



USER MANUAL

Megapixel IP Cameras and AV100 Video System Software

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Chapter I - Introduction

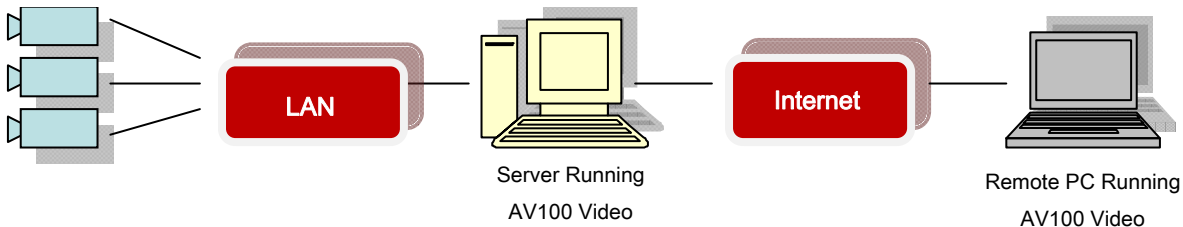
Product Overview

Arecont Vision offers AV100, a full-featured video surveillance software system, to complement its line of megapixel IP cameras. AV100 supports full-motion, real-time, multi-camera viewing and policy-based archiving, remote access to live and archived video via Internet Explorer, post-event zooming from digital archives, simultaneous viewing of full-field of view and multiple zoomed images and a multitude of other features that take advantage of unique functionality and performance of Arecont Vision cameras.

A typical system consists of a number of cameras connected over a local or wide area network to a server PC which is running the AV100 software. To achieve full motion archival rate, the server may be placed locally to the cameras so that the interconnecting LAN has sufficient bandwidth and a small roundtrip delay between the cameras and the server PC.

Alternatively, a remote PC can connect to a Server PC over a slower network connection, such as Internet. Once connected, the remote PC can display the live video stream and browse archives using Internet Explorer. Note that when connected to the AV100 software, the remote PC does not connect to the cameras directly. Rather, the remote PC connects to the server PC on which AV100 is running.

Figure1. System Configuration including a remote PC.



Product Contents

The AV Megapixel Camera system packaging consists of the following:

- Arecont Vision camera(s)
- CD with AV100 software

Inspect the package and its contents for visible damage. If any components are damaged or missing, do not use the unit; contact the supplier immediately. If you need to return the unit, you must ship it in the original box.

Server Requirements

We recommend a dedicated PC to receive the image streams from cameras for archiving and display. The suggested minimum computer requirements are detailed for standard and high performance installations.

Standard Performance

24fps at full resolution for an AV2100:

- CPU: Core 2 Duo 2Ghz
- RAM: 1 GB
- Video Card: NVIDIA, 128 MB RAM
- Network card: 100 base-T, 2 network cards – one for cameras and one for remote viewing

A PC with a single, slower CPU is sufficient in the case when images are to be archived, but not viewed live. HDD size depends according to the desired capacity of the video archives (approximately 200Kbytes/image). As an example, two 400GB drives will yield approximately 6 days of archiving capacity for an 8 camera system recording at 1 frame per second in JPEG mode, or over 30 days recording in h.264 mode.

Network PoE Switch or PoE Router

Using a 100 Mbps Ethernet Switch with PoE ports or a Router with PoE ports is recommended. A gigabit Ethernet Switch with PoE ports for multiple camera connections is highly recommended, especially in the case of a multi-camera installation. Simple hubs do not provide collision management and are not suitable for a multi-camera AV system.

Suggested models:

- Netgear ProSafe 8PT 100Base-TX Switch with PoE #FS108PNA, 10/100Base-TX w/4 PoE 100Base-TX (www.netgear.com)
- Netgear ProSafe 24+2 Gigabit Switch with PoE, 1 Gigabit output w/12 PoE, 100Base-TX (www.netgear.com)
- D-Link Web Smart #DES-1316 (POE Switch/Hub)10/100Base-TX, 8 PoE ports and 8 non-PoE ports, True IEEE 802.3af (www.compuplus.com)
- TRENDnet #TPE-S88 (POE Switch/Hub, www.trendnet.com) 10/100Base-TX 8 PoE ports and 8 non-PoE ports, True IEEE 802.3af (www.provantage.com)

- PowerDsine #PD-6001/AC (PoE Single port hub, www.powerdsine.com)
10/100Base-TX, Single Midspan POE port, True IEEE 802.3af (www.provantage.com)

PoE network equipment must be CE marked for use in European Community. Note that the cameras are designed for use with indoor network cabling only.

Recommended Accessories

We recommend the following monitors:

- Dell UltraSharp 2405FPW
24-inch Wide Aspect Flat Panel LCD Monitor with Height Adjustable Stand
(www.dell.com)
- Samsung's 243T, 24 Inch LCD Display (www.samsung.com)

Please note that the AV100 software requires a resolution of 1600x1200 or greater in order to properly display all the on screen menus.

Camera Reference

AV1300/1305/1355, AV2100/2105/2155, AV3100/3105/3155, AV3130, AV5100/5105/5155, AV8180/8185 and AV8360/8365 are megapixel resolution IP cameras capable of delivering crisp, low-noise images at video frame rate.

AV1300/1305/1355 is a 1.3-megapixel resolution camera with a maximum resolution of 1280 by 1024, achieving a maximum frame rate of 30 fps. AV1300 supports MJPEG compression only. AV1305/1355 supports both MJPEG and H.264 (MPEG4 Part 10) compression. AV1355 is a dome camera.

AV2100/2105 is a 2-megapixel resolution camera with a maximum resolution of 1600 by 1200, achieving a maximum frame rate of 24 fps. AV2100 supports MJPEG compression only. AV2105/2155 supports both MJPEG and H.264 (MPEG4 Part 10) compression. AV2155 is a dome camera

AV3100/3105 is a 3-megapixel resolution camera with a maximum resolution is 2048 by 1536. AV3100 is typically viewed at 1920 by 1200 resolution with a frame rate of up to 20 fps. AV3100/3105 supports MJPEG compression only. AV3105 supports both MJPEG and H.264 (MPEG4 Part 10) compression. AV3155 is a dome camera

AV3130 is a dual-sensor, day-night camera featuring a 3-megapixel color sensor paired with a 1.3-megapixel monochrome sensor sensitive to near infrared illumination. When the scene is well illuminated the 3-megapixel sensor is selected to deliver color images of up to 2048x1536 pixels. To provide seamless transition between day and night modes the color sensor is set to default resolution of 1920x1200 pixels. In low-light conditions AV3130 can automatically switch to the 1.3-megapixel (1280x1024) monochrome sensor, enabling the delivery of clear imagery at illumination levels as low as 0.00 lux (infrared only). AV3130 typically delivers 20 fps in day mode at 1920x1200 and over 30 fps in night mode.

AV5100/5105 is a 5-megapixel resolution camera. Its maximum resolution is 2592 by 1944. AV5100 is typically viewed at 2560 by 1600 resolution with the frame rate up to 12 fps. AV5100 supports MJPEG compression only. AV5105/5155 supports both MJPEG and H.264 (MPEG4 Part 10) compression. AV5155 is a dome camera

AV8180/8185 is a quad-sensor 8-megapixel camera consisting of four 2-megapixel sensors operating at up to 22 fps at 1600 by 1200 resolution. It is capable of providing 180 degree field of view. AV8185 supports both MJPEG and H.264 (MPEG4 Part 10) compression.

AV8360/8365 is a quad-sensor 8-megapixel panoramic camera consisting of four 2-megapixel sensors and operating at up to 22 fps at 1600 by 1200 resolution. It is capable of providing 360 degree field of view. AV8365 supports both MJPEG and H.264 (MPEG4 Part 10) compression.

All cameras are equipped with a LAN connector and can deliver image data at a maximum data rate of up to 70 Mbps. Images are sent over the network using TFTP, HTTP and RTSP/RTP (available for H.264 camera models only) protocols.

All cameras feature:

- Automatic Exposure (AE) and Gain (AGC) control
- Automatic backlight compensation
- Automatic multi-matrix white balance
- 50/60Hz selectable flicker control
- Electronic Zoom, Pan and Tilt (PTZ)
- Programmable brightness, saturation, gamma, sharpness, windowing and decimation
- Simultaneous delivery of full-field view and zoomed images at video frame rate
- Up to eight simultaneous connections per camera
- Electronic image rotation by 180 degrees

- On board motion detection
- Optional auto iris
- Optional day/night IR switching filter

Connectors

All AV Megapixel cameras have the following connectors located on the rear panel of the camera housing:

- LAN connector, accepting a network UTP or STP cable carrying 100 Base-T. The LAN connector also accepts Power-over-Ethernet (PoE).
- Power terminals: please refer to enclosed documentation and product labeling for specific power options:
 - accepting 15V-48V DC supply
 - accepting 12V-48V DC and 24V AC supply
- Optionally, a DC auto-iris connector. AV3130 does not support auto-iris and does not have this connector.
- Auxiliary input and output connector

Power

Power for all AV cameras can be supplied as follows:

- Via LAN connector according to IEEE 802.3af (PoE). For a list of recommended PoE switches, see "Network PoE Switch or Router PoE" on page 7.
- Via an auxiliary power jack.

Power consumption will vary depending on the mode of operation. The maximum power consumption takes place when the camera is streaming video at a maximum frame rate and at full resolution.

The maximum power consumption is:

- AV1300, AV2100, AV3100, AV5100 -- 3 W
- AV1305, AV2105, AV3105, AV5105 -- 4 W
- AV1355, AV2155, AV3155, AV5155 -- 5 W
- AV3130 -- 3.2 W
- AV8180, AV8360 -- 7.8 W
- AV8185, AV8365 -- 8.0 W

Housing and Mounting

All AV camera models feature a durable aluminum housing that minimizes fire hazards. The housing is not hermetically sealed. The ambient temperature should be maintained between 0°C and 50°C (32°F to 122°F). Cameras used outdoors require appropriate protective enclosures.

Cameras are mounted using a ¼" x 20 threaded hole on the bottom of the housing. When mounting the camera, make sure that the mounting screw is no longer than ¼". The cameras are to be installed according to the applicable code and regulations. The mounting hardware should be able to support 1 lb camera (except AV8360 that weights 4lbs).

Model AV3130 requires a 3" enclosure window; all other cameras can use most any outdoor housing.

Network Cabling

Category 5e cabling or better is recommended. All network cabling must be installed according to applicable codes and regulations.

Manual and Auto-Iris lenses

All AV cameras should be used with a 1/2" or 2/3" megapixel-resolution lenses. AV3130 requires two manual iris lenses and has a limitation on lens diameter (<38mm). AV8360 is supplied with 4 preinstalled 4mm high-quality megapixel-resolution lenses.

Manual Iris Lenses

A wide variety of C/CS mount lenses with megapixel resolution may be used with AV cameras. Note that all C-mount lenses require a 5mm adaptor ring. Additionally, some lenses may also require 0.4mm-0.8mm adjustment spacers.

Arecont Vision lens suggestions include:

- Arecont LENS4-10 (4mm -10mm)
- Computar H0514-MP (5mm), M0814-MP (8mm), M1214-MP (12mm), M1614-MP (16mm), M2514-MP (25mm), M5018-MP (50mm), HG2Z0414FC-MP (4mm - 8mm), M3Z1228C-MP (12mm - 36mm)
- Fujinon HF12.5SA-1 (12.5mm), Fujinon HF16SA-1 (16mm), Fujinon HF25SA-1 (25mm), HF35SA-1 (35mm), Fujinon HF50SA-1 (50mm), Fujinon HF75SA-1 (75mm)
- Fujinon DF6HA-1B (6mm), HF9HA-1B (9mm), HF12.5HA-1B (12.5mm), HF16HA-1B (16mm), HF25HA-1B (25mm), HF35HA-1B (35mm), HF50HA-1B (50mm), HF75HA-1B (75mm)
- Tamron 12VM1040ASI (10mm - 40mm)

Using Manual Iris Lenses

Choosing the lens correctly is very important for megapixel cameras. Poorly selected lenses may cause the image to appear blurry when the lens iris is fully open or closed too much.

To deliver sharp megapixel resolution images, it is recommended to:

- Use megapixel-resolution lenses
- Obtain best resolution and depth of focus by having the iris slightly closed

When setting up the camera, direct the camera at the scene, fully open the iris, and then try closing the iris slightly. At some point the image will look it's sharpest. However, do not close down the iris too much to the point where the image becomes too noisy due to insufficient light.

Auto-Iris Lenses

Standard DC auto-iris lenses can be used with AV1300AI, AV2100AI, AV3100AI, AV5100AI, AV1305AI, AV2105AI, AV3105AI and AV5105AI (cameras equipped with the auto-iris feature).

Arecont Vision recommends the following high-resolution optics:

- Computar HG2Z0414FC-MP 4mm-8mm
- Tamron 12VM412ASIR-SQ 4mm-12mm
- Tamron 12VG1040ASIR-SQ 10mm-40mm

Using Auto-Iris Lenses

AV1300AI, AV2100AI, AV3100AI, and AV5100AI are available with DC auto-iris option.

To use the DC auto-iris lens:

- Attach the lens to the AV camera.
- Plug in the lens cable into the connector on the back of the camera. Make sure that the lens cable is long enough. Many DC lenses are available with short and long cable options.

The camera will automatically detect the presence of an auto-iris DC lens and start using it.

An auto-iris lens typically operates as follows:

- If illumination is sufficient, the camera will partially close the iris within half a minute.
- When the iris is partially closed, the image should become visibly sharper. As the iris is gradually closed the image brightness may fluctuate slightly.

Monitoring Auto-Iris Status with AV100 Video System

You can monitor the state of the auto-iris in AV100 Video System "Settings" dialog (see "Operating AV100 Video System" on pg. 23 for details).

Accessing AV Cameras

AV Cameras can be accessed and controlled by means of:

- AV100 Video System software
- Third-party software utilizing Arecont Vision SDK (Software Developer Kit)
- HTTP requests issued from Microsoft Internet Explorer, Mozilla Firefox and other web browsers
- RTSP/RTP-capable media players, such as Apple QuickTime, VLC or other third party RTSP/RTP software (for camera models supporting H.264 compression).

Chapter II - AV100 Video Surveillance Software

Software Installation

To install AV100 video surveillance software:

1. Make sure your Windows XP/Vista account has Administrative privileges.
2. Open “Control Panel\Add or Remove Programs”, remove old versions of AV100 Video System software if any. There may be issues installing a newer version of AV100 over an older version so make sure any older versions are removed prior to installing the newest version.
3. Turn off all Anti-Virus Software and Windows Firewall.
4. Run Setup.exe and follow the directions to complete the installation.
5. Under Windows Vista, users must navigate to the installation directory, then open C:\ProgramFile\ArecontVision\VideoSurveillance\AVInstaller.exe (type choose Application). Right-click on this file named “AVInstaller.exe”, choose “Properties -> Compatibility -> Privilege Level” and enable the “Run this program as an administrator” option.

The setup process installs the software and places a shortcut “Arecont Vision Application Manager” on the desktop and creates a group named “Arecont Vision/AV Video System” in the Start menu.

Configure Firewall

As you start AV applications, your PC may prompt you to permit access to the network.

AV100 Video System includes two applications that need access to the network:

- AVInstaller.exe: the camera finding and installation program
- LocalMachine.exe: the viewing and archiving program

Both executables are located in the AV100 installation folder. You should grant access to these two applications when the firewall prompts you.

For example:

For older version of Norton Internet Security

Select **Permit Always** and click **Ok**.

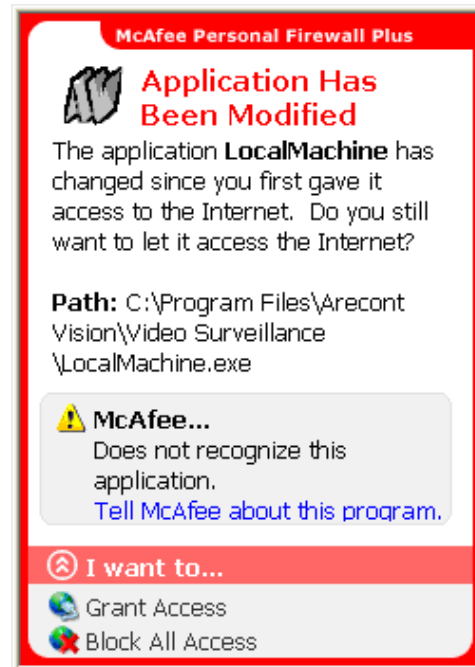
Figure 2. Older version of Norton Internet Security



For McAfee Personal Firewall

Click **Grant Access**.

McAfee Personal Firewall Plus



For newer versions of Norton Internet Security (Figure 3), go to **Settings->Personal Firewall** (under Web Browsing) and select Turn Off.

Figure 3. Newer version of Norton Internet Security



If you are using Windows XP firewall, follow these instructions:

1. Click the Windows **Start** button and select **Control Panel>Windows firewall**.
2. The Windows Firewall settings dialog will appear. If the firewall is on, make sure “Don’t allow exceptions” is unchecked (Figure 5).
3. Click the “Exceptions” tab. Make sure “AV Manager”, “AV Video System” and “AV Installer” appear in the list of programs and services and have a checkmark next to them (Figure 6). If these applications are not in the list, click **Add Program** button.
4. Find “AV Installer” in the list of programs and click **Ok**. Repeat the same steps for “AV Video System”.
5. Click **Ok** to close the Windows Firewall dialog.

Figure 5. Windows Firewall General Tab

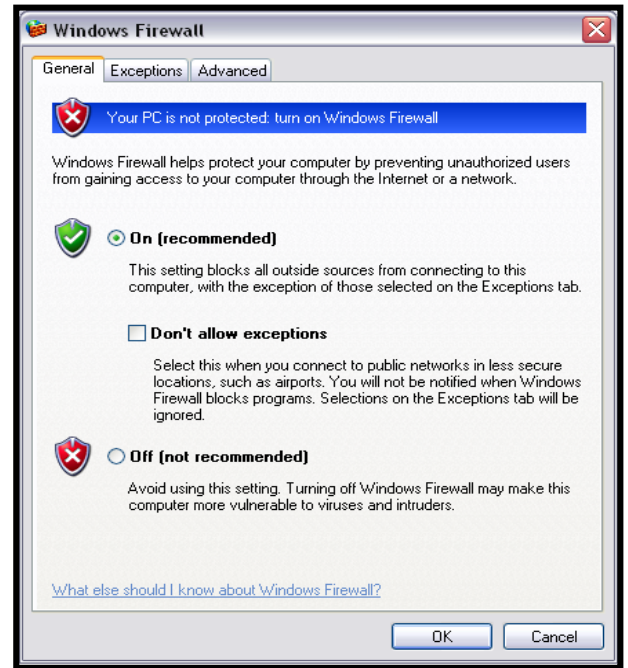


Figure 7. Exceptions Tab

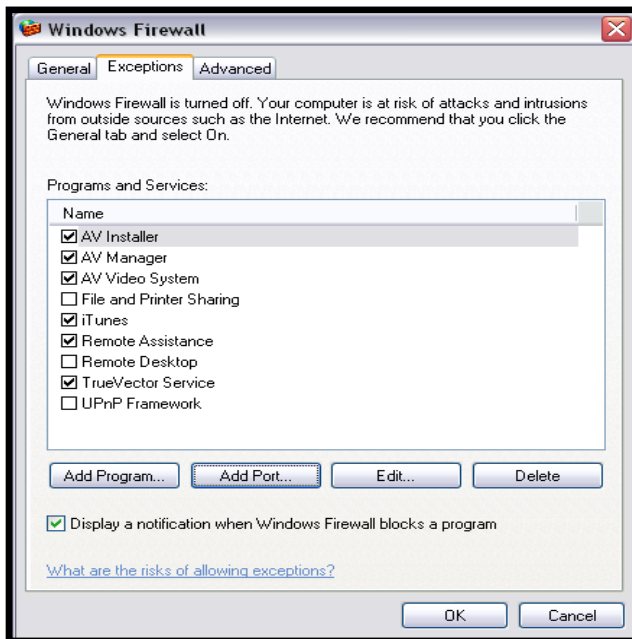
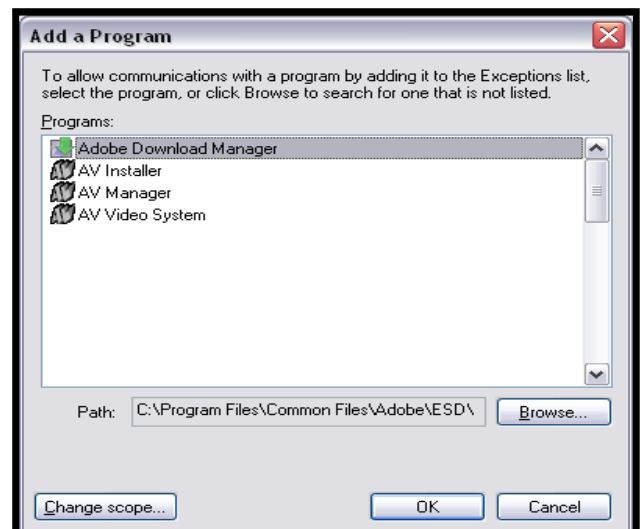


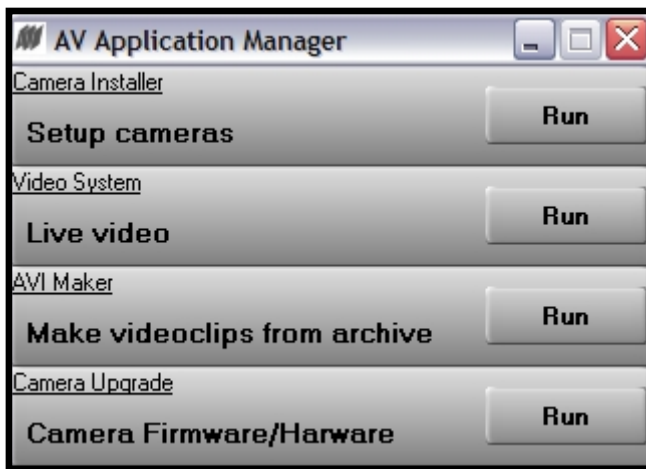
Figure 6. Add a program



AV Application Manager

After the software installation is complete, a shortcut to the AV Application Manager will appear on the user's Desktop. All programs and utilities comprising the AV100 Video System can be launched from the AV Application Manager. By default, the installation will include the Camera Installer, Video System, and AVI Maker. The optional Firmware Loader is not included in the installation, but is available upon request. It will appear in the Application Manager as shown below (figure 8) by placing the FirmwareLoader.exe in "**Arecont Vision\Video Surveillance**" folder (C:\Program Files\Arecont Vision\Video Surveillance).

