



# Configuration

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This chapter describes the IP camera settings options. It includes the following topics

- [Accessing the Settings Pages, page 5-2](#)
- [System > General settings, page 5-3](#)
- [System > Homepage layout, page 5-3](#)
- [System > Logs, page 5-5](#)
- [System > Parameters, page 5-6](#)
- [System > Maintenance, page 5-6](#)
- [Media > Image, page 5-8](#)
- [Media > Video, page 5-14](#)
- [Media > Audio, page 5-19](#)
- [Network > General settings, page 5-19](#)
- [Network > Streaming protocols, page 5-22](#)
- [Network > QoS \(Quality of Service\), page 5-24](#)
- [Network > SNMP \(Simple Network Management Protocol\), page 5-25](#)
- [Security > User accounts, page 5-26](#)
- [Security > User accounts, page 5-26](#)
- [Security > HTTPS \(Hypertext Transfer Protocol over SSL\), page 5-26](#)
- [Security > Access List, page 5-27](#)
- [Security > IEEE 802.1X, page 5-29](#)
- [Security > SSH, page 5-30](#)
- [PTZ > PTZ settings, page 5-30](#)
- [PTZ, page 5-31](#)
- [Event > Event settings, page 5-33](#)
- [Applications > Motion detection, page 5-38](#)
- [Applications > Audio detection, page 5-40](#)
- [Applications > Package management, page 5-42](#)
- [Recording > Recording settings, page 5-42](#)
- [Local storage > SD card management, page 5-44](#)

- [Local storage > Content management, page 5-45](#)

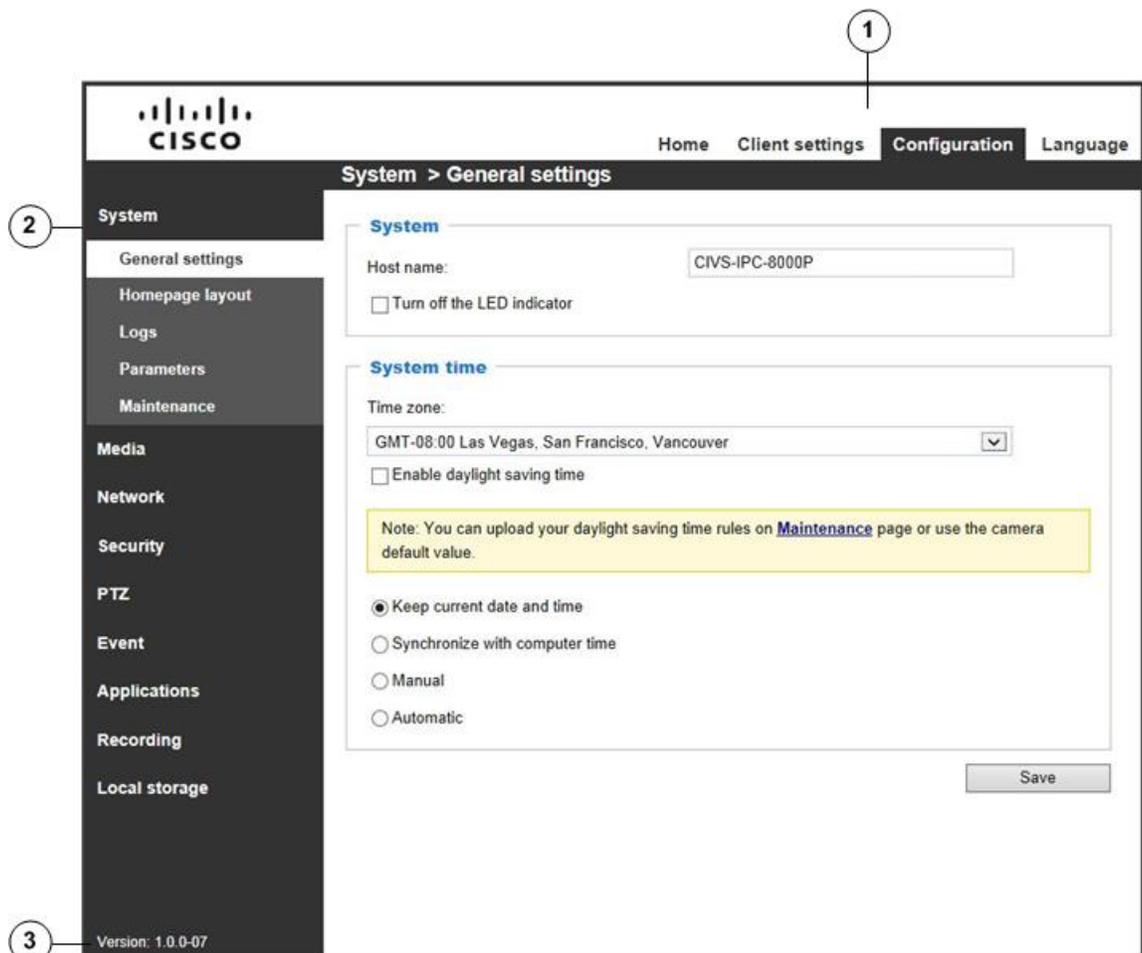
## Accessing the Settings Pages

To access the settings pages, click **Configuration** on the main page. Only Administrators can access the configuration page.

The camera provides an easy-to-use user interface that helps you set up the camera with minimal effort. In order to simplify the user interface, detailed information will be hidden unless you click on the function item. When you click on the first sub-item, the detailed information for the first sub-item will be displayed; when you click on the second sub-item, the detailed information for the second sub-item will be displayed and that of the first sub-item will be hidden.

[Figure 5-1](#) illustrates the configuration main page.

**Figure 5-1** Configuration Main Page



1	Navigation area.
2	Configuration list.
3	Firmware version

Each function on the configuration list will be explained in the following sections.

The Navigation Area provides access to all different views from the Home page (for live viewing), Configuration page, and multi-language selection.

## System > General settings

This section explains how to configure the basic settings for the camera, such as the host name and system time. It is composed of the following two columns: System, and System Time. When finished with the settings on this page, click **Save** at the bottom of the page to enable the settings.

- **Host name**—Enter a desired name for the camera. The text will be displayed at the top of the main page.
- **Turn off the LED indicators**—If you do not want others to notice the camera is in operation, you can select this option to turn off the LED indicators.
- **Keep current date and time**—Select this option to preserve the current date and time of the camera. The camera internal real-time clock maintains the date and time even when the power of the system is turned off.
- **Synchronize with computer time**—Select this option to synchronize the date and time of the camera with the local computer. The read-only date and time of the PC is displayed as updated.
- **Manual**—The administrator can enter the date and time manually. Note that the date and time format are [yyyy/mm/dd] and [hh:mm:ss].
- **Automatic**—The Network Time Protocol is a protocol which synchronizes computer clocks by periodically querying an NTP Server.
  - **NTP server**—Assign the IP address or domain name of the time-server. Leaving the text box blank connects the camera to the default time servers. The precondition is that the camera must have the access to the Internet.
  - **Update interval**—Select to update the time using the NTP server on an hourly, daily, weekly, or monthly basis.
- **Time zone**—Select the appropriate time zone from the list. If you want to upload Daylight Savings Time rules, see the [“Import/Export files” section on page 5-7](#) for details.

## System > Homepage layout

This section explains how to set up your own customized homepage layout.

### General settings

This column shows the settings of your home page layout. You can manually select the background and font colors in Theme Options (the second tab on this page). The settings will be displayed automatically in this Preview field.

- **Logo graph**—Here you can change the logo that is placed at the top of your homepage. To to upload a new logo, follow these steps:
  1. Click **Custom** and the Browse field will appear.
  2. Select a logo from your files.

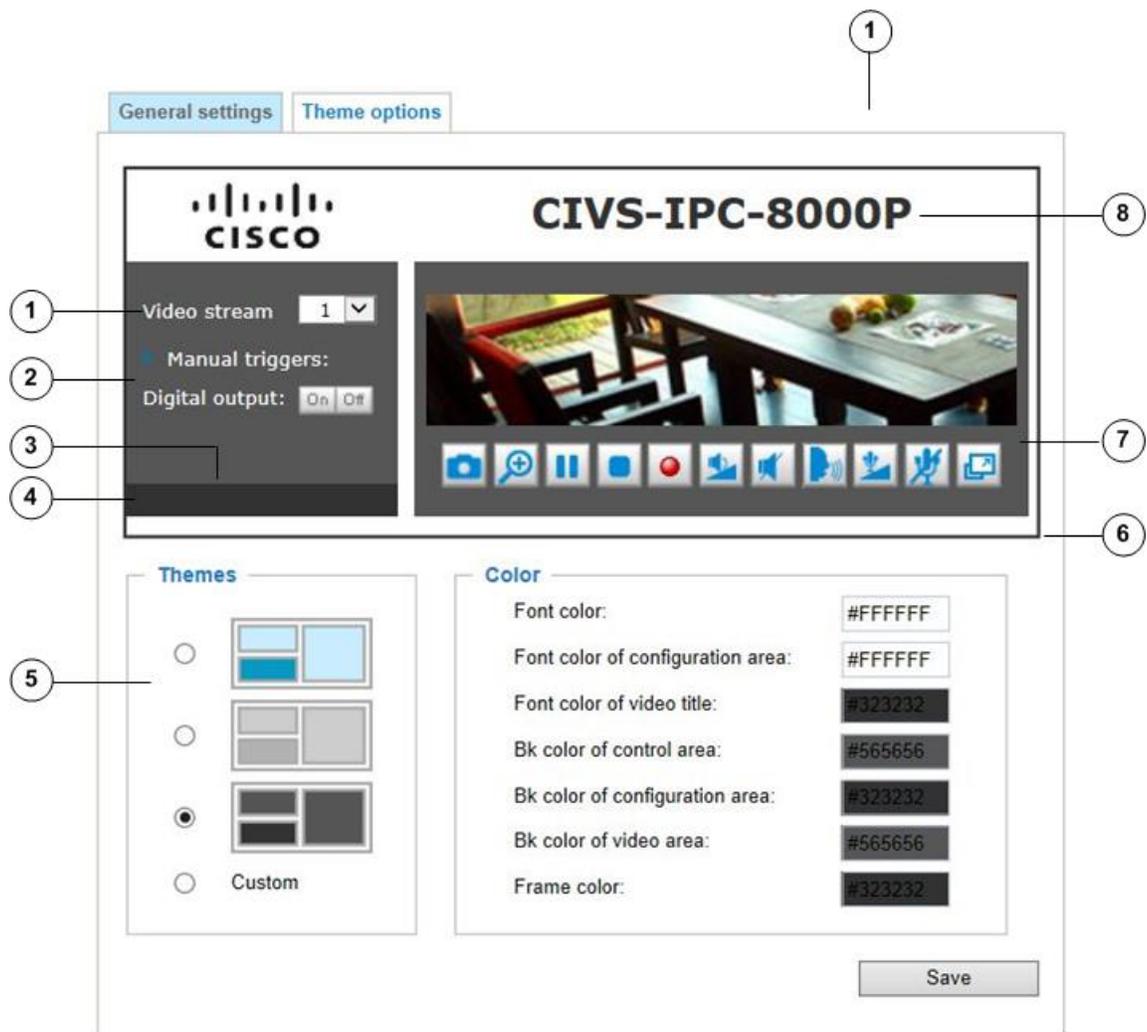
3. Click Upload to replace the existing logo with a new one.
  4. Enter a website link if necessary.
  5. Click **Save** to enable the settings.
- Customized button—If you want to hide manual trigger buttons on the homepage, uncheck this item. This item is checked by default.

## Theme Options

Here you can change the color of your homepage layout. There are three types of preset patterns for you to choose from. The new layout will simultaneously appear in the Preview filed. Click **Save** to enable the settings.

Figure 5-2 illustrates theme options.

Figure 5-2 Theme Option



1 Font color.

2	Background color of the control area.
3	Font color of the configuration area.
4	Background color of the configuration area.
5	Preset patterns.
6	Frame color.
7	Background color of the video area.
8	Font color of the video title.

To set up the custom home page, follow these steps:

- 
- Step 1** Click **Custom** on the left column.
  - Step 2** Click the field where you want to change the color on the right column.  
The palette window will pop up.
  - Step 3** Drag the slider bar and click on the left square to select a desired color.  
The selected color will be displayed in the corresponding fields and in the Preview column.
  - Step 4** Click Save to enable the settings.
- 

## System > Logs

This section explains how to configure the camera to send the system log to a remote server as backup.

