



**Product Evaluation:  
AXIS Camera Station 3.10**

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## Feature Key

-  Feature not supported
-  Feature not supported (present in 2.11, but missing in 3.10)
-  Supported Feature
-  Supported Feature (new in 3.10)



## AXIS Camera Station Recording Software

<b>Camera Station 3.10</b>				
<b>Company:</b> <i>Axis; Lund, Sweden</i>				
Ownership: Publicly traded on Nordic Stock Exchange				
Age of business: Founded in 1984				
Age of product: First Released in 2004 Version 3.0 released in April 2008				
<b>Other Products</b>				
<ul style="list-style-type: none"> <li>• Network devices for video surveillance and network printing</li> </ul>				
<b>Footprint</b>				
<ul style="list-style-type: none"> <li>• Over 25,000 installations</li> </ul>				
<b>Noteworthy Installations</b>				
<ul style="list-style-type: none"> <li>• Hughes and Hughes Bookstores (Ireland, UK)</li> </ul>				
<b>Price List (MSRP)</b>				
Product	Base Cost	Max Cameras	Included Camera licenses	Cost of Additional Camera Licenses
<b>AXIS Camera Station (4 base license)</b>	<b>\$649</b>	<b>50</b>	<b>4</b>	<b>\$99</b>
<b>AXIS Camera Station (10 base license)</b>	<b>\$999</b>	<b>50</b>	<b>10</b>	<b>\$99</b>
<b>Supported Devices</b>				
<p>AXIS Camera Station 3.10 is compatible with Axis network video devices running firmware 4.30 or higher.</p> <p>No other manufacturers supported.</p>				
<b>Supported Languages</b>				
<p>Chinese (Traditional &amp; Simplified), English, French, German, Italian, Japanese, Korean, Mongolian, Russian, Spanish and Swedish are supported in 3.11</p>				
<b>Scope of Product Evaluation</b>				
AXIS Camera Station version 3.10.026				



## **Executive Summary**



### **NetVideo Summary Analysis of AXIS Camera Station**

AXIS Camera Station 3.10 is a dramatic improvement over the 2.11 version. The product significantly enhances the forensic functions of video search, playback and export – major weaknesses in the 2.11 version. The application continues to provide a very capable recording and monitoring solution for a single site video system of up to 50 cameras (extended from 25).

Overall, the application looks very professional and is very usable and intuitive. The Graphical User Interface (GUI) is implemented in at least 11 languages. The use of auto-discovery to automatically add cameras during the setup process is a differentiating feature that reduces the setup time. Event programming is well implemented with 4 step wizard that assigns automated actions to system events such as motion detection and contact input. This is among the most user friendly implementations of event programming on the market.

The video search and playback design is very functional. Video searches are performed quickly with very little latency. A graphic video timeline and event logs provide good tools for finding event video. The playback controls are well designed.

Camera selection for live video is very responsive, camera switching (tours) occurs crisply with no noticeable gaps between the camera switch; and MPEG-4 streaming latency was measured at a low 180 ms on the remote client.

#### **Notable Features**

- Very significant improvement in performance of forensic video features (video search, playback control, export)
- Professional and intuitive look and feel
- Good use of auto-discovery for adding cameras to server
- Excellent live video performance: live video can be selected and rendered without delays; crisp camera sequencing, low video latency (with MPEG-4) and smooth PTZ control
- Simple and discrete drop-down configuration dialogs
- Good live event management programming with implementation of event handling for motion, contact closures and system issues such as a full disk drive or lost camera connection
- Good scope of recording functionality (event recording, schedule recording, multi-encoded recording)
- Support for H.264, MPEG-4 and Motion JPEG compression



## ***Background on Axis Communications, Inc.***

Axis Communications is a publicly held company based in Sweden. Since its foundation in 1984, Axis has been involved in the development and sale of network connected devices. In the early 1990's, the company's business revolved around network print servers. The current business continues to encompass print servers and now includes a large portfolio of network cameras, video servers and supporting products such as video management software.

In November 2008, IMS Research estimated that Axis held 33.5% of the global market share for network cameras. The same report also estimates that Axis holds the number 3 position in terms of global sales of all surveillance cameras (analog and network).

Through its business history, Axis has sold over 1,000,000 professional network video products.

Axis operates as a global company with a presence in more than 20 countries with over 500 employees.

Axis has been a leader in building partner relationships to build comprehensive security solutions with its open product interfaces. In September 2008, Axis joined with Bosch and Sony to create the Open Network Video Interface Forum (ONVIF) to develop a global standard for the interface of network video products.



