporting a media file, please set up Export Settings first. For detailed information about how to set up EXE, 3GP, and AVI **Export Settings**, please refer to Record Settings on page 200.

The default exporting path is: C:\ProgramData\VIVOTEK Inc\VAST\Client\PlayBack\Export

Limitations

1. The size of exported footage depends on the file size limitation. When the limitation is reached, files will be concluded regardless of the length of your selection.
2. The Export button will not be available when there is another exporting task.
3. If the time settings on camera and VAST server are inconsistent, the export task will generate files of unexpected length.
4. The minimum export length is 1 minute. The maximum is 150 minutes. However, due to the embedded limitation, the approximate max. file size is 3.7GB.

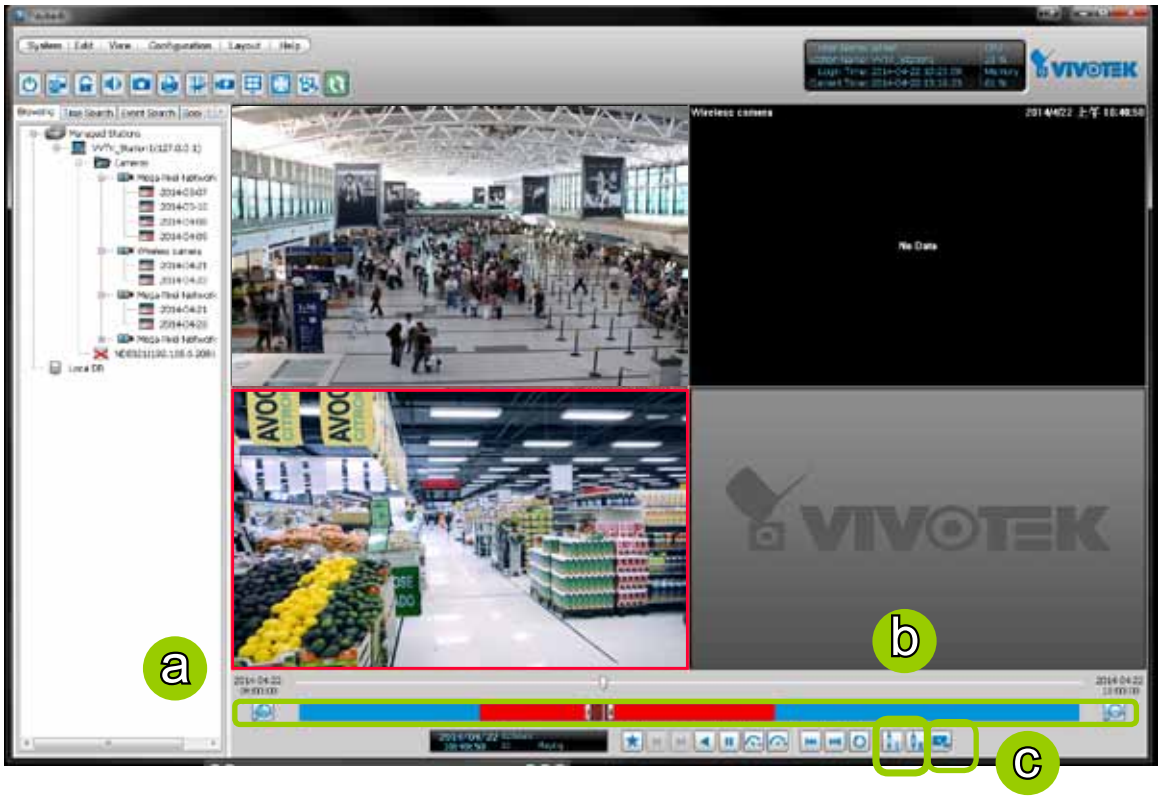
Export an EXE/3GP/AVI File

Please follow the steps below to convert part of an EXE/3GP/AVI file of recorded video:

a. Playback a video clip from which you want to export a media file.

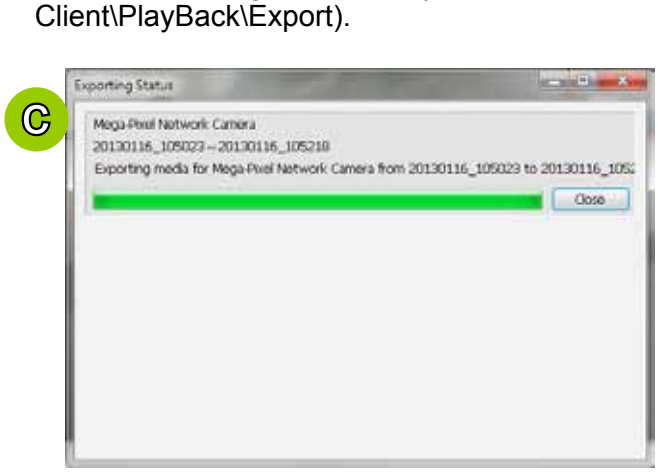
b. Set a period of time. Move the timeline slider bar to the desired start time and click Marker I . Move the timeline slider bar to the desired end time and click Marker II .

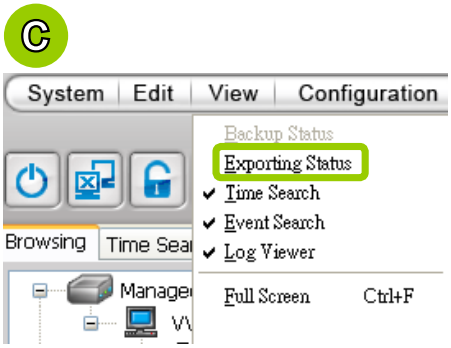
Currently exporting video files from the NVR series is not supported.



c. Click Export EXE/3GP/AVI , the server will start to export the data and popup a window showing the exporting status. If you close the status window, you can also open it again by clicking **View > Exporting Status**.

d. When the export is complete, you will see an information dialog. The exported data will be restored in the preset storage folder on your local computer (C:\ProgramData\Documents\VIVOTEK Inc\VAST\Client\PlayBack\Export).





View Settings

This section allows you to set up the display mode of video cell. For detailed information about **View Settings**, please refer to page 206.

Proxy Settings

Please refer to page 219 for detailed illustration.

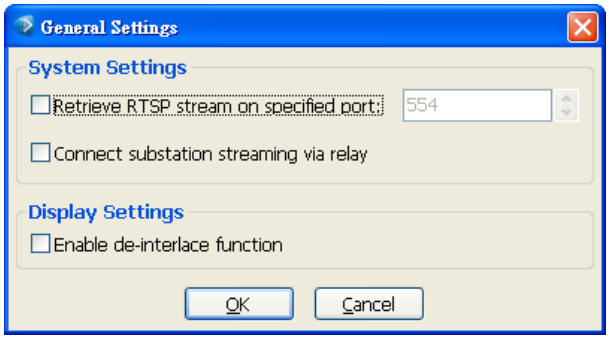
General Settings

System Settings

Please refer to page 209 for detailed information.

Display Settings

- Enable de-interlace function: Select this option if your connected device does not support de-interlace function. For example: VS7100.



How to Configure Video Enhancement

The Playback also allows you to enable post-image enhancement and defog for video viewing. Please refer to page 223 for detailed information.

How to Search for a Device on the Hierarchical Management Tree

The Playback also allows you to conveniently search for an inserted device. Please refer to page 228 for detailed information.

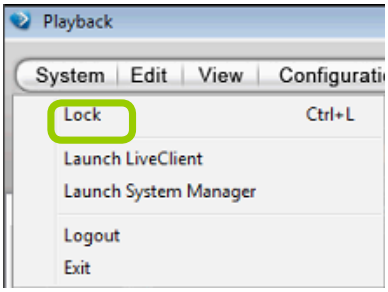
How to Print a Video Image

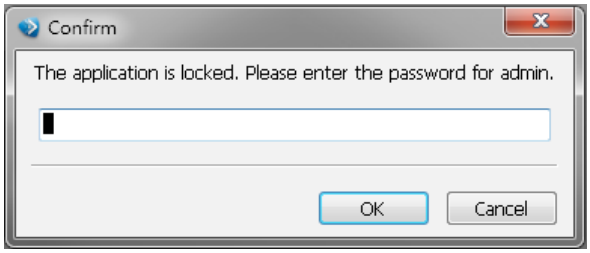
The Playback also allows you print out an image of live video. Please refer to page 229 for detailed information.