### Log server settings

To set up the remote log, follow these steps:

- 
- Step 1** Select **Enable** remote log.
  - Step 2** In the IP address text box, enter the IP address of the remote server.
  - Step 3** In the port text box, enter the port number of the remote server.
  - Step 4** When completed, click **Save** to enable the setting.
- 

You can configure the camera to send the system log file to a remote server as a log backup. Before utilizing this feature, it is suggested that the user install a log-recording tool to receive system log messages from the camera. An example is Kiwi Syslog Daemon.

### System log

The system log displays the system log in a chronological order. The system log is stored in the camera buffer area and will be overwritten when reaching a certain limit.

## Access log

Access log displays the access time and IP address of all viewers (including operators and administrators) in a chronological order. The access log is stored in the camera buffer area and will be overwritten when reaching a certain limit.

## System > Parameters

The View Parameters page lists the entire system parameters. If you need technical assistance, provide the information listed on this page.

## System > Maintenance

This section explains how to restore the camera to factory default, upgrade firmware version, and so on.

### General settings > Upgrade firmware

This feature allows you to upgrade the firmware of your camera. It takes a few minutes to complete the process.



#### Note

Do not power off the camera during the upgrade.

To upgrade the firmware, follow these steps:

**Step 1** Download the latest firmware file from the Cisco website at this link:  
<https://software.cisco.com/download/navigator.html>.

The file is in .pkg file format.

**Step 2** Click **Browse...** and locate the firmware file.

**Step 3** Click **Upgrade**.

The camera starts to upgrade and will reboot automatically when the upgrade completes.

If the upgrade is successful, you will see “Reboot system now!! This connection will close”. After that, access the camera again.

The following message displays when the upgrade has succeeded:

```
Reboot system now!!
This connection will close.
```

The following message is displayed when you have selected an incorrect firmware file:

```
Starting firmware upgrade...
Do not power down the server during the upgrade.
The server will restart automatically after the upgrade is
completed.
This will take about 1 - 5 minutes.
Wrong PKG file format
Unpack fail
```

## General settings > Reboot

This feature allows you to reboot the camera, which takes about one minute to complete. When completed, the live video page will be displayed in your browser. During the reboot process, the system displays an information message and a progress bar shows the status of the process.

If the connection fails after rebooting, manually enter the IP address of the camera in the address field to resume the connection.

## General settings > Restore

This feature allows you to restore the camera to factory default settings.

- **Network**—Select this option to retain the Network Type settings (see the “[Network > General settings](#)” section on page 5-19).
- **Daylight Saving Time**—Select this option to retain the Daylight Saving Time settings (see the “[Import/Export files](#)” section on page 5-7).
- **Custom Language**—Select this option to retain the Custom Language settings.
- **VADP**—Retain the VADP modules (3rd-party software stored on the SD card) and related settings.
- **Focus position**—Retain the lens focus position using the previously saved position parameters.

If none of the options is selected, all settings will be restored to factory default. A status message and progress bar is displayed during the restoring process.

## Import/Export files

This feature allows you to Export / Update daylight saving time rules, custom language file, configuration file, and server status report.

- **Export daylight saving time configuration file**—Click to set the start and end time of DST (Daylight Saving).

To export, follow these steps:

1. In the Export files column, click **Export** to export the daylight saving time configuration file from the camera.
2. In the File Download dialog box that pops up, click **Open** to review the XML file or click **Save** to store the file for editing.
3. Open the file with a text editor such as Microsoft Notepad and locate your time zone; set the start and end time of DST.
4. When completed, save the file.

- **Update daylight saving time rules**—Click **Browse...** and specify the XML file to update.

If the incorrect date and time are assigned, you will see a warning message when uploading the file to the camera.

The message “The file must have a .xml filename suffix” displays when attempting to upload an incorrect file format.

- **Export language file**—Click to export language strings.
- **Update custom language file**—Click **Browse...** and specify your own custom language file to upload.

- Export configuration file—Click to export all parameters for the device and user-defined scripts.
- Upload configuration file—Click **Browse...** to update a configuration file. The model and firmware version of the device should be the same as the configuration file. If you have set up a fixed IP or other special settings for your device, it is not suggested to update a configuration file.
- Export server status report—Click to export the current server status report, such as time, logs, parameters, process status, memory status, file system status, network status, kernel message, and so on.

**Tip**

If a firmware upgrade is accidentally disrupted, say, by a power outage, you still have a last resort method to restore normal operation. See the following for how to bring the camera back to work:

Applicable scenario:

- Power disconnected during firmware upgrade.
- Unknown reason causing abnormal LED status, and a Restore cannot recover normal working condition.

You can use the following methods to activate the camera with its backup firmware:

- Press and hold down the reset button for at least one minute.
- Power on the camera until the Red LED blinks rapidly.
- After boot up, the firmware should return to the previous version before the camera changed. (The procedure should take 5 to 10 minutes, longer than the normal boot-up process.) When this process is completed, the LED status should return to normal.

## Media > Image

This section explains how to configure the image settings of the camera. It is composed of the following columns: General settings, Image settings, Exposure, Lens configuration, Focus, and Privacy mask. The Focus window is available only for models that come with motorized lens.

### General settings

- Video title
  - Show\_timestamp\_and\_video\_title\_in\_video\_and\_snapshots—Enter a name that will be displayed on the title bar of the live video. A zoom indicator will be displayed on the Home page when you zoom in/out on the live viewing window. You may zoom in/ out on the image by scrolling the mouse wheel inside the live viewing window, and the maximum zoom in will be up to 12.8 times.
  - Position of timestamp and video title on image—Select to display time stamp and video title on the top or at the bottom of the video stream.
  - Timestamp and video title font size—Select the font size for the time stamp and title.
  - Video font (.ttf)—You can select a True Type font file for the display of textual messages on video.
  - Color—Select to display color or black/white video streams.

- Power line frequency—Set the power line frequency consistent with local utility settings to eliminate image flickering associated with fluorescent lights.
- Video orientation:
  - Flip—Vertically reflect the display of the live video
  - Mirror—Horizontally reflect the display of the live video. Select both options if the camera is installed upside-down (for example, on the ceiling) to correct the image orientation. If you have preset locations, those locations will be cleared after flip/mirror setting.
- Rotate—Indicates clockwise rotation. Rotation can be applied with flip, mirror, and physical lens rotation settings to adapt to different mounting locations.

The camera may be installed on a vertical, side-facing, or tilted surface in order to accommodate the interior or exterior design of a building. The interior of a building can be shaped as a narrow rectangular space, such as corridor. The conventional HD image, such as that of a 16:9 aspect ratio, will be incongruous with its wide horizontal view. With video rotation, the camera can more readily cover the field of view on a tall and narrow scene.

## Day/Night settings

- Switch to B/W in night mode—Select this to enable the camera to automatically switch to Black/White during night mode.
- Turn on external IR illuminator in night mode—Select this to turn on the external IR illuminator when the camera detects low light condition and enters the night mode. A Digital Output connection to external IR is needed.
- IR cut filter—With a removable IR-cut filter, this camera can automatically remove the filter to let IR light enter the light sensor during low light conditions.
  - Auto mode—The camera automatically removes the filter by judging the level of ambient light.
  - Day mode—In day mode, the camera switches on the IR cut filter at all times to block infrared light from reaching the sensor so that the colors will not be distorted.
  - Night mode—In night mode, the camera switches off the IR cut filter at all times for the sensor to accept infrared light, thus helping to improve low light sensitivity.
  - Synchronize with digital input—The camera automatically removes the IR cut filter when a Digital Input is triggered. For example, the digital input can come from a housing that is equipped with IR illumination and control circuits.
  - Schedule mode—The camera switches between day mode and night mode based on a specified schedule. Enter the start and end time for day mode. Note that the time format is [hh:mm] and is expressed in 24-hour clock time. By default, the start and end time of day mode are set to 07:00 and 18:00.
- Light sensor sensitivity—Tune the responsiveness of the IR filter to lighting conditions as Low, Normal, or High.

When completed with the settings on this page, click **Save** to enable the settings.

## Image settings

On this page, you can tune the White balance and Image adjustment.

Sensor Setting 2 are for special situations and Sensor Setting 1 is for normal situations.

- White balance—Adjust the value for the best color temperature.

To adjust the white balance to the best color temperature, follow these steps:

1. Place a sheet of paper of white or cooler-color temperature color, such as blue, in front of the lens, then allow the camera to automatically adjust the color temperature.
2. Click the On button to Fix current value and confirm the setting while the white balance is being measured.

You may also manually tune the color temperature by pulling the RGain and BGain slide bars.

- Image Adjustment:
  - Brightness—Adjust the image brightness level, which ranges from 0% to 100%.
  - Contrast—Adjust the image contrast level, which ranges from 0% to 100%.
  - Saturation—Adjust the image saturation level, which ranges from 0% to 100%.
  - Sharpness—Adjust the image sharpness level, which ranges from 0% to 100%.
  - Gamma curve—This option is disabled when the WDR function is enabled. Adjust the image sharpness level, which ranges from 0 to 0.45. You may let firmware Optimize your display or select a value to change the preferred level of Gamma correction towards higher contrast or towards the higher luminance for detailed expression for both dark and lighted areas of an image.
- Defog—Defog helps improve the visibility quality of captured image in poor weather conditions such as smog, fog, or smoke.
- 3D noise reduction—Adjust the 3D noise reduction, which ranges from Low to High.
- Enable digital image stabilizer—If you experience problems such as vibration on a pole mount, try enable the image stabilizer.




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**Note** All changes made to image settings is directly shown on screen. You can click Restore to recall the original settings without incorporating the changes. When completed with the settings on this page, click Save to enable the setting. You can also click on Profile mode to adjust all settings above in a tabbed window for special lighting conditions.

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- Enable to apply these settings at—Select the mode this profile to apply to: Day mode, Night mode, or Schedule mode. Manually enter a range of time if you choose Schedule mode. Then check Save to take effect.

## Exposure

On this page, you can configure the Exposure measurement window, Exposure level, Exposure mode, Exposure time, Gain control, and Day/Night mode settings. You can configure two sets of Exposure settings: one for normal situations, the other for special situations, such as the day/night/ schedule mode.

Sensor Setting 2 are for special situations and Sensor Setting 1 is for normal situations.

- Measurement Window—This function allows you to set measurement window(s) for low light compensation. For example, where low-light objects are posed against an extremely bright background. You may want to exclude the bright sunlight shining through a building's corridor.
  - Full view—Calculate the full range of view and offer appropriate light compensation.
  - Custom—This option allows you to manually add customized windows as inclusive or exclusive regions. A total of 10 windows can be configured.

**Note**

The Exposure control setting in the Exposure window will be disabled when the WDR function is enabled (system default).

The inclusive window refers to the “weighed window”; the exclusive window refers to “ignored window”. It adopts the weighed averages method to calculate the value. The inclusive windows have a higher priority. You can overlap these windows, and, if you place an exclusive window within a larger inclusive window, the exclusive part of the overlapped windows will be deducted from the inclusive window. An exposure value will then be calculated out of the remaining of the inclusive window.

- BLC (Back Light Compensation): This option will automatically add a “weighted region” in the middle of the window and give the necessary light compensation.
- Exposure control:
  - Exposure level—You can manually set the Exposure level, which ranges from –2.0 to +2.0 when WDR pro is disabled and from +0.7 to –0.7 when WDR pro is enabled (dark to bright). You can click and drag the semi-circular pointers on the Exposure time and Gain control slide bars to specify a range of shutter time and Gain control values within which the camera can automatically tune to an optimal imaging result. You may prefer a shorter shutter time to better capture moving objects, while a faster shutter reduces light and needs to be compensated by electrical brightness gains.
  - Exposure mode—You can click and drag the semi-circular pointers on the Exposure time and Gain control slide bars to specify a range of shutter time and Gain control values within which the camera can automatically tune to an optimal imaging result. For example, you may prefer a shorter shutter time to better capture moving objects, while a faster shutter reduces light and needs to be compensated by electrical brightness gains.
  - Flickerless—Under some circumstances when there is a difference between the video capture frequency and local AC power frequency (NTSC or PAL), the mismatch causes color shifts or flickering images. If the above mismatch occurs, select the Flickerless check box, and the range of Exposure time (the shutter time) will be limited to a range in order to match the AC power frequency. When selected, the exposure time will be forced to stay longer than 1/120 second. For cameras that come with fixed iris lens, setting the exposure time to longer than 1/120 second may introduce too much lights to the lens. You can use this option to observe whether the result of long exposure time is satisfactory.