Figure 8. Application manager



The AV Application Manager selections include:

- Camera Installer** - setup cameras (see pg.15).
- Video System** - watch live video (see pg.19).
- AVI Maker** - make video clips from archive (see pg.42).
- Camera Upgrade** - upgrade cameras (see pg.46).

Camera Installer

The Camera Installer is a utility for discovering AV cameras that are present on the local area network and assigning IP addresses to the cameras. The assigned IP address is stored on camera, and maintained when the power is off. The camera's IP can only be changed through one of the following methods: via the Camera Installer, via 3rd party software, via a web browser using the camera's webpage, or via a HTTP command. There are two supported modes of operation of the Camera Installer – Basic and Advanced. To start the Camera Installer press the Run button under **Camera Installer**.

Basic Mode

In basic mode, the camera Installer detects all AV cameras that can be reached by a broadcast request sent over the network by the computer running the Camera Installer. It automatically assigns IP addresses to these detected cameras, selecting addresses that belong to the same sub-network as the computer running the camera Installer and those which are not assigned to other network devices. To detect and install the cameras automatically, click on "Install Cameras". The installer will detect any cameras, configure their IPs and verify their operability. Once the installation is complete, the list of newly installed cameras will appear in the top panel with the result "Installed, online". This list can be sorted by the MAC address or IP address by clicking on the respective column name. The list may also include previously installed cameras which may be listed as "Installed, online" or "Installed, offline", depending on whether the camera is still accessible. The installer offers a lock mechanism to protect previously installed cameras (if any) from accidental changes of their IP address. To change the IP address manually, or type in a description of the camera (which will be stored on camera), double click on the IP address of the camera and make the changes. Press the **Save/Exit** button to save the installation information and exit the Camera Installer.

Figure 9. Basic mode

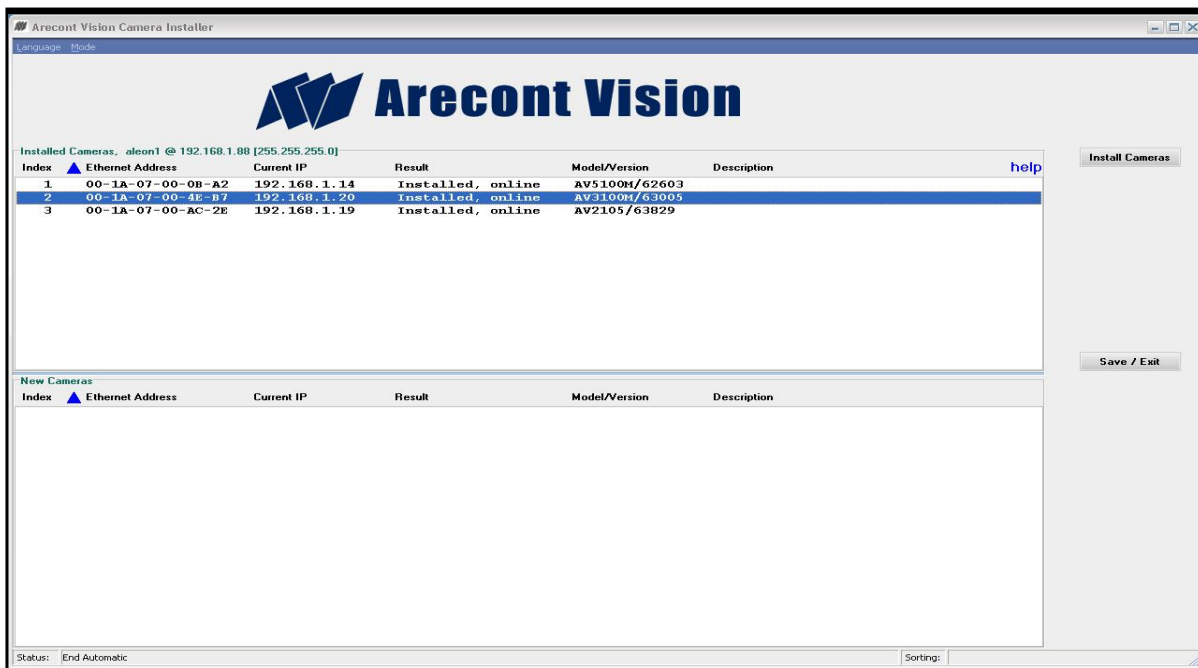
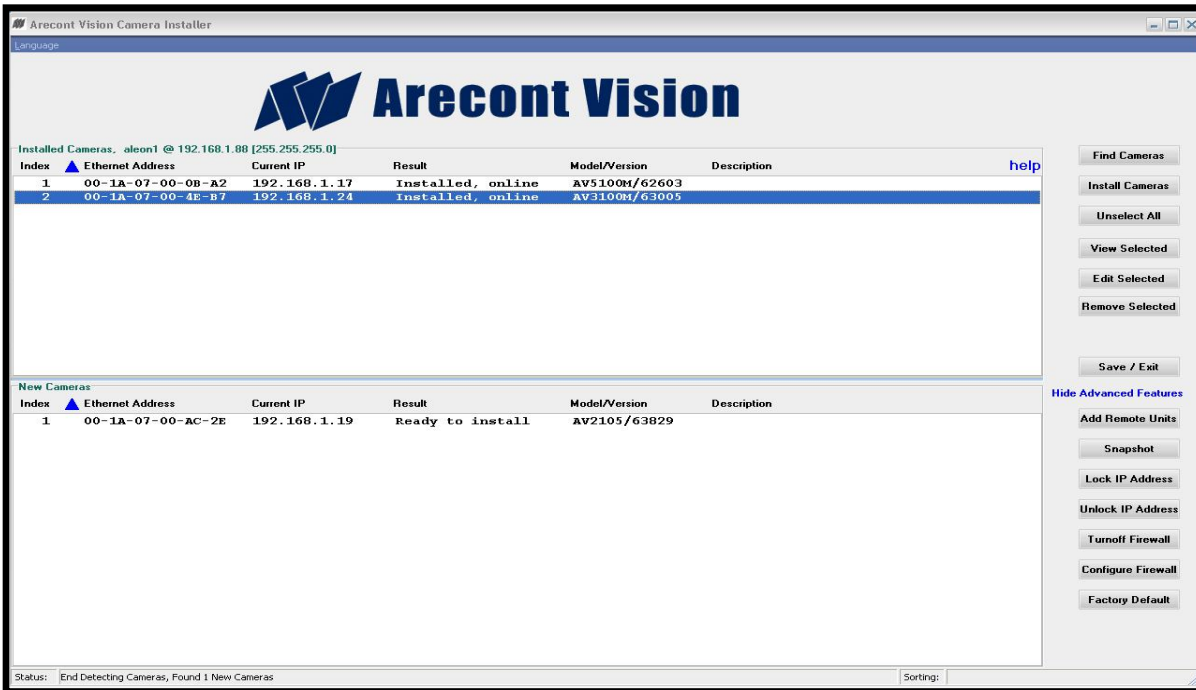


Figure 10. Advanced mode



Advanced Mode

In advanced mode the user has the ability to manually control which cameras are installed, in contrast with the basic mode where the installation is performed automatically. In the advanced mode the installer offers a mechanism to protect previously installed cameras, if any, from accidental changes of their IP address. To access **Advanced Mode** on your menu bar select **Mode**, then select **Advanced**. The Advanced Features can be displayed by clicking on **Show Advanced Features**. To hide these options click “Show Advanced” again (Figure 10).

Find Cameras

The “Advanced” mode provides the following Camera Installer functions:

This function searches for all AV cameras that are present on the local network, and are accessible by the broadcast request sent over the network by the Camera Installer. The top panel will list the previously installed cameras, if any, that may be marked as “Installed, online” or “Installed, offline”; depending on whether the camera is still accessible. The bottom panel will list any newly detected cameras that were not previously installed, with the result “Ready to install”.

Install Selected

This function installs any cameras highlighted by the user in the bottom panel and verifies their operation in a similar way to the Install Cameras function in Basic mode. After the installation process is completed, the installed cameras will appear in the top panel, while any cameras that were not highlighted will remain uninstalled in the bottom panel. If no cameras were selected, the Installer will do nothing. The IP addresses of the installed cameras in the top panel will not be changed during the installation of the new cameras from the bottom panel. If the IP address of an installed camera was changed by another computer on the network, the Installer will display red alert message showing the previous and the changed IP address. Click "Save/Exit" to save any newly installed cameras.

Unselect All

Deselect all highlighted cameras.

View Selected

Opens a web-browser to view live video from the selected camera and configure the camera settings using its webpage interface. This also allows for camera setting configuration using the camera's web page interface.

TIP: Double-clicking the selected camera in "Result" or "Model/Version" column has the same effect.

Edit Selected

Opens an **Advanced** dialog to edit the selected camera's IP address and/or type in camera description, which will then be stored in the camera's memory.

TIP: Double-clicking the selected camera in "IP address" or "Description" column has the same effect.

Remove Selected

Uninstall the cameras highlighted in the top panel: the removed cameras will then appear in the bottom panel. Press Save/Exit to save changes.

Save / Exit

Saves the information about the installed cameras into a file "LocalMachine.ini" used by AV100 Video System, and exports a plaintext list of cameras into a file "CameraList.txt" for third party software, then exits the Installer. These files are located by default in "C:\Documents & Settings\All Users\Application Data\Video Application" in Windows XP

Add Remote Units

This option opens a dialog to add cameras manually. Remote units are cameras that may not be present on the local area network or may not have been installed normally. Users should use this feature only if the camera's MAC and an available IP address is known and connectivity has been verified.

Snapshot

Take snapshots for all installed cameras and display them. The displayed snapshots can be saved or printed.

Lock IP Address

This option sets a lock on camera to protect its IP Address from being changed by the Camera Installer or any other software, or manually, unless the lock is first removed. An asterisk will appear next to the IP Address of any locked cameras. This option is available for firmware version 64116 or higher.

Unlock IP Address

This option removes the lock set on camera as well as the asterisk next to the IP address. An unlocked camera's IP address can be then modified manually or by the camera Installer, or any other software.

Turnoff Firewall

Opens a command prompt window to disable Windows Firewall.

Configure Firewall

Opens a command prompt window that will configure the Windows Firewall to allow exceptions for Arecont Vision software.

Factory Default

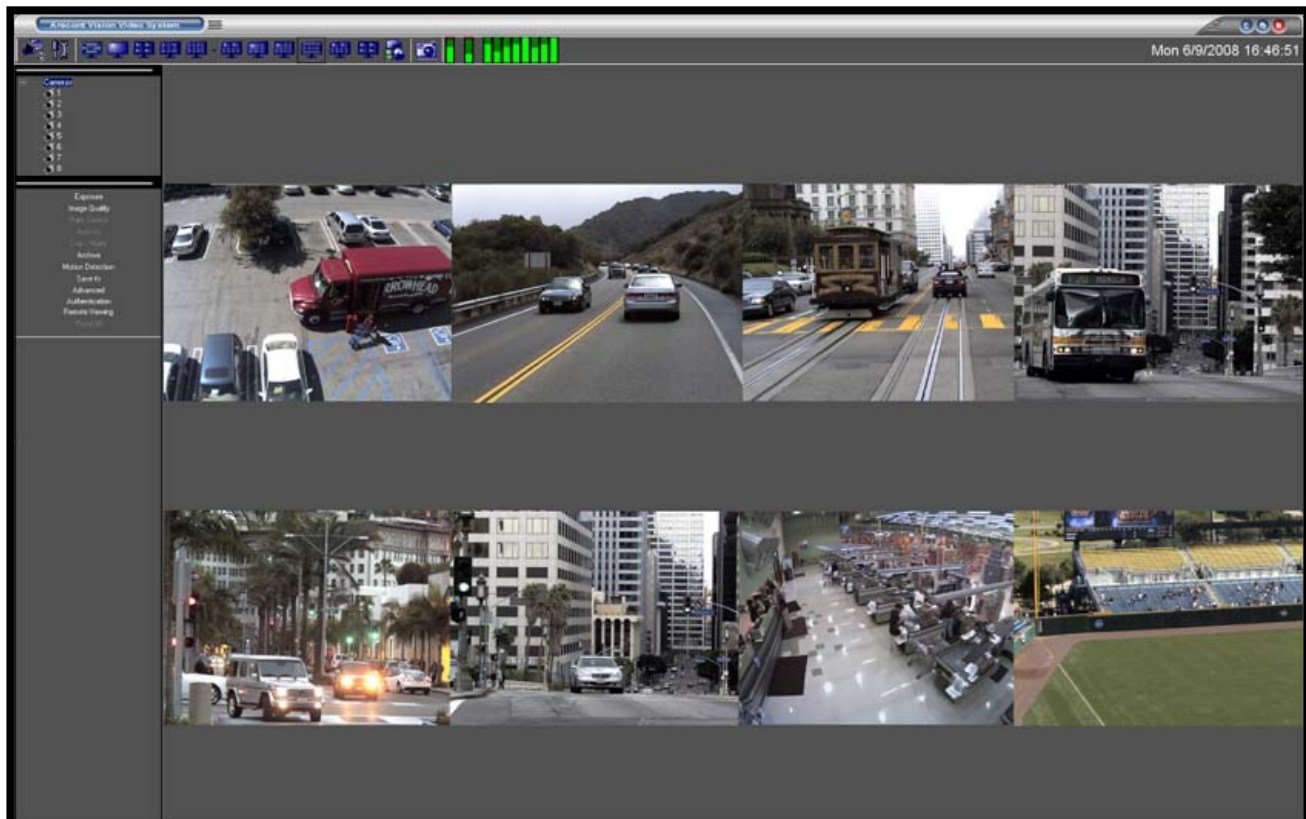
Restores all camera settings to factory default. This will retain the current IP address.

Operating AV100 Video System

Note: The AV100 Video System requires a license file for each AV Camera that is used for archiving video. The license is tied to the unique MAC address of a particular camera. License files are located in the C:\Program Files\Arecont Vision\Video Surveillance\license folder. However, for evaluation purposes, AV100 will operate any number of AV cameras without a license, displaying live video with no archiving capabilities. After the cameras are successfully installed, the AV100 Video System can be activated by clicking the **Run** button next to **Live Video** in the AV Application Manager.

The Arecont Vision logo screen will display while the program is loading. Shown below (Figure 11) is the AV100 Video System displaying live video from eight AV cameras. Clicking minimize will place the application in the system tray of the Windows task bar.

Figure 11. Live video display



Toolbar

The toolbar of the AV100 Video System is located in the upper portion of the screen above the video display area. It contains the following icons:



Toggles a drop-down list of the installed cameras. Individual cameras are disabled / enabled by left double-clicking on the camera number. When disabled, the live video image from the disabled camera is replaced with a blue rectangle, and the camera number in the drop-down list is marked with a red X.



Displays the Settings menu (see the Setting section on page 22).



Enables a full screen display without the toolbar and menus. Press escape or double click the image to exit full screen mode.



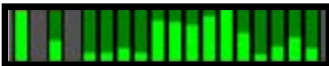
Selects screen layout for viewing live/archived video from multiple cameras. From left to right: single camera layout, 2x2 camera layout; 3x3 camera layout; 4x4 camera layout; 10-camera layout with 2 large and 4x2 smaller images; 8-camera layout with 1 large, 3x1 and 1x4 smaller images; 13-camera layout with 1 large, 2x2 and 4x2 smaller images, 8-camera layout with 2x4 images for panoramic cameras, 10-camera layout with 2 large and 2x4 smaller images for regular and panoramic cameras. Any unused sections of the layout will be filled with a watermark of the Arecont Vision logo.



Displays the Archive controls (see Browsing Archives below).



Takes a snapshot of live video or an archive video. The snapshot is taken from the camera which is highlighted in the drop-down list of the installed cameras (see above). To highlight another camera, left-click on the camera number in the list. To take the snapshot from all cameras, highlight “cameras” at the root (top) of the drop-down camera list. The snapshot file names contain the date and time of the snapshot. To locate/view the snapshots in the snapshot folder, right-click anywhere on the live video, then select “photo”, “browse”. Alternatively, snapshots can be taken by right-clicking on the live video image, and then selecting “photo”, “save”. The directory path to the snapshot folder is specified in the Settings menu (see Settings), or using the Right-Click menu under “Save To” (see Right-Click menu). By default, this is the directory C:\Documents and Settings\(\User Profile)\My Documents\My Pictures\Arecont Vision Photos.



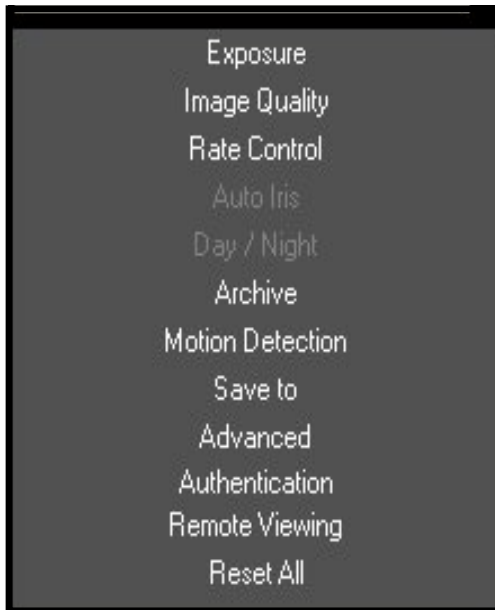
Reports the current CPU usage and network usage. The first two LED bars on the left show the CPU usage and total network usage, respectively. The rest of LED bars show the network usage for each camera. The displayed values are relative to the camera which uses the most bandwidth, displayed as 100% usage.

Settings



The settings menu (Figure 13) is displayed by clicking on the Settings button  in the toolbar.

Figure 13. Settings menu



The settings menu is the top level menu for all settings provided in the AV Video System.

Selecting one of the menu items opens up a lower level drop-down menu containing detailed settings and options. Depending on the camera model, some of the listed groups of settings may become unavailable (for example, Day/Night settings are available only for the AV3130 and DN cameras). The bar between the camera list and the settings area can be dragged up and down to resize the area.

The lower level menus contain a “Camera” field that displays the camera number which the settings are applied to (Figure 14). The “Camera” field can be expanded to a drop-down list of all installed cameras to select from. The list includes an “All cameras” option to apply settings to all cameras.

Figure 14. Display the camera number



NOTE: Selecting “*Reset all*” restores default settings for that camera.

Selecting Full / Reduced Resolution Display

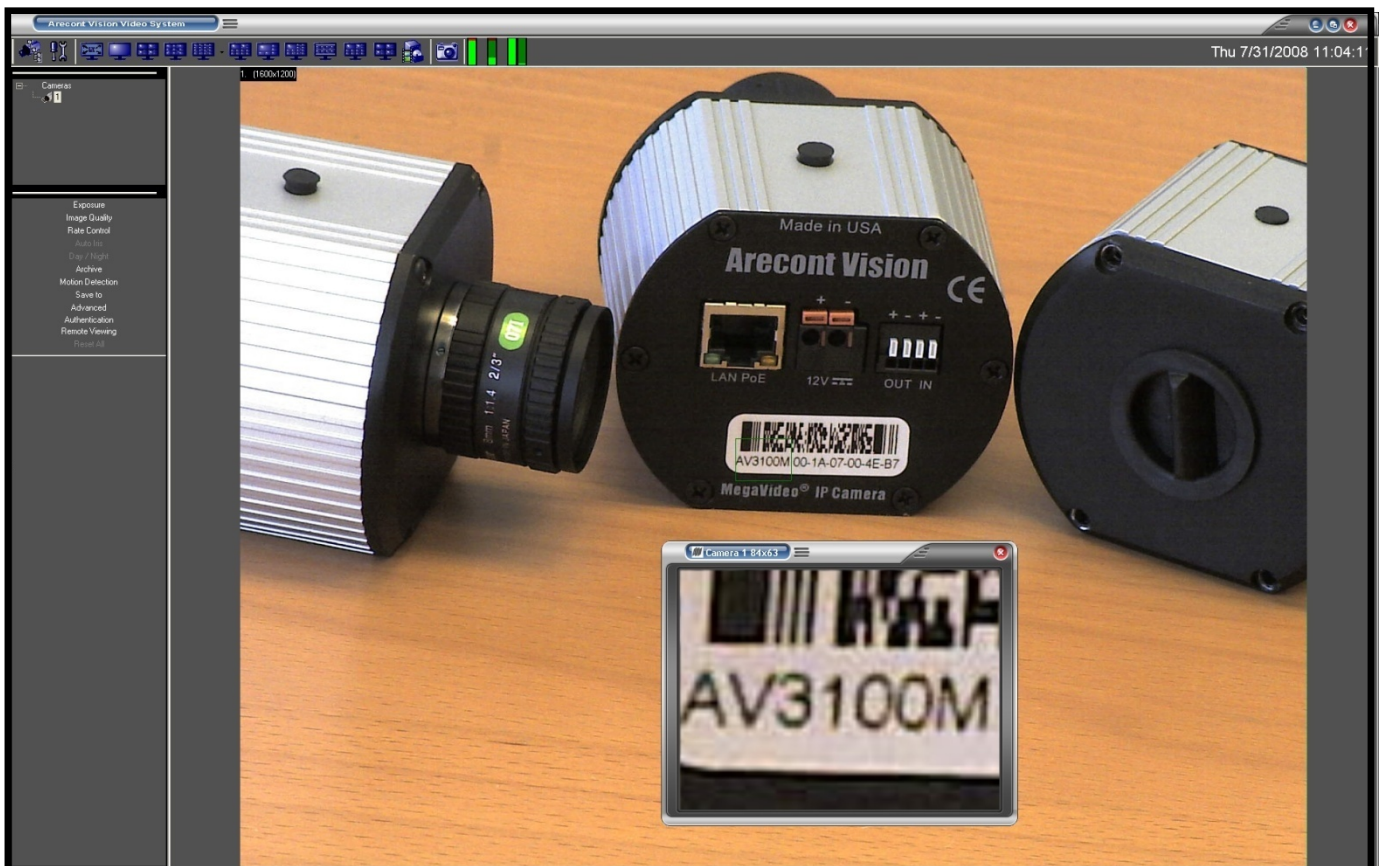
AV cameras offer two options for image resolution: full and reduced (quarter) resolution where the image resolution is reduced by a factor of two in horizontal and vertical dimensions. Either resolution image can also be cropped to any size.