## Architecture

AXIS Camera Station supports all Axis network video camera and encoder products. It does not support third party network cameras.

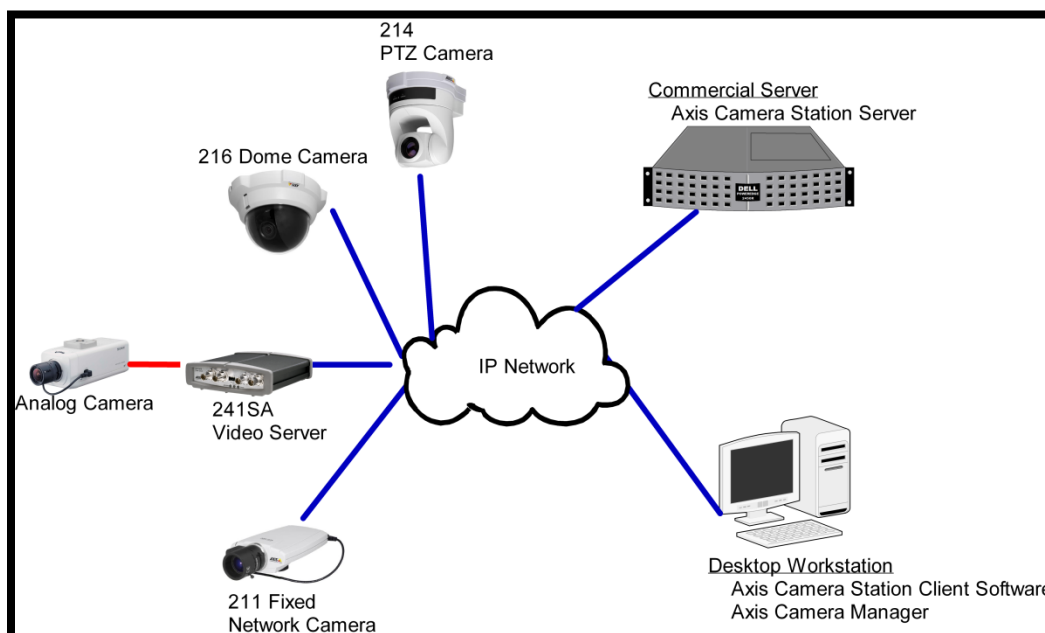
The AXIS Camera Station is a client-server system that runs on Windows operating systems (Vista Business, XP Professional, Windows 2008 Server and 2003 Server). The client software requires .NET 3.5 framework and Windows Media 11. The server uses the open source Firebird database.

The Camera Station consists of a recording service and client software with a Graphical User Interface (GUI) built on the Windows .NET framework. The recording service will record up to 50 Axis cameras or video server inputs. The service is installed to automatically start when the system is booted. Recording does not require a running GUI application.

The Camera Station client provides access to live audio/video, recorded audio/video, PTZ control, camera configuration, event configuration and user management. The client may be run remotely or on the same machine with the recording service.

AXIS Camera Station supports simultaneous dual encoded video streams from each Axis Camera or encoder source. Live and recorded video can be configured to use either source. Multiple simultaneous streams of different configurations (frame rate) are possible with MJPEG. The MJPEG stream can be configured at different frame rates for live and recorded video. H.264 and MPEG-4 must be configured to the same frame rate for both live and recorded video.

All video is streamed from the network cameras to the Camera Station Server. The Server provides live viewing streams and recorded video to the client application over a TCP /IP network connection.



**Figure 1: AXIS Camera Station architecture supports remote access to live and recorded video through the AXIS Camera Station Client.**