You can click and drag the semi-circular pointers on the Exposure time and Gain control slide bars to specify a range of shutter time and Gain control values within which the camera can automatically tune to an optimal imaging result. For example, you may prefer a shorter shutter time to better capture moving objects, while a faster shutter reduces light and needs to be compensated by electrical brightness gains.
- AE Speed Adjustment—This function applies when you need to monitor fast changing lighting conditions. For example, the camera may need to monitor a highway lane or entrance of a parking area at night where cars passing by with their lights on can bring fast changes in light levels. The same applies if the camera is installed on a vehicle, and when it needs to adapts to fast changes of light when entering and leaving a tunnel.
- WDR—Refers to the Wide Dynamic Range function that enables the camera to capture details in a high contrast environment. Use the check box to enable the function, and use the slide bar to select the strength of the WDR Pro functionality, depending on the lighting condition at the installation site. You can select a higher effect when the contrast is high (between the shaded area and the light behind the objects).

You can click **Restore** to recall the original settings without incorporating the changes. When completed with the settings on this page, click **Save** to enable the settings.

If you want to configure another sensor setting for day/night/schedule mode, click **Profile mode** to open the Profile of exposure settings page.

- **Activated period**—Select the mode this profile to apply to Night mode or the Schedule mode. Manually enter a range of time if you select the Schedule mode. Then check the **Save** button for the configuration take effect.

To set up a profile, follow these steps:

1. Select the **Profile mode** tab.
2. Select the applicable mode: Night mode or Schedule mode. Manually enter a range of time if you choose the Schedule mode.
3. Configure Exposure control settings s. See previous discussions for detailed information.
4. Click **Save** to enable the setting and click **Close** to exit the page.

## Lens configuration

The camera supports two lens: CIVS-IPCA-VCM4.1-9 and CIVS-IPCA-12-50MM.

By default, the firmware uses the lens profile for CIVS-IPCA-VCM4.1-9 (DV22X41SR4A).

If you apply a CIVS-IPCA-12-50MM (SL1250P) lens to the camera, please select the appropriate lens configuration file and click **Save**.

**Table 5-1 Lens Configuration**

Part Number	Description	Lens Configuration File
CIVS-IPCA-VCM4.1-9	Vari-Focal DC- Iris Lens, 4.1 - 9 mm	DV22X41SR4A
CIVS-IPCA-12-50MM	Vari-Focal DC- Iris Lens 12-50 mm	SL1250P



### Note

- Lens configuration changes require a camera reboot.
- If the camera is restored, the default lens configuration for CIVS-IPC-VCM4.1-9 is restored.

## Focus

Focus here refers to the Remote Focus, is applicable to cameras that are equipped with stepping motor lens. The automated focus adjustment function eliminates the needs to physically adjust camera focus. In an outdoor deployment consisting of a large number of cameras, the auto focus function can be very helpful when these cameras become out of focus after days or weeks of operation. And that can easily result from the effects of natural forces, for example, shrink and expand due to a wide range of operating temperatures and the vibration caused by wind.

To perform the automated Focus function, follow these steps:

- 
- Step 1** Select from the bottom of the screen whether you want to perform focus adjustment on the Full view or within a Custom focus window.
- You can create a custom window and click and drag the window to a desired position on screen.
- Step 2** It is recommended to Reset to the default back focus position of the sensor board.
- Step 3** Click to select the Fine-tune focus or the Full-range scan buttons.
- When a full-range scan is selected, a full-range scan through the camera's entire focal length can take about 30 to 80 seconds. If not, the auto focus scan will only go through the length where optimal focus may occur, and that takes about 15 to 20 seconds. In theory, best results of the auto scan can be acquired when the camera's iris is fully open.
- Step 4** Wait for the scan to complete.
- After a short while, the clearest image obtained should be displayed and the optimal focus range achieved. Use the arrow marks on the sides to fine-tune the focus if you are not satisfied with the results. You may still need to use the arrow marks to fine-tune the focus depending on the live image on your screen. “>” means moving from wide to tele end; and “<” tele to wide.
- 

The methodology of using the Resize Buttons at the upper left corner of the streaming window is the same as that on the home page.

## Focus Window

By default, the optimal focus is found on a full view window. You may designate a custom window within your current field of view to acquire the best focus out of it. However, you can not place a focus window on a distant background, for example, a hall way that stretches away for 3 meters or farther. Doing so you will not benefit from the Focus window function.

- Full view—The focus tuning takes place by referring to the full view.
- Custom—You can create a focus window and drag it to a place of interest in your view window. It is recommended to use this function only when you have a solid object in your view window that is showing a consistent color or texture.

This function will not take effect if you set the focus window on a distant background. You can try the Snapshot focus function (in Applications > Package management) when applied in the above mentioned scenario.

## Privacy Mask

Click **Privacy Mask** to open the settings page. On this page, you can block out sensitive zones to address privacy concerns.

To set the privacy mask windows, follow theses:

1. Click **New** to add a new window.
2. You can use 4 mouse clicks to create a new masking window, which is recommended to be at least twice the size of the object (height and width) you want to cover.
3. Enter a Window Name and click **Save** to enable the setting.

4. Click on the `Enable privacy mask` check box to enable this function.
- 

Up to 5 privacy mask windows can be configured on the same screen.

If you want to delete the privacy mask window, click the **x** mark on the side of window name.

## Media > Video

### Stream settings—Mode - Resolution and Frame rate

For a 5MP model, the default resolution is 5 megapixels, and if bandwidth or frame rate per second is of the concern, you can select a lower resolution while enjoying a higher frame rate (for example, in traffic monitoring). The other configurable options is 1080P (16:9) at 60fps.

The camera supports multiple streams with frame sizes ranging from 320 x 240 to 2560 x 1920 pixels.

- Stream 1—You can define the “Region of Interest” (viewing region) and the “Output Frame Size” (size of the live view window)
- Stream 2—The default frame size for Stream 2 is set to the 1600 x 1200
- Stream 3—The default frame size for Stream 3 is set to the 640 x 480
- Stream 4—The default frame size is 2560 x 1920, and the Viewing Window function is not available for stream 3

Click **Viewing Window** to open the viewing region settings page. On this page, you can configure the Region of Interest and the Output Frame Size for a video stream. For example, you can crop only a portion of the image that is of your interest, and thus save the bandwidth needed to transmit the video stream.

To set up those settings for a stream, follow these steps:

1. Select a stream for which you want to set up the viewing region.
1. Select a Region of Interest from the drop-down list. The floating frame, the same as the one in the Global View window on the home page, will resize accordingly. If you want to set up a customized viewing region, you can also resize and drag the floating frame to a desired position with your mouse.
2. Choose a proper Output Frame Size from the drop-down list according to the size of your monitoring device.



#### Note

All the items in the “Region of Interest” should not be larger than the “Output Frame Size” (current maximum resolution).

---

- The parameters of the multiple streams are as follows:

	Region of Interest	Output frame size
Stream 1	2560 X 1920 ~ 320 x 240 (Selectable)	2560 X 1920 ~ 320 x 240 (Selectable)
Stream 2	2560 X 1920 ~ 320 x 240 (Selectable)	2560 X 1920 ~ 320 x 240 (Selectable)
Stream 3	2560 X 1920 ~ 320 x 240 (Selectable)	2560 X 1920 ~ 320 x 240 (Selectable)
Stream 4	Fixed	Fixed

When completed with the settings in the Viewing Window, click Save to enable the settings and click Close to exit the window. The selected Output Frame Size will immediately be applied to the Frame size of each video stream. Then you can go back to the home page to test the e-PTZ function. For more information about the e-PTZ function, see the [“PTZ > PTZ settings” section on page 5-30](#).

Click the stream item to display the detailed information. The maximum frame size will follow your settings in the above Viewing Window sections.

This camera offers real-time H.265, H.264, and MJPEG compression standards (Triple Codec) for real-time viewing. If the H.264 or H.265 mode is selected, the video is streamed via the RTSP protocol. There are several parameters through which you can adjust the video performance:

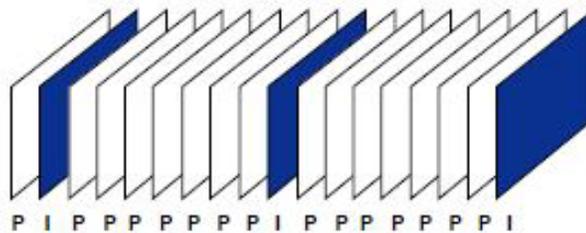
- Frame size**—You can set up different video resolutions for different viewing devices. For example, set a smaller frame size and lower bit rate for remote viewing on mobile phones and a larger video size and a higher bit rate for live viewing on web browsers, or recording the stream to an NVR. A larger frame size takes up more bandwidth.
- Maximum frame rate**—Limits the maximum refresh frame rate per second. Configure the frame rate higher for smoother video viewing and for recognizing moving objects in the field of view. If the power line frequency is set to 50Hz, the frame rates are selectable at 1fps, 2fps, 3fps, 5fps, 8fps, 12fps, 10fps, 15fps, 20fps, 24fps, and 25fps. If the power line frequency is set to 60Hz, the frame rates are selectable at 1fps, 2fps, 3fps, 5fps, 8fps, 10fps, 12fps, 15fps, 20fps, 24fps, 25fps, and 30fps. You can also select Customize and manually enter a value.

The frame rate will decrease if you select a higher resolution.

- Intra frame period**—Determine how often for firmware to plant an I frame. The shorter the duration, the more likely you will get better video quality, but at the cost of higher network bandwidth consumption. Select the intra frame period from the following durations: 1/4 second, 1/2 second, 1 second, 2 seconds, 3 seconds, and 4 seconds.
- Smart Stream II**
- Dynamic Intra frame period**—High quality motion codecs, such as H.265, utilize the redundancies between video frames to deliver video streams at a balance of quality and bit rate.

The encoding parameters are summarized and illustrated in [Figure 5-3](#). The I-frames are completely self-referential and they are largest in size. The P-frames are predicted frames. The encoder refers to the previous I- or P-frames for redundant image information.

**Figure 5-3 H.264/H.265 Frame Types**

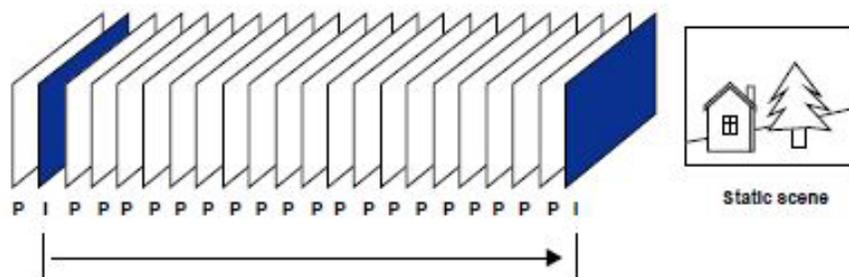


By dynamically prolonging the intervals for I-frames insertion to up to 10 seconds, the bit rates required for streaming a video can be tremendously reduced. When streaming a video of a static scene, the Dynamic Intra frame feature can save up to 53% of bandwidth. The amount of bandwidth thus saved is also determined by the activities in the field of view. If activities occur in the scene, firmware automatically shortens the I-frame insertion intervals in order to maintain image quality. In the low light or night conditions, the sizes of P-frames tend to be enlarged due to the noises, and hence the bandwidth saving effect is also reduced.

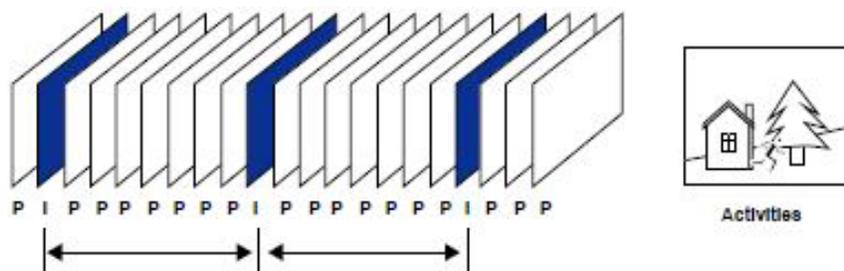
Streaming a typical 2MP scene normally requires 3~4Mb/s of bandwidth. With the Dynamic Intra frame function, the bandwidth for streaming a medium-traffic scene can be reduced to 2~3Mb/s, and during the no-traffic period of time, down to 500kb/s.