In order to save bandwidth the images are displayed at a reduced resolution. The format of the reduced resolution display is determined by the chosen screen layout (see **Toolbar** on pg.20).

An individual camera image can be expanded to a full resolution display by double-clicking on the image. The full resolution image can be scaled back to its reduced resolution display by double-clicking the image again. The image size (in pixels) is displayed in the upper left corner of the image.

An alternative mode of viewing the full resolution content is the zoom window (see **ROI**, pg. 24).

Figure 12. Zoom window of screen snapshot

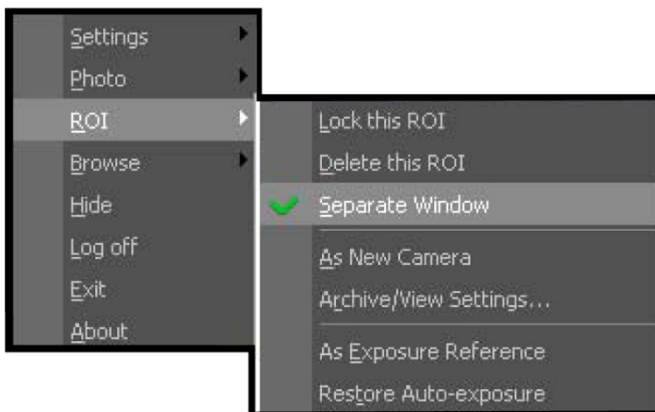


ROI (Region of Interest)

To zoom-in on a region of interest (ROI), draw a rectangle with the mouse (by left-clicking and holding down the mouse button). A separate zoom window will open up showing live video of the selected area at full resolution. A green outline of the selected area will appear in the underlying reduced resolution image. Zooming in and out is performed by pressing Page Up and Page Down on the keyboard, or alternatively by rotating the mouse wheel (if available). Panning of the zoomed area is performed by dragging the green outline across the underlying camera image with the mouse (by left-clicking within the outline and holding down the left mouse button) or alternatively with the keyboard arrow keys.

A maximum of three independent live regions of interest (ROI) windows can be opened per each camera.

***NOTE:** Panoramic camera models AV8360/8365 and AV8180/8185 allow only one zoom window per channel and no ROI settings.*



ROI can be configured by right-clicking on the green outline of a selected region of interest and selecting “ROI” from the menu. A separate ROI sub menu will open.

- **Lock this ROI** will freeze the ROI position in place and disable PTZ functions.
- **Delete this ROI** deletes the selected ROI and is the same as closing an ROI window.
- **As New Camera** creates a new video window of the selected ROI as a virtual camera, and assigns new numbers to the cameras starting at ROI-101. The virtual camera video can be archived independently as any other camera, and its archival frame rate and video display frame rate can be independently adjusted.
- **Archive/ View Settings** opens up archival settings menu to set the rate of ROI archiving and viewing.



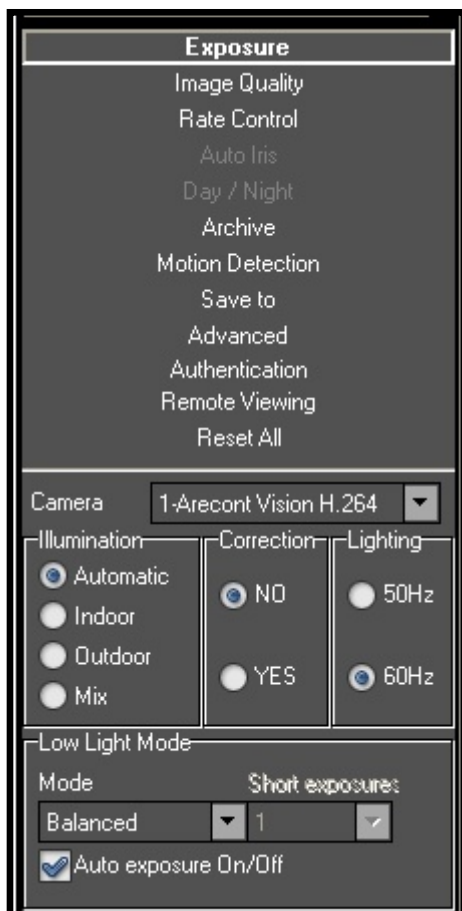
***NOTE:** The actual number of frames per second / minute depends on camera model, image resolution, exposure settings, etc.*

***NOTE:** If both boxes are checked, the displayed frame rate (the frame rate display is enabled by pressing Ctrl-S) corresponds to the view rate value.*

- **As Exposure Reference** enables the on-camera auto-exposure system to use the brightness within the ROI to adjust the overall brightness of the entire camera image while ignoring the brightness outside of the ROI. A typical use of this feature is backlight compensation when the camera is facing a window where bright backlight makes objects in the foreground appear dark. By positioning ROI over the foreground object, and selecting “As Exposure Reference”, the foreground objects can be made brighter.
- **Restore Auto-Exposure** reverses the exposure control based on the ROI to a default exposure mode based on a default window in the center of the image and its background. Exposure reference settings persist when closing a particular ROI. Ensure that “Restore Auto-Exposure” is used prior to closing an ROI window.

Exposure

Figure 15. Exposure menu



The **Exposure** (Figure 15) menu adjusts exposure related settings for the selected camera.

Illumination adjusts the camera's white balance computation based on the scene's illumination. "Automatic" enables the camera to adjust for illumination automatically while indoor/outdoor settings use presets assuming the camera is indoors or outdoors.

Correction aids in flicker control for AV5100/05 camera models.

Lighting prevents flicker caused by the oscillation frequency of indoor lighting: European (50 Hz) or US/Japan (60 Hz).

Low Light Mode adjusts performance under low light conditions.

Exposure time refers to the amount of time the sensor is exposed to light. Short exposures result in less light, giving darker images whereas longer exposures can flood an image with light, giving washed out images in the presence of a lot of light. Additionally, motion blur is reduced under short exposures and increased under long exposures.

High Speed enables a fixed exposure time, selectable from the "Short Exposure" menu with values between 1 and 80ms. Low values will reduce motion blur but may result in a noisier video. Ample illumination is required to improve quality under very short exposures due to the lack of captured light.

Speed enables short exposures ranging from 10-80ms. The exposure time will increase with low light conditions.

Balanced enables medium exposures ranging from 20-80ms with low light conditions resulting in a higher exposure time.

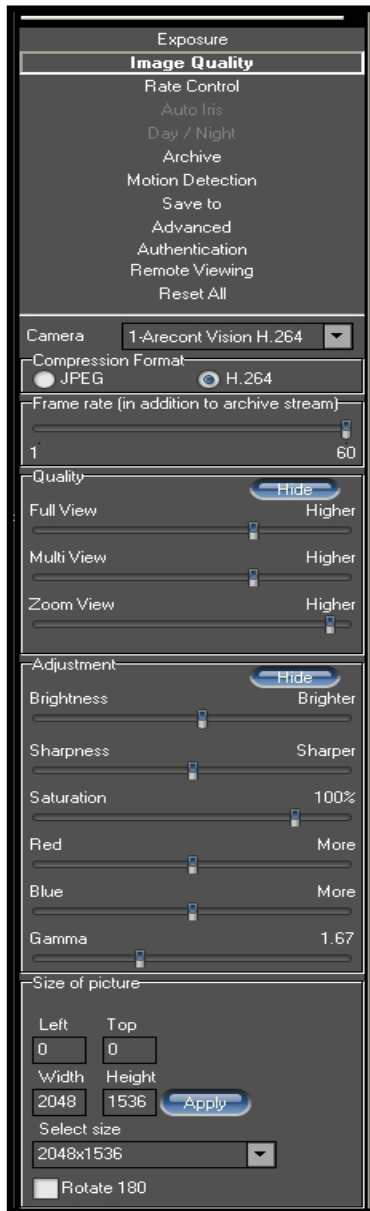
Quality enables longer exposures ranging from 40-200ms. Motion blur may increase, but video will contain less noise under low light conditions.

Moon Light enables exposures of up to 500 ms if necessary. This mode will result in more motion blur for fast moving objects.

Auto exposure On/Off is an option to enable/disable the on-camera automatic exposure control. Auto exposure maintains the user-set image brightness under changing lighting conditions. This must be enabled to ensure the 'Low Light Mode' settings function.

Image Quality

Figure 16. Image Quality menu



Select **Image Quality** from the Setting menu to open up a lower-level menu for adjusting image quality settings:

Compression Format offers two options for compressing the video: JPEG and H.264. H.264 is only available on the xx05 series of AV cameras and offers an average of 1/5 to 1/10 the bandwidth usage of a standard Motion JPEG camera.

Frame Rate adjusts and displays the frame rate at which the software is requesting frames from the camera(s) for viewing only.

Quality adjusts the compression level for three display modes (applies to both JPEG and H.264 compression formats):

- “Full View” affects the display and archive of full resolution video.
- “Multi View” affects the display of multiple cameras.
- “Zoom View” affects any ROI windows.

Brightness adjusts image brightness.

Sharpness adjusts image sharpness or the crispness of an image.

Saturation adjusts image color saturation or the amount of color in an image. Lower saturation gives a duller, faded image.

Red/Blue adjusts the red/blue tint. This setting changes the target for camera’s automatic white balance computation. The effect is gradual and takes 20-30 seconds for the camera to fully adjust to the new setting.

Gamma adjusts image contrast to reveal more or less shades of gray in the dark and light areas of the image (requires firmware 64116 and hardware 64107).

Size of Picture adjusts image cropping.

Rotate 180 is an option for flipping the image vertically and horizontally to rotate it 180 degrees.

Rate Control

Rate Control is an option available only for H.264 video streams which is enabled individually per camera. If rate control is enabled, any image quality settings under Image Quality are ignored and the camera will automatically adjust its video quality on a frame by frame basis to maintain the desired constant bit rate. The video quality may deteriorate at very low bit rate settings.



There are three options available for Rate Control:

- **Use bitrate control in full view video** enables a constant bit rate for live video display at full resolution.
- **Use bitrate control in multi view video** enables a constant bit rate for live video display at a reduced resolution when viewing multiple cameras at once.
- **Use bitrate control in archive video** enables a constant bit rate for archiving.

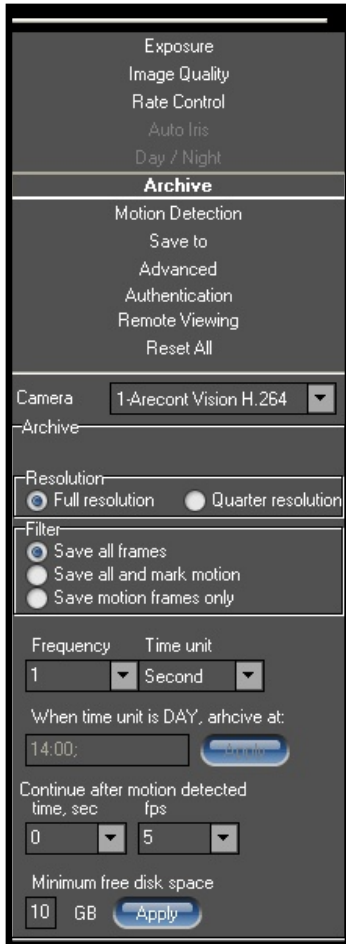
The frame rate and bandwidth usage can be displayed by pressing Ctrl-S. If the last option is enabled, the displayed values are calculated by adding the archival bit rate to the display bit rate for full resolution or multi view resolution. In case the archival rate is set to the maximum frame rate, the displayed values correspond to the archival rate settings.

NOTE: *Certain bit rate values may not be possible depending on the camera resolution, image cropping, light conditions, exposure settings, and amount of motion.*

Archive

Select **Archive** (Figure 17) from the Setting menu. **Archive** is a lower-level menu to configure video archival settings. Please note that archival is only available with a license file.

Figure 17. Archive menu



Resolution selects between archiving the video at full resolution or at quarter resolution.

Filter is a group of archiving options:

- **Save all frames** archives the entire video stream received from the camera.
- **Save all and mark motion** archives the entire video stream, marking the frames where motion was detected.
- **Save motion frames only** archives only when motion is detected by the on-camera motion detector and disables archiving in the absence of motion.

Frequency is a drop-down list of options for archive recording rate.

The “Off” option disables the archive recording. The “Max” option sets the archive frequency limited only by the camera and the network (different for different camera models).

Continue after motion detected determines the duration for which recording will continue after motion is detected when the camera is set to “Save motion frames only” and the frame rate at which such recording is done.

***NOTE:** If new motion is detected during such after-motion recording, the rate of recording will revert to the one specified under “Frequency”.*

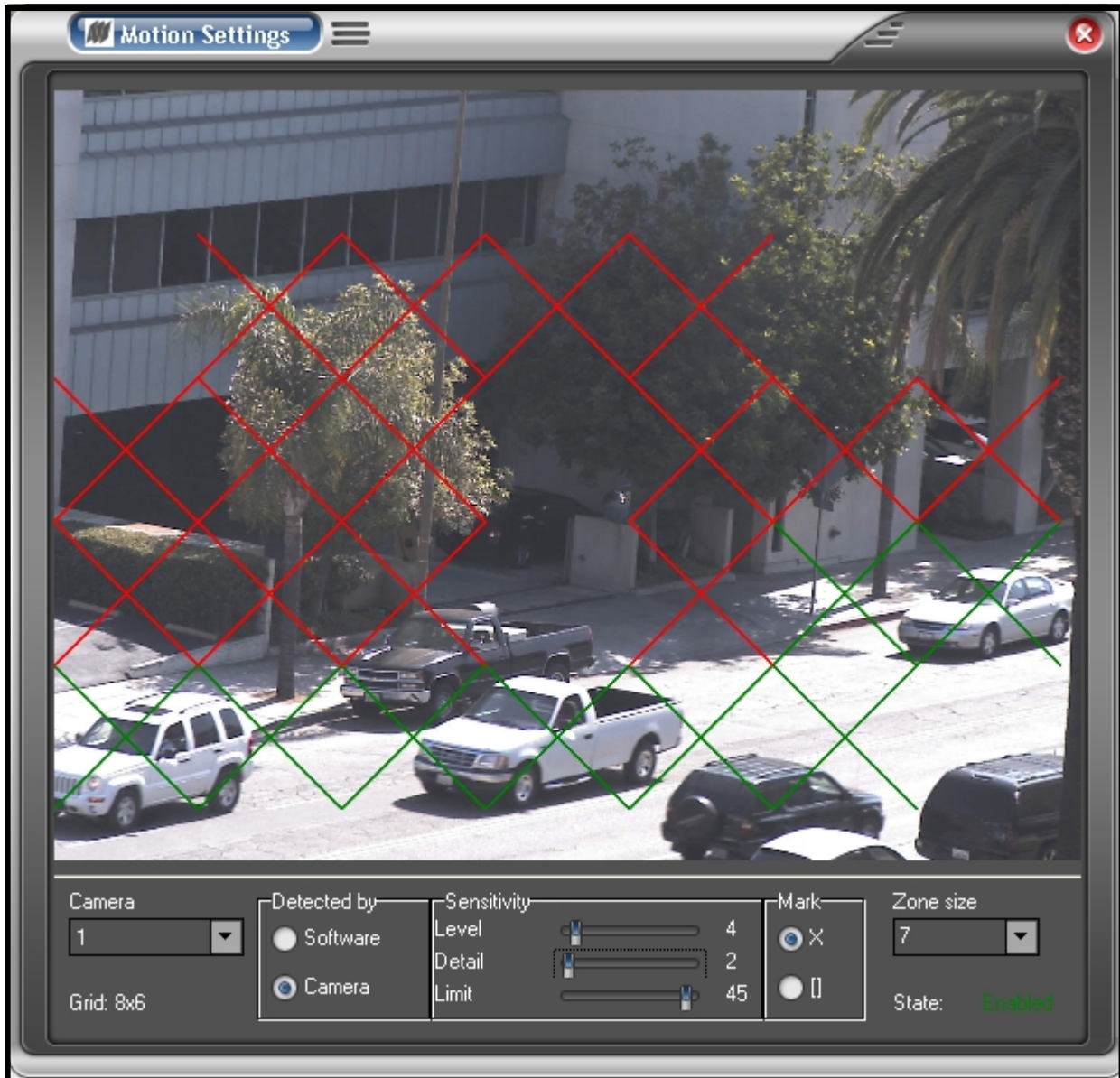
Minimum free disk space sets the minimum free disk space that is required on a disk to start overwriting old video recordings. With a setting of 10GB, archives will not be overwritten until the free space on the drive goes below 10GB. It is recommended that at least 5GB of free space is always available.

Motion Detection

Motion detection is achieved by analyzing inter-frame brightness changes on a pixel-by-pixel basis. Clicking “Motion Detection” from the left menu brings up the Motion Settings window, as seen in Figure 18. There are two modes of Motion Detection supported in the AV100 Video System: a software mode and an on-camera mode.

- The software mode performs motion detection by processing the images after they are transmitted from the camera to the computer. In contrast, the on-camera mode performs motion detection prior to transmitting the images to the computer. As such, the on-camera motion detection setting allows for a significant reduction in CPU load and network load when motion detection is enabled.
- Motion detection is only enabled via the Archive settings when one of the two following options is selected: “Save all and mark motion” or “Save only motion”. If the Archive is enabled for “Save all frames”, motion detection is disabled. The Enabled/Disabled status is displayed in the bottom right corner of the Motion Settings window.
- Motion detection is computed independently in multiple detection zones on a square grid. The largest grid supported for any AV camera model and image size is 8 by 8. The actual grid for any particular model is determined by the chosen zone size (a drop-down list in the lower right corner of the Motion Settings screen) and the camera’s pixel resolution. The actual grid is displayed in the lower left corner. When motion is present, the Motion Settings window displays green marks (selectable between crosses and boxes) in the zones where motion occurs (Figure 18).
- A privacy mask can be set up to block motion detection in some of the zones by drawing a rectangle with the mouse (by left-clicking and holding down the mouse button). The privacy mask is marked with red crosses. A more complex shape can be created by drawing multiple rectangles. Erasing the mask (or part of the mask) is done by drawing a rectangle with the right mouse button.

Figure 18. Image of motion detection



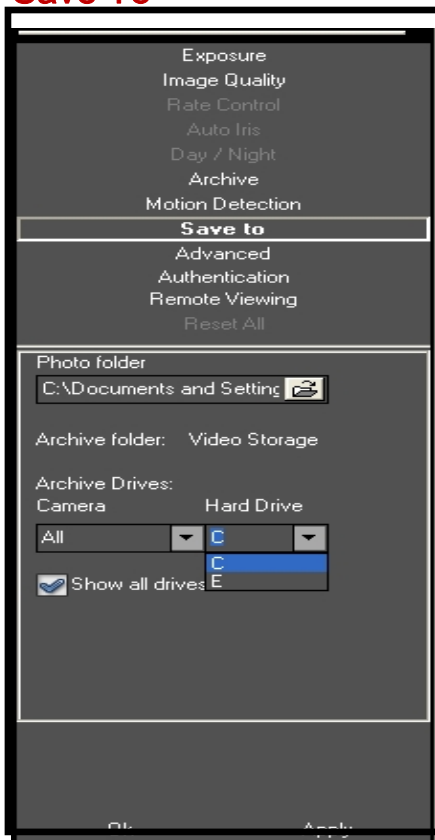
Motion detection settings apply only to the camera which number is displayed in the Camera field on the left of the **Motion Settings** menu: use drop-down list to change the camera number. The settings are:

Detected by provides two options for toggling between software motion detection and on-camera motion detection.

Sensitivity is a group of controls to adjust motion detection computation:

- **Level** adjusts the inter-frame brightness change threshold that triggers motion detection. Lower settings may cause false motion detection due to noise. A higher setting will require a larger brightness change on the moving object for motion detection.
- **Detail** adjusts the size of the detectable objects within each motion detection zone. Lower settings may cause false motion detection due to noise. Higher settings require larger objects for motion detection. This is useful when motion detection should only detect something of the size of a car and ignore smaller objects like an animal.
- **Limit** serves as a guard against false triggering due to a sudden overall change in lighting that would trigger motion detection in a large number of zones simultaneously. For example, a bright flash in the scene would not trigger motion detection. If the number of zones activated simultaneously is larger than the “Limit” setting, motion detection will be blocked. This parameter cannot exceed the number of zones in the grid (displayed in the lower left corner of Motion Settings).

Save To



The lower level Save to menu specifies the directory for video archives and for snapshot images. Note that the name of archival directory should be the same for all cameras; it is possible to specify different Hard Drives for each camera.

Advanced

Select **Advanced** (figure 19) to set the following options:

Figure 19. Advanced menu



Use DirectX if possible causes AV100 to use DirectX functions that utilize graphics card hardware for displaying images rather than using software processing. This reduces the load on the CPU. The drop-down list “DirectX size” provides options for the graphics area supported by DirectX – *the selected size should correspond to the resolution used for live video*. If using a 5 Megapixel camera please increment the value as the default value corresponds to a 3 Megapixel camera.

Auto-Startup is an option to automatically start the AV Video System at Windows startup with its previous settings.

Real-time if folded is an option to continue running the AV Video System application at the Real Time priority level within Windows, even when AV100 is minimized and placed in the system tray of the Windows task bar.

Show motion marks areas where motion is detected in live video (requires enabling motion detection).

Use double packets is an option to use data packets with 2904 bytes instead of the regular 1450 bytes for image transmission. This allows for increased image transmission bandwidth but may lead to less stable performance on high traffic networks.

Warning on disconnect is an option to display a red screen warning in place of live video that has been disconnected or temporarily lost. When disabled, the last captured frame will be displayed.

Static ARP is an option to enable a static link between the camera’s MAC address and its IP address. An alternative is dynamic ARP, which is not supported by some older models of the AV cameras.