How to Lock VAST Playback for Security Concerns

If you happen to be away from your computer, for security reasons, we suggest you lock the program. When VAST Playback is locked, the user must enter the correct password to unlock and access the program again.

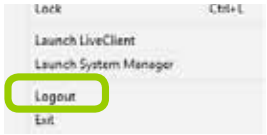
- To lock Playback, click **Unlock** on the quick access bar or click **System > Lock** on the system menu. The **Unlock** icon will then turn into **Lock**.
- To unlock Playback, click and enter the correct password in the popup window.

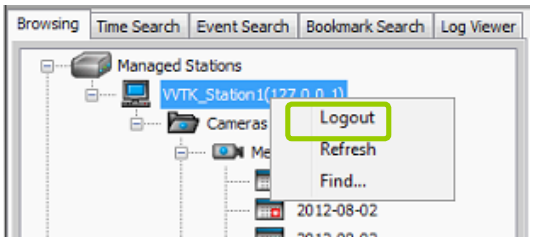




How to Log out from the VAST Server

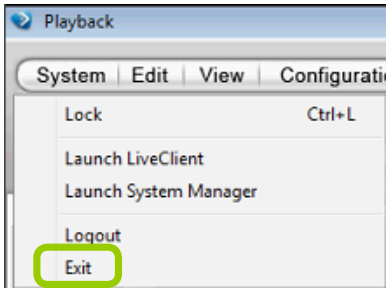
To log out from the current server, click the station and click **Logout** on the quick access bar or click **System > Logout** on the menu bar. You can also **right-click** the station and click **Logout**. A confirmation window will pop up. Click **OK** to confirm or **Cancel** to return to the VAST Playback window.

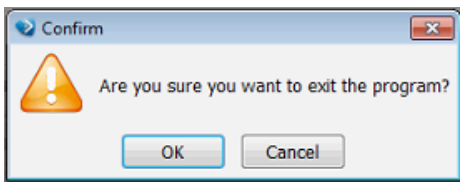




How to Exit VAST Playback

To exit VAST Playback, click **Exit** on the quick access bar or click **System > Exit** on the menu bar. A confirmation window will pop up. Click **OK** to confirm or **Cancel** to return to the VAST Playback window. When you exit the program, your user account will be automatically logged out from the current server.





Import and Export Utility

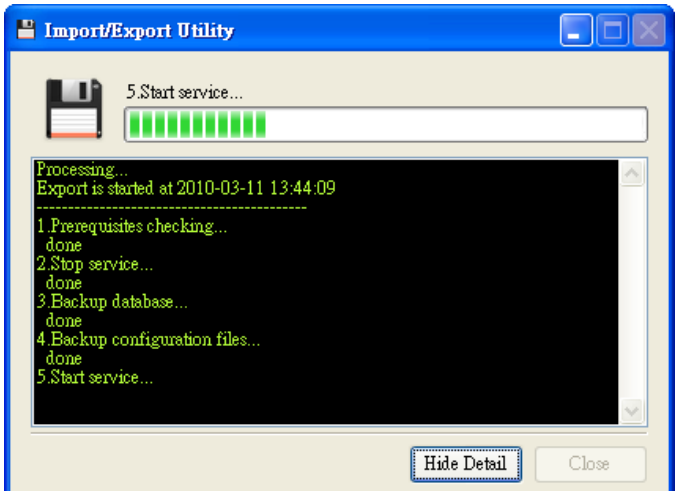
VAST supports import and export utility for user to keep record of all server settings. You can use the export file to copy the configuration on another host.

Export Utility

Please follow the steps below to export the server settings:

a. Under Microsoft Windows, choose "**Start > All Programs > VIVOTEK Inc > VAST > Tools > Import-export Utility.**"

b. The **Import/Export Utility** window will pop up. Click **Export** and select a target folder. The system will start to export a .bin file.



Import Utility

Please follow the steps below to import the server settings:

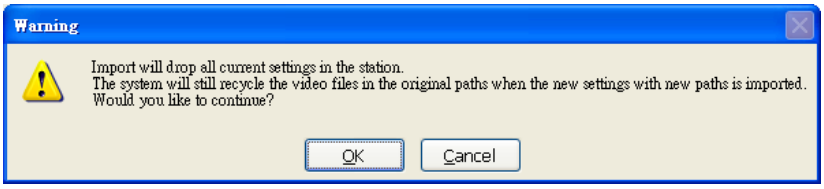
a. Under Microsoft Windows, choose "**Start > All Programs > VIVOTEK Inc > VAST > Tools > Import-export Utility.**"

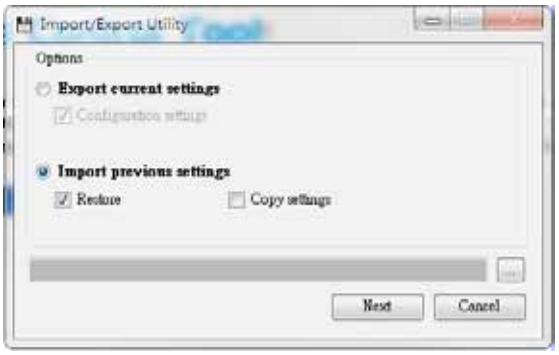
b. The **Import/Export Utility** window will pop up. Click **Import** and select the export file. The system will start to import the file.

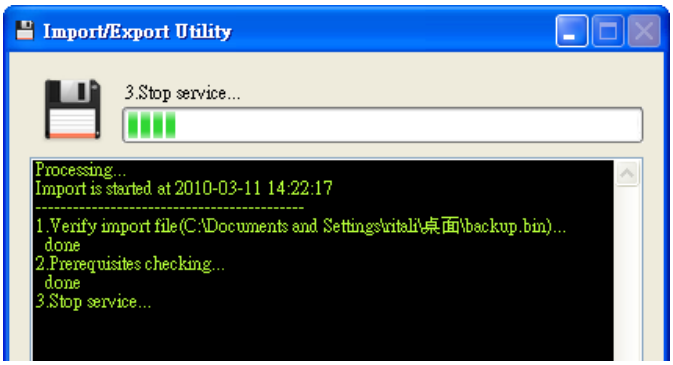
You should then select the **Restore** or **Copy** settings options.

Restore: If this is selected, the VAST server GUID will also be restored. This option applies when you need to restore as crashed server.

Copy Settings: This applies you use the exported profile to duplicate your configuration to multiple computers. A new server GUID will be generated.


Warning
Import will drop all current settings in the station.
The system will still recycle the video files in the original paths when the new settings with new paths is imported.
Would you like to continue?
OK
Cancel

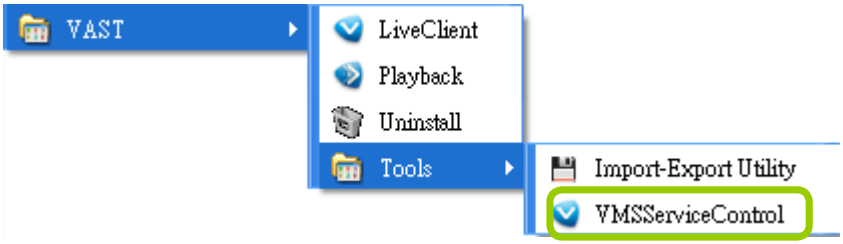

Import/Export Utility
Options
Export current settings
Import previous settings
Restore
Copy settings
Next
Cancel


Import/Export Utility
3.Stop service...
Processing...
Import is started at 2010-03-11 14:22:17
1.Verify import file(C:\Documents and Settings\ritali\桌面\backup.bin)...
done
2.Prerequisites checking...
done
3.Stop service...