Figure 5-4 shows dynamic intra frame with static scenes. Figure 5-5 dynamic intra frame shows activities in scenes

**Figure 5-4 Dynamic Intra Frame with Static Scenes**



**Figure 5-5 Dynamic Intra Frame with Activities in Scenes**



With the H.265 codec in an optimal scenario and when Dynamic Intra frame is combined with the Smart Stream function, an 80% of bandwidth saving can be achieved compared with using H.264 without enabling these bandwidth-saving features.

- Smart codec—Smart codec effectively reduces the quality of the whole or the non-interested areas on a screen and therefore reduces the bandwidth consumed.

You can manually specify the video quality for the foreground and the background areas.

Select an operation mode if Smart codec is preferred:

- Auto tracking—The Auto mode configures the whole screen into the non-interested area. The video quality of part of the screen returns to normal when one or more objects move in that area. The remainder of the screen where there are no moving objects (no pixel changes) will still be transmitted in low-quality format.
- Manual—The Manual mode allows you to configure 3 ROI windows (Region of Interest, with Foreground quality) on the screen. Areas not included in any ROI windows will be considered as the non-interested areas. The details in the ROI areas will be transmitted in a higher-quality video format.

As shown in [Figure 5-6](#), the upper screen may contain little details of your interest, while the sidewalk on the lower screen is included in an ROI window.

As the result, the lower screen is constantly displayed in high details, while the upper half is transmitted using a lower-quality format. Although the upper half is transmitted using a lower quality format, you still have an awareness of what is happening on the whole screen.

**Figure 5-6 ROI Window**



- Hybrid—The major difference between the “Manual” mode and the “Hybrid” mode is that in the “Hybrid” mode, any objects entering the non-interested area will restore the video quality of the moving objects and the area around them. The video quality of the associated non-interested area is immediately restored to normal to cover the moving objects. In the “Manual” mode, the non-interested area is always transmitted using a low quality format regardless of the activities inside.
- Quality priority—Use the slide bar to tune the quality contrast between the ROI and non-interested areas.

The farther the slide bar button is to the right, the higher the image quality of the ROI areas. On the contrary, the farther the slide bar button to the left, the higher the image quality of the non-interested area.

In this way, you may set up an ROI window as a privacy mask by covering a protected area using an ROI window, while the remaining screen become the non-interested area. You may then configure the non-interested area to have a high image quality, or vice versa.

You should also select the Maximum bit rate from the pull-down menu as the threshold to contain the bandwidth consumption for both the high- and low-quality video sections in a smart stream.

- Video quality:
  - Constant bit rate—A complex scene generally produces a larger file size, meaning that higher bandwidth will be needed for data transmission. The bandwidth utilization is configurable to match a selected level, resulting in mutable video quality performance. The bit rates are selectable at the following rates: 20Kbps, 30Kbps, 40Kbps, 50Kbps, 64Kbps, 128Kbps, 256Kbps, 512Kbps, 768Kbps, 1Mbps, 2Mbps, 3Mbps, 4Mbps, 6Mbps, 8Mbps, 10Mbps, 12Mbps, 14Mbps, ~ to 40Mbps. You can also select Customize and manually enter a value up to 40Mbps.
  - Target bit rate—Select a bit rate from the pull-down menu (Customized, Medium, Standard, Good, Detailed, or Excellent). The bit rate then becomes the Average or Upper bound bit rate number. The camera will strive to deliver video streams around or within the bit rate limitation you impose.
  - Policy—If Frame Rate Priority is selected, the camera will try to maintain the frame rate per second performance, while the image quality will be compromised. If Image quality priority is selected, the camera may drop some video frames in order to maintain image quality.
  - Fixed quality—On the other hand, if Fixed quality is selected, all frames are transmitted with the same quality; bandwidth utilization is therefore unpredictable. The video quality can be adjusted to the following settings: Medium, Standard, Good, Detailed, and Excellent. You can also select Customize and manually enter a value.
  - Maximum bit rate—With the guaranteed image quality, you might still want to place a bit rate limitation to control the size of video streams for bandwidth and storage concerns. The configurable bit rate starts from 20Kbps to 40Mbps (Fixed quality).

You may also manually enter a bit rate number by selecting the Customized option.

The Maximum bit rate setting in the Fixed quality configuration can ensure a reasonable and limited use of network bandwidth. For example, in low light conditions where a Fixed quality setting is applied, video packet sizes can tremendously increase when noises are produced with electrical gain.

If JPEG mode is selected, the camera sends consecutive JPEG images to the client, producing a moving effect similar to a filmstrip. Every single JPEG image transmitted guarantees the same image quality, which in turn comes at the expense of variable bandwidth usage. Because the media contents are a combination of JPEG images, no audio data is transmitted to the client. There are three parameters provided in MJPEG mode to control the video performance:

- Frame size—You can set up different video resolution for different viewing devices. For example, set a smaller frame size and lower bit rate for remote viewing on mobile phones and a larger video size and a higher bit rate for live viewing on web browsers. Note that a larger frame size takes up more bandwidth.
- Maximum frame rate—Limits the maximum refresh frame rate per second. Set the frame rate higher for smoother video quality. If the power line frequency is set to 50Hz (at the 5MP resolution), the frame rates are selectable at 1fps, 2fps, 3fps, 5fps, 8fps, 10fps, and 12fps. If the power line frequency is set to 60Hz, the frame rates are selectable at 1fps, 2fps, 3fps, 5fps, 8fps, 10fps, and 12fps. Up to 30 fps for JPEG with 1080P (FullHD mode). You can also select Customize and manually enter a value. The frame rate will decrease if you select a higher resolution.

- Video quality—The configuration method is identical to that for H.264 or H.265.

**Note**

Video quality and fixed quality refers to the compression rate, so a lower value will produce higher quality.

Converting high-quality video may significantly increase the CPU loading, and you may encounter streaming disconnection or video loss while capturing a complicated scene. In the event of occurrence, we suggest you customize a lower video resolution or reduce the frame rate to obtain smooth video.

## Media > Audio

- Mute—Select this option to disable audio transmission from the camera to all clients. That if muted, no audio data will be transmitted even if audio transmission is enabled on the Client Settings page. In that case, this message is displayed: “The media type has been changed to video only because the media from server contains no audio.”
- External microphone input—Select the gain of the external audio input according to ambient conditions. Adjust the gain from 0 (least sensitive) to 100% (most sensitive).
- Audio type—Select audio codec and the sampling bit rate.
  - G.711 also provides good sound quality and requires about 64Kbps. Select pcmu (µ-Law) or pcma (A-Law) mode.
  - G.726 is a speech codec standard covering voice transmission at rates of 16, 24, 32, and 40kbit/s.

When completed with the settings on this page, click **Save** to enable the settings.

## Network > General settings

This section explains how to configure a wired network connection for the camera.

### Network Type Tab

- LAN—Select this option when the camera is deployed on a local area network (LAN) and is intended to be accessed by local computers. The default setting for the Network Type is LAN. Remember to click on the **Save** button when you complete the Network setting.
  - Get IP address automatically—Select this option to obtain an available dynamic IP address assigned by the DHCP server each time the camera is connected to the LAN.
  - Use fixed IP address—Select this option to manually assign a static IP address to the camera. Enter the Static IP, Subnet mask, Default router, and Primary DNS provided by your ISP or network administrator.
    - Subnet mask—This is used to determine if the destination is in the same subnet. The default value is “255.255.255.0”.

- Default router—This is the gateway used to forward frames to destinations in a different subnet. Invalid router setting will disable the transmission to destinations across different subnets.
- Primary DNS—The primary domain name server that translates host names into IP addresses.
- Secondary DNS—Secondary domain name server that backups the Primary DNS.
- Primary WINS server—The primary WINS server that maintains the database of computer names and IP addresses.
- Secondary WINS server—The secondary WINS server that maintains the database of computer names and IP addresses.
- Enable UPnP presentation—Select this option to enable UPnP presentation for your camera so that whenever a camera is presented to the LAN, the shortcuts to connected cameras will be listed in My Network Places. You can click the shortcut to link to the web browser. Currently, UPnP is supported by Windows XP or later. To utilize this feature, make sure the UPnP component is installed on your computer.
- Enable UPnP port forwarding—To access the camera from the Internet, select this option to allow the camera to open ports automatically on the router so that 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.
- PPPoE (Point-to-point over Ethernet)—Select this option to configure your camera to make it accessible from anywhere as long as there is an Internet connection. To utilize this feature, it requires an account provided by your ISP.

To acquire your camera's public IP address, follow these steps:

1. Set up the camera on the LAN.
2. Go to **Configuration > Event > Event settings > Add server** (see the “Add server” section on page 5-34) to add a new email or FTP server.
3. Go to **Configuration > Event > Event settings > Add media** (see the “Add media” section on page 5-37).

Select System log so that you will receive the system log in TXT file format that contains the camera's public IP address in your email or on the FTP server.

4. Go to **Configuration > Network > General settings > Network type**. Select **PPPoE** and enter the user name and password provided by your ISP. Click Save to enable the setting.

The camera will reboot.

5. Disconnect the power to the camera; remove it from the LAN environment.

If the default ports are already used by other devices connected to the same router, the camera will select other ports for the camera.

If UPnP is not supported by your router, you will see the following message: “Error: Router does not support UPnP port forwarding.”

To enable the UPnP user interface on your computer, follow these steps (you must log on to the computer as a system administrator to install the UPn components):

1. From the Start menu, click **Control Panel**, then click **Add or Remove Programs**.
2. In the Add or Remove Programs dialog box, click **Add/Remove Windows Components**.
3. In the Windows Components Wizard dialog box, select Networking Services and click **Details**.
4. In the Networking Services dialog box, select **Universal Plug and Play** and click **OK**.

5. Click **Next** in the following window
6. Click **Finish**. UPnP is enabled.

UPnP networking technology provides automatic IP configuration and dynamic discovery of devices added to a network. Services and capabilities offered by networked devices, such as printing and file sharing, are available among each other without the need for cumbersome network configuration. In the case of cameras, you will see camera shortcuts under My Network Places.

Enabling UPnP port forwarding allows the camera to open a secondary HTTP port on the router—not HTTP port—meaning that you have to add the secondary HTTP port number to the camera’s public address in order to access the camera from the Internet. For example, when the HTTP port is set to 80 and the secondary HTTP port is set to 8080, the following table shows the camera’s IP address

From the Internet	In LAN
http://203.67.124.123:8080	http://192.168.4.160 or http://192.168.4.160:8080

If the PPPoE settings are incorrectly configured or the Internet access is not working, restore the camera to factory default; see the “[General settings > Restore](#)” section on page 5-7 for details. After the camera is reset to factory default, it will be accessible on the LAN.

- Enable IPv6—Select this option and click **Save** to enable IPv6 settings. This only works if your network environment and hardware equipment support IPv6. The browser should be Microsoft Internet Explorer 6.5, Mozilla Firefox 3.0 or above.

When IPv6 is enabled, by default, the camera will listen to router advertisements and be assigned with a link-local IPv6 address accordingly.

- IPv6 Information—Click this button to obtain the IPv6 information. If your IPv6 settings are successful, the IPv6 address list will be listed in the pop-up window

To link to an IPv6 address, follow these steps:

1. Open your web browser.
2. Enter the link-global or link-local IPv6 address in the address bar of your web browser.
3. Press **Enter** on the keyboard or click **Refresh** button to refresh the web page.

If you have a secondary HTTP port (the default value is 8080), you can also link to the web page using the following address format. (See the “[HTTP streaming](#)” section on page 5-22 for detailed information.)

http://[2001:0c08:2500:0002:0202:d1ff:fe04:65f4]/:8080

- Manually setup the IP address: Select this option to manually set up IPv6 settings if your network environment does not have DHCPv6 server and router advertisements-enabled routers. If you check this item, the following blanks will be displayed for you to enter the corresponding information:
  - Optional IP address / Prefix length
  - Optional Default Router
  - Optional primary DNS

# Network > Streaming protocols

## HTTP streaming

To utilize HTTP authentication, make sure that you have set a password for the camera first; see the [“Security > User accounts” section on page 5-26](#) for details.