Don’t update sensor window is an option that determines how the changes to the image size are applied: at a software level or in hardware (the image sensor). Enabling this option helps to avoid conflicts when multiple users are viewing the same camera (each user will be able to set a different image size). Alternatively, disabling this option allows an increase in camera frame rate due to a smaller image size.

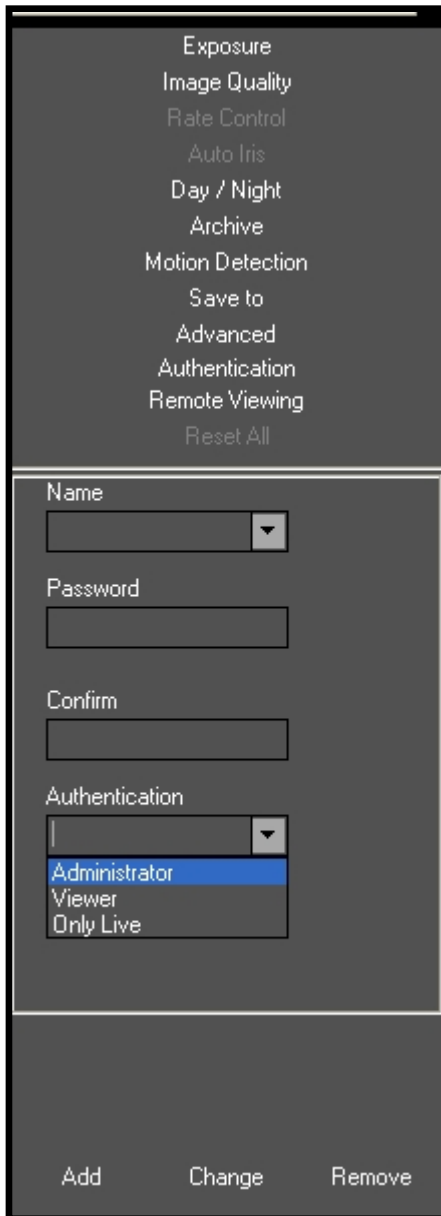
Panoramic Mode is used for panoramic camera model AV8180 to automatically position and display the four images on screen.

Language selects the language which will be used throughout AV100 .

Authentication

Authentication allows for password protected access to AV100 Video System. There are three levels of access available (Figure 20):

Figure 20. Authentication menu



- Administrator** grants full access to all features of AV Video System.
 - Viewer** grants access to live video and browsing the archives, but not to the settings.
 - Live only** grants access to live video only.
- Adding, changing, and removing users is done via the **Add, Change, and Remove** buttons on the bottom of the menu.

If one or more user accounts were created, the AV Video System will display a log-in dialog prompting for the user name and password upon startup (Figure 21):

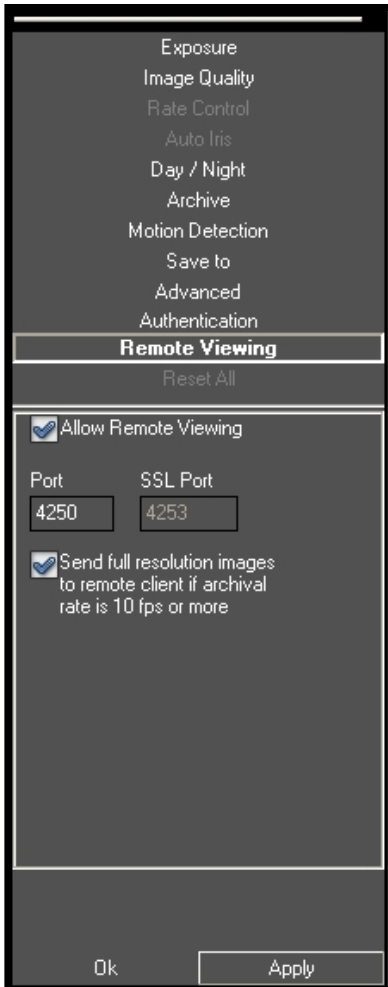
Figure 21. User authentication



Remote Viewing

AV100 has a built-in web server allowing AV cameras and archives to be viewed remotely (Figure 22).

Figure 22. Remote viewing menu



To enable the built-in HTTP server, select **Remote viewing** from the **Setting** menu and do the following:

1. Select **Allow Remote Viewing**.
2. On the bottom of the menu click **Apply** then **Ok**.
3. Start Internet Explorer and type in the address of the web server. For example, if AV Video System is installed on a PC with IP address 200.168.1.102, type in the following address:
<http://200.168.1.102:4250/guix.htm>
4. Then click **Enter** to have Internet Explorer open that page.

Upon successful connection a web page will open. Internet Explorer will prompt to install an ActiveX component. Click on the webpage as prompted to install ActiveX.

The main AV menu located on the left hand side of the IE window will provide full access to each AV camera. Selecting the AV camera of choice will display the option to disconnect as well as make changes to settings such as the Resolution Speed, Archive, Zoom and viewing images in separate windows.

Access from outside the local network will require that the server PC is accessible on the selected port. Please ensure that any routers or firewalls have this port open for outside user access.

Right-clicking anywhere on the Explorer web page will provide access to the options menu:

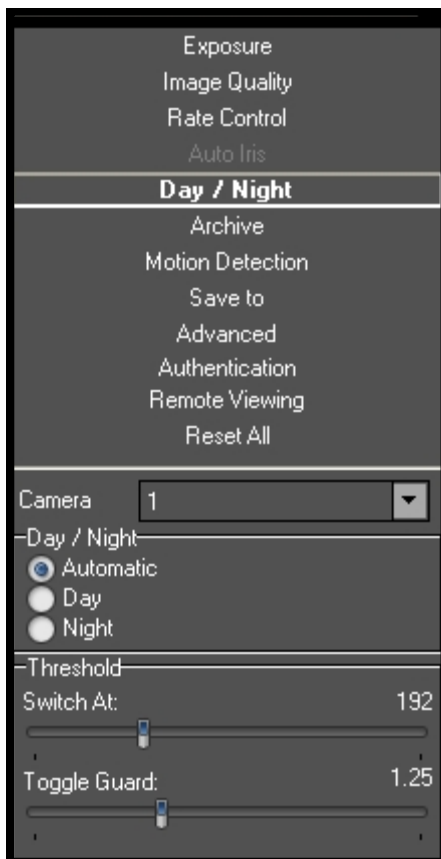
Click **Save** to take a snapshot image.

- Click **Manage Servers** to provide server information and allows changes to the servers.
- Click **Auto Hide Menu** to automatically hide the main menu.
- Click **Settings** to adjust camera and video settings.

Day/Night

Day/Night (Figure 23) settings apply only to dual-sensor cameras as well as single-sensor DN camera models equipped with a switching IR filter.

Figure 23. Day/Night setting menu



Automatic enables the camera to automatically switch from daylight to nighttime conditions and vice versa based on the **Threshold** settings.

Day forces day mode and disables night mode.

Night forces night mode and disables day mode.

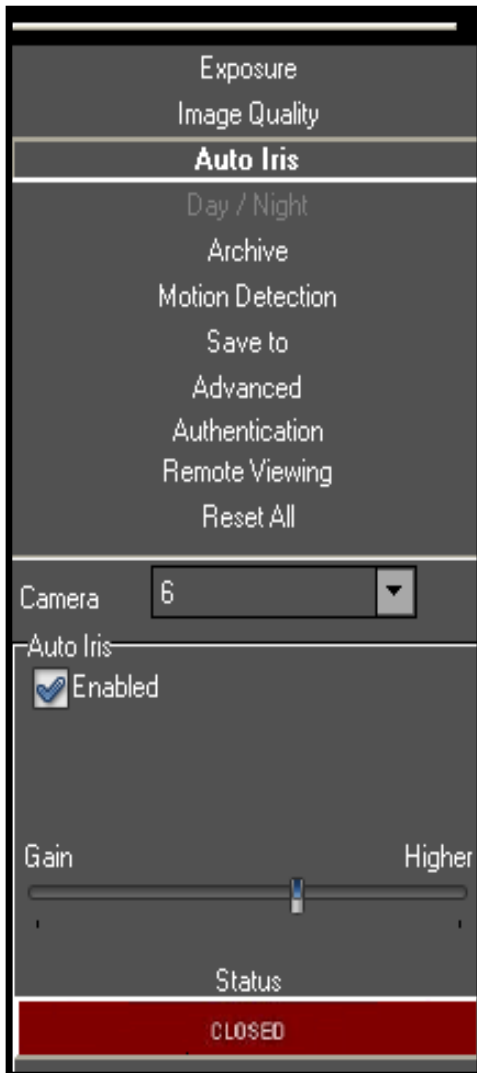
Threshold adjusts the automatic switching of the camera (Note: for dual-sensor camera models the values are displayed in F-Stops, while for single-sensor DN models the values are in terms of camera gain):

- **Switch At** adjusts the level of darkness to switch from day to night mode. Values to the left will cause the camera to switch to night mode when there is still much light in the scene. Values to the right will cause the camera to stay in day mode much longer, requiring near darkness in order to switch.
- **Toggle Guard** adjusts the level of brightness required to switch from nighttime to daylight mode. Setting this to 0% corresponds to “Switch At” set to 100%. Toggle Guard should be adjusted to prevent the mode from toggling during transitional lighting.

Auto-Iris

The Auto-Iris menu allows you to monitor the state of the automatic DC iris. If the scene is too dark, the camera will open the iris fully. This allows more light onto the sensor and will substantially improve the low-light performance. If the scene is too dark when the camera is started, the camera will not close the iris until there is enough illumination. Camera DC auto-iris can be configured using “Auto-Iris” menu (Figure 24):

Figure 24. Auto-Iris menu



The status of the auto-iris is displayed on a color panel at the bottom of the Auto-Iris settings. There are six states possible:

- **Disabled:** The auto-iris is either disabled by un-checking the **Enabled** check box, or is not present.
- **Evaluating:** The camera is preparing to close the iris.
- **Too Dark:** The camera cannot close the iris because the scene illumination is too low.
- **Closing:** The iris is closing down by the number of F-stops appropriate for the lens model.
- **Closed:** The iris is closed.
- **Opening:** The iris is opening.

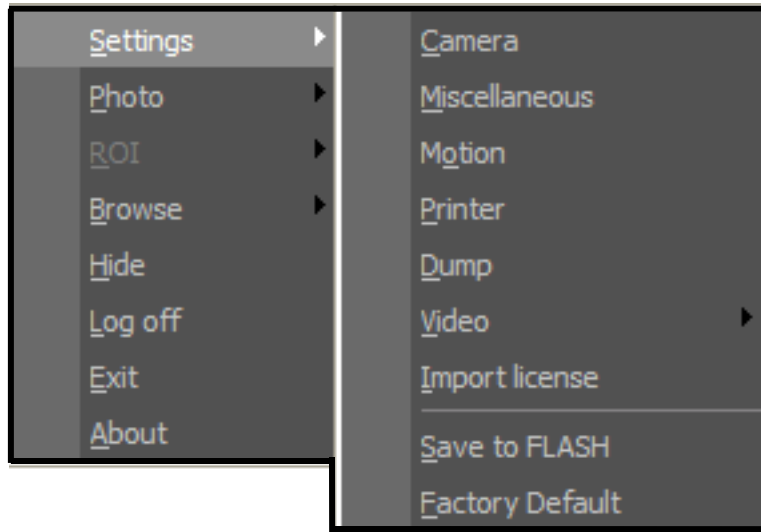
Auto-iris will open the lens fully once the on-camera analog gains exceed a certain level. The **gain** scroll bar adjusts the point where the auto-iris will open fully: the higher the gain, the later the auto-iris will open as the illumination diminishes.

The iris can be disabled by un-checking **Enabled**. The camera will open the iris fully and have electronic auto-exposure working. This configuration is identical to using a manual lens.

Right-Click Menu

Right-clicking anywhere within the AV100 Video System screen brings up an additional menu (Figure 25):

Figure 25. Additional menu within AV100 Video System screen



Settings enables access to configuring the main settings groups as described in **Settings** (see pg.22):

Camera enables access to a combined menu that includes:

- **Exposure** (see pg. 26)
- **Image Quality** (see pg.27)
- **Rate Control** (see pg.28)
- **Archive** (see pg.29)
- **Day/Night** (see pg. 36)
- **Auto-Iris** (see pg. 37)
- It also includes some options from **Advanced** settings (see pg.33).

Miscellaneous enables access to the following:

- **Save To** (see pg.32)
- **Advanced** (see pg.33)
- **Authentication** (see pg.34)
- **Remote Viewing** (see pg.35)

Motion enables access to **Motion Settings** (see pg.30).

- **Printer** opens the **Print Setup** menu.

- **Dump** logs camera settings to a file named LocalMachine.ini located in the installation directory. When contacting Arecont Vision's technical support, this file should be included.
- **Video** displays live video in full-screen mode.
- **Import License** will import a specified license file so that the software's archive functionality is accessible.
- **Save to Flash** saves camera setting to camera flash memory.
- **Factory Default** resets the camera setting without changing camera IP Address to factory settings.

Photo enables saving and printing individual snapshots, as well as browsing:

- **Save** takes a snapshot of live video and saves it in the snapshot folder. The snapshot is taken from the camera which is highlighted in the drop-down list of the installed cameras on the left side (see **Toolbar** on pg.20). To highlight another camera, left-click on the camera number. To take the snapshot from all cameras, highlight "cameras" at the top of the drop-down camera list.
- **Save/Print** takes a snapshot and prints it instantly.
- **Browse** opens the snapshot folder for browsing.

Browse presents three options:

- **Archive** enables access to browsing archives (See **Browsing Archives**).
- **Photos** enables access to snapshots taken with the AV cameras. The default snapshots location is C:\Documents and Settings**(User Profile)**\My Documents\My Pictures\Arecont Vision Photos, a different directory path to the snapshot folder can be specified in the Settings menu (see **Settings** on pg.22).
- **HTTP** opens the default web browser to view the video stream from the selected camera via the web browser.

Hide minimizes the AV100 Video System application and hides it in the system tray of the Windows task bar.

Log off logs off the current user.

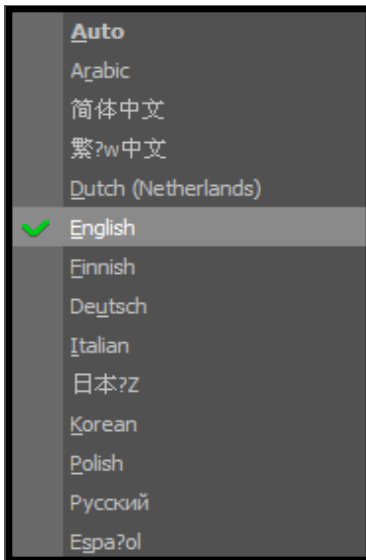
Exit exits the AV100 Video System application.

About shows the version of the AV100 Video System software and additional information for each of the installed camera(s): version of firmware and hardware, MAC address, and IP address.

Language Selection

The AV100 Live Video System supports user interfaces in Arabic, Chinese Simplified, Chinese Traditional, English, Finnish, German, Japanese, Spanish, Russian and other languages. To select language press the **F2** button to bring up the language menu (Figure 26).

Figure 26. Language menu



Browsing Archives




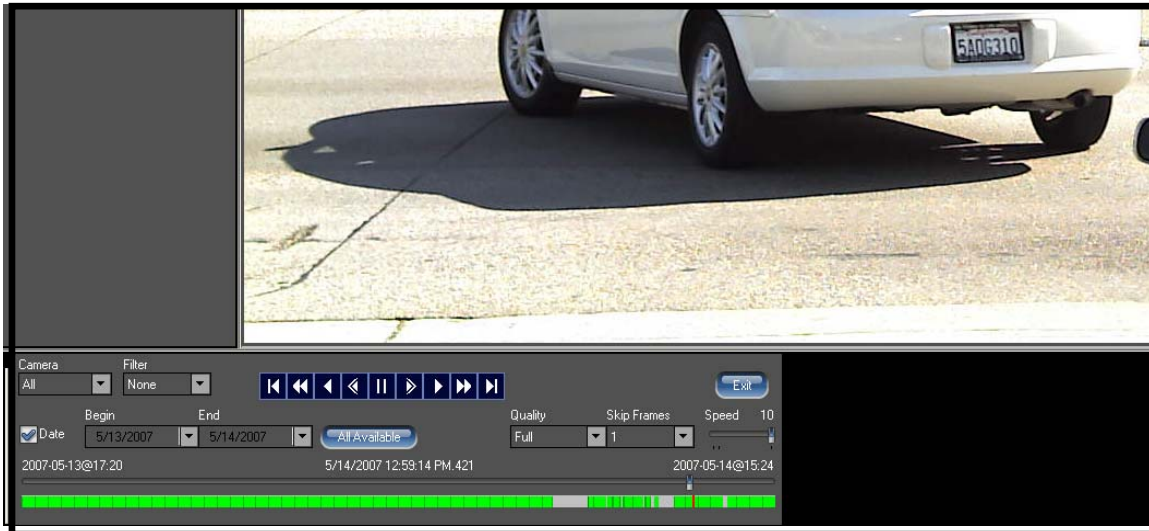









Archive browsing is enabled by pressing the  button in the Toolbar, or via the right-click menu (see **Right-Click Menu** on pg.38).

Figure 27. Archive screen




Archive browsing controls are located on the bottom of the playback screen (Figure 27). Archives are best viewed when the video is displayed in full-screen mode. The date-and-time stamp is located on the top left-hand side of the image. The user can select playback speed and frame skipping, as well as the image quality. If the archive was recorded using motion detection (see Motion Detection), browsing can be based on detected motion by selecting “Motion” from the drop-down list under “Filter”.

-  Rewind - Starts archive video from the earliest recording
-  Fast Reverse – Jumps backward 5 minute intervals.
-  Play in Reverse – Plays the recorded archive continuously in reverse (H.264 archives will jump in reverse in 1 minute intervals)
-  Play by Frame in Reverse – Steps backward one frame at a time.
-  Pause – Pauses the playback.
-  Play by Frame Forward – Steps forward one frame at a time.
-  Play – Plays the recorded archive continuously forward.
-  Fast forward – Jumps forward in 5 minute intervals.
-  Forward - Starts archive video from the end of recording.

The slider on the bottom of the screen displays/positions the current frame position in the archive. It has a date-and-time display located to the right side of the slider to reference a particular event.

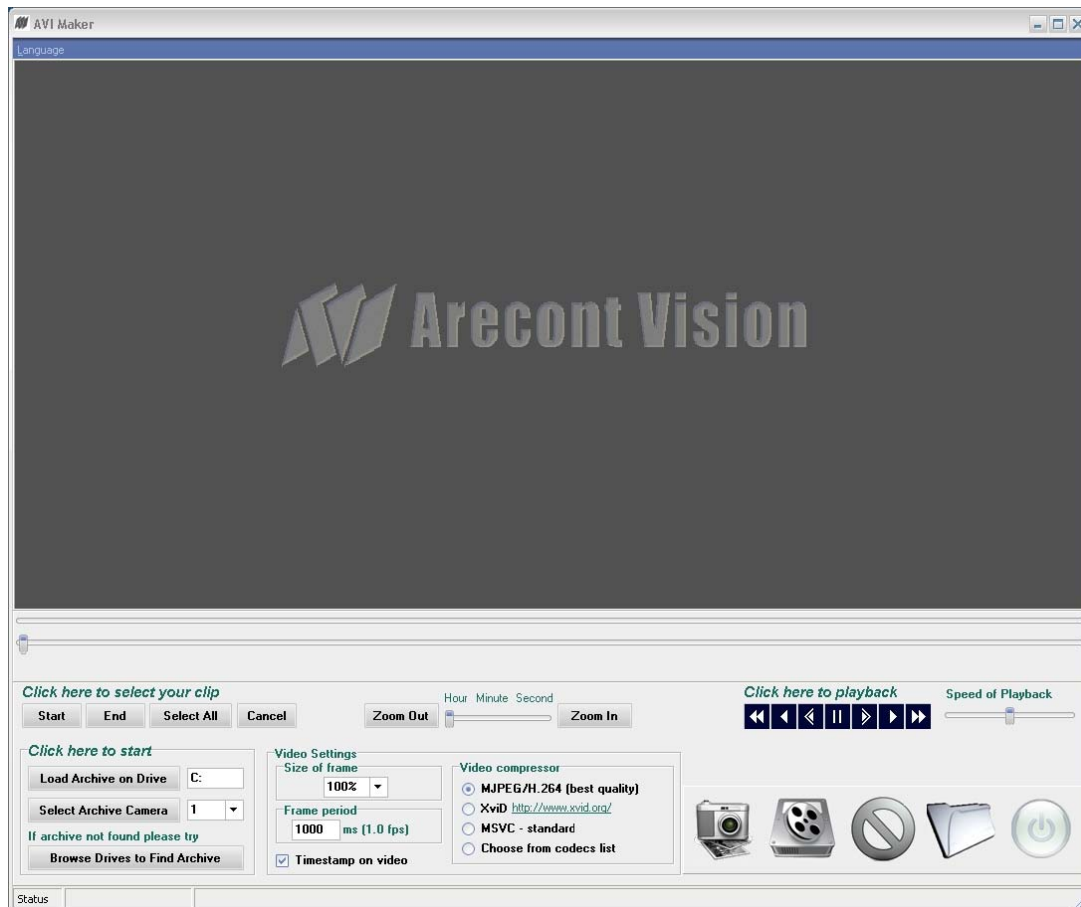


Press the  button on the Toolbar to take a snapshot from the archive. Alternatively, snapshots can be taken by right-clicking on the video image, and then selecting “photo”, “save”.

AVI Maker - Making video clips from the archive

The AVI Maker (Figure 28) is started by clicking the corresponding Run button in the AV Application Manager. Please note that you will not have access to the AVI Maker if you do not have a license for archiving.

Figure 28. AVI Maker




NOTE: Make sure that the archive is not empty when making avi clips.