VAST Service Control Tool

VAST service control tool is a tool for server control and for user to be aware of the VAST Server status. It starts up as Windows OS startup.

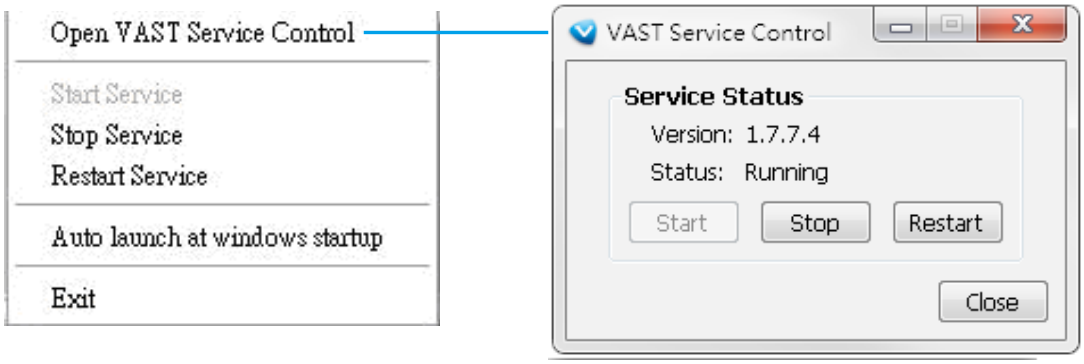
Under Microsoft Windows, choose "**Start > All Programs > VIVOTEK Inc > VAST > Tools > VMServiceControl.**"



You may also find it in the system tray icon of the tool bar, which indicates that the service is running:

It shows a disconnection icon when the service is stopped:

A menu for the service control tool will pop up when you **right-click** on the icon:

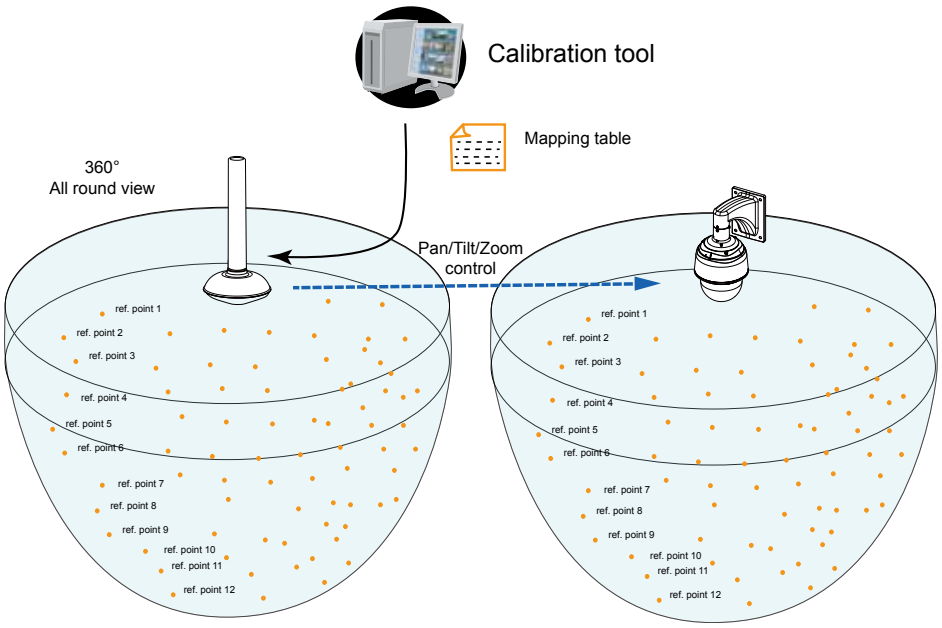


Here you can manually start, stop and restart the service.

Appendix A Panoramic PTZ (P-PTZ) Configuration

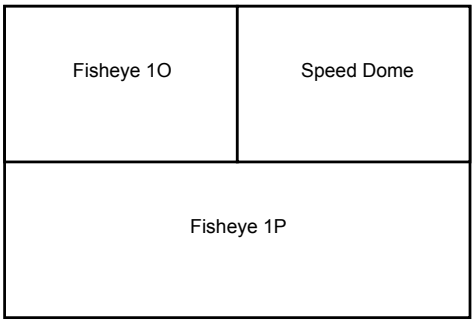
Enable Panoramic PTZ on VAST

The process of configuring two cameras (1 fisheye and 1 speed dome) into the Panoramic PTZ configuration takes place on a PC using the calibration tool. The Auto Tracking feature is configured using a web console with the fisheye camera. A Panoramic PTZ package should comprise two cameras running specific firmware for this application and a software CD containing all necessary utilities. For configuration details, please refer to the **Panoramic PTZ Installation Guide**.



To exert Panoramic PTZ control on VAST:

1. Once these two cameras are configured into an interactive pair, insert these cameras into your VAST configuration.
2. Select a preferred layout using the Layout button. The 1P+2, 1P+6, and 1P+8 layouts are specifically designed for the Panoramic PTZ configuration.
3. Taking the 1P+2 layout as an example, once they are listed on the device list, click and drag the fisheye camera to the upper left and the bottom view cells. Place the speed dome in the upper right view cell.



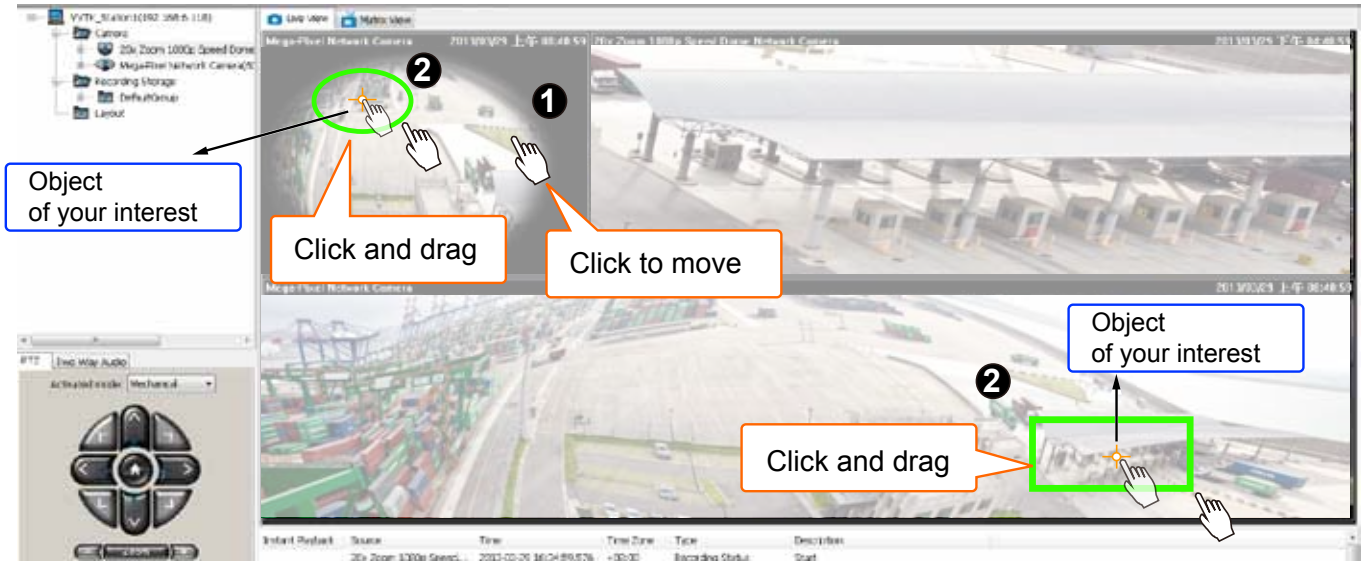
4. Right-click on the fisheye's view cell to change its Display mode either into the **1O** (Original) or the **1P** (Panoramic) mode. Note that the Panoramic PTZ control does not take effects on the "**R**" (Regional) mode and the combinations of other display modes.