- **Authentication**—Depending on your network security requirements, the camera provides two types of security settings for an HTTP transaction: basic and digest. If basic authentication is selected, the password is sent in plain text format and there can be potential risks of being intercepted. If digest authentication is selected, user credentials are encrypted using MD5 algorithm and thus provide better protection against unauthorized accesses.
- **HTTP port / Secondary HTTP port**—By default, the HTTP port is set to 80 and the secondary HTTP port is set to 8080. They can also be assigned to another port number between 1025 and 65535. If the ports are incorrectly assigned, warning messages will be displayed:

To access the camera on the LAN, both the HTTP port and secondary HTTP port can be used to access the camera. For example, when the HTTP port is set to 80 and the secondary HTTP port is set to 8080, the camera’s IP address on the LAN is LAN `http://192.168.4.160` or `http://192.168.4.160:8080`.

- **Access name for stream 1 ~ 4**—This camera supports multiple streams simultaneously. The access name is used to identify different video streams. You can click **Media > Video > Stream** settings to set up the video quality of linked streams. For more information about how to set up the video quality, see the [“Stream settings—Mode - Resolution and Frame rate” section on page 5-14](#).

When using Mozilla Firefox to access the camera and the video mode is set to JPEG, you will receive video comprised of continuous JPEG images. This technology, known as “server push,” allows the camera to feed live pictures to Mozilla Firefox.

URL command: `http://ip address:http port/access name for stream 1, 2, 3, 4`

For example, when the Access name for stream 2 is set to video2.mjpg:

1. Launch Mozilla Firefox or Netscape.
2. Type the above URL command in the address bar. Press **Enter**.
3. The JPEG images will be displayed in your web browser.



**Note** Microsoft Internet Explorer does not support server push technology; therefore, you will not be able to access a video stream using `http://ip address:http port/access name for stream 1, 2, 3, 4`.

## RTSP Streaming

To utilize RTSP streaming authentication, make sure that you have set a password for controlling the access to video stream first. See the [“Security > User accounts” section on page 5-26](#) for details.

- **Authentication**—Depending on your network security requirements, the camera provides three types of security settings for streaming via RTSP protocol: disable, basic, and digest. If basic authentication is selected, the password is sent in plain text format, but there can be potential risks of it being intercepted. If digest authentication is selected, user credentials are encrypted using MD5 algorithm, thus providing better protection against unauthorized access.

- Access name for stream 1 ~ 4—This camera supports multiple streams simultaneously. The access name is used to differentiate the streaming source. If you want to use an RTSP player to access the camera, you have to set the video mode to H.264 or H.265 and use the following RTSP URL command to request transmission of the streaming data.

`rtsp://ip address:rtsp port/access name for stream 1 to 4`

For example, when the access name for stream 1 is set to live.sdp:

1. Launch an RTSP player.
  2. Choose **File > Open URL**. A URL dialog box will pop up.
  3. Type the above URL command in the text box.
  4. The live video will be displayed in your player.
- RTSP port /RTP port for video, audio/ RTCP port for video, audio:
    - RTSP (Real-Time Streaming Protocol) controls the delivery of streaming media. By default, the port number is set to 554.
    - The RTP (Real-time Transport Protocol) is used to deliver video and audio data to the clients. By default, the RTP port for video is set to 5556.
    - The RTCP (Real-time Transport Control Protocol) allows the camera to transmit the data by monitoring the Internet traffic volume. By default, the RTCP port for video is set to 5557.

The ports can be changed to values through 1025 to 65535 (for RTSP port) or 1026 to 65534 for (RTP port). The RTP port must be an even number and the RTCP port is the RTP port number plus one, and thus is always an odd number. When the RTP port changes, the RTCP port will change accordingly.

If the RTP ports are incorrectly assigned, the following warning message will be displayed.

`Invalid port number. RTP video port must be an even number.`

- Multicast settings for streams—Click the items to display the detailed configuration information. Select the Always multicast option to enable multicast for video streams.

Unicast video transmission delivers a stream through point-to-point transmission; multicast, on the other hand, sends a stream to the multicast group address and allows multiple clients to acquire the stream at the same time by requesting a copy from the multicast group address. Therefore, enabling multicast can effectively save Internet bandwidth.

The ports can be changed to values between 1025 and 65535. The multicast RTP port must be an even number and the multicast RTCP port number is the multicast RTP port number plus one, and thus is always odd. When the multicast RTP port changes, the multicast RTCP port will change accordingly.

If the multicast RTP video ports are incorrectly assigned, the following warning message will be displayed:

`Invalid port number. Multicast stream 1 video port must be an even number.`

- Multicast TTL [1~255]—The multicast TTL (Time To Live) is the value that tells the router the range a packet can be forwarded.

Initial TTL	Scope
0	Restricted to the same host
1	Restricted to the same subnetwork

Initial TTL	Scope
32	Restricted to the same site
64	Restricted to the same region
128	Restricted to the same continent
255	Unrestricted in scope

The Multicast metadata port is utilized by VADP modules to transfer video analytics results, PTZ stream, textual data, and event messages between the camera and the client side running and observing the video analysis. If your client side computer is located outside the local network, you may need to open the associated TCP port on routers and firewall.

## Network > QoS (Quality of Service)

Quality of Service refers to a resource reservation control mechanism, which guarantees a certain quality to different services on the network. Quality of service guarantees are important if the network capacity is insufficient, especially for real-time streaming multimedia applications. Quality can be defined as, for instance, a maintained level of bit rate, low latency, no packet dropping, etc.

The following are the main benefits of a QoS-aware network:

- The ability to prioritize traffic and guarantee a certain level of performance to the data flow.
- The ability to control the amount of bandwidth each application may use, and thus provide higher reliability and stability on the network.

## Requirements for QoS

To utilize QoS in a network environment, the following requirements must be met:

- All network switches and routers in the network must include support for QoS.
- The network video devices used in the network must be QoS-enabled.

## QoS models

### CoS (the VLAN 802.1p model)

IEEE802.1p defines a QoS model at OSI Layer 2 (Data Link Layer), which is called CoS, Class of Service. It adds a 3-bit value to the VLAN MAC header, which indicates the frame priority level from 0 (lowest) to 7 (highest). The priority is set up on the network switches, which then use different queuing disciplines to forward the packets.

In the setting column for CoS, enter the VLAN ID of your switch (0~4095) and choose the priority for each application (0~7).

If you assign Video the highest level, the switch will handle video packets first.



#### Note

- A VLAN Switch (802.1p) is required. Web browsing may fail if the CoS setting is incorrect.

- The Class of Service technologies do not guarantee a level of service in terms of bandwidth and delivery time; they offer a “best-effort.” You can think of CoS as “coarsely-grained” traffic control and QoS as “finely-grained” traffic control.
- Although CoS is simple to manage, it lacks scalability and does not offer end-to-end guarantees since it is based on L2 protocol.

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#### QoS/DSCP (the DiffServ model)

DSCP-ECN defines QoS at Layer 3 (Network Layer). The Differentiated Services (DiffServ) model is based on packet marking and router queuing disciplines. The marking is done by adding a field to the IP header, called the DSCP (Differentiated Services Codepoint). This is a 6-bit field that provides 64 different class IDs. It gives an indication of how a given packet is to be forwarded, known as the Per Hop Behavior (PHB). The PHB describes a particular service level in terms of bandwidth, queueing theory, and dropping (discarding the packet) decisions. Routers at each network node classify packets according to their DSCP value and give them a particular forwarding treatment; for example, how much bandwidth to reserve for it.

Use the setting options of DSCP (DiffServ Codepoint) to specify the DSCP value for each application (0~63).

## Network > SNMP (Simple Network Management Protocol)

This section explains how to use the SNMP on the camera. The Simple Network Management Protocol is an application layer protocol that facilitates the exchange of management information between network devices. It helps network administrators to remotely manage network devices and find, solve network problems with ease.

The SNMP consists of the following three key components:

- Manager—Network-management station (NMS), a server which executes applications that monitor and control managed devices.
- Agent—A network-management software module on a managed device which transfers the status of managed devices to the NMS.
- Managed device—A network node on a managed network. For example: routers, switches, bridges, hubs, computer hosts, printers, IP telephones, cameras, web server, and database.

Before configuring SNMP settings on the this page, enable your NMS.

### SNMP Configuration

- Enable SNMPv1, SNMPv2c—Select this option and enter the names of Read/Write community and Read Only community according to your NMS settings.
- Enable SNMPv3—This option contains cryptographic security, a higher security level, which allows you to set the Authentication password and the Encryption password.
  - Security name—According to your NMS settings, choose Read/Write or Read Only and enter the community name.
  - Authentication type—Select MD5 or SHA as the authentication method.
  - Authentication password—Enter the password for authentication (at least 8 characters).

- Encryption password—Enter a password for encryption (at least 8 characters).

## Security > User accounts

This section explains how to enable password protection and create multiple accounts.

### Privilege Management

- PTZ control—You can modify the management privilege for operators or viewers. Select or deselect the check boxes, then click **Save** to enable the settings. If you give Viewers the privilege, Operators will also have the ability to control the camera through the main page.
- Digital Output—You can modify the management privilege for operators or viewers. Select or deselect the check boxes, then click **Save** to enable the settings.
- Allow anonymous viewing—If you check this item, any client can access the live stream without entering a User ID and Password.

### Account Management

Administrators can create up to 20 user accounts.

1. Input the new user's name and password.
2. Select the privilege level for the new user account. Click **Add** to enable the setting. Access rights are sorted by user privilege (Administrator, Operator, and Viewer).

Viewers and operators can view, listen, talk to the camera, and can control DI/DO and PTZ of the camera per the Privilege set from Privilege management. Administrator access rights can fully control the camera operations. Only administrators can access the Configuration page.

Here you also can change a user's access rights or delete user accounts.

1. Select an existing account to modify.
2. Make necessary changes and click Update or Delete to enable the setting.

## Security > HTTPS (Hypertext Transfer Protocol over SSL)

This section explains how to enable authentication and encrypted communication over SSL (Secure Socket Layer). It helps protect streaming data transmission over the Internet on higher security level.

### Create and Install Certificate Method

Before using HTTPS for communication with the camera, a Certificate must be created first. There are two ways: to create and install a certificate:

#### Method 1: Create Self-Signed Certificate

- 
- Step 1** Select this option from a pull-down menu.

- Step 2** In the first column, select **Enable HTTPS secure connection**, then select a connection option: **HTTP & HTTPS** or **HTTPS only**.
- Step 3** Click **Create certificate** to generate a certificate.  
The Certificate Information will automatically be displayed. You can click **Certificate properties** to view detailed information about the certificate.
- Step 4** Click **Save** to preserve your configuration, and your current session with the camera will change to the encrypted connection.
- Step 5** If your web session does not automatically change to an encrypted HTTPS session, click **Home** to return to the main page. Change the URL address from “http://” to “https://” in the address bar and press **Enter** on your keyboard. Some Security Alert dialogs will pop up. Click **OK** or **Yes** to enable HTTPS.
- 

### Method 2: Create and Install Certificate

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- Step 1** Select the option from the Method pull-down menu.
- Step 2** Click **Create certificate** to proceed.
- Step 3** Certificate information will show up in a pop-up window after clicking Create. Then click **Save** to generate the certificate request.
- Step 4** The Certificate request displays. If you see a “pop-up blocked” message in the bar, click **OK** and click on the Information bar at the top of the page to allow pop-ups.
- Step 5** Look for a trusted certificate authority, such as Symantec VeriSign Authentication Services, that issues digital certificates. Sign in and purchase the SSL certification service. Copy the certificate request from your request prompt and paste it in the signing request window of the CA. Proceed with the rest of the process as CA instructions on their web page.
- Step 6** Once completed, your SSL certificate should be delivered to you via an email or other means. Copy the contents of the certificate in the email and paste it in a text/HTML/hex editor/converter, such as IDM Computer Solution UltraEdit.
- Step 7** Open a new edit, paste the certificate contents, and press **ENTER** at the end of the contents to add an empty line.
- Step 8** Convert file format from DOS to UNIX. Open **File menu > Conversions > DOS to Unix**.
- Step 9** Save the edit using the “.crt” extension, using a file name like “CAcert.crt.”
- Step 10** Return to the original firmware session, use the Browse button to locate the crt certificate file, and click Upload to enable the certification.
- Step 11** When the certificate file is successfully loaded, its status will be stated as Active. A certificate must have been created and installed before you can click on the **Save** button for the configuration to take effect.
- Step 12** To begin an encrypted HTTPS session, click **Home** to return to the main page. Change the URL address from “http://” to “https://” in the address bar and press Enter on your keyboard. Some Security Alert dialogs will pop up. Click **OK** or **Yes** to enable HTTPS.
- 

## Security > Access List

This section explains how to control access permission by verifying the client PC IP address.