To make video clips from your archives click **Run** on AVI Maker from AV Application Manager.
Under “Click here to start”:

Loading an Archive

1. Specify which drive contains the video archive under “Load Archive on Drive.” If AV100 has the default settings, then C: would be the default archive drive. Otherwise type in the correct drive letter in the edit box, including the colon, i.e. D:
2. Click **Load Archive on Drive**. This will initiate a search on the specified drive for all available archives. The archives will be listed in the combo-box, numbered according to the camera numbers they were recorded with, starting with the smallest number.
3. Use the pull-down menu to select the desired camera/archive number.
4. Click **Select Archive Camera**. An image will appear on the screen corresponding to the earliest record of your video archive. If no archive is found, the screen will remain blank.
5. To explicitly specify which folders to search for archive video click the **Browse Drives to Find Archive** button and select folders that contain your video archive.

Selecting a Clip

1. To play archive press the play button , use the Speed scrollbar to increase or decrease the speed of playback.
2. Select a specific time interval by pressing **Start** and then scroll the timeline scrollbar to the desired point in time. Then, press **End** under **Click here to select your clip**. Alternatively, use **Select All** to select the entire recorded archive.
3. To narrow down the time interval use the **Zoom In** button. Clicking the **Zoom In** button results in the time scale changing from Hours to Minutes to Seconds. To reverse backwards from Seconds to Minutes to Hours, use the **Zoom Out** button. Within each zoomed time scale, the start and end point can be re-selected to fine-tune the selected time interval.

Exporting a Video

1. **Video Settings** offers three options:
 - **Size of Frame** adjusts the AVI frame size relative to the archived frame size. This option only affects XviD and MSVC video codecs and does NOT affect MJPEG/H.264 format
 - **Frame Period** adjusts the AVI frame rate (in milliseconds). **AviMaker** will automatically calculate the average frame period for selected archive. If the calculated number is longer than 1000 milliseconds, 1000 millisecond will be used. If the actual archive frame rate varies

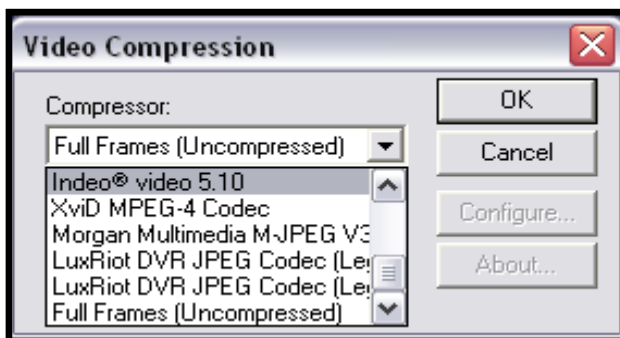
with time, the resulting video will be played accordingly faster or slower, depending on how much the actual frame rate deviate from the average.


- **Timestamp** adds date/time information to the resulting video clip. Notice that it works differently in case “MJPEG/H.264” codec is selected. When the selected archive is JPEG format, **AviMaker** will decompress and recompress the top 64 lines of each frame to incorporate the timestamp, but the rest of the image will remain intact. When the selected archive is in H.264 format, the timestamp option is ignored.

Video Compression offers four options for creating the AVI file:

- MJPEG/H.264 (best quality) offers a video format as recorded in the archive without decompression and recompression procedures. For this reason, this format offers best video quality.
- “XviD – <http://www.xvid.org/>” is a codec recommended by Arecont Vision (it is distributed together with the AV100 Software and is typically installed during the AV100 software installation). This codec has been found to produce reasonably good quality to compression ratio.
- “MSVC - standard” is a standard Microsoft video codec.
- “Choose from codecs list” allows selection of any of the alternative codecs that are installed on the computer. The drop-down list opens after “Make AVI” is clicked (Figure 29).

Figure 29. Video Compression




6. Click  to start creating the video clip. If no records are available for the selected range of dates or times a warning will be displayed.

7. In the **Save As** window type in a file name for your new AVI file, then click Save. If “Codec List” was selected under “Video Compression”, a drop-down list of available codecs will appear. Select a codec from the list to proceed.
8. The AVI Maker will begin to create the AVI and show the progress in the progress bar. Clicking ‘Stop’ will terminate the AVI creation.

Viewing Your Recorded Video

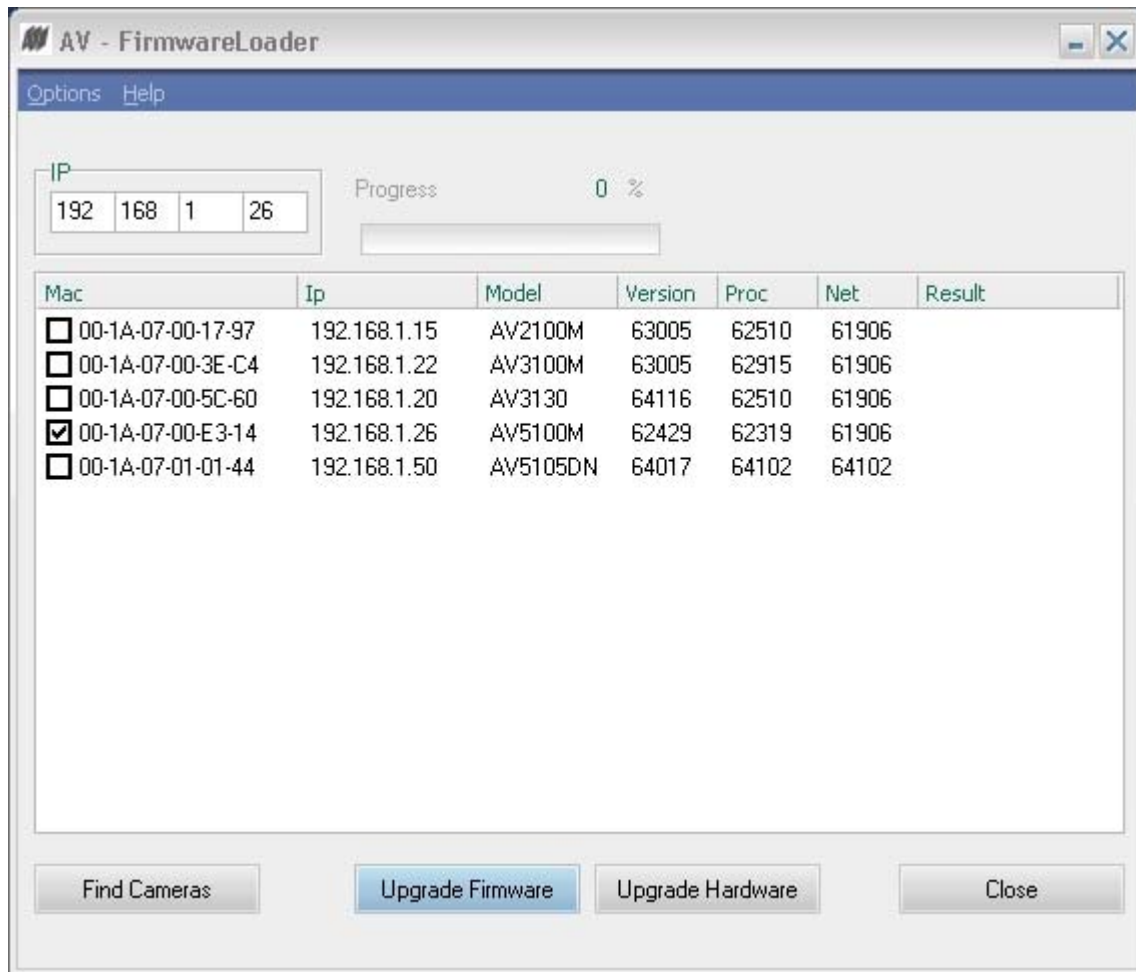


To view your exported AVI, download the latest Apple Quick Time (v7.4.5 or higher) for Windows XP or Vista from <http://www.apple.com/quicktime/download/>

1. Select the drive where you stored your video recording by pressing  and locate the recording.

2. Double Click on the video recording to start the player.
3. Click on the play button.

Firmware Loader – Upgrading Camera Firmware / Hardware in the Field



All models of AV cameras are field-upgradeable. The AV Firmware Loader is the utility for upgrading the camera's firmware and/or hardware. All AV cameras with firmware revision 51821 or higher support firmware upgrades. Please contact your distributor to obtain the latest firmware upgrade file and utility.

NOTE: It is recommended to run the AV camera installer to install the camera immediately prior to running the firmware loader.

To upgrade a camera:

1. Start the AV Firmware Loader by clicking the corresponding **Run** button in the AV Application Manager. Alternatively, run FirmwareLoader.exe.
2. Click **“Find Cameras”**. It may take up to a minute to find any cameras. Once the cameras have been found select the appropriate cameras to upgrade.
3. To upgrade the firmware:
 - Click **“Upgrade Firmware”** and choose the firmware upgrade file. The file name starts with **“fwupdate”**, and the file extension is .txt. **MAKE SURE THAT THE CAMERA MODEL YOU ARE UPGRADING IS INCLUDED IN THE FWUPDATE FILE NAME.**
 - The firmware upgrade will start automatically. Do not disconnect the AV camera at any point during the upgrade process. When the upgrade is complete, a **“Success!”** message will be displayed next to the new version of firmware.
4. To upgrade the hardware:
 - Click **“Upgrade Hardware”** and choose the hardware upgrade file. The file name starts with **“hwupdate”**, and the file extension is .bin. **MAKE SURE THAT THE CAMERA MODEL YOU ARE UPGRADING IS INCLUDED IN THE HWUPDATE FILE NAME.**
 - The hardware upgrade will start automatically. Do not disconnect the AV camera at any point during the upgrade process. When the upgrade is complete, a **“Success!”** message will be displayed next to the new revision of hardware.



IMPORTANT: DISCONNECTING THE POWER TO THE CAMERA DURING THE UPGRADE WILL RESULT IN PERMANENT DAMAGE TO THE CAMERA.

Chapter III - HTTP Access

Arecont Vision cameras support three protocols: TFTP, HTTP, and RTSP/RTP. TFTP protocol is recommended for application scenarios where high quality video at full frame rate is required. The drawback (if any) is that the implementation of TFTP protocols requires custom software application development based on Arecont Vision's SDK. RTSP/RTP protocol is supported only in camera models that are equipped with h.264 encoder, as described at the end of this chapter.

Camera performance in terms of frame rate is somewhat slower via HTTP than via TFTP and is comparable to other multi-megapixel products available on the market.

Notational conventions:

- **camera_ip** : IP address of the camera;
- **|** : means one or another, but not both i.e. logical OR;
- **()** : allowable values;
- **..** : a range of values which can be incremented by 1;
- **• +/-** : positive values do not need the "+" sign, while the negative values do need the "-" sign in front of the value;
- **[]** : non-mandatory value which can be omitted.

On-Camera Web Page

AV cameras can be accessed from a web browser via the on-camera web page. The web page allows changing camera settings and to view live video by means of Java script stored in camera's non-volatile memory. The web page is accessed by typing in any web browser:

http://ip_address or http://ip_address/index.html

In addition to the web page AV cameras also implement html video container that can be used for incorporation of the camera URL into user's own html page. This video container is accessed from:

http://ip_address/livevideo

To incorporate the video container in an html page, use the following line in the body of the page:

```
<iframe  
src="http://200.168.1.10/"width="800"height="600"marginheight="0"marginwidth="0"scrolling="no">  
</iframe>
```

where the width and height parameters specify the image size requested from the camera.

HTTP Request Format for Receiving Individual JPEG Frames

NOTE: A complete set of http requests described in this document is supported for firmware versions 61430 and above. If you have an AV camera with a lower firmware version contact your distributor for a firmware upgrade.

An individual image can be requested from AV cameras by using the following HTTP request format:

http://ip_address/image?res=resolution_value&x0=X0&y0=Y0&x1=X1&y1=Y1&quality=quality_value&doublescan=doublescan_value&id=value

where

- **Res** can have value of either “half” or “full” and specifies whether camera should decimate the image by a factor of 2 in each direction or display the full resolution.
- **X0, Y0, X1, Y1** are the left, top, right and bottom coordinates of the requested image window, respectively. These values cannot exceed the size of the image sensor array for the specific camera and should be divisible by 16 if “**Res=full**” and 32 if “**Res=half**”. These parameters allow for a particular image to be cropped to a selected size.
- **Quality** is the compressed JPEG image quality with a range from 1 to 20.
- **Doublescan** allows the user to specify whether the camera should delay the image output until a new image is available (**doublescan** = 0) or the image request should be serviced by outputting the content of the image buffer that was already once output (useful for picture-in-picture display).
- **ID** is an optional field that is ignored by the camera but may be set by the user to a random value to force some browsers to display a new image. Some browsers may display a cached image if a previous URL is reused without modifying the **ID** field.
-

The following example illustrates the request to camera with IP address 192.168.0.36 for a new full resolution 1600x1200 image with compression quality 12:

<http://192.168.0.36/image?res=full&x0=0&y0=0&x1=1600&y1=1200&quality=12&doublescan=0>

The user also has the option of specifying default image parameters via parameter “set” requests and then obtaining the image by using a simple request without additional parameters: http://ip_address/img.jpg

HTTP Request Format for Continuous MJPEG Video Streaming

Continuous sequence of JPEG images (MJPEG) separated by the boundary separator can be requested from AV cameras by using the following GET method request format:

```
GET/mjpeg?res=resolution_value&x0=X0&y0=Y0&x1=X1&y1=Y1&quality=quality_value&doublescan
=doublescan_value&fps=value&id=value
HTTP/1.1\r\n
Host: ip_address\r\n
\r\n
```

where

- **Res** can have value of either full or half and specifies whether camera should decimate the image by a factor of 2 in each direction or display the full resolution.
- **X0, Y0, X1, Y1** are the left, top, right and bottom coordinates of the requested image window, respectively. These values cannot exceed the size of the image sensor array for the specific camera and should be divisible by 16 if “**Res=full**” and 32 if “**Res=half**”. These parameters allow for the video to be cropped to a specific size.
- **Quality** is the compression quality of the jpeg image with the range from 1 to 20;
- **Doublescan** allows the user to specify whether the camera should delay the image output until a new image is available (**doublescan** = 0) or if the image request should be serviced by outputting the content of the image buffer that was already once output (useful for picture-in-picture display).
- **FPS** specifies the requested frame rate; values 1 to 15 result in the specified frame rate, while omitting fps parameter as well as fps values of 0 and all values above 16 will result in maximum frame rate that is model dependent.

The following example illustrates the request to camera with IP address 192.168.0.36 for the new full resolution 1600x1200 video stream with compression quality 12 at a maximum frame rate:

```
GET /mjpeg?res=half&x0=0&y0=0&x1=1600&y1=1200&quality=12&doublescan=0 HTTP/1.1\r\n
Host: 192.168.1.11\r\n\r\n
```

In response to the above request the camera sends a continuous stream of images separated by the boundary separator “fbdr” in accordance with MIME multipart/x-mixed-replace format. Please note that MIME multipart/x-mixed-replace format is not directly supported by Internet Explorer. For video viewing based on IE only the users should use on-camera script that can be accessed via http://ip_address/index.html request.

```
HTTP/1.0 200 OK\r\n
Content-Type: multipart/x-mixed-replace;boundary=fbdr\r\n
\r\n
--fbdr\r\n
```

```

Content-Type: image/jpeg\r\n
\r\n
<JPEG image 1 data>
\r\n
--fbd\r\n
Content-Type: image/jpeg\r\n
\r\n
<JPEG image 2 data>
\r\n
--fbd\r\n
...
Content-Type: image/jpeg\r\n
\r\n
<JPEG image n data>
\r\n
--fbd\r\n

```

HTTP Request Format for Receiving Individual H.264 Frames

NOTE: The h.264 http requests described below are supported only by camera models AVxxx5.

To maintain a continuous H.264 stream, the requests for individual video frames should be sent one after another. If the delay between requests exceeds 5 sec, the camera will initiate a new stream by sending an Intra coded frame first in response to the next frame request. Individual H.264 video frames are requested from AV cameras by using the following HTTP request format:

```

http://camera_ip/h264f?res=(half|full)&x0=(0..2596)&y0=(0..1944)&x1=(32..2596)&y1=(32..1944)&qp
=(4..36)&doublescan=(0|1)&ssn=(1..65535)[&iframe=(0|1)][&bitrate=(1..51200)][&
intra_period=(0..255)]

```

Where

- **Res** can have a value of either “half” or “full” to specify whether the camera should decimate the image by a factor of 2 in each dimension or produce the full resolution image.
- **X0, Y0, X1, Y1** are the left, top, right and bottom coordinates of the requested image window, respectively. These values cannot exceed the size of the image sensor array for the specific camera model and should be divisible by 32 if **Res = full** and 64 if **Res = half**.

- **QP** is the quantization parameter for H.264 encoder. To achieve a higher quality image, a lower **QP** is needed. Recommended values are in the range (16..37);
- **Doublescan** is the parameter that allows the user to specify whether the camera should delay the frame output until a new frame is available from the sensor (**doublescan** = 0) or the request should be serviced by outputting the content of the memory buffer that has been already once output (**doublescan**=1, useful for picture-in-picture display).
- **SSN** specifies stream identifier. MPEG codecs including H.264 codecs are context dependent (decoding of the current frame depends on the previous frame(s)). The stream is a sequence of frames of the same resolution which can be decoded sequentially by one instance of an MPEG decoder. Accordingly, **SSN** is a means to distinguish different streams from one another. Use a unique **SSN** for each stream with a unique image size, quality and/or frame rate. Each camera supports up to eight simultaneous non-identical streams. Each client must have a unique (ip:ssn)
- **Iframe** set to 1 will force the camera to return an Intra frame with a corresponding SPS and PPS as an IDR slice, so that the stream is decodable from this point. When opening a new stream (for example when changing the image size and/or frame rate) the Intra frame will be sent automatically regardless of the input value of **iframe**. To reduce the stream size, reduce the frequency of **iframe** = 1 in the requests. The default number of P-frames for any of the streams sent by the camera is set using HTTP command :

[http://camera/setreg?page=3®=21&val=\(number of P-frames\)](http://camera/setreg?page=3®=21&val=(number of P-frames))

The camera will return an Intra frame even if **iframe** in the request is set to 0 when the on-camera counter of P-frames fills up. To find out whether an Intra frame was received, check the HTTP Content Type.

- **Bitrate** is used to set up a constant **bitrate** of the H.264 stream in kilobits per second. If this parameter is present in the request string and is larger than zero then the QP parameter is ignored, and the camera adjusts quantization parameters automatically to maintain the specified **bitrate**.
- **Intra_period** is valid only in bitrate control when a non-zero bitrate is present in the request string and **iframe**=1 is periodically requested by the user. In this case, the user must specify the intra-frame period at which the user is sending requests with **iframe**=1. If the user does not specify **intra_period** in this case, then bitrate control will not function correctly unless the actual period of sending **iframe**=1 requests is the same as the default number of P-frames specified in register 3:21 of the camera via

[http://camera/setreg?page=3®=21&val=\(number of P-frames\)](http://camera/setreg?page=3®=21&val=(number of P-frames))

If there are no **iframe=1** requests, then **intra_period** parameter is not required and the bitrate control will rely on the default number of P-frames set in register 3:21.

The following example illustrates a request to a camera with IP address 192.168.0.36 for a full resolution 1600x1200 image as a part of the stream with a constant bitrate set to 2 Mbits/sec:

```
http://192.168.0.36/h264f?res=full&x0=0&y0=0&x1=1600&y1=1200&quality=12&doublescan=0&bitrate=2048&ssn=1
```

Each frame sent by the camera may contain multiple zero bytes at the end – there is no Unit Delimiter (UD). Although this does not contradict ITU-T H.264 standard (ISO/IEC 14496-10), some decoders may delay decoded frames by one due to the absence of the UD. If this presents a problem, replace all zero bytes at the end with the UD, a sequence of the following five bytes: 0x00 0x00 0x01 0x09 0x10. In addition, the number of zero bytes at the end of a frame may be significant, up to a few hundred bytes. Replacing them with the UD will also reduce the stream size.

HTTP Request Format for Continuous H.264 Video Streaming

NOTE: The h.264 http requests described below are supported only by camera models AVxxx5.

A continuous h.264 video stream with frames separated by the boundary separator can be requested from AV cameras by using the following GET method request format:

```
GET/h264stream?res=(half|full)&x0=(0..2596)&y0=(0..1944)&x1=(32..2596)&y1=(32..1944)&qp=(4..36)&doublescan=(0|1)&ssn=(1..65535)[&fps=value][&bitrate=(1..51200)]
HTTP/1.1\r\n
Host: ip_address\r\n
\r\n
```

Where:

- **Res** can have value of either “half” or “full” and specifies whether the camera should decimate the image by a factor of 2 in each dimension or produce the full resolution image.
- **X0, Y0, X1, Y1** are the left, top, right and bottom coordinates of the requested image window, respectively. These values cannot exceed the size of the image sensor array for the specific camera model and should be divisible by 32 if **Res = full** and 64 if **Res = half**.
- **QP** is the quantization parameter for H.264 encoder. To achieve a higher quality video, a low *qp* is needed. Recommended values are in the range (16..37);

- **Doublescan** allows the user to specify whether the camera should delay the image output until a new image is available from the sensor (`doublescan = 0`) or the image request should be serviced by outputting the content of the image buffer that has been already once output (useful for picture-in-picture display).
- **SSN** specifies the stream identifier. MPEG codecs including H.264 codecs are context dependent (decoding of the current frame depends on the previous frame(s)). The stream is a sequence of frames of the same resolution which can be decoded sequentially by one instance of an MPEG decoder. Accordingly, **SSN** is a means to distinguish different streams from one another. Use a unique **SSN** for each stream with a unique image size, quality, and/or frame rate. Each camera supports up to eight simultaneous non-identical streams. Each individual client must have a unique (`ip:ssn`)
- **Bitrate** is used to set up a constant bitrate of the H.264 stream in kilobits per second. If this parameter is present in the request string and is larger than zero then the **QP** parameter is ignored and the camera adjusts quantization parameters automatically to maintain the specified bitrate.
- **FPS** specifies the requested frame rate. Values 1 to 15 result in the specified frame rate. Omitting the `fps` parameter or using `fps` values of 0 or any values above 16 will result in maximum frame rate which is model dependent.