5. There are two different ways to quickly exert Panoramic PTZ control. The pan, tilt, and zoom actions are made from the fisheye's 360° hemispheric overview:

   5-1. Click on a spot on the fisheye's Original or Panoramic view where you detected a condition of your interest. The speed dome will aim its lens at the corresponding position to cover that field of view.

   5-2. Click and drag a region of interest either on the Original or on the Panoramic view. The speed dome will move to that region and zoom in to fill the same proportion of view into its view cell.

   - On the Original view, click-and-drag creates a circular region of interest.
   - On the Panoramic view, a square region.
   - If you draw a small region, the speed dome will zoom in on the scene. The smaller the region, the larger the zoom-in ratio. A large region makes the speed dome to zoom out.

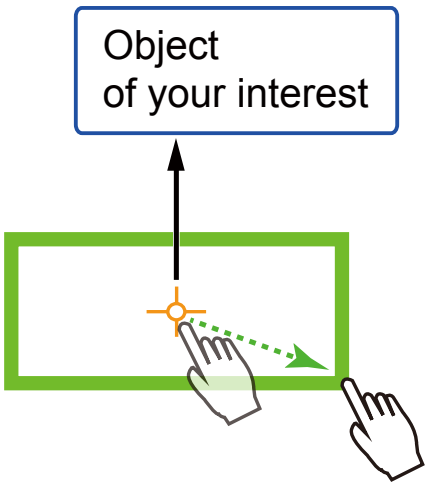


The speed dome camera automatically performs optical zoom in/out to best fit the selected field of view until the maximum and minimum zoom ratio is reached.

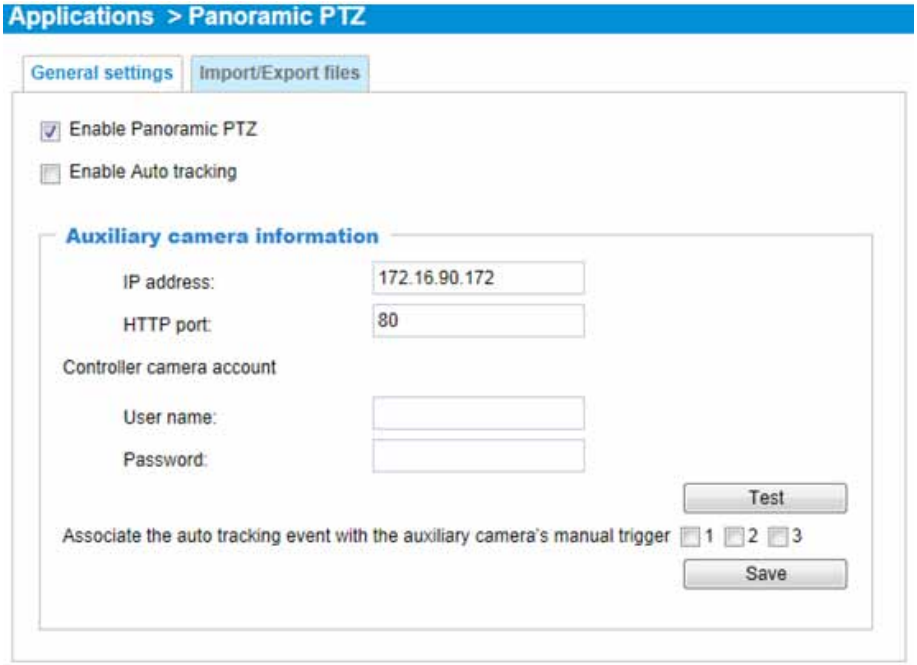
Tips:

1. When drawing a region of interest, click and drag from the center of your interest over a diagonal line to the bottom right. It is not like drawing a diagonal line from corner to corner.

2. To swipe the Panoramic view left or right, press and hold down the **Ctrl.** key and the left mouse button.



1. The fisheye and the speed dome are made into an interactive pair using the calibration tool. The VAST software provides the control interface only. If the cameras have not been properly configured, the Panoramic PTZ function will not take effect.
2. If the password of the speed dome camera has been changed, you will need to open a web console with the fisheye camera to change the coordinate password.
3. You may need to reset the fisheye camera if the speed dome camera is powered on after you started the VAST software.
4. The precision level of the interactive positions between the view cells of the fisheye and the speed dome is determined by the mapping table. Make sure you have inserted a sufficient number of reference points and make good association of these points using the calibration tool.
5. Currently the associated event trigger by Auto Tracking is not supported on VAST. The associated event triggering is configured through a web console with the fisheye camera:

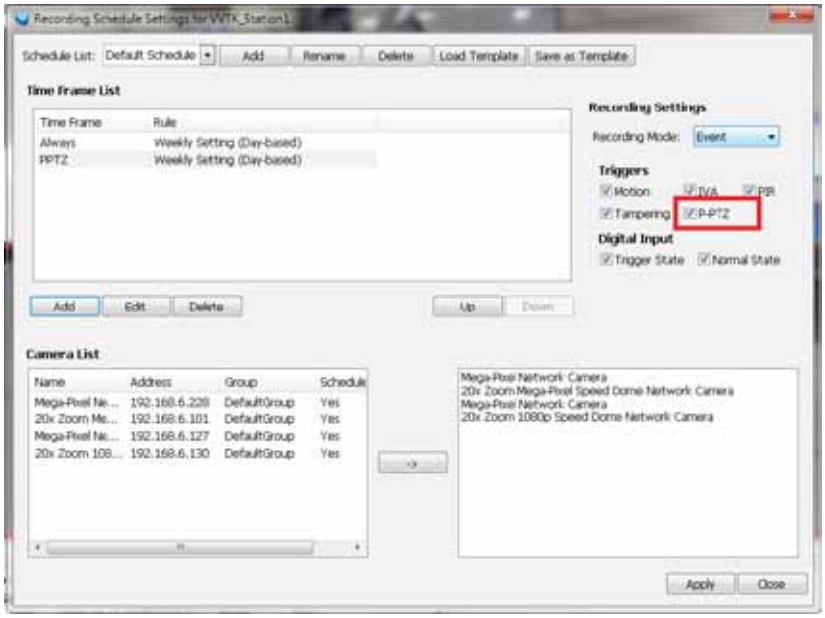


   5-1. You should then create an event setting using the manual triggers as triggering sources.
   5-2. When Auto Tracking takes place, the pre-configured event settings on the speed dome camera can take associated actions, e.g., taking a snapshot, recording to SD, or triggering the DO pins.
6. The Panoramic PTZ function is currently not available on the Matrix or web console mode in VAST.
7. If the interactive camera pairs (Panoramic PTZ cameras) are managed under VAST substations, then all of the VAST instances, such as the primary VAST server, the substations, and the client side must be running the revision that supports P-PTZ.