## General Settings

- Maximum number of concurrent streaming connection(s) limited to—Simultaneous live viewing for 1~10 clients (including stream 1 to stream 4). The default value is 10. If you modify the value and click Save, all current connections will be disconnected and automatically attempt to re-link (IE Explorer or Quick Time Player).
- View Information—Click this button to display the connection status window showing a list of the current connections. Only consoles that are currently displaying live streaming will be listed in the View Information list.
  - IP address—Current connections to the camera.
  - Elapsed time—How much time the client has been at the web page.
  - User ID—If the administrator has set a password for the web page, the clients have to enter a user name and password to access the live video. The user name will be displayed in the User ID column. If the administrator allows clients to link to the web page without a user name and password, the User ID column will be empty.
  - There are some situations that allow clients access to the live video without a user name and password:
    - The administrator does not set up a root password. For more information about how to set up a root password and manage user accounts, see the [“Security > User accounts” section on page 5-26](#).
    - The administrator has set up a root password, but set RTSP Authentication to “disable.” For more information about RTSP Authentication, see the [“RTSP Streaming” section on page 5-22](#).
    - The administrator has set up a root password, but allows anonymous viewing. For more information about Allow Anonymous Viewing, see the [“Privilege Management” section on page 5-26](#).
  - Refresh—Click this button to refresh all current connections.
  - Add to deny list—You can select entries from the Connection Status list and add them to the Deny List to deny access. Those checked connections will only be disconnected temporarily and will automatically try to re-link again (IE Explore or Quick Time Player). If you want to enable the denied list, check **Enable access list filtering** and click **Save** in the first column.
  - Disconnect—If you want to break off the current connections, select them and click this button. Those checked connections will only be disconnected temporarily and will automatically try to re-link again (IE Explore or Quick Time Player).

## Filter

- Enable access list filtering—Check this item and click Save if you want to enable the access list filtering function.
- Filter type—Select **Allow** or **Deny** as the filter type. If you choose Allow Type, only those clients whose IP addresses are on the Access List can access the camera, and the others cannot. On the contrary, if you choose Deny Type, those clients whose IP addresses are on the Access List will not be allowed to access the camera, and the others can.

Then you can Add a rule to the following Access List. The IPv6 access list column will not be displayed unless you enable IPv6 on the Network page. For more information about IPv6 Settings, see the [“Network > General settings” section on page 5-19](#) for detailed information.

There are three types of rules:

- Single—This rule allows the user to add an IP address to the Allowed/Denied list.
- Network—This rule allows the user to assign a network address and corresponding subnet mask to the Allow/Deny List. The address and network mask are written in CIDR format. If IPv6 filter is preferred, you will be prompted by the Add ipv6 filter list window. Enter the IPv6 address and the two-digit prefix length to specify the range of IP addresses in your configuration
- Range—This rule allows the user to assign a range of IP addresses to the Allow/Deny List. This rule only applies to IPv4 addresses

## Administrator IP address

- Always allow the IP address to access this device—You can check this item and add the Administrator's IP address in this field to make sure the Administrator can always connect to the device.

## Security > IEEE 802.1X

Enable this function if your network environment uses IEEE 802.1x, which is a port-based network access control. The network devices, intermediary switch/access point/hub, and RADIUS server must support and enable 802.1x settings.

The 802.1x standard is designed to enhance the security of local area networks, which provides authentication to network devices (clients) attached to a network port (wired or wireless). If all certificates between client and server are verified, a point-to-point connection will be enabled; if authentication fails, access on that port will be prohibited. 802.1x utilizes an existing protocol, the Extensible Authentication Protocol (EAP), to facilitate communication.

The components of a protected network with 802.1x authentication include the following:

- Supplicant—A client end user (camera), which requests authentication
- Authenticator (an access point or a switch)—A “go between” that restricts unauthorized end users from communicating with the authentication server
- 3. Authentication server (usually a RADIUS server)—Checks the client certificate and decides whether to accept the end user access request.

Cameras support two types of EAP methods to perform authentication: EAPPEAP and EAP-TLS.

To enable 802.1x settings, follow these steps:

- 
- Step 1** Before connecting the camera to the protected network with 802.1x, apply a digital certificate from a Certificate Authority (such as your network administrator) that can be validated by a RADIUS server.
  - Step 2** Connect the camera to a PC or notebook outside of the protected LAN. Open the configuration page of the camera. Select EAP-PEAP or EAP-TLS as the EAP method. In the field, enter your ID and password issued by the CA, then upload related certificate(s).
  - Step 3** When all settings are complete, move the camera to the protected LAN by connecting it to an 802.1x enabled switch. The devices will then start the authentication automatically.
-

**Note**


---

The authentication process for 802.1x:

1. The Certificate Authority (CA) provides the required signed certificates to the camera (the supplicant) and the RADIUS Server (the authentication server).
  2. A camera requests access to the protected LAN using 802.1X via a switch (the authenticator). The client offers its identity and client certificate, which is then forwarded by the switch to the RADIUS Server, which uses an algorithm to authenticate the camera and returns an acceptance or rejection back to the switch.
  3. The switch also forwards the RADIUS Server's certificate to the camera.
  4. Assuming all certificates are validated, the switch then changes the camera's state to authorized and is allowed access to the protected network via a preconfigured port.
- 

## Security > SSH

- Enable SSH server—Check this item to enable the SSH server.
- SSH port—Enter the SSH port that is used to access the IP camera. Valid port numbers are 22 and 1024 through 65535. The default port is 22.

Click **Save** to enable the settings.

## PTZ > PTZ settings

This section explains how to control the camera's Pan/Tilt/Zoom operation.

- Digital—Control the e-PTZ operation. Within a field of view, it allows you to quickly move the focus to a target area for close-up viewing without physically moving the camera.
- Mechanical—Connect the camera to a PTZ driver or scanner via the RS485 interface.

## Digital PTZ Operation (E-PTZ Operation)

The e-PTZ control settings section includes the following options. For e-PTZ related details, see the [“Patrol Settings” section on page 5-31](#).

- Auto pan/patrol speed—Select the speed from 1~5 (slow/fast) to set up the Auto pan/patrol speed control.
- Zoom factor display—If you check this item, the zoom indicator will be displayed on the home page when you zoom in/out the live viewing window.

When completed with the e-PTZ settings, click **Save** to enable the settings on this page.

In the Home page in the E-PTZ Mode, the e-Preset Positions will also be displayed on the home page. Select one from the drop-down list, and the camera will move to the selected position. If you have set up different preset positions for different streams, you can select one of the video streams to display its separate preset positions.

- **Global View**—In addition to using the e-PTZ control panel, you can also use the mouse to drag or resize the floating frame to pan/tilt/zoom the viewing region. The live view window will also move to the viewing region accordingly.
- **Moving Instantly**—If you check this item, the live view window will switch to the new viewing region instantly after you move the floating frame. If not selected, the process of moving from one position to another will be shown.
- **Click on Image**—The e-PTZ function also supports “Click on Image“. When you click on any point of the Global View Window or Live View Window, the viewing region will also move to that point. That the Click on Image function only applies when you have configured a smaller “Region of Interest” out of the maximum output frame, for example, an 800 x 600 region from out of the camera maximum frame size.
- **Patrol button**—Click this button, then the camera will patrol among the selected preset positions continuously.

## Patrol Settings

You can select some preset positions for the camera to patrol.

To set up a patrol schedule, follow these steps:

- 
- Step 1** Select the preset locations on the list, and click .
  - Step 2** The selected preset locations will be displayed on the Patrol locations list.
  - Step 3** Set the Dwelling time for the preset location during an auto patrol.
  - Step 4** If you want to delete a preset location from the Patrol locations list, select it and click **Remove**.
  - Step 5** Select a location and click   to rearrange the patrol order.
  - Step 6** Select patrol locations you want to save in the list and click **Save** to enable the patrol settings.
  - Step 6** To implement the patrol schedule, go to the Home page and click on the **Patrol** button.
- 

## PTZ

### Mechanical PTZ Operation

Select the Mechanical tab to display the RS485 Settings:

## RS485 Settings

- **Disable**—Select this option to disable this function.
- **PTZ camera**—Select this option to enable PTZ operation. To utilize this feature, connect the camera to a PTZ driver or scanner via RS485 serial interface first. Then you can configure the PTZ driver and RS485 port with the Camera ID, PTX Driver, and Port (Baud rate, Data bits, Stop bits, Parity bits) settings.

The IP camera supports the following PTZ drivers: DynaDome/SmartDOME, Lilin PIH-7x00, Pelco D, and Pelco P protocol. If none of the above PTZ drivers is supported by your PTZ scanner, select **Custom camera** (scanner). See the documentation of your PTZ scanner to determine the Camera ID, PTZ driver, and Port settings. The Camera ID is necessary to control multiple cameras. If you click Save to enable this function, the camera control panel will be displayed on the main page.

- **Transparent HTTP Tunnel**—If you want to use your own RS-485 device, you can use UART commands to build a Transparent HTTP Tunnel. The UART commands will be sent through HTTP tunnel established between the RS-485 device and the camera.

## Preset Positions

If you select DynaDome/SmartDOME, Lilin PIH-7x00, Pelco D, Pelco P protocol as the PTZ driver and click the **Save** button, the Preset Position button will become available. Click on the **Preset Position** button to open the configuration window. A total of 20 preset positions can be configured. To configure preset positions, follow these steps:

- 
- Step 1** Adjust the shooting area to the desired position using the buttons on the right side of the window.
  - Step 2** Enter a name for the preset position, which allows for up to forty characters.  
Click **Add** to enable the settings. The preset positions will be displayed under the Preset Location list on the left side.
  - Step 3** To add additional preset positions, repeat [Step 1](#) and [Step 2](#).
  - Step 4** To remove a preset position from the list, select it from the drop-down list and click **Remove**.  
The preset positions will also be displayed on the main page.
  - Step 5** Click to enable the settings.
- 

## Home page in Mechanical PTZ Mode

The Preset Positions will also be displayed on the home page. Select one from the drop-down list, and the camera will move to the selected preset position.



### Note

- The Preset Positions will also be displayed on the Home page. Select one from the Go to menu, and the camera will move to the selected preset position.
  - Click **Patrol**: The camera will patrol along the selected positions repeatedly
-

## Event > Event settings

This section explains how to configure the camera to respond to particular situations (events). A typical application is that when a motion is detected, the camera sends buffered images to an FTP server or e-mail address as notifications. When an event is triggered, you can specify what type of action that will be performed. You can configure the camera to send snapshots or videos to your email address or FTP site.

### Event

To configure an event with reactive measures such as recording video or snapshots, it is necessary to configure the server and media settings so that the camera will know what action to take (such as which server to send the media files to) when a trigger is activated. An event is an action initiated by a user-defined trigger source. In the Event column, click **Add** to open the event settings window. Here you can arrange three elements—Schedule, Trigger, and Action—to set an event. A total of three event settings can be configured.

- Event name—Enter a name for the event setting.
- Enable this event—Select this option to enable the event setting.
- Priority—Select the relative importance of this event (High, Normal, or Low). Events with a higher priority setting will be executed first.
- Detect next event after  $x$  seconds—Enter the duration in seconds to pause motion detection after a motion is detected. This can prevent event-related actions to take place too frequently.

#### Schedule

Specify the period of time during which the event trigger will take effect. Select the days of the week and the time in a day (in 24-hr time format) for the event triggering schedule. For example, you may prefer an event to be triggered only during the off-office hours.

#### Trigger

This is the cause or stimulus which defines when to trigger the camera. The trigger source can be configured to use the camera built-in motion detection mechanism or external digital input devices.

There are several choices of trigger sources. Select the item to display the detailed configuration options.

- Video motion detection—This option makes use of the built-in motion detection mechanism as a trigger source. To enable this function, you need to configure a Motion Detection Window first. For more information, see the [“Applications > Motion detection” section on page 5-38](#).
- Periodically—This option allows the camera to trigger periodically for every other defined minute. Up to 999 minutes are allowed.
- Digital input—This option allows the camera to use an external digital input device or sensor as a trigger source. Depending on your application, there are many choices with digital input devices on the market which help detect changes in temperature, vibration, sound, light, etc.
- System boot—This option triggers the camera when the power to the camera is disconnected and reconnected.
- Recording notify—This option allows the camera to trigger when the recording disk is full or when recording starts to overwrite older data.