The first frame of the stream is always an IDR (Intra) frame followed by multiple P (Inter) frames. The default number of P-frames is 50, and can be modified via register 3:21 using the following HTTP command:

[http://camera/setreg?page=3®=21&val=\(number of P-frames\)](http://camera/setreg?page=3®=21&val=(number of P-frames))

The current P-frames setting can be checked using the following HTTP command:

<http://camera/getreg?page=3®=21>

Each frame sent by the camera may contain multiple zero bytes at the end. There is no Unit Delimiter (UD) used. Although this does not contradict the ITU-T H.264 standard (ISO/IEC 14496-10), some decoders may delay decoded frames by one due to the absence of the UD. If this presents a problem, replace all zero bytes at the end with the UD, a sequence of the following five bytes: 0x00 0x00 0x01 0x09 0x10. In addition, the number of zero bytes at the end of a frame may be significant, up to a few hundred bytes. Replacing them with the UD will also reduce the stream size.

The following example illustrates a request to a camera with IP address 192.168.1.11 for full resolution 1600x1200 images as a part of the stream with a constant bitrate set to 2 Mbits/sec with maximum frame rate:

```
GET/h264stream??res=full&x0=0&y0=0&x1=1600&y1=1200&qp=26&ssn=1&doublescan=0&bitrate=
2048 HTTP/1.1\r\n
Host: 192.168.1.11\r\n\r\n
```

In response to the above request the camera sends a continuous stream of images separated by the boundary separator “fhdr” in accordance with MIME multipart/x-mixed-replace format.

RTSP Request Format for Continuous H.264 Video Streaming

Reference documents for the RTSP/RTCP+SDP+RTP protocol implementation are:

- RFC 3550 for RTCP
- RFC 1889 for RTP
- RFC 2327 for SDP
- RFC 2326 for RTSP
- RFC 3984 for the data format of H.264 streaming over RTP

Unicast camera access:

The AVxxx5 series cameras support the RTSP protocol via TCP connections. Any RTSP request sent to camera via UDP will be ignored. The actual video stream is transmitted by the camera using RTP protocol. AV cameras support two options for RTP transmission: RTP over UDP, and RTP over TCP (RTP/AVP). The maximum number of simultaneously serviced unicast requests or video streams is eight.

Multicast Camera access:

The AVxxx5 series cameras support multicast h.264 video streaming. Valid multicast destination IP address range is: 224.0.0.0 – 239.255.255.255, default is 224.0.0.1. Destination multicast IP address range for SAP is: 224.0.0.0 – 239.255.255.255, default is 224.0.0.255.

Accessing video stream via RTSP commands:

An H.264 video stream is requested via RTSP using the following URL. Please note that this URL will not work in a typical web browser. A media player such as VLC or Apple Quicktime is required for this to function properly.

```
rtsp://camera_ip/h264.sdp?res=(half | full)&x0=(0..max_sensor_width)&y0=(0..
max_sensor_height)&x1=(32..max_sensor_width)&y1=(32..max_sensor_height)&qp=(4..51)&
ssn=(1..65535)&[doublescan=(0|1)]&[bitrate=(0..65536)]&[fps=1..100]
```

Where:

- **Res** can have value of either “half” or “full” and specifies whether the camera should decimate the image by a factor of 2 in each dimension or produce the full resolution image.
- **X0, Y0, X1, Y1** are the left, top, right and bottom coordinates of the requested image window, respectively. These values cannot exceed the size of the image sensor array for the specific camera model and should be divisible by 32 if **Res = full** and 64 if **Res = half**.
- **QP** is the quantization parameter for H.264 encoder. To achieve a higher quality video, a low *qp* is needed. Recommended values are in the range (16..37);
- **Doublescan** allows the user to specify whether the camera should delay the image output until a new image is available from the sensor (doublescan = 0) or the image request should be serviced by outputting the content of the image buffer that was already once output (useful for picture-in-picture display).
- **SSN** specifies the stream identifier. MPEG codecs including H.264 codecs are context dependent (decoding of the current frame depends on the previous frame(s)). The stream is a sequence of frames of the same resolution which can be decoded sequentially by one instance of an MPEG decoder. Accordingly, **SSN** is a means to distinguish different streams from one another. Use a unique **SSN** for each stream with a unique image size, quality, and/or frame rate. Each camera supports up to eight simultaneous non-identical streams. Each client must have a unique (ip:ssn)
- **Bitrate** is used to set up a constant bitrate of the H.264 stream in kilobits per second. If this parameter is present in the request string and is larger than zero then the **QP** parameter is ignored and the camera adjusts quantization parameters automatically to maintain the specified bitrate.
- **FPS** specifies the requested frame rate. Values 1 to 15 result in the specified frame rate. Omitting the fps parameter or using fps values of 0 or any values above 16 will result in maximum frame rate which is model dependent.

The camera recognizes the following RTSP methods:

- OPTIONS** – requesting supported RTSP methods;
- DESCRIBE** – requesting available resources and their format;
- SETUP** – resolving the camera’s and the client’s ports;
- PLAY** – starting RTP video stream;

The camera also recognizes PAUSE and TEARDOWN but terminates the RTSP session when it receives these commands. To resume the stream it is necessary to repeat stream initialization.

The following is a sequence of resolving camera's parameters and starting an RTP stream:

- 1) Open a TCP connection on port 554 (RTSP) of the camera.
- 2) Request the camera's data format via DESCRIBE. The camera will respond with SDP parameter set of the H.264 stream (SPS/PPS), and the method of forming RTP data packets and synchronization (90 KHz timer).
- 3) Specify via SETUP the client ports for receiving the video stream.
- 4) Request PLAY to start the RTP video stream.
- 5) Receive and decode H.264 video frames packed into fragmented RTP packets that are transmitted via UDP, or optionally over TCP, by the camera.
- 6) At least every 5 seconds of the RTP streaming send RTCP feedback packets. If the camera does not receive any RTCP packets over a 10 second period, the session will be terminated.

The camera sends IDR frames followed by multiple P-frames. All frames are transmitted in the form of FU-A fragmented RTP packets as described in RFC 3984. The default number of P-frames is 50, and can be modified using the following HTTP command:

[http://camera_IP/setreg?page=3®=21&val=\(number of P-frames\)](http://camera_IP/setreg?page=3®=21&val=(number of P-frames))

The current P-frame setting can be checked using the following HTTP command:

http://camera_IP/getreg?page=3®=21

Basic Camera Control Parameters

The camera parameters can be accessed via the HTTP requests of the following format:

http://ip_address/set?parameter=value

http://ip_address/get?parameter

Examples:

<http://192.168.0.36/set?brightness=15>

<http://192.168.0.36/get?brightness>

The following parameter requests are supported via HTTP protocol by AV cameras:

- **brightness** – image brightness (valid values are from -50 to 50)
- **sharpness** – image sharpening (valid values are from 0 to 4)
- **saturation** – color saturation (valid values from 0 to 6)
- **blue** - blue tint adjustment (valid values from -10 to +10)
- **red** - red tint adjustment (valid values from -10 to +10)

- **illum** – illumination setting for auto white balance (valid values are auto, indoor, outdoor, mix)
- **freq** – frequency of AC powered light sources (valid values are 50 and 60)
- **lowlight** – low light mode of the camera, allows tradeoff between frame rate and image quality (valid values are balance, speed, quality, highspeed, moonlight). If highspeed is used, an additional parameter **shortexposures** can be set with valid values from 1 to 10.
- **rotate** – image rotation (valid values are 0 and 180)
- **autoexp** – allows to turn on and off auto exposure (valid values are on and off)
- **expwndleft** - left coordinate of user-defined auto-exposure measurement window (valid values should fall within sensor window)
- **expwndtop** - top coordinate of user-defined auto-exposure measurement window (valid values should fall within sensor window)
- **expwndwidth** - width of user-defined auto-exposure measurement window (valid values should fall within sensor window)
- **expwndheight** – height of user-defined auto-exposure measurement window (valid values should fall within sensor window)
- **sensorleft** - left coordinate of sensor window (valid values defined by sensor size)
- **sensortop** - top coordinate of sensor window (valid values defined by sensor size)
- **sensorwidth** - width of sensor window (valid values defined by sensor size; this value affects sensor frame rate)
- **sensorheight** - height of sensor window (valid values defined by sensor size; this value affects sensor frame rate)
- **imgleft** - left coordinate of the default image returned in response to the simple request http://ip_address/img.jpg (valid values should fall within the camera's sensor window)
- **imgtop** - top coordinate of the default image returned in response to the simple request http://ip_address/img.jpg (valid values should fall within the camera's sensor window)
- **imgwidth** – width of the default image returned in response to the simple request http://ip_address/img.jpg (valid values should fall within the camera's sensor window)
- **imgheight** - height of the default image returned in response to the simple request http://ip_address/img.jpg (valid values should fall within sensor window)
- **imgquality** – quality setting of the image returned in response to the simple request http://ip_address/img.jpg (valid values 1 to 21)
- **imgres** – resolution of the default image returned in response to the simple request http://ip_address/img.jpg (valid values are full and half, where half is used to request images decimated by a factor of 2 in both directions)
- **auto-iris** – allows to enable and disable auto-iris (valid values are on and off)
- **irisgain** – allows to specify threshold for closing the auto-iris (valid values are from 8 to 255)

- **save** – saves current camera configuration (all parameter values) in the non-volatile memory
http://ip_address/set?params=save
- **mac** – retrieves the MAC address of the camera (read-only)
- **make** – retrieves the manufacturer abbreviation (requires firmware version 64116)
- **model** – retrieves a four-digit camera model number (read-only, e.g. AV2100M camera will return “model=2100”)
- **fwversion** – retrieves firmware version of the camera
- **procversion** – retrieves version of the image processor
- **netversion** – retrieves version of the network processor
- **revision** – retrieves the revision code of the PCB
- **factory** – restores camera parameters to factory defaults http://ip_address/set?params=factory

The camera registers can be accessed via the HTTP requests of the following format:

[http://camera_ip/getreg?page=\(0..6\)®=\(0..255\)](http://camera_ip/getreg?page=(0..6)®=(0..255))

[http://camera_ip/setreg?page=\(0..6\)®=\(0..255\)&val=\(0..65535\)](http://camera_ip/setreg?page=(0..6)®=(0..255)&val=(0..65535))

Parameters Specific to AV3130 and DAY/NIGHT Cameras

The AV3130 camera utilizes two distinct sensors for its day and night modes. Specifically, a 3-Megapixel color sensor with IR-cut filter is used in the day mode, and a 1.3-Megapixel monochrome sensor without IR-cut filter is used in the night mode.

Single sensor Day/Night cameras use a mechanical IR switcher to switch between day mode (color, with IR-cut filter) and night mode (monochrome, without IR-cut filter).

By default, the camera automatically switches between day and night channels as illumination changes.

However, it is also possible to force the camera to operate in either day or night channel by using the **daynight** request. The switching point between day and night modes is determined based on overall AE/AGC gain and can be adjusted via the parameter **nightgain**. To avoid oscillations between day and night modes, the night-to-day transition is specified via parameter **daygain** in terms of “hysteresis” relative to day-to-night transition threshold.

- **daynight** – if set to “auto” the camera will select between color and monochrome channels automatically based on **daygain** and **nightgain thresholds** (valid values are “auto”, “day” and “night”)
- **nightgain** – specifies the automatic switching point for day-to-night transition in proportion to overall exposure*gain value. The user may need to adjust this value if the lenses on day and night channels have different f-stops. Higher values will cause the transition to night mode at lower illumination levels (valid values for the AV3130 are 0..18, for -DN models the valid range is 64..512)

- **daygain** – allows to specify the automatic switching point for night-to-day transition as “hysteresis” relative to night-to-day transition; Higher values will cause the transition to day mode at higher illumination level (valid values for AV3130 are 0..6, for –DN models are 1..4)

As AV3130 camera has two sensors with different resolutions it is most convenient to specify the required image size in terms of percentages of the full image size as shown in the following example:

<http://200.168.1.10/image?res=full&x0=0%&y0=0%&x1=100%&y1=100%&quality=12&doublescan=0>

Motion Detection Control Parameters

The unique design of AV cameras allows for highly accurate 64-zone motion detection (also see Motion Detection). Motion detection is achieved by analyzing inter-frame brightness changes on a pixel-by-pixel basis. To provide accurate motion detection in low contrast and low light environments, EACH pixel of EACH frame is analyzed. The user can set the size of motion detection zones (via **mdzonesize**), select the sensitivity to motion (via **mdlevelthreshold**), select the zones where the motion detection has to be blocked (via **mdprivasymask**) and specify the size of the moving objects of interest (via **mddetail**). Motion detection information can be obtained from the camera in terms of “amount” of motion in each zone (via **mdresult**) In addition to retrieving motion detection information, the camera can also be configured to output images only if motion is detected (via **mdmode**).

The On-camera motion detection unit utilizes up to 64 distinct zones. All zones are square, have equal size and are arranged in 8 rows with 8 zones per row. The zones are numbered from 0 to 63, upper leftmost zone having number 0 and lower rightmost zone having number 63. The zones are broken into sub-zones of size 32x32 pixels. The size of zones is specified in terms of the square root of the number of sub-zones via parameter **mdzonesize**. The zones can be defined to be as small as 7x7 sub-zones to as large as 15x15 sub-zones. By setting the limit on how many sub-zones should contain the motion for the entire zone to be considered to contain motion the user can effectively decide on the size of the moving objects that should be detected. This is done via the parameter **mddetail**.

- **motiondetect** – enables on-camera motion detection (valid values are “on” and “off”)
- **mdmode** – motion detection mode for mjpeg streams (valid values are “on” and “off”); if set to “on” the camera will only output an image in the presence of motion; If the motion is not detected, the field following the frame boundary separator --fbdr will be followed by Content-Type: text/plain (instead of usual -Type: image/jpeg) and the image data will be substituted with the text message “no motion”
- **mdtotalzones** - number of independent motion detection zones; Currently must be 64. There are 8 rows of zones, 8 zones per row. Note that depending on zone size and the camera model (image

resolution in terms of the number of pixels) some zones may not correspond to the active image area (valid value 64)

- **mdzonesize** – size of motion detection zones measured in number of 32x32 pixel blocks in each zone; All zones are squares of the same size from 7x7 to 15x15 (valid values are 7 to 15 for AV1300 and AV2100 and 8 to 15 for AV3100 and AV3130)
- **mdlevelthreshold** – motion detection threshold that determines the sensitivity to local inter-frame brightness changes (valid values are 2...31). Lower settings may cause false motion detection due to noise. This parameter corresponds to “Level” under the “Motion Settings” in the AV100 Video System GUI.
- **mdsensitivity** – sensitivity of the motion detection to sudden overall lighting changes. This prevents false triggering due to a sudden overall brightness change that triggers motion detection in a large number of zones simultaneously. If more than this number of zones have motion it is assumed that the change is due to lighting change and the detected motion is ignored. Recommended values are 40 for AV3100/AV3130, 30 for AV2100 and 20 for AV1300. This parameter corresponds to “Limit” under the “Motion Settings” in the AV Video System GUI.
- **mddetail** – allows controlling the size of detectable moving objects. The value is the number of 32x32 sub-zones within each zone that should contain motion for the entire zone to be considered to contain motion. (valid values are 1 through square of **mdzonesize**). This parameter corresponds to “Detail” under “Motion Settings” in AV Video System GUI.
- **mdprivasymask** – Privacy matrix. An 8-byte array, where each byte corresponds to one row of motion detection zones. Each bit in a byte enables motion detection in a corresponding zone, if set to ‘1’. Leftmost zone is controlled by MSB, rightmost zone by LSB.

Example: `set?mdprivasymask=2a8f3d135b71ee04` results in the following enabled zones relative to camera image:

```
01010100
11110001
10111100
11001000
11011010
10001110
01110111
00100000
```

- **mdresult** – Motion detection information returned by the camera; The return value is “no motion” if motion has not been detected, otherwise the motion detection information is returned in the following format:

```
mdresult=<SP><hexadecimal byte0><SP><hexadecimal byte1>...<SP><hexadecimal  
byte63>
```

where <SP> is the SPACE symbol, and the byte value, byteN, indicates the number of sub-zones (blocks of 32x32 pixels) with motion within zone N. Note: the sub-zone size is fixed to 32x32 and cannot be changed. Important: the user should keep in mind that the total number of zones is always 64 (8 vertically and 8 horizontally). Therefore, if the zone size is large, some zones may not correspond to the active pixel array. In that case their motion detection value is not meaningful and should be ignored. For example, for AV1300 camera: if the image size is 1280x1024, then for zone size 8x8 there are 5 by 4 active zones (3 zones after every 5 zones must be ignored as well as all zones after zone 32).

Example:

```
mdresult= 00 1A 01... means that in zone 0 motion was not detected, in zone 1 there are 26  
(32x32) sub-zones with motion, in zone 2 there is one sub-zone 1 with motion ....
```

Access Control

Arecont Vision cameras support two levels of password-protected access control. Camera authentication is compatible with RFC-2068 HTTP 1.1 and is supported by all standard browsers and video surveillance software.

There are two types of users with the following reserved names:

admin – full access to all camera settings and live video.

viewer –viewing access only to all current camera settings and live video.

Setting and removing the passwords is the privilege of the **admin** user, while the **viewer** can only use the existing password, but not change it. Factory defaults erase all current passwords for both the **admin** and the **viewer**. A newly shipped camera has no password protection and allows full anonymous access from the network. In case the **admin** password has not been set, the camera has full anonymous access from the network, even if the **viewer** password has been set.

Access control setup consists of three steps:

1. Set **admin** password (using http commands or using the camera's web page, see below).
2. Log-in using the **admin** password and set the **viewer** password.
3. Communicate the **viewer** password to the users.

In order to delete **viewer** password, log-in as **admin** and change the viewer password to a reserved password **empty** – this would restore the full anonymous access to the camera. The **admin** user can change the **viewer** password at any time, even without knowing the current **viewer** password.

***NOTE:** If the admin password has been set and forgotten, it can only be erased through reprogramming the camera's firmware, or by accessing the camera registers via developers' register access from AV100 software.*

HTTP commands for password setting:

1. For **admin** passwords:

http://camera_IP/get?admin

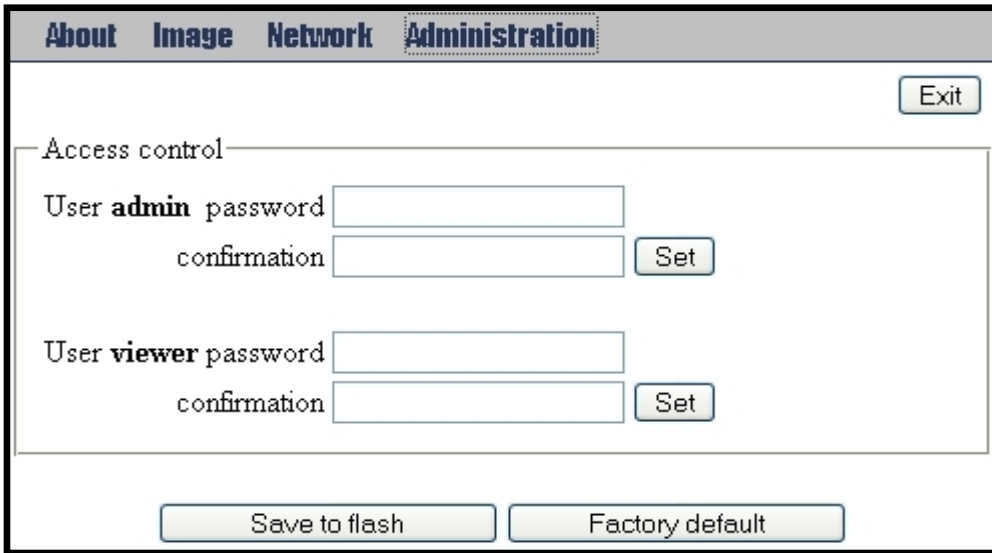
[http://camera_IP/set?admin=\(a string of 1..8 ASCII symbols or "empty"\)](http://camera_IP/set?admin=(a string of 1..8 ASCII symbols or \) The reserved password **empty** is used to erase the existing password.

2. For **viewer** passwords (Figure 30):

http://camera_IP/get?viewer

[http://camera_IP/set?viewer=\(a string of 1..8 ASCII symbols or "empty"\)](http://camera_IP/set?viewer=(a string of 1..8 ASCII symbols or \) The reserved password **empty** is used to erase the existing password.

Figure 30. Camera's web page menu for setting passwords



The screenshot shows a web browser window with a navigation menu at the top containing 'About', 'Image', 'Network', and 'Administration'. The 'Administration' tab is selected. In the top right corner of the window is an 'Exit' button. The main content area is titled 'Access control' and contains two sections for user password management. The first section is for the 'admin' user, with fields for 'password' and 'confirmation', and a 'Set' button. The second section is for the 'viewer' user, also with 'password' and 'confirmation' fields and a 'Set' button. At the bottom of the window are two buttons: 'Save to flash' and 'Factory default'.

Access Control for Panoramic Cameras

Arecont Vision cameras support dual-level password-protected access control. Camera authentication is compatible with RFC-2068 HTTP 1.1 and is supported by all standard browsers and video surveillance software.

There are two types of users with the following reserved names:

- admin** – has full access to all camera settings and the video.
- viewer** – has viewing access to all current camera settings and the video.

Setting and removing the passwords is the privilege of the **admin** user. The **viewer** user can only use a password set by the admin and has no rights to modify their own password. Resetting to factory default will erase all current passwords for both **admin** and **viewer**. A newly shipped camera will have no password protection and will allow full anonymous access. Setting the **viewer** password without an admin password will still allow full anonymous access to the camera's live feed.

Access control setup consists of three steps:

1. Set an **admin** password, using http commands or using the camera's web page.
2. Log-in using the **admin** password and set the **viewer** password.
3. Convey the **viewer** password to the users.

In order to delete **viewer** password, log-in as **admin** and change the viewer password to a reserved password **empty** – this would restore the full anonymous access to the camera. The **admin** user can change the **viewer** password at any time, without knowing the current **viewer** password.

***NOTE:** If the admin password has been set and forgotten, it can only be erased through reprogramming the camera's firmware or by accessing the camera registers via developers' register access from AV100 software.*

HTTP/1.1 vs. HTTP/1.0

Arecont Vision cameras support both HTTP/1.0 and HTTP/1.1 protocols as defined by RFC-1945 and RFC-2068, respectively. While HTTP/1.0 is simple, it limits the speed of image transmission for cases when the user requests individual images rather than an mjpeg stream. This is due to the fact that connection is closed after the transmission of each image, forcing the client to incur round trip delay repeatedly. However, HTTP/1.0 is supported by all HTTP implementations and can be used reliably, albeit with limited speed. By default, Arecont Vision cameras are configured to respond using HTTP/1.0 protocol regardless of the HTTP version used by the client.