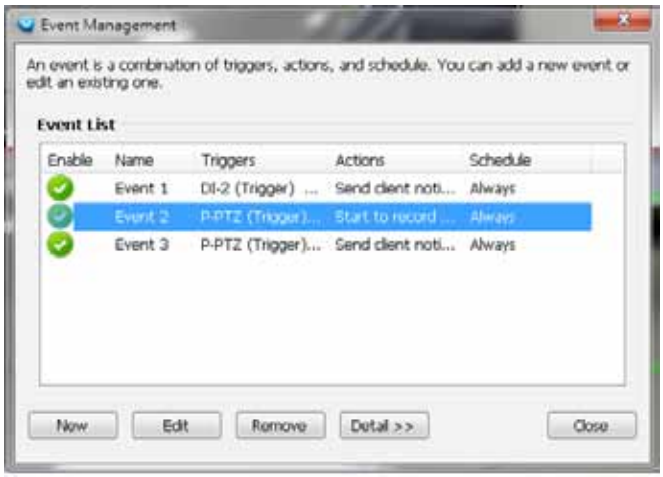
Panoramic PTZ - Event Trigger

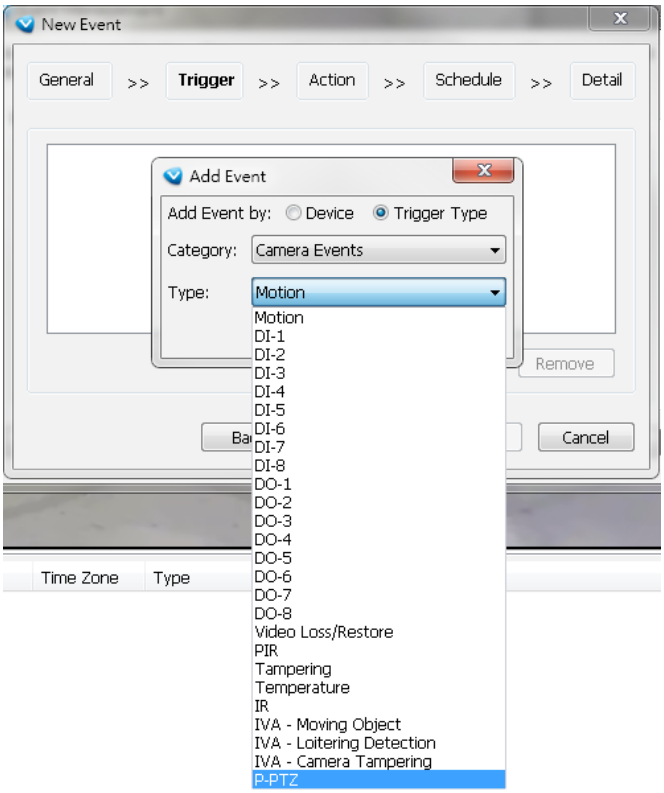
The P-PTZ-related event types include: "triggered" and "returned to normal" when Auto Tracking takes place. Below are the configurable options with the event configuration:

1. When configuring a recording schedule, the Auto Tracking actions can be selected as one of the event triggers. The configuration is found in **Configuration** > **Station Settings** > **Recording Schedule Settings**.

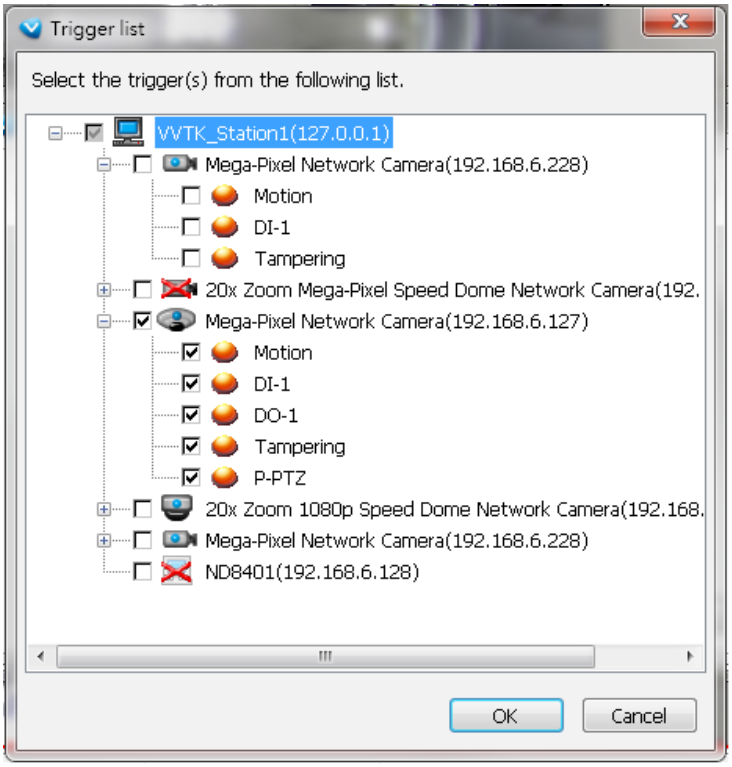


2. When Auto Tracking is enabled, its actions are considered as one of the system event types. In **Configuration** > **Event Management**, P-PTZ is configurable as a Trigger Type in **Event Management** > **New Event** > **Trigger**. This event trigger can be associated with different actions, such as Email, recording, moving to a preset location, GSM message, HTTP, Client notification, etc.





Auto Tracking can also function as a Device type in the Event Management configuration.

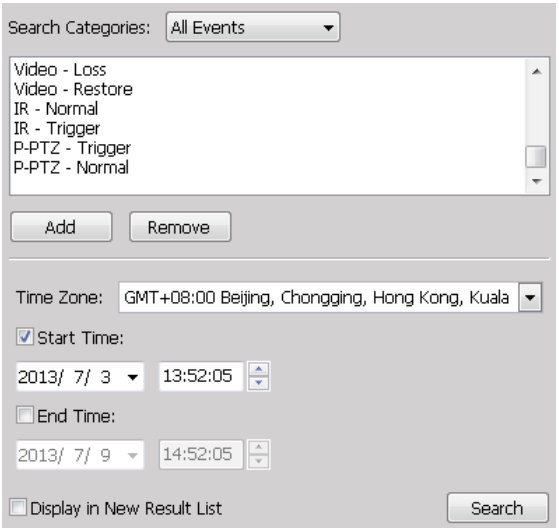


Once triggered, the P-PTZ Trigger and P-PTZ Normal events will create two short videos for a length of 30 seconds.

Note that the P-PTZ event is not triggered by Panoramic PTZ control on the view cells, it is triggered by Auto Tracking. Auto Tracking takes place when a moving object enters the pre-configured region of interest. Please refer to the **Panoramic PTZ Installation Guide**.

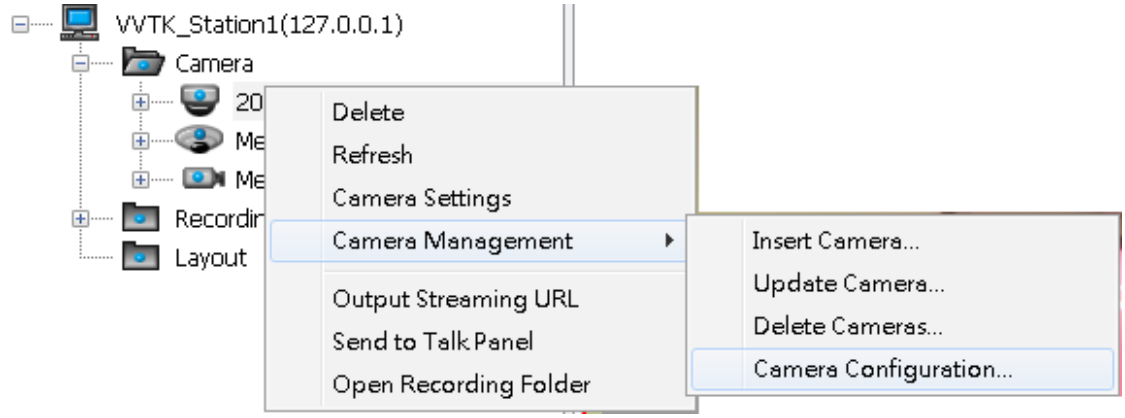
3. Events triggered by Auto Tracking are also recorded into system logs.

4. As the result, in **Playback** > **Event Search** panel, Auto Tracking (P-PTZ Trigger/Normal) is also a search condition.