- **Audio detection**—A preset threshold can be configured with an external microphone as the trigger to system event. The triggering condition can be an input exceeding or falling below a threshold. Audio detection can take place as a complement to motion detection or as a method to detect activities not covered by the camera's view.
- **Camera tampering detection**— This option allows the camera to trigger when the camera detects that is being tampered with. To enable this function, you need to configure the Tampering Detection option first. See the [“Applications > Tampering detection” section on page 5-40](#) for detailed information.
- **Manual Triggers**—This option allows you to enable event triggers manually by clicking the on/off button on the homepage. Configure one to three associated events before using this function.
- **VADP**—It is presumed that you already uploaded and enabled the Cisco APP Package modules before you can associate Cisco APP Package triggers with an Event setting.

Click on the **Set VADP Trigger** button to open the VADP triggers menu. The triggering conditions available with third-party software modules known as Cisco APP Packages will be listed. Use the arrow buttons to select these triggers. You may implant these modules for different purposes such as triggering motion detection, or applications related to video analysis, etc. See the [“Applications > Package management” section on page 5-42](#) for the configuration options with Cisco App Package modules.

Once the triggers are configured, they will be listed under the VADP option.

#### Action

Define the actions to be performed by the camera when a trigger is activated.

- **Trigger digital output for  $x$  seconds**—Select this option to turn on the external digital output device when a trigger is activated. Specify the length of the trigger interval in the text box.
- **Backup media if the network is disconnected**—Select this option to backup media file on SD card if the network is disconnected. This function will only be displayed after you set up a network storage (NAS). The media to back up can include snapshot images, video, or system logs depending on your event settings.

## Add server

It is necessary to configure the server and media settings so that the camera will know what action to take (such as which server to send the media files to) when a trigger is activated. Click **Add server** to open the server setting window. You can specify where the notification messages are sent to when a trigger is activated. A total of 5 server settings can be configured.

There are four choices of server types available: Email, FTP, HTTP, and Network storage. Select the item to display the detailed configuration options. You can configure either one or all of them.

#### Server type: Email

Select to send the media files via email when a trigger is activated.

- **Server name**—Enter a name for the server setting.
- **Sender email address**—Enter the email address of the sender.
- **Recipient email address**—Enter the email address of the recipient.
- **Server address**—Enter the domain name or IP address of the email server.
- **User name**—Enter the user name of the email account if necessary.

- Password—Enter the password of the email account if necessary.
- Server port—The default mail server port is set to 25. You can also manually set another port.

If your SMTP server requires a secure connection (SSL), select **This server requires a secure connection (SSL)**.

To verify if the email settings are correctly configured, click **Test**. The result will be shown in a pop-up window. If successful, you will also receive an email indicating the result.

Click **Save server** to enable the settings.

After you configure the first event server, the new event server will automatically display on the Server list. If you wish to add other server options, click **Add server**.

#### Server type: FTP

Select to send the media files to an FTP server when a trigger is activated.

- Server name—Enter a name for the server setting.
- Server address—Enter the domain name or IP address of the FTP server.
- Server port—By default, the FTP server port is set to 21. It can also be assigned to another port number between 1025 and 65535.
- User name—Enter the login name of the FTP account.
- Password—Enter the password of the FTP account.
- FTP folder name—Enter the folder where the media files will be placed. If the folder name does not exist, the camera will automatically create one on the FTP server.
- Passive mode—Most firewalls do not accept new connections initiated from external requests. If the FTP server supports passive mode, select this option to enable passive mode FTP and allow data transmission to pass through the firewall. The firmware default has the Passive mode check box selected.

To verify if the FTP settings are correctly configured, click **Test**. The result will be shown in a pop-up window. If successful, you will also receive a test.txt file on the FTP server.

Click **Save server** to enable the settings

#### Server type: HTTP

Select to send the media files to an HTTP server when a trigger is activated.

- Server name—Enter a name for the server setting.
- URL—Enter the URL of the HTTP server.
- User name—Enter the user name if necessary.
- Password—Enter the password if necessary.

To verify if the HTTP settings are correctly configured, click **Test**. The result will be shown in a pop-up window. If successful, you will receive a test.txt file on the HTTP server.

Click **Save server** to enable the settings.

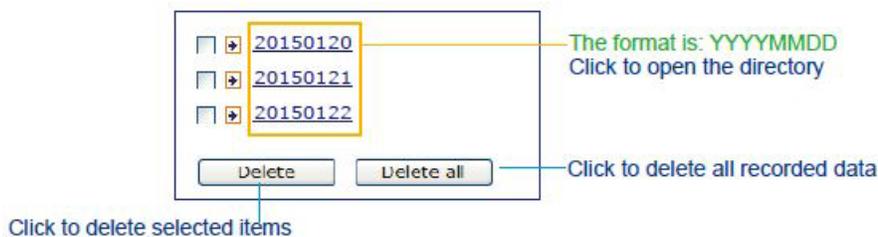
#### Network storage

Select to send the media files to a networked storage when a trigger is activated. See the [“Recording > Recording settings” section on page 42](#) for details. Only one NAS server can be configured. Click **Save server** to enable the settings.

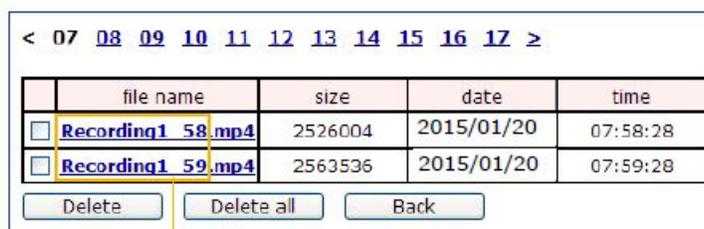
## Action

- **SD Test**—Click to test your SD card. The system will display a message indicating the result as a success or a failure. If you want to use your SD card for local storage, format it before use.
- **View**—Click this button to open a file list window. This function is only for SD card and Network Storage. If you click the View button for an SD card, a Local storage page will prompt so that you can manage the recorded files on SD card. For more information about Local storage, see the “[Local storage > SD card management](#)” section on page 5-44. If you click the View button for a Network storage, a file directory window will prompt for you to view recorded data on Network storage.
- **Create folders by date, time, and hour automatically**—If you select this item, the system will automatically create folders by the date when video footages are stored onto the networked storage.

The following is an example of a file destination with video clips:



Click 20150120 to open the directory:



The format is: File name prefix + Minute (mm)  
You can set up the file name prefix on Add media page.

## Add media

Click **Add media** to open the media setting window. You can specify the type of media that will be sent when a trigger is activated. A total of five media settings can be configured. There are three choices of media types available: Snapshot, Video Clip, and System log. Select the item to display the detailed configuration options. You can configure either one or all of them.

### Media type: Snapshot

Select to send snapshots when a trigger is activated.

- **Media name**—Enter a name for the media setting.
- **Source**—Select to take snapshots from any of the video streams.
- **Send  $x$  pre-event images**—The camera has a buffer to temporarily hold data up to a certain limit. Enter a number to decide how many images to capture before a trigger is activated. Up to 7 images can be generated.
- **Send  $x$  post-event images**—Enter a number to decide how many images to capture after a trigger is activated. Up to seven images can be generated. For example, if both the Send pre-event images and Send post-event images are set to 7, a total of 15 images can be generated after a trigger is activated.
- **File name prefix**—Enter the text that will be appended to the front of the file name.
- **Add date and time suffix to the file name**—Select this option to add a date/time suffix to the file name. The date and time suffix format is YYYYMMDD\_HHMMSS.

Click **Save media** to enable the settings.

After you set up the first media server, a new column for media server will automatically display on the Media list. If you wish to add more media options, click **Add media**.

### Media type: Video clip

Select to send video clips when a trigger is activated.

- **Media name**—Enter a name for the media setting.
- **Source**—Select a video stream as the source of video clip.
- **Pre-event recording**—The camera has a buffer to temporarily hold data up to a certain limit. Enter a number to decide the duration of recording before a trigger is activated. Up to 9 seconds can be set.
- **Maximum duration**—Specify the maximum recording duration in seconds. The duration can be 1 through 20 seconds. For example, if pre-event recording is set to five seconds and the maximum duration is set to ten seconds, the camera continues to record for another 4 seconds after a trigger is activated.
- **Maximum file size**—Specify the maximum file size allowed. You may need to stitch the video clips together when searching and packing up forensic evidence.
- **File name prefix**—Enter the text that will be appended to the front of the file name.

Click **Save media** to enable the settings.

### Media type: System log

Select to send a system log when a trigger is activated.

Click **Save media** to enable the settings, then click **Close** to exit the page.

In the Event settings column, the Servers and Medias you configured will be listed; make sure the Event -> Status is indicated as ON, in order to enable the event triggering action.

When completed, click the Save event button to enable the settings and click **Close** to exit Event Settings page. The new Event / Server settings / Media will appear in the event drop-down list on the Event setting page.

When the Event Status is ON, the event configuration above is triggered by motion detection, the camera will automatically send snapshots via e-mail.

If you want to stop the event trigger, you can click on the ON button to turn it to OFF status or click the **Delete** button to remove the event setting.

To remove a server setting from the list, select a server name from the drop-down list and click **Delete**. Note that you can only delete a server setting when it is not applied in an existing event setting.

To remove a media setting from the list, select a media name from the drop-down list and click **Delete**. You can only delete a media setting when it is not applied in an existing event setting.

## Customized Script

This function allows you to upload a sample script (.xml file) to the web page, which will save you time on configuring the settings. There is a limited number of customized scripts you can upload; if the current amount of customized scripts has reached the limit, an alert message will prompt.

## Applications > Motion detection

This section explains how to configure the camera to enable motion detection. A total of five motion detection windows can be configured.

To enable motion detection, follow these steps:

- 
- Step 1** Click **New** to add a new motion detection window.
  - Step 2** In the Window Name text box, enter a name for the motion detection window.  
Use 4 mouse clicks to designate a detection window. You can change the window shape by dragging the corner marks to a preferred location.  
Drag the item size tab to change the minimum size of item to trigger an alarm. An item size box will appear in the center of screen for your reference (in semi-transparent red). An intruding object must be larger than the Item size to trigger an alarm. Change the item size according to the live view.  
To delete a window, click the X mark on the right of the window name.
  - Step 3** Define the sensitivity to moving objects by moving the Sensitivity slide bar.  
A high sensitivity is prone to produce false alarms such as the fast changes of light (such as day/night mode switch, turning lights on/off). A movement must persist longer than 0.3 second for the motion to be detected.
  - Step 4** Click Save to enable the settings.
  - Step 5** Select **Enable motion detection** to enable this function.
- 

The Percentage Indicator will rise or fall depending on the variation between sequential images. When motions are detected by the camera and are considered to exceed the preset threshold, the red bar rises. Meanwhile, the motion detection window will be outlined in red.

Photos or videos can be captured instantly and configured to be sent to a remote server (via an Email or FTP server). For more information on how to configure an event setting, see the [“Event > Event settings” section on page 5-33](#).

A green bar indicates that even though motions have been detected, the event has not been triggered because the image variations still fall under the preset threshold

If you want to configure other motion detection settings for day/night/schedule mode (for example, for a different lighting condition), click **Profile** to open the Motion Detection Profile Settings page. Another three motion detection windows can be configured on this page.

To set up a profile, follow these steps:

- 
- Step 1** Create a new motion detection window.
  - Step 2** Click the **Profile mode** tab.
  - Step 3** Select the applicable Schedule mode. Manually enter a time range.
  - Step 4** Click **Save** to enable the settings and click Close to exit the page.
- 

This motion detection window will also be displayed on the Event Settings page. You can go to **Event > Event settings > Add Event > Trigger** to select it as a trigger source. See the [“Event > Event settings” procedure on page 5-33](#) for detailed information.

## How does Motion Detection Work?

There are two motion detection parameters: Sensitivity and Min. Item Size. Sensitivity is a value that expresses the sensitivity to moving objects. A higher sensitivity setting allows camera to detect slight movements while a lower sensitivity setting will neglect them.