Users who desire faster full duplex communication and image delivery may request responses using the HTTP/1.1 protocol. To do so, the user should append the parameter `ver=HTTP/1.1` to the request string as shown in the following example:

<http://192.168.0.36/image?res=full&x0=0&y0=0&x1=1600&y1=1200&quality=12&doublescan=0&ver=HTTP/1.1>

It is important to note that AV cameras implement “chunked” transfer encoding as defined by paragraph 14.40 of RFC-2068. While RFC-2068 requires that all HTTP/1.1 implementations support “chunked” encoding, in reality many older implementations (Indy 9, WinHTTP 5.0, etc) are not fully compliant with the requirements of the standard. As a result, if the HTTP/1.1 protocol is requested from a non-compliant implementation, the chunks separators will remain in the data stream and the jpeg image will be corrupted. If the user receives corrupted images over HTTP/1.1 the user should either remove HTTP/1.1 specification from the request or upgrade the HTTP implementation to fully compliant (e.g. WinHTTP 5.1)

HTTP Access of Panoramic Cameras

Notational conventions:

camera_ip	: IP address of the camera;
get	: get a parameter from camera via http;
set	: set a parameter on camera via http;
<channel>	: panoramic camera channel number from 1 to 4;
""	: a symbol string in ASCII;
 	: means one or another, but not both;

- () : allowable values;
- .. : a range of values incrementable by 1;
- +/- : positive values do not need the “+” sign, while the negative values do need the “-” sign in front of the value;
- [] : non-mandatory value which could be dropped.

In order to access the built-in camera’s web page type either of the two following http commands into the web browsers’ address field:

http://camera_ip/

http://camera_ip/index.html

Requesting Images from Panoramic Cameras AV8180/85 & 8360/65

The AV8360/AV8180/AV8365/AV8185 camera models support two types of image requests: individual JPEG image requests (image or img.jpg) and continuous MJPEG stream requests (mjpeg). In addition, models AV8365/AV8185 support h.264 streaming using RTSP/RTP protocol. The maximum number of supported simultaneous requests of single images or mjpeg streams is eight for AV8180 and AV8360, and up to twelve in AV8185 and AV8365.

***NOTE:** Even though the camera supports multi-user access, the maximum frame rate is achieved only when there is a single request arriving to each channel at any given time.*

1. Requesting individual JPEG images

1.1 Requesting images using explicit parameter list within the HTTP string:

[http://camera_ip/image\[<channel>\]?res=\(half|full\)&x0=\(0..1600\)&y0=\(0..1200\)&x1=\(32..1600\)&y1=\(32..1200\)&quality=\(1..21\)&doublescan=\(0|1\)&\[id=\(0..999999999999999\)\]&\[ssn=\(0..65535\)\]](http://camera_ip/image[<channel>]?res=(half|full)&x0=(0..1600)&y0=(0..1200)&x1=(32..1600)&y1=(32..1200)&quality=(1..21)&doublescan=(0|1)&[id=(0..999999999999999)]&[ssn=(0..65535)])

Where:

Res can have value of either “half” or “full” and specifies whether the camera should decimate the image by a factor of 2 in each dimension or display the full resolution.

x0,y0,x1,y1 are the left, top, right and bottom coordinates of the requested image window, respectively. These values cannot exceed the size of the image sensor array.

Quality – image quality, the inverse of image compression level;

Doublescan allows the user to specify whether the camera should delay the image output until a new image is available (doublescan = 0) or the image request should be serviced by

outputting the content of the image buffer that was already once output (useful for picture-in-picture display).

Id is an arbitrary number used to control the web browser's cache;

SSN a unique HTTP session number which cancels out any earlier sent HTTP request with the same number which got "hung".

***NOTE:** Image requests without the <channel> parameter specified will cause the camera to transmit the next available image from any of the currently enabled channels. The channel number of the transmitted image could then be identified from the HTTP header Etag (see RFC-2068 HTTP 1.1): **ETag: Channel<channel>** .*

- 1.2 Requesting images using an implicit parameter list (parameters are loaded on camera in advance using separate http commands (see section B 16 below):

[http://camera_ip/img.jpg?\[id=\(0..9999999999999999\)\]&\[ssn=\(0..65535\)\]](http://camera_ip/img.jpg?[id=(0..9999999999999999)]&[ssn=(0..65535)])

Where:

id – an arbitrary number used to control the web browser's cache;

ssn – a unique HTTP session number which cancels out any earlier sent HTTP request with the same number which got "hung".

2. Requesting a continuous Motion JPEG image stream

[http://camera_ip/mjpeg\[<channel>\]?res=\(half|full\)&x0=\(0..1600\)&y0=\(0..1200\)&x1=\(32..1600\)&y1=\(32..1200\)&quality=\(1..21\)&doublescan=\(0|1\)&\[fps=\(0..15\)\]&\[id=\(0..9999999999999999\)\]&\[ssn=\(0..65535\)\]](http://camera_ip/mjpeg[<channel>]?res=(half|full)&x0=(0..1600)&y0=(0..1200)&x1=(32..1600)&y1=(32..1200)&quality=(1..21)&doublescan=(0|1)&[fps=(0..15)]&[id=(0..9999999999999999)]&[ssn=(0..65535)])

Where:

Res can have value of either "half" or "full" and specifies whether the camera should decimate the image by a factor of 2 in each dimension or display the full resolution.

x0,y0,x1,y1 are the left, top, right and bottom coordinates of the requested image window, respectively. These values cannot exceed the size of the image sensor array.

Quality – image quality, the inverse of image compression level;

Doublescan allows the user to specify whether the camera should delay the image output until a new image is available (doublescan = 0) or the image request should be serviced by

outputting the content of the image buffer that was already once output (useful for picture-in-picture display).

FPS specifies the desired frame rate.

Id is an arbitrary number used to control the web browser's cache;

SSN a unique HTTP session number which cancels out any earlier sent HTTP request with the same number which got "hung".

***NOTE:** MJPEG requests without <channel> parameter specified will cause the camera to transmit next available image from any of the currently enabled channels. The channel number of the transmitted image could then be identified from the HTTP header Etag (see RFC-2068 HTTP 1.1):*
Etag: Channel<channel> .

3. In addition to JPEG streaming, panoramic camera models AV8185 and AV8365 support h.264 streaming using RTSP/RTP protocol. Any RTSP request sent to camera via UDP will be ignored. The actual video stream is transmitted by the camera using RTP protocol. AV cameras support two options for RTP transmission: RTP over UDP, and RTP over TCP (RTP/AVP). The maximum number of simultaneously serviced unicast requests or video streams is up to twelve per panoramic camera allocated among its enabled channels. For example three video streams per channel for each of the four channels are supported.

Accessing video stream via RTSP commands in AV8185 and AV8365:

An H.264 video stream is requested via RTSP using the following URL. Please note that this URL will not work in a typical web browser. A media player such as VLC or Apple Quicktime is required for this to function properly.

[rtsp://camera_ip/h264.sdp<channel>?res=\(half|full\)&x0=\(0..1600\)&y0=\(0..1200\)&x1=\(32..1600\)&y1=\(32..1200\)&qp=\(4..51\)&ssn=\(1..65535\)&\[bitrate=\(0..65536\)\]&\[fps=1..100\]](rtsp://camera_ip/h264.sdp<channel>?res=(half|full)&x0=(0..1600)&y0=(0..1200)&x1=(32..1600)&y1=(32..1200)&qp=(4..51)&ssn=(1..65535)&[bitrate=(0..65536)]&[fps=1..100])

Where:

- **Res** can have value of either "half" or "full" and specifies whether the camera should decimate the image by a factor of 2 in each dimension or produce the full resolution image.

- **X0, Y0, X1, Y1** are the left, top, right and bottom coordinates of the requested image window, respectively. These values cannot exceed the size of the image sensor array for the specific camera model and should be divisible by 32 if **Res = full** and 64 if **Res = half**.
- **QP** is the quantization parameter for H.264 encoder. To achieve a higher quality video, a low *qp* is needed. Recommended values are in the range (16..37);
- **SSN** specifies the stream identifier. MPEG codecs including H.264 codecs are context dependent (decoding of the current frame depends on the previous frame(s)). The stream is a sequence of frames of the same resolution which can be decoded sequentially by one instance of an MPEG decoder. Accordingly, **SSN** is a means to distinguish different streams from one another. Use a unique **SSN** for each stream with a unique channel, image size, quality, and/or frame rate. Each camera supports up to eight simultaneous non-identical streams. Each client must have a unique (ip:ssn)
- **Bitrate** is used to set up a constant bitrate of the H.264 stream in kilobits per second. If this parameter is present in the request string and is larger than zero then the **QP** parameter is ignored and the camera adjusts quantization parameters automatically to maintain the specified bitrate.
- **FPS** specifies the requested frame rate. Values 1 to 15 result in the specified frame rate. Omitting the fps parameter or using fps values of 0 or any values above 16 will result in maximum frame rate which is model dependent.

Getting and Setting Camera Parameters

NOTE: All commands listed below that allow parameter setting without explicitly specifying the channel number apply to all four channels.

*NOTE: The parameter setting is allowed only for the users with the **admin** access level (see below under Camera Access Control).*

1. Enabling camera channels:

http://camera_ip/get?channelenable

[http://camera_ip/set?channelenable=\(1..15 as a 4-bit mask where each bit corresponds to one camera channel, LSB is channel 1\)](http://camera_ip/set?channelenable=(1..15 as a 4-bit mask where each bit corresponds to one camera channel, LSB is channel 1))

2. Image rotation:

http://camera_ip/get<channel>?rotate

[http://camera_ip/set\[<channel>\]?rotate=\(0|180\)](http://camera_ip/set[<channel>]?rotate=(0|180))

3. Brightness:

http://camera_ip/get<channel>?brightness

[http://camera_ip/set<channel>?brightness=\(-50..+50\)](http://camera_ip/set<channel>?brightness=(-50..+50))

4. Sharpness:

http://camera_ip/get<channel>?sharpness

[http://camera_ip/set<channel>?sharpness=\(0..4\)](http://camera_ip/set<channel>?sharpness=(0..4))

5. Saturation:

http://camera_ip/get<channel>?saturation

[http://camera_ip/set<channel>?saturation=\(0..6\)](http://camera_ip/set<channel>?saturation=(0..6))

6. Blue balance:

http://camera_ip/get<channel>?blue

[http://camera_ip/set<channel>?blue=\(-10..+10\)](http://camera_ip/set<channel>?blue=(-10..+10))

7. Red balance:

http://camera_ip/get<channel>?red

[http://camera_ip/set<channel>?red=\(-10..+10\)](http://camera_ip/set<channel>?red=(-10..+10))

8. Illumination:

http://camera_ip/get<channel>?illum

[http://camera_ip/set<channel>?illum=\("auto"|"indoor"|"outdoor"|"mix"\)](http://camera_ip/set<channel>?illum=()

9. Mains frequency, Hz (for indoor lighting compensation):

http://camera_ip/get<channel>?freq

[http://camera_ip/set<channel>?freq=\(50|60\)](http://camera_ip/set<channel>?freq=(50|60))

10. Exposure mode (low light mode):

http://camera_ip/get<channel>?lowlight

[http://camera_ip/set<channel>?lowlight=\("highspeed"|"speed"|"balance"|"quality"|"moonlight"\)](http://camera_ip/set<channel>?lowlight=()

11. Shutter time in high-speed exposure mode (in milliseconds):

http://camera_ip/get<channel>?shortexposures

[http://camera_ip/set<channel>?shortexposures=\(1..10\)](http://camera_ip/set<channel>?shortexposures=(1..10))

12. Auto exposure control:

http://camera_ip/get<channel>?autoexp

[http://camera_ip/set<channel>?autoexp=\("on"|"off"\)](http://camera_ip/set<channel>?autoexp=()

13. Auto exposure mode:

http://camera_ip/get<channel>?exposure

[http://camera_ip/set<channel>?exposure=\("auto"|"on"|"off"\)](http://camera_ip/set<channel>?exposure=()

14. Exposure window:

http://camera_ip/get?expwndleft

[http://camera_ip/set?expwndleft=\(0..max of the corresponding sensor size\)](http://camera_ip/set?expwndleft=(0..max of the corresponding sensor size))

http://camera_ip/get?expwndtop

[http://camera_ip/set?expwndtop=\(0..max of the corresponding sensor size\)](http://camera_ip/set?expwndtop=(0..max of the corresponding sensor size))

http://camera_ip/get?expwndwidth

[http://camera_ip/set?expwndwidth=\(0..max of the corresponding sensor size\)](http://camera_ip/set?expwndwidth=(0..max of the corresponding sensor size))

http://camera_ip/get?expwndheight

[http://camera_ip/set?expwndheight=\(0..max of the corresponding sensor size\)](http://camera_ip/set?expwndheight=(0..max of the corresponding sensor size))

15. Sensor cropping:

http://camera_ip/get?sensorleft

[http://camera_ip/set?sensorleft=\(0..max of the corresponding sensor size\)](http://camera_ip/set?sensorleft=(0..max of the corresponding sensor size))

http://camera_ip/get?sensortop

[http://camera_ip/set?sensortop=\(0..max of the corresponding sensor size\)](http://camera_ip/set?sensortop=(0..max of the corresponding sensor size))

http://camera_ip/get?sensorwidth

[http://camera_ip/set?sensorwidth=\(0..max of the corresponding sensor size\)](http://camera_ip/set?sensorwidth=(0..max of the corresponding sensor size))

http://camera_ip/get??sensorheight

[http://camera_ip/set?sensorheight=\(0..max of the corresponding sensor size\)](http://camera_ip/set?sensorheight=(0..max of the corresponding sensor size))

16. Image settings used as the implicit parameter list in **img.jpg** image requests:

http://camera_ip/get?imgleft

[http://camera_ip/set?imgleft=\(0..max of the corresponding sensor size\)](http://camera_ip/set?imgleft=(0..max of the corresponding sensor size))

http://camera_ip/get?imgtop

[http://camera_ip/set?imgtop=\(0..max of the corresponding sensor size\)](http://camera_ip/set?imgtop=(0..max of the corresponding sensor size))

http://camera_ip/get?imgwidth

[http://camera_ip/set?imgwidth=\(0..max of the corresponding sensor size\)](http://camera_ip/set?imgwidth=(0..max of the corresponding sensor size))

http://camera_ip/get?imgheight

[http://camera_ip/set?imgheight=\(0..max of the corresponding sensor size\)](http://camera_ip/set?imgheight=(0..max of the corresponding sensor size))

http://camera_ip/get?imgquality

[http://camera_ip/set?imgquality=\(0..21\)](http://camera_ip/set?imgquality=(0..21))

http://camera_ip/get?imgres

[http://camera_ip/set?imgres=\("full"|"half"\)](http://camera_ip/set?imgres=()

17. Obtaining MAC address:

http://camera_ip/get?mac

18. Getting camera model:

http://camera_ip/get?model

19. Getting firmware version:

http://camera_ip/get?fwversion

20. Getting image processor engine version:

http://camera_ip/get?procversion

21. Getting network processor version:

http://camera_ip/get?netversion

22. Getting PCB revision

http://camera_ip/get?revision

23. Store current settings into the flash memory:

http://camera_ip/set?params=save

24. Restore factory default settings:

http://camera_ip/set?params=factory

25. Custom mode settings:

http://camera_ip/get<channel>?kneepoint

[http://camera_ip/set<channel>?kneepoint=\(1..100\)](http://camera_ip/set<channel>?kneepoint=(1..100))

http://camera_ip/get<channel>?analoggain

[http://camera_ip/set<channel>?analoggain=\(1..10\)](http://camera_ip/set<channel>?analoggain=(1..10))

http://camera_ip/get<channel>?maxkneegain

[http://camera_ip/set<channel>?maxkneegain=\(2..??\)](http://camera_ip/set<channel>?maxkneegain=(2..??))

http://camera_ip/get<channel>?maxexptime

[http://camera_ip/set<channel>?maxexptime=\(0..100\)](http://camera_ip/set<channel>?maxexptime=(0..100))

http://camera_ip/get<channel>?maxdigitalgain

[http://camera_ip/set<channel>?maxdigitalgain=\(32..127\)](http://camera_ip/set<channel>?maxdigitalgain=(32..127))

26. Alternative receiving port of the camera's web server:

http://camera_ip/get?webserverport

[http://camera_ip/set?webserverport=\(0..65535\)](http://camera_ip/set?webserverport=(0..65535))

27. User password with **admin** level of access:

http://camera_ip/get?admin

[http://camera_ip/set?admin=\(text string of 1..8 ASCII symbols | "empty"\)](http://camera_ip/set?admin=(text string of 1..8 ASCII symbols |)

NOTE: to erase the password use the reserved word "empty".

28. User password with **viewer** level of access:

http://camera_ip/get?viewer

[http://camera_ip/set?viewer=\(text string of 1..8 ASCII symbols | "empty"\)](http://camera_ip/set?viewer=(text string of 1..8 ASCII symbols |)

NOTE: to erase the password use the reserved word "empty".

29. Camera's register access:

[http://camera_ip/getreg?page=\(0..6\)®=\(0..255\)](http://camera_ip/getreg?page=(0..6)®=(0..255))

[http://camera_ip/setreg?page=\(0..6\)®=\(0..255\)&value=\(0..65535\)](http://camera_ip/setreg?page=(0..6)®=(0..255)&value=(0..65535))

Chapter IV - Troubleshooting and Useful Tips

Connecting Directly to a Laptop or PC

In a typical scenario cameras are connected using network cables to a network switch. A camera can also be connected to a PC or laptop directly by using a cross-over network cable between the camera and PC.

When a camera is connected directly, you may need to change the TCP/IP configuration on your PC. For example, the PC may need to be configured to use a static IP address.

When a PoE injector is used and connected directly to a PC, there are two networking cables. One cable connects the PC to the PoE injector, while the other connects the injector to the camera. Only one of these cables should be cross-over. The other cable must be a regular, straight through cable.

***NOTE:** AV8360 cameras require a higher PoE power class (Class 3: from 6.49 to 12.95 Watt) than other AV camera models.*

Switches and Routers

Note that some Gigabit switches and network adapters incompletely emulate 100BaseT signaling levels and may not work correctly with high bandwidth 100BaseT equipment.

Low Sharpness

If the image sharpness appears to be low:

- Check if the lens is in focus.
- Check if the lens is appropriate for a megapixel camera.
- Under the Image Quality menu decrease compression and increase sharpness.
- Check if the lens iris is fully open or closed down too much. For best resolution and depth of field the iris (depending on lens make and model) should be closed by 2-3 F-stop.

Frequently Asked Questions

1. **What type of video compression is used in AV cameras?** AV cameras use MJPEG in the case of model numbers AVxxx0 and H.264 for models AVxxx5.

2. How much storage space is required when using AV cameras?

The storage space requirements will vary depending on the compressibility of your imagery. Shown below (Figure 31) is an example of a system running at 22 FPS. However, the user can specify the archival frequency to be lower than the full frame rate. Most AV cameras also provide highly sophisticated on-board motion detection. To further reduce the required storage the user has an option to archive only those images that contain motion. Furthermore, AV cameras support real-time resolution changes and image windowing on a frame-by-frame basis. The user may wish to archive windows of interest or reduced resolution images at the high frame rate while archiving full resolution images at the lower frame rate. A bandwidth calculator is provided on <http://www.arecontvision.com/> to help with determining storage/bandwidth requirements.

Figure 31. Example of a system running at 22 FPS

Busy scene, lot of motion (e.g. busy parking lot)										
FPS = 22	Quality = 2			Quality = 13			Quality = 21			
Resolution	Kbytes/frame	Mbytes/Hr	Mbytes/24 Hr	Kbytes/frame	Mbytes/Hr	Mbytes/24 Hr	Kbytes/frame	Mbytes/Hr	Mbytes/24 Hr	
2040x1530	202	15,998	383,962	278	22,018	528,422	463	36,670	880,070	
1920x1200	154	12,197	292,723	216	17,107	410,573	352	27,878	669,082	
1920x1080	148	11,722	281,318	202	15,998	383,962	329	26,057	625,363	
1600x1200	128	10,138	243,302	176	13,939	334,541	293	23,206	556,934	
1280x1024	100	7,920	190,080	139	11,009	264,211	227	17,978	431,482	
640x480	29	2,297	55,123	40	3,168	76,032	60	4,752	114,048	
Quiet scene, not a lot of motion (e.g. hallway)										
Resolution	Kbytes/frame	Mbytes/Hr	Mbytes/24 Hr	Kbytes/frame	Mbytes/Hr	Mbytes/24 Hr	Kbytes/frame	Mbytes/Hr	Mbytes/24 Hr	
2040x1530	148	11,722	281,318	205	16,236	389,664	369	29,225	701,395	
1920x1200	111	8,791	210,989	151	11,959	287,021	267	21,146	507,514	
1920x1080	103	8,158	195,782	142	11,246	269,914	247	19,562	469,498	
1600x1200	97	7,682	184,378	134	10,613	254,707	233	18,454	442,886	
1280x1024	69	5,465	131,155	97	7,682	184,378	165	13,068	313,632	
640x480	20	1,584	38,016	26	2,059	49,421	43	3,406	81,734	

Notes: Quality refers to JPEG compression. Therefore Quality = 21 refers to high quality image

3. Why do I get a license warning?

A license is only needed for archiving video. This warning will display until the software is licensed. You can obtain a license file by contacting your distributor or contacting websales@arecontvision.com.