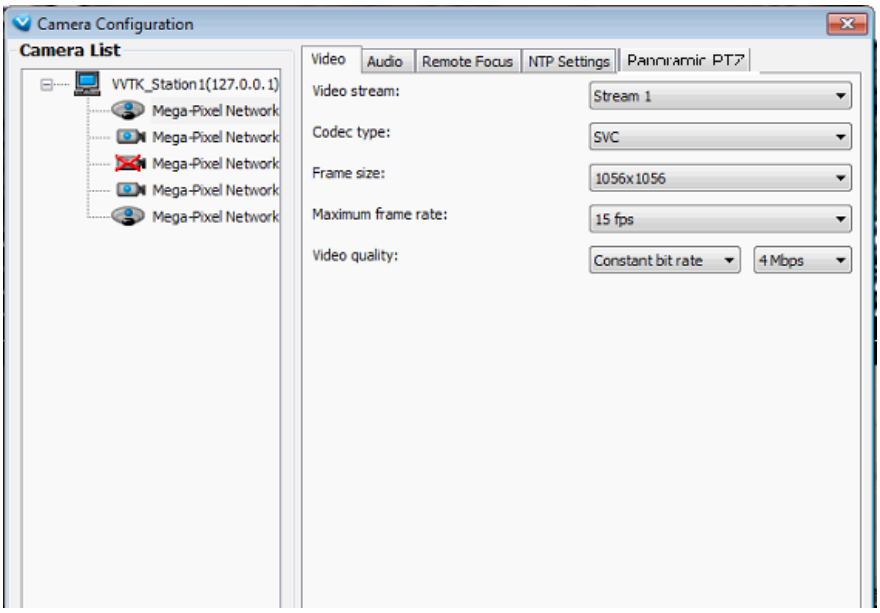


Enable or Disable the Panoramic PTZ Functions

You can manually enable or disable the Panoramic PTZ function in **Configuration** > **Camera Management** > **Camera Configuration**:



1. Select the fisheye camera by a single click, and then open the panoramic PTZ panel from the tabbed menu.
2. You can enable or disable the panoramic PTZ or the Auto Tracking functionality using the checkboxes.
3. Click the Save button, and the saving progress window will prompt.



4. Click Close to end the configuration process.

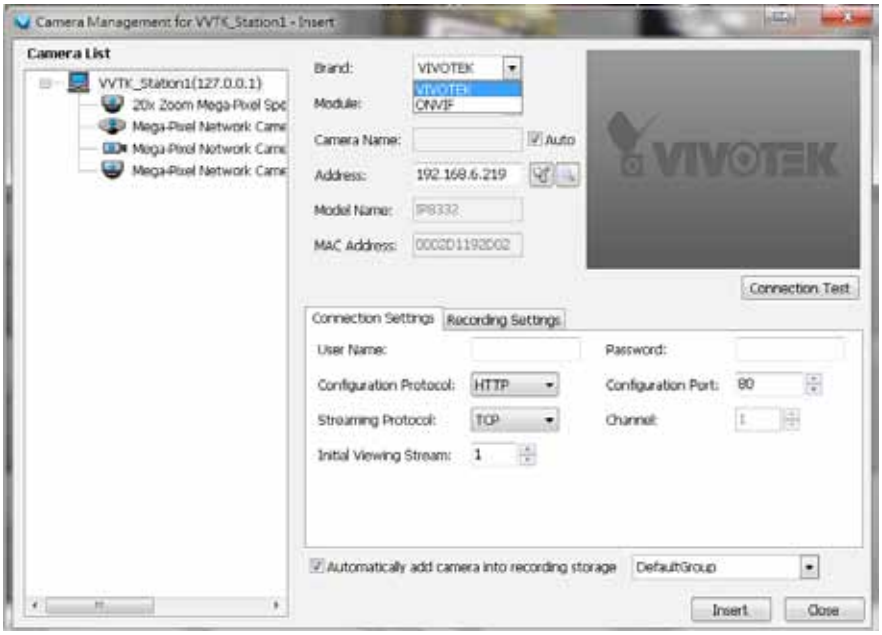
Appendix B ONVIF Support

ONVIF is supported in an environment where the VAST server can detect and record video streams from the cameras made by other manufacturers.

The following are supported.

1. ONVIF camera icons on the device tree.

   Brand name selection is also available on the configuration window.



2. Insert/update/delete camera from the device tree.
   2-1. Detect ONVIF cameras.
   2-2. Connection test.
   2-3. camera password authentication.
   2-4. Supports HTTP and HTTPS streaming protocol.
   2-5. Supports multiple streaming.
3. Live view/recording/playback.
   3-1. Audio G.711 support.
4. Mechanical PTZ support with the exception of Focus, Iris, Pan, Patrol, and preset location operation.

Limitations:

The following limitations apply to ONVIF cameras made by other manufacturers. Some features may be implemented in later releases of software.

1. Users should ensure that your other brand cameras support ONVIF.
2. The connection statuses of the other brand cameras will not be displayed on the device tree.
3. For mechanical PTZ cameras, the Focus, Iris, Pan, Patrol, and preset locations functions will not be supported. The associated buttons and control elements on the UI screen will not be disabled.
4. Does not support the Batch Insert Camera function.
5. Does not support Camera Configuration.
6. Does not support Active Adaptive Stream (AAS) function.
7. Does not support Event related functions, including event recording, event management, instant playback, event search, etc.
8. Does not support camera DI/DO.
9. Does not support Two Way Audio.
10. Does not support Auto Stream Size.
11. The ONVIF user authentication (account and password) may not comply with those configured via a web console.
12. The number of multiple profiles can vary.
13. The number of accessible profile can vary. Some might have only one profile to be connected.
14. Does not support Click on Image.

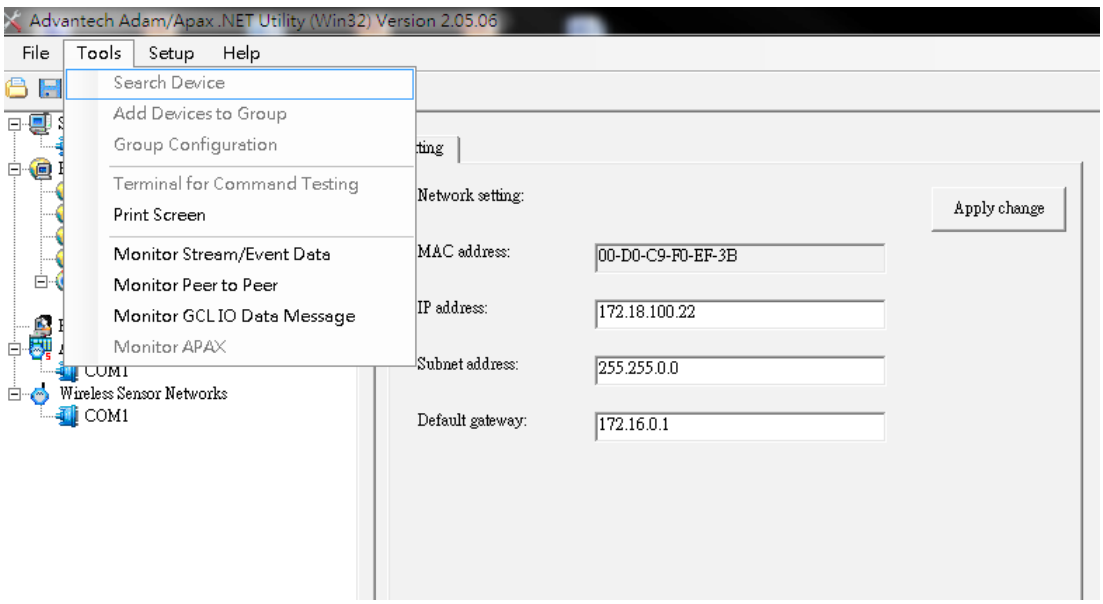
Appendix C Support for Digital I/O Modbus TCP Modules

The VAST revision 1.9, supports Advantech's I/O Modbus TCP Modules 6000 series. The VAST server can receive digital inputs and trigger digital outputs via the I/O modules.

The Advantech I/O modules come with configuration utilities, such as the Adam/Apax.NET. Connect the DI/DO wires to the module and the Ethernet wire from the module to the local network.