The minimum item size is a threshold value that determines how many “alerted pixels” can trigger an event. When the size of an intruding object is larger than the minimum size, and its movement persist for 0.3 second, the motion is judged to exceed the defined threshold; and the motion window will be outlined in red. With a large minimum item size, the size of moving object is considered as smaller than the minimum item size, no motion alarm is triggered. With a smaller minimum item size, the same moving object triggers the alarm.

For applications that require a high level of security management, it is suggested to use higher sensitivity settings. However, a higher sensitivity level can also produce false alarms due to fast light changes when switching between the day and night modes, AE switch, turning the light on or off, etc.

## Applications > DI and DO

- Digital input—Select High or Low as the Normal status for the digital input. Connect the digital input pin of the camera to an external device to detect the current connection status.
- Digital output—Select Grounded or Open to define the normal status for the digital output. Connect the digital output pin of the camera to an external device to determine the current status.

Set up the event source as DI on Event > Event settings Add Event > Trigger. See the [“Event > Event settings” section on page 5-33](#) for detailed information.

## Applications > Tampering detection

This section explains how to set up camera tamper detection. With tamper detection, the camera is capable of detecting incidents such as redirection, blocking or defocusing, or even spray paint.

To set up the camera tamper detection function, follow these steps:

---

**Step 1** Click to select the check box before tampering conditions: Tampering detection, Image too dark, Image too bright, and Image too blurry, then enter the tamper trigger duration (10 sec. ~ 10 min.).

The tamper alarm will be triggered only when the tampering factor (the difference between current frame and pre-saved background) exceeds the trigger threshold. Conditions such as image too dark, too bright, or too blurry (defocused) can also be configured as tampering conditions. The Trigger threshold determines how sensitive your is tamper detection setting.

- Too bright—Shining a flashlight. The average lighting level of the scene is taken into consideration.
- Too dark—Covering the objective or spraying paint.
- Too blurry—Blurry scene can be the result of strong interference on the device, such as EMI interference.

**Step 2** You can configure Tampering Detection as a trigger element to the proactive event configurations in Event -> Event settings -> Trigger.

For example, when the camera is tampered with, camera can be configured to send the pre- and post-event video clips to a networked storage device. See the [“Event > Event settings” section on page 5-33](#) for detailed information.

---

## Applications > Audio detection

Audio detection, along with video motion detection, is applicable in the following scenarios:

- 1. Detection of activities not covered by camera view, for example, a loud input by gun shots or breaking a door/window.
- A usually noisy environment, such as a factory, suddenly becomes quiet due to a breakdown of machines.
- A PTZ camera can be directed to turn to a preset point by the occurrence of audio events.
- Dark environments where video motion detection may not function well.

In the example shown in [Figure 5-7](#), the red circles indicate where the audio alarms can be triggered when breaching or falling below the preset threshold.

Figure 5-7 Audio Detection



To configure audio detection, follow these steps:

- 
- Step 1** Once the Audio detection window is opened, the current sound input will be interactively indicated by a fluctuating yellow wave diagram.
- Step 2** Use a mouse click to drag the Alarm level tab to a preferred location on the slide bar.
- Step 3** Select the **Enable audio detection** check box and click **Save** to enable the feature.
- 

**Note**

- The volume numbers (0~100) on the side of wave diagram does not represent decibel (dB). Sound intensity level has already been mapped to preset values. You can, however, use the real-world inputs at your installation site that are shown on the wave diagram to configure an alarm level.
  - To configure this feature, you must not mute the audio in Configuration > Media > Audio. The default of the camera can be muted due to the lack of an internal microphone. An external microphone is provided by users.
- 

You can use the Profile window to configure a different Audio detection setting. For example, a place can be noisy in the day time and become very quiet in the night. To make this configuration, follow these steps:

- 
- Step 1** Click on the **Enable this profile** check box.
- Once the Audio detection window is opened, the current sound input will be interactively indicated by a fluctuating yellow wave diagram.

- Step 2** Use a mouse click to drag the Alarm level tab to a preferred location on the slide bar.
- Step 3** Select the Day, Night, or Schedule mode check circles.  
You may also manually configure a period of time during which this profile will take effect.
- Step 4** Click **Save** and then click **Close** to complete your configuration.

---

If the Alarm level and the received volume are set within a range of 20% on the wave diagram, frequent alarms will be triggered. It is recommended to set the Alarm level farther apart from the detected sound level.

To configure and enable this feature, you must not configure video stream #1 into Motion JPEG. If an external microphone input is connected and recording of audio stream is preferred, audio stream is transmitted between camera and viewer/recording station along with stream #1.

See the “[Media > Audio](#)” section on page 5-19 for audio settings and the “[Media > Video](#)” section on page 5-14 for video streaming settings.

## Applications > Package management

You can store and execute Cisco or 3rd-party software modules onto the camera's flash memory or SD card. These software modules can apply in video analysis for intelligent video applications such as license plate recognition, object counting, or as an agent for edge recording, etc.

- Once the software package is successfully uploaded, the module configuration (vadp. xml) information is displayed. When uploading a module, the camera will examine whether the module fits the predefined Cisco APP package requirements. Contact Cisco or the vendor of your 3rd-party module for the parameters contained within.
- You can also run Cisco APP package packages as a means to access updated functionality instead of replacing the entire firmware.
- For some cameras the flash is too small to hold Cisco APP package packages. These cameras will have its Save to SD card check box selected and grayed-out for all time.
- The file system of SD card (FAT32) does not support soft (symbolic) link. It will return failure if your module tries to create soft links on SD card.

To utilize a software module, acquire the software package and click **Browse** and **Upload** buttons.

To start a module, select the radio button in front, and click the **Start** button.

If you should need to remove a module, select the radio button in front and then click the **Stop** button. By then the module status will become OFF, and the X button will appear at the end of the row. Click on the **X** button to remove an existing module.

When prompted by a confirm message, click **Yes** to proceed.

That the actual memory consumed while operating the module will be indicated on the Memory status field. This helps determine whether a running module has consumed too much of system resources.

## Recording > Recording settings

This section explains how to configure the recording settings for the camera.

## Recording Settings

Insert your SD card and click **SD test** to test



### Note

Remember to format your SD card via the camera's web console (in the Local storage SD card management page) when using it for the first time. See the [“Local storage > SD card management” section on page 5-44](#) for detailed information.

Click **Add** to open the recording setting window. On this page, you can define the adaptive recording, recording source, recording schedule, and recording capacity. A total of 2 recording settings can be configured.

- Recording name—Enter a name for the recording setting.
- Enable this recording—Select this option to enable video recording.
- With adaptive recording—Select this option will activate the frame rate control according to alarm trigger. The frame control means that when there is a triggered alarm, the frame rate will raise up to the value you configured on the Video quality page. See the [“Media > Video” section on page 5-14](#) for more information.

If you enable adaptive recording on a camera, only when an event is triggered on Camera A will the server record the full frame rate streaming data; otherwise, it will only request the I frame data during normal monitoring, thus effectively saves bandwidths and storage space.



### Note

To enable adaptive recording, make sure you have set up the trigger source such as Motion Detection, DI Device, or Manual Trigger.

When there is no alarm trigger:

- JPEG mode: record 1 frame per second
- H.264 or H.265 mode: record the I frame only

When the I frame period is >1s on Video settings page, firmware will force decrease the I frame period to 1s when adaptive recording is enabled.

The alarm trigger includes: motion detection and DI detection. See the [“Event > Event settings” section on page 5-33](#).

- Pre-event recording and post-event recording—The camera has a buffer that temporarily holds data for a period of time. Therefore, when an event occurs, the camera can retrieve image frames taken several seconds ago. Enter a number to define the duration of recording before and after a trigger is activated.
- Priority—Select the relative importance of this recording (High, Normal, or Low). Recording with a higher priority setting will be executed first.
- Source—Select a video stream as the recording source.

To enable recording notification configure Event settings first. See the [“Event > Event settings” section on page 5-33](#).

Follow these steps to set up recording:

1. Trigger: Select a trigger source.
  - Schedule—The server will start to record files on the local storage or network storage (NAS).

- Network fail—Since network fail, the server will start to record files on the local storage (SD card).
2. Destination: You can select the SD card or network storage (NAS) for the recorded video files. If you have not configured a NAS server, see the following steps.

#### NAS server

1. Click **Add NAS** server to open the server setting window.
2. Fill in the information for your server.
  - In the Network storage location field, enter the network storage path in the format `\\server_name` or `IP_address\folder_name`
  - In the Username and password field, enter information for your server
3. Click **Test** to check the setting. The result will be shown in a pop-up window. If successful, you will receive a test.txt file on the network storage server.
4. Enter a server name.
5. Click **Save** to complete the settings and click Close to exit the page.
  - Capacity—You can choose either the entire free space available or limit the reserved space. The recording size limitation must be larger than the reserved amount for cyclic recording.
  - Enable cyclic recording—If you check this item, when the maximum capacity is reached, the oldest file will be overwritten by the latest one. The reserved amount is reserved for the transaction stage when the storage space is about to be full and new data arrives. The minimum for the Reserved space must be larger than 15 MB.
  - Recording file management—You can manually assign the Maximum duration and the Maximum file size for each recording footage. You may need to stitch individual files together under some circumstances. You may also designate a file name prefix by filling in the responsive text field.
  - File name prefix—Enter the text that will be appended to the front of the file name.

If you want to enable recording notification, click **Event** to configure event triggering settings. See the “[Event > Event settings](#)” section on page 5-33 for more details.

When completed, select **Enable this recording**. Click **Save** to enable the setting and click Close to exit this page. When the system begins recording, it will send the recorded files to the network storage. The new recording name will appear in the drop-down list on the recording page.

To remove a recording setting from the list, select a recording name from the drop-down list and click **Delete**.

- Click recording (Name)—Opens the Recording Settings page to modify.
- Click ON (Status)—The Status will become OFF and stop recording.
- Click NAS (Destination)—Opens the file list of recordings. For more information about folder naming rules, see the “[Add server](#)” section on page 5-34.

## Local storage > SD card management



#### Note

- It is recommended to turn OFF the recording activity before you remove an SD card from the camera.
- The lifespan of an SD card is limited. Regular replacement of the SD card can be necessary.

- Camera file system takes up several megabytes of memory space. The storage space cannot be used for recording.
  - An SD card that already contains data recorded by another device should not be used in this camera.
  - Do not modify or change the folder names in the SD card. That may result in camera malfunctions.
- 

This section explains how to manage the local storage on the camera. Here you can view SD card status, and implement SD card control.

## SD card status

This column shows the status and reserved space of your SD card. Remember to format the SD card when using for the first time. If the SD card status field shows “Detached,” there is no SD card.

## SD card format

The SD card format FAT32 or Ext4 is applied to SD cards up to 32GB. For SD cards larger 32GB, only the Ext4 file format is applied. If EXT4 is applied, the computers running Windows will not be able to access the contents on the SD card unless using some 3rd-party software.

## SD card control

- Enable cyclic storage—Check this item if you want to enable cyclic recording. When the maximum capacity is reached, the oldest file will be overwritten by the latest one.
- Enable automatic disk cleanup—Check this item and enter the number of days you wish to retain a file. For example, if you enter “7 days,” the recorded files will be stored on the SD card for 7 days.

Click *Save* to enable your settings.

# Local storage > Content management

This section explains how to manage the content of recorded videos on the camera. Here you can search and view the records and view the searched results.

## Searching and Viewing the Records

This column allows the user to set up search criteria for recorded data. If you do not select any criteria and click Search button, all recorded data will be listed in the Search Results column.

- File attributes—Select one or more items as your search criteria.
- Trigger time—Manually enter the time range you want to search for contents created at a specific point in time.

Click **Search** and the recorded data corresponding to the search criteria will be listed in Search Results window.

## Search Results

The Search results window includes four columns: Trigger time, Media type, Trigger type, and Locked. From the drop-down list at the bottom left, choose the number of entries to be displayed on one page.

- **Play**—Click on a search result which will highlight the selected item. A Play window will appear on top for immediate review of the selected file.
- **Download**—Click on a search result to highlight the selected item in purple. Then click the Download button and a file download window will pop up for you to save the file.
- **JPEGs to AVI**—This functions only applies to JPEG format files such as snapshots. You can select several snapshots from the list, then click this button. Those snapshots will be converted into an AVI file.
- **Lock/Unlock**—Select the check box in front of a desired search result, then click this button. The selected items will become Locked, which will not be deleted during cyclic recording. You can click again to unlock the selections.
- **Remove**—Select the desired search results, then click this button to delete the files.