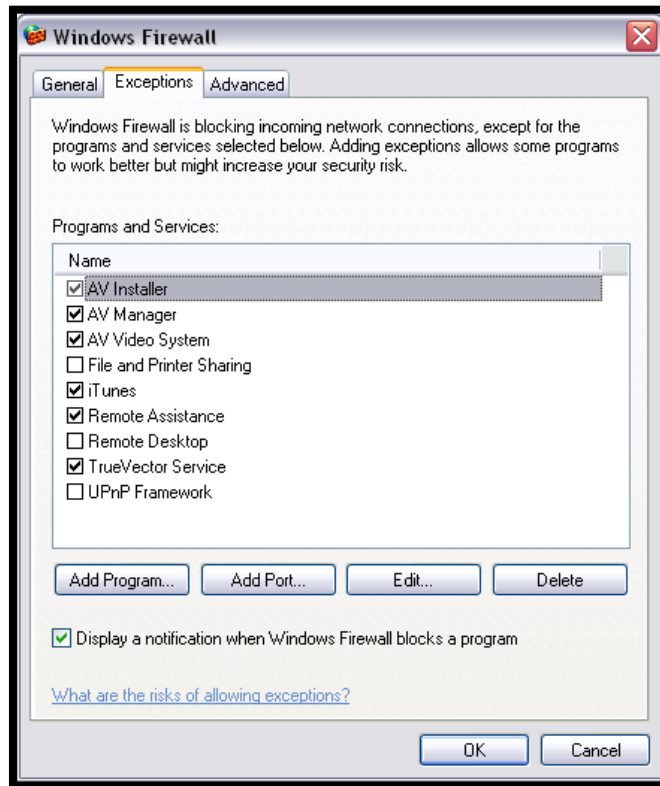
4. Why is my Arecont Vision camera not detecting in the Camera Installer?

If the camera is not detected it may be because of the PC's firewall settings. To allow Camera Installer access to the network the user should configure the firewall properly. To configure the Windows firewall, access the **Windows Security Center** in the Windows **Control Panel** and click on **Windows Firewall**.

In the Windows Firewall window (Figure 33), click the **Exceptions** tab and add AV programs (AV Installer, AV Manager, and AV Video System) to the list of exceptions. Once the selections have been made click **OK** and re-run the Camera Installer. If the Camera Installer still cannot find the camera make sure that there are no hardware firewalls blocking the connection on your network. Additionally, try isolating the

camera and your PC from the rest of the network if you are continuing to have difficulty detecting the camera.

Figure 33. Windows firewall



5. Which DVRs support your cameras?

Several DVRs support Arecont Vision cameras such as Bosch, March networks and Sanyo DVRs. Please visit www.arecontvision.com for further information.

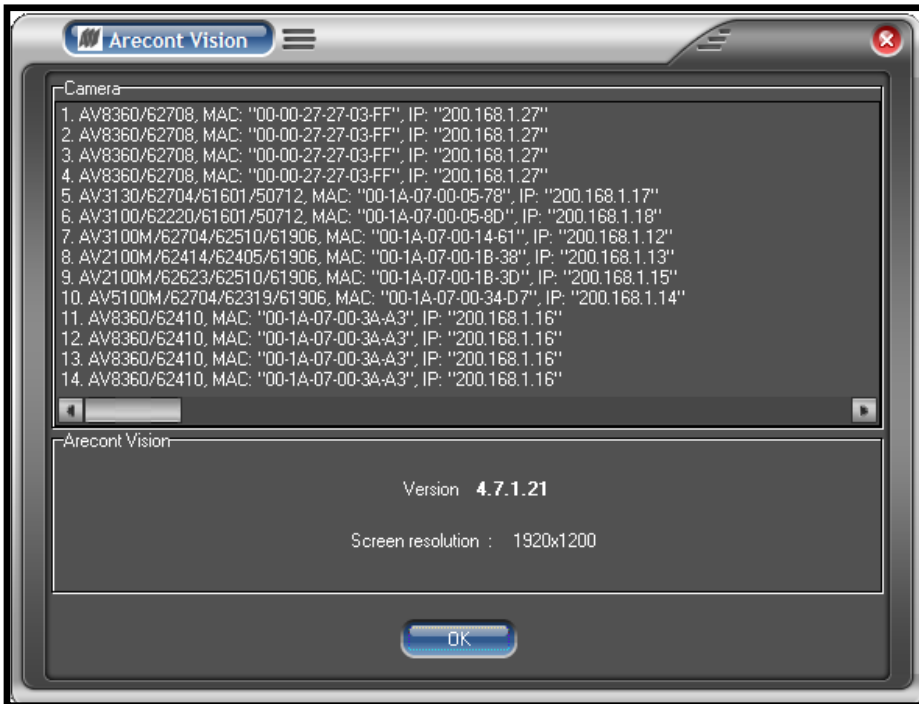
6. Can I update all my cameras with the same version of firmware?

No, you will need to make sure you use the appropriate firmware file for your camera. There are several variations of firmware update files, with the camera model being listed in the update file name. Please ensure that the firmware file you are using contains the model number of your camera in its file name.

7. How do I find out which version of the software is installed? What are the IP and MAC addresses of my cameras?

This information is displayed in the **About** dialog (Figure 34). To open the **About** dialog, right click anywhere in the live video application and select **About**.

Figure 34. About dialog



8. What is the cost of an Arecont Vision camera?

The cost varies from camera to camera but for unparalleled clarity our prices are unbeatable. Almost all cameras have MSRP well below \$1000. Visit us online at <http://www.arecontvision.com/buy.html>. Fill out the form and our sales staff will contact you.

9. Is there any third party software that can be used?

Arecont Vision cameras are supported by many third-party software packages. Contact websales@arecontvision.com for an updated list or visit www.arecontvision.com.

10. When should I use an auto-iris camera?

The following cameras support the auto-iris function: AV1300-AI, AV2100-AI, AV3100-AI and AV5100-AI. The auto-iris option allows for the camera to keep the lens optimally closed when there is sufficient scene illumination, providing good depth of focus. When the illumination diminishes the camera automatically opens the iris, allowing more light to reach the sensor, thus extending the sensitivity range of the camera. This option should only be used for outdoor applications, where there is a large variation in illumination. In many applications the auto-iris is unnecessary. It is important to keep in mind that the best image quality will still be achieved with megapixel lenses. The auto-iris

lenses available on the market today are not megapixel and will yield the images that are less crisp than those that can be obtained with manual megapixel lens.

11. What adjustments can be made to reduce motion blur?

The shutter speed is automatically controlled by the camera. Motion blur may occur when the camera operates at slow shutter speeds (long exposure times, such as the scene being relatively dark. AV cameras provide a number of options that allow the user to control auto-exposure behavior when illumination is low.

The user can set the preferred exposure time that the camera will attempt to maintain as long as illumination level allows. This setting essentially allows the user to choose the tradeoff between gains and exposure time at reduced light levels. There are 3 basic settings: Speed, Balance, and Quality (Figure 35). These settings can be selected from “Low Light Mode” menu Mode list. The Speed setting will result in higher image noise but will attempt to maintain 10ms exposure time for as long as possible, reducing motion artifacts. The Quality setting will maintain 40 ms exposure time, resulting in low-noise image with some motion blur in low light. The Balanced setting falls between Quality and Speed.

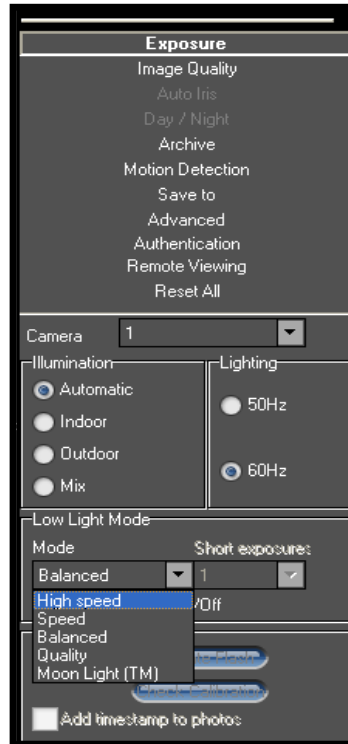
There are also two special modes, High Speed and MoonLight™, which can be used for very fast moving targets and very low illumination, respectively. High Speed mode allows the user to specify a fixed exposure time in terms of milliseconds (from 1 to 80). While this will allow crisp video of fast moving vehicles, the side effect of this setting is that low-light performance of the camera will be significantly worse (up to 800 times) than in default mode. Therefore, High Speed should only be used for well lit scenes.

The other special mode, MoonLight™ implements long exposure times of up to 0.5 seconds in combination with proprietary noise cancellation technology. This mode allows viewing under extremely low illumination conditions. It is important to note, that MoonLight™ is NOT digital frame integration and will offer significantly better image quality than cameras that employ digital frame integration. However, the motion blur will still be significant.

Setting the Low Light Mode to Speed is the first thing to try to eliminate motion blur. If that doesn't produce enough improvement, the user may want to open the lens aperture more to allow more light in. The user may also want to consider going with the camera equipped with auto-iris lens - the lens will open automatically as illumination diminishes. If that is not sufficient, the user may want to consider using a lower resolution camera. For example, the 2-megapixel AV2100 has larger pixels

and has better low-light sensitivity than the 3-mega pixel product, AV3100. If that still does not yield sufficient low-light performance then, the user should consider the AV3130 day-night camera that uses a monochrome sensor in low light conditions and is sensitive to 0.00 lux .

Figure 35. Exposure menu



12. What information can I provide to AV customer support for a faster response to my issues?

- AV Camera MAC address and firmware release (shown in the **About** dialog box).
- Switch or POE model number.
- Type of network cable eg Cat 5e (min and max distance of run)
- Type of power used (VDC, milliamps, Watts) or POE
- Computer Information:
 - 100base-T or Gigabit card
 - CPU speed, RAM, Video Card specs
 - Hard disk size, and available free space.
- Please provide the lmlg.dat file and localmachine.ini file. This file can be found in XP under "C:\Documents and Settings\All Users\Application Data\Video" and in Vista under

“C:\Users\YourUserName\AppData\Video Application” Or

“C:\Users\YourUserName\AppData\Local\VirtualStore\ProgramData\Video Application”

Additionally, Arecont Vision’s online support portal at <http://support.arecontvision.com/> allows for quick online submission of issues with email notification of responses and fixes.

13. How do I disable the auto startup of the Arecont Vision software?

Click on **Advanced** on the AV Software Settings and uncheck “Auto – Startup”.

14. Is there a link to view live video from your camera systems?

We have three sites that are accessible. Please contact our sales team at sales@arecontvision.com

15. What is the maximum physical distance between computer and AV camera?

Typical Ethernet 100Base-T has a maximum distance of 100 meters (330 feet). The range can be increased by using a standard powered mid-span switch. Alternatively, 3Com IntelliJack Switch that accepts the power over Ethernet can be used to avoid the need to provide mid-span power supply.

16. Are AV cameras RoHS compliant?

Arecont Vision products confirm to the Europeans Union Restrictions on Use of Hazardous Substances in Electrical and Electronic equipment (RoHS) Directive 2002/95/EC for six regulated substances. The certification is applicable to all Arecont Vision products shipped after April 15, 2006.

17. Can we mount a motorized zoom lens from another supplier?

Motorized zoom is not supported by the camera but you can mount an external PTZ unit with independent controls.

18. How do I access the Arecont Vision MegaPixel® WEB camera home page to view my cameras remotely?

Type <http://200.168.100.10/index.html> in your web browser, replacing 200.168.100.10 with the camera’s IP address.

19. Is the MegaPixel® WEB camera home page compatible with Mozilla Firefox?

You can take snapshots, view live video and adjust camera settings via the internet using Mozilla Firefox.

20. Does your software include motion detection?

Our software does include motion detection. Most AV cameras also support on-board motion detection that, in contrast to software motion detection, does not take up CPU cycles. The “on camera” feature was implemented to reduce the overall network bandwidth so the camera itself will not send images until motion is detected. The user can adjust 3 motion detection sensitivity settings and specify up to 64 motion detection zones.

21. Can image archival be configured for cyclic recording?

AV100 software will overwrite old files every few minutes once the available disk space reaches a limit value that the end user can set. This value is set under the “Archive” menu in “Minimum Free Disk Space” in the AV100 software.

22. How can I access the SDK download?

Access to the SDK requires an NDA (Non-Disclosure Agreement) to be signed and approved prior to obtaining access. More information can be provided through websales@arecontvision.com or by accessing the support section of <http://www.arecontvision.com/>

23. How do the Arecont Vision cameras utilize PTZ (Pan, Tilt, Zoom)?

There is no mechanical PTZ. However, AV cameras allow instantaneous electronic pan, tilt and zoom by specifying PTZ window coordinates. Multiple users can each select their own windows allowing for independent PTZ control.

24. How can I get the AV100 built-in web server to work?

AV100 software has a built-in web server that allows multi-user remote access to live video and video archives. This web server can be accessed from any web browser by typing:

[HTTP://ip_address:port/guix.htm](http://ip_address:port/guix.htm)

where ip_address is the IP address of the computer running AV100 and the port corresponds to the port number set in the Remote Viewing menu. Please note that in order to access the AV100 server remotely, the user should enable the server by checking the “Allow Remote Viewing” field and selecting a port that is not blocked by their firewall. For increased security the default value of remote access port is 4250, but any port may be selected for this purpose. Often, port 80 (HTTP port) is most likely to be open on a secured network as it is used by default for most web browsing. See page 37 for more details on configuring remote viewing.

25. What is the night performance (Lux) of the AV3130 camera?

In low-light conditions AV3130 switches to 1.3 megapixel monochrome sensor resulting in good image quality down to 0.01 Lux. AV3130 is also sensitive to near-infrared illumination, allowing the use of standard infrared illuminators as a light source.

26. When I attempt to update the firmware on the AV camera with the firmware update option I receive the “Ack Timeout” message. Why do I get this error?

If you get the timeout message take the following steps:

- Make sure that no application, aside from FirmwareLoader.exe, is accessing the camera during the update
- Make sure that the camera is connected via switch and not with a cross-over cable
- Re-run AV Installer prior to the upgrade to make sure the camera is accessible and there is no IP conflict

27. Do AV cameras support multicast?

No, AV cameras do not support multicast.

28. Are there any moving mechanical parts in the AV3130?

The AV3130 does not have any mechanical moving parts inside.

29. What is Ethereal and where can I get it?

Ethereal is a network protocol analyzer. It can be obtained through their web site at <http://www.ethereal.com/>

30. How do I reset the camera settings to the original factory configuration?

Resetting the AV camera to its original configuration can be achieved through the built-in web interface. To reset the AV camera open your web browser and type

http://ip_address/set?params=factory

Replace “ip_address” with the camera’s current IP address.

31. How can I download the latest copy of AV100 and this manual?

The latest copy of the software and manual are available as of this manual revision from <http://www.arecontvision.com> under Support, in the Product Literature/Downloads section.

32. How can I obtain an RMA for a camera?

Initial RMA requests should be directed to the vendor from whom you purchased your camera. Your vendor may be capable of processing your request directly, resulting in a quick turnaround time for a replacement camera. If this is not possible, please fill out a support request on <http://support.arecontvision.com/> and a support representative will follow up to verify your claim prior to issuing an RMA number. Please do not ship a camera back to Arecont Vision without an approved RMA number or your return will be severely delayed in processing.

Chapter V - Regulatory Compliance

FCC Compliance Statement

All AV cameras have been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his/her own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

1. It is suggested that the user use shielded CAT6 cables to comply with FCC rules.
2. It is suggested that the user use power-over-Ethernet supply
3. To comply with FCC rules when using auto-iris with AV1300, AV2100 and AV3100 it is also suggested using a ferrite common mode choke Fair-Rite # 0444164281 with 1 ½ turns place on the auto-iris lens cable three centimeters from the lens.

Terms and Conditions of Sale

- 1. Terms and Conditions.** This sale is subject to the terms and conditions set forth below, which supersede any and all terms and conditions set forth in any documents issued by Purchaser, including Purchaser's purchase order. ANY ADDITIONAL, DIFFERENT OR CONFLICTING TERMS AND CONDITIONS HEREBY ARE OBJECTED TO BY ARECONT VISION, LLC ("AV"), AND SHALL BE OF NO FORCE AND EFFECT. No waiver or amendment of these terms and conditions shall be binding on AV unless made in writing expressly stating that it is such a waiver or amendment and signed by AV.
- 2. Limited Warranty.** AV warrants to Purchaser (and only Purchaser) (the "Limited Warranty"), that: (a) each Product shall be free from material defects in material and workmanship for a period of twelve

(12) months from the date of shipment (the "Warranty Period"); (b) during the Warranty Period, the Products will materially conform with the specification in the applicable documentation; (c) all licensed programs accompanying the Product (the "Licensed Programs") will materially conform with applicable specifications. Notwithstanding the preceding provisions, AV shall have no obligation or responsibility with respect to any Product that (i) has been modified or altered without AV's written authorization; (ii) has not been used in accordance with applicable documentation; (iii) has been subjected to unusual stress, neglect, misuse, abuse, improper storage, testing or connection; or unauthorized repair; or (iv) is no longer covered under the Warranty Period. AV MAKE NO WARRANTIES OR CONDITIONS, EXPRESS, IMPLIED, STATUTORY OR OTHERWISE, OTHER THAN THE EXPRESS LIMITED WARRANTIES MADE BY AV ABOVE, AND AV HEREBY SPECIFICALLY DISCLAIMS ALL OTHER EXPRESS, STATUTORY AND IMPLIED WARRANTIES AND CONDITIONS, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NON-INFRINGEMENT AND THE IMPLIED CONDITION OF SATISFACTORY QUALITY. ALL LICENSED PROGRAMS ARE LICENSED ON AN "AS IS" BASIS WITHOUT WARRANTY. AV DOES NOT WARRANT THAT (I) THE OPERATION OF THE PRODUCTS OR PARTS WILL BE UNINTERRUPTED OR ERROR FREE; (II) THE PRODUCTS OR PARTS AND DOCUMENTATION WILL MEET THE END USERS' REQUIREMENTS; (III) THE PRODUCTS OR PARTS WILL OPERATE IN COMBINATIONS AND CONFIGURATIONS SELECTED BY THE END USER; OTHER THAN COMBINATIONS AND CONFIGURATIONS WITH PARTS OR OTHER PRODUCTS AUTHORIZED BY AV OR (IV) THAT ALL LICENSED PROGRAM ERRORS WILL BE CORRECTED.

3. Exclusive Remedy; Limitation of Liability. Purchaser's exclusive remedy for a breach of the Limited Warranty shall be limited to repair or replacement of, or refund for, the non-conforming Product (at AV's sole option). Product returned to AV for non-compliance with this Limited Warranty shall be returned in accordance with the "Rejection/Return" provisions below. Any refund shall be equal to the actual purchase price for the applicable Product. IN NO EVENT SHALL AV BE LIABLE TO PURCHASER FOR ANY INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES RESULTING FROM AV'S PERFORMANCE OF FAILURE TO PERFORM, WHETHER DUE TO BREACH OF CONTRACT OR WARRANTY, NEGLIGENCE OR OTHERWISE.

4. Repaired or Replaced Product. The warranty for repaired or replaced Product shall be limited in scope to the warranty set forth above, and shall have a duration of the greater of (i) the remaining Warranty Period in the original warranty that was applicable to the original Product, extended by the time elapsed between AV receiving notice of the non-conformity and Purchaser's receipt of the

repaired or replaced Product; or (ii) ninety (90) days following delivery to Purchaser's of the repaired or replaced Product.

- 5. Shipment and Risk of Loss.** All Products shipped by AV shall be packaged in AV's shipping cartons so as to prevent damage and shall be delivered to a common carrier FOB AV's facility in Altadena, CA, USA, at which time risk of loss shall pass to Purchaser. All freight, insurance, and other shipping expenses, as well as expenses for any special packing requested by Purchaser and provided by AV, shall be paid by Purchaser.
- 6. Licensed Programs.** Upon the sale of any Product to Purchaser, AV grants to such Purchaser a non-exclusive, non-transferable, royalty-free license to (i) install copies of the Licensed Programs in appropriate hardware; and (ii) use the Licensed Programs for their intended purpose. Purchaser may make copies of any Licensed Programs only as necessary to exercise its rights authorized hereunder and as necessary to backup the Licensed Programs.
- 7. Payment.** Payment shall be in U.S. Dollars, and shall be due and payable in accordance with the terms set forth on the applicable AV Quotation. Payment shall be in an amount equal to the purchase price for the applicable Product plus all applicable taxes, shipping charges, and other charges to be borne by Purchaser.
- 8. Rejection/Return.** All Products shall be deemed accepted by Purchaser twenty (20) business days after receipt unless Purchaser rejects such Product within such twenty (20) business day period for failure to comply with the Limited Warranty set forth in above. Upon such rejection, Purchaser shall immediately notify AV of the rejection and shall, at AV's option, return the Product or allow AV to inspect the rejected Product and shall follow AV's instructions regarding disposition of the rejected Product. Prior to the return of any Product to AV as provided for hereunder, Purchaser shall obtain from AV's Technical Support Department a Return Material Authorization ("RMA") number. Within ten (10) business days after receiving an RMA number for the Product, Purchaser shall package the Product in its original packing material or an equivalent and return such Product to AV or such other location as AV may designate in writing. AV shall bear the cost of freight and insurance for the return to AV. Purchaser shall enclose with the returned Product the applicable RMA form, and any other documentation or information requested by AV. AV may refuse to accept returns of any Product not packed and shipped as provided in this paragraph. Upon verification that the Product does not comply with the Limited Warranty, AV shall repair, replace, or provide a refund for such Product, at AV's option, no later than thirty (30) days after the time AV receives from Purchaser written notice of

such return or rejection. AV shall be responsible for returning, at AV's cost, repaired or replaced Products to Purchaser.

- 9. General Provisions.** Notwithstanding any other provision hereof, performance by AV shall be excused to the extent that performance is rendered commercially unreasonable by acts of God, war, fire, flood, riot, power failure, embargo, material shortages, strikes, governmental acts, man-made or natural disasters, earthquakes, failure or limitation of supply, or any other reason where failure to perform is beyond the reasonable control and not caused by the negligence of AV. The time for performance shall be extended for the time period lost due to the delay. This Agreement shall be governed by and construed under the laws of the State of California, USA, without reference to conflict of laws. These terms and conditions, including those on the face page hereof (if any), set forth the entire agreement and understanding of AV and Purchaser with respect to the sale and distribution of Products, the Licensed Products and Parts and supersede all prior or contemporaneous agreements relating thereto, written or oral, between the parties. Purchaser may not assign its rights or delegate its obligations hereunder without the express written consent of AV. Any assignment by Purchaser without such consent shall constitute a breach hereof by Purchaser.