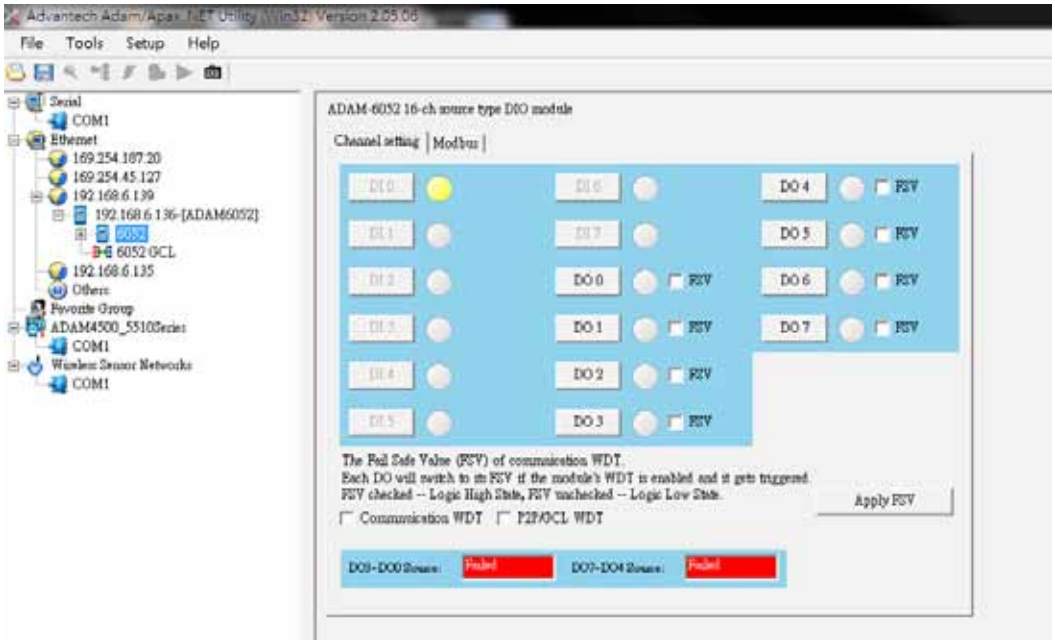
Proceed with the following to configure the I/O module:

1. Use the Search function to locate the I/O module on the network.

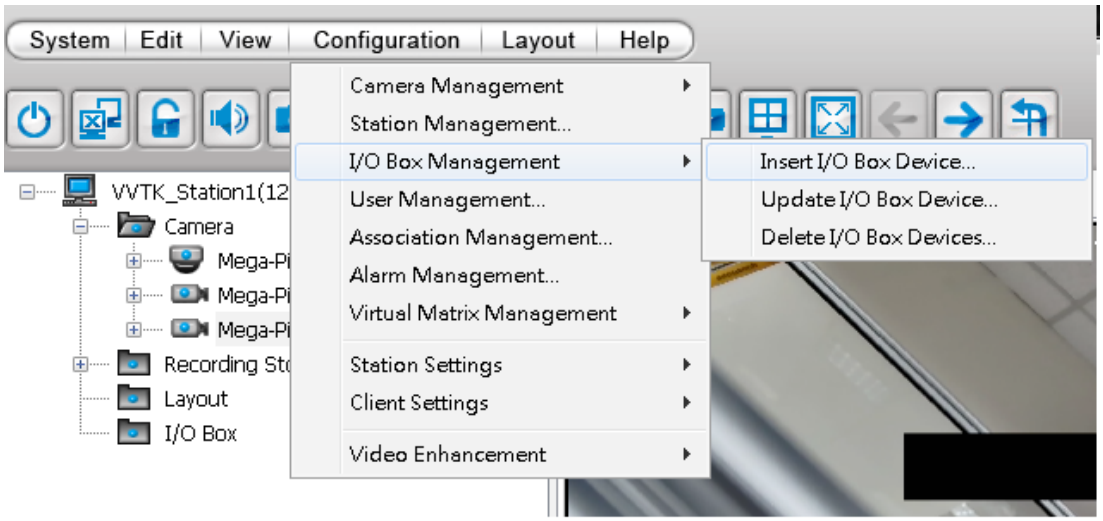


2. It is recommended to configure a static IP for the I/O module.

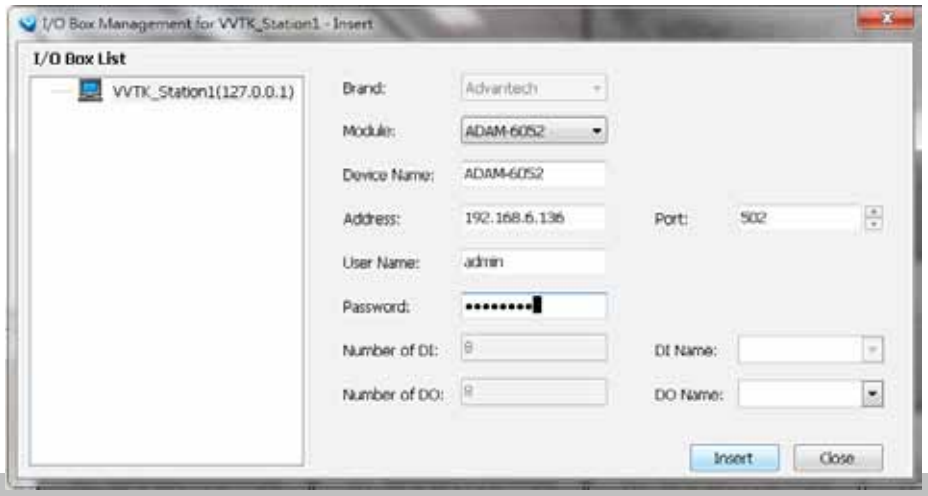
3. You may then test the DI/DO device connectivity using the software utility.



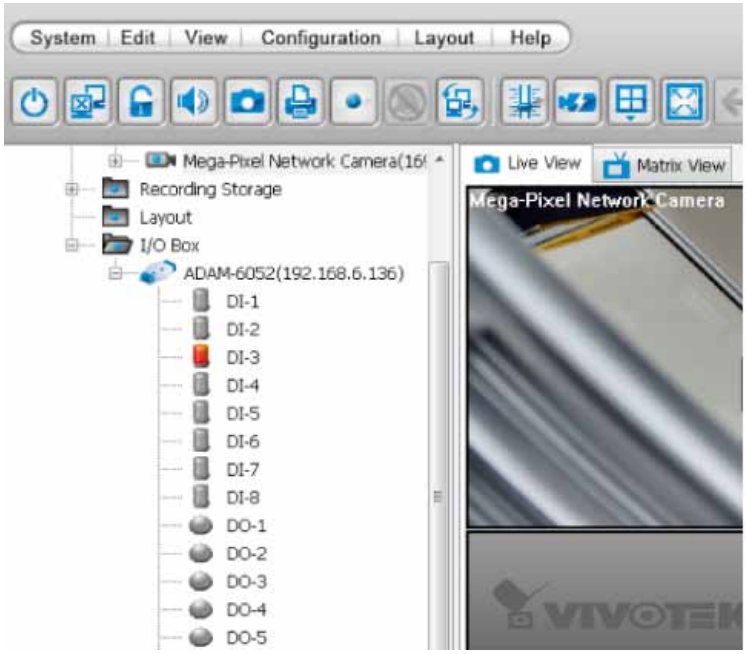
4. To configure the I/O modules in VAST, open the **Configuration** > **I/O Box Management** > **Insert I/O Box Device** window.



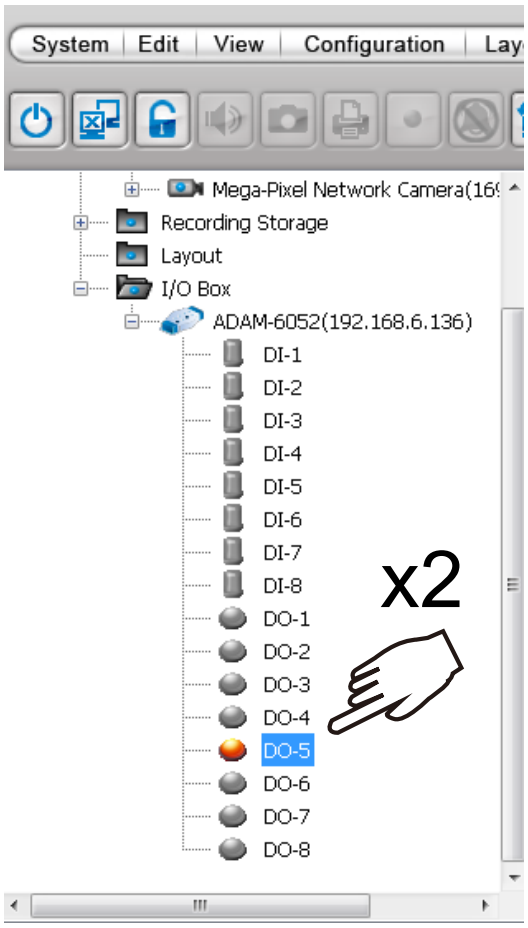
5. Select the Module model name, enter IP address, User Name, Password, and then click the Insert button.



6. Click Close to close the window. The I/O module and its DI/DO entries should be listed on the device tree under the I/O box sub-directory. As shown below, once a DI is triggered from the I/O module, the associated DI icon will be lighted. Audible notification can also be heard from the VAST server.

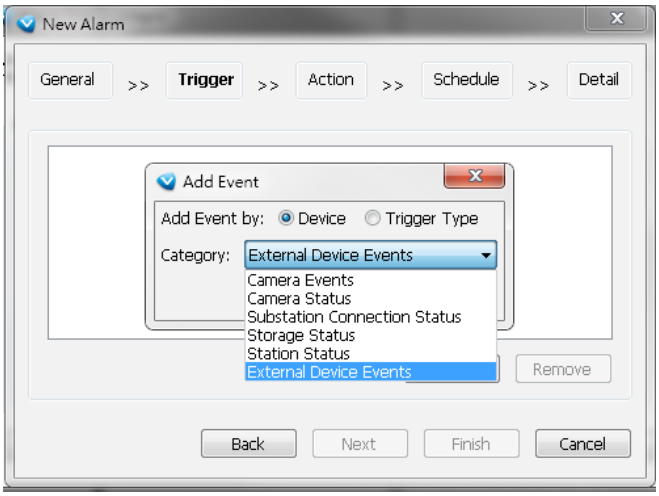


7. You can also double-click on a DO icon to manually trigger the digital output. Double-click again to cancel the trigger.

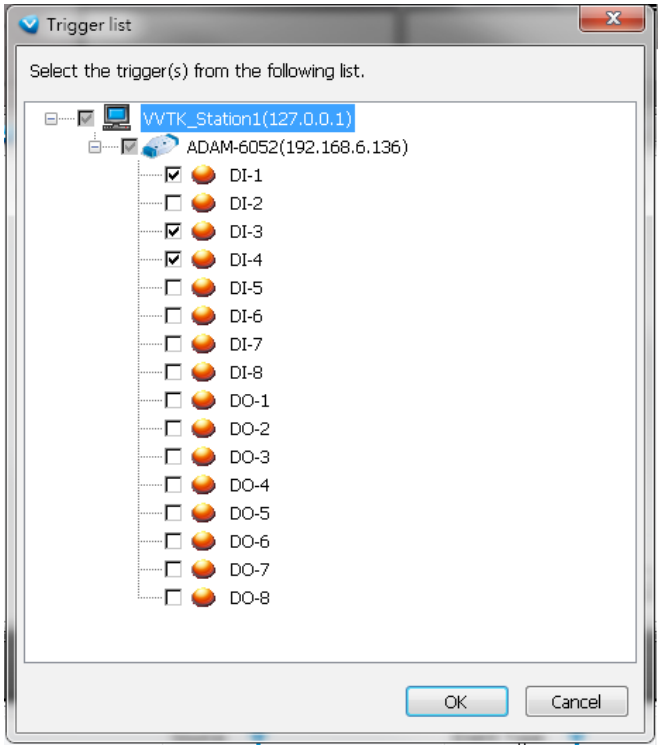


8. You can also implement the digital inputs and outputs from the I/O module in your alarm setting. For example, a DI can be wired to an intrusion detector; and when the DI is triggered, an associated DO can be used to sound an alarm.

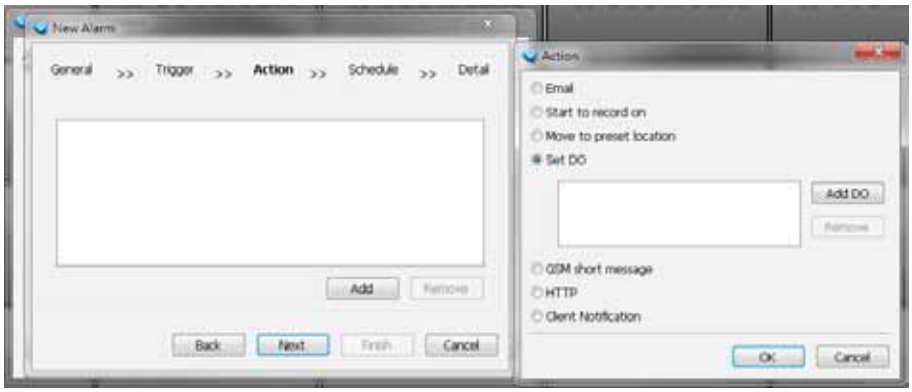
   To configure the Alarm setting, enter the **Configuration** > **Alarm management** window. Configure a new alarm. On the Trigger window, select the Trigger Category as **External Device Events**.

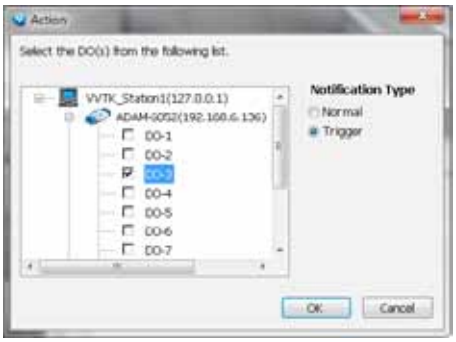


9. The DIs and DOs on the I/O module will be listed. You can then select one or more DIs as the triggers.



10. On the Action panel, you can select to trigger DOs, for example, as the reacting actions





Note that once a DO is triggered, you should manually disable the DO.

If an I/O module is started later than the VAST server, you may not be able to access the I/O module. You should then re-start the VAST service.

Appendix D Other Parameters

Disable background decode:

Administrators can choose to disable the background decode for other view cells when entering a single view of a specific camera. This can help reduce the CPU load on a server short of system resources.

This function can be evaluated in two aspects:

1. For a server with abundant system resources, there is less stress when disabling and enabling background decode. When a user leaves a single view and enters a multi-cell view, the background decode starts again, and a powerful server handles this process more smoothly.
2. For a server with less resources, this feature can reduce CPU load. However, latency can occur during the process when returning from a single view back to a multi-cell view.

This feature is enabled by editing the ClientSetting.ini file in C:\ProgramData\VIVOTEK Inc\VAST\Client\LiveClient.

```
[GeneralSetting]
AutoFullScreen=0
AutoAddCam=1
SSE=1
EnableRTSP=0
RTSPPort=4543
StreamingRelay=1
SubscribeCamera=0
SortCamera=0
LiveEvent=1
LocalAlert=0
EventWindowType=0
RotateSec=10
AutoRotate=0
DeInterlace=0
SyncAudioVideo=0
AutoStreamSize=1
AutoStreamSizeMode=0
InstantReplay=1
DefaultPlaybackLength=1
BufferTime=0
GDIOnly=0
GPUDecode=0
GPUDecodeMaxNumber=0
MinPTSpeed=-1
MaxPTSpeed=-1
DisableBackgroundDecode=1
```