## Video Monitoring (Live Viewing) Software

Table 1: AXIS Camera Station Client Live Viewing Features

AXIS Live Video Viewing		Comments
<b>Views and Layout</b>		
Multiple Camera tiles per monitor	✓	Up to 25 live camera views per monitor
Multiple Monitor Support	✓	Up to 50 camera live views using up to 3 monitors
Configurable Tile Patterns	✓	11 predefined patterns/layouts – easy to configure
Full Screen Video View	✓	Toggles to Full Screen “monitor” view with no visible toolbars or controls
View System events	✓!	A scrolling list of events is displayed on the main GUI display. Events can be selected for an instant replay.
<b>Camera Selection</b>		
Camera Tree	✓!	
Map Icons	✓!	Interactive graphical maps can be imported and used to select cameras and sequences.
Camera Tour/Sequence	✓!	Very good performance with no observable gaps between video switches. Tours can be “paused” by the operator and can include PTZ presets.
Pre-Defined Views	✓	
Event triggered video switching	✓	Events can trigger an automatic switch to a specific camera view in live mode.
<b>Controls</b>		
Instant Replay	✓	Events can be selected for replay.
Save and Print Snapshots	✓!	Snapshots are automatically stored in “My Pictures” or a user-defined folder
Add Text Bookmarks	⊘	Ad hoc text markers are not supported
Digital Zoom	✓!	Supports a Digital Zoom and Pan Tilt feature.
Manually Start/Stop Recording	✓!	
Manually trigger output ports	✓	
<b>Audio</b>		
Audio Out (PC Microphone)	⊘!	Not Supported
Audio In (PC Speaker)	✓	Receives audio from network device
<b>PTZ Control</b>		
Pan-Tilt Zoom (Navigation buttons)	✓	Use of icon and navigation buttons for control
Pan-Tilt Zoom (Point and Click)	✓	Points to area in video image for pan tilt navigation
Iris	⊘	Not Supported
Focus	⊘	Not Supported
Tours	✓!	PTZ tours are created by including PTZ presets in a camera sequence.
Presets	✓	Presets can be triggered from the live view screen.
Lock	⊘	Not Supported
User Priorities	⊘	Not Supported
USB Joystick	✓	Axis 295 provides much better control versus mouse.





## NetVideo Analysis of Live Video Monitoring

- 📌 Intuitive camera selection and PTZ control
- 📌 USB Joystick PTZ control is very responsive
- 📌 Alarms are visible and can be selected with the mouse for quick instant replay of the alarm event
- 📌 Visible indicators of camera status (alarm mode, recording etc)
- 📌 Good assortment of configurable views and camera layouts
- 📌 Interactive Maps provide graphical selection of cameras, camera sequences and views
- 📌 Camera sequences switch quickly and cleanly with no visible gaps

The screenshot displays the AXIS Camera Station Client interface. On the left is a 'View Groups' tree with categories like Auto Views, My Views, Shared Views, and Camera Views. The main area is divided into four quadrants: a 'Map' showing camera locations, a live feed of an office rack (AXIS 2435A - 192.168.1.14), a live feed of a hallway (AXIS 233D - 192.168.1.233), and a live feed of a person at a computer (AXIS Q7406 - 192.168.1.131). At the bottom, an alarm log table shows recent events.

Time	Alarm	Description
12/10/2008 2:07:40 PM	Office Intruder	Motion by Camera Rack
12/10/2008 2:07:40 PM	Motion Detection	Motion detection on 'AXIS 2435A - 192.168.1.14'
12/10/2008 1:10:39 PM	Office Intruder	Motion by Camera Rack
12/10/2008 1:10:39 PM	Motion Detecti...	Motion detection on 'AXIS 2435A - 192.168.1.14'
12/10/2008 1:08:03 PM	Office Intruder	Motion by Camera Rack

Connected to local server

Figure 2: AXIS Camera Station Live View








## Network Video Recording

**Table 2 : AXIS Camera Station Network Video Recording Features**

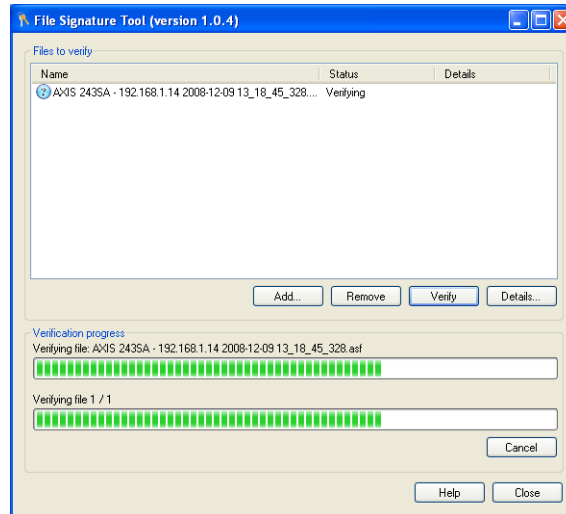
Network Video Recording	Test Results	Comments
Audio Recording	✓	Good audio/video synchronization.
Recording Modes		
Motion-based Recording	✓	Supports device-based motion detection
Event-triggered Recording	✓	
Pre-Alarm Post Alarm Recording	✓	From 0 to 60 seconds of pre-alarm video From 0 to 60 seconds of post-alarm video
Scheduled Recording	✓	
Continuous Recording	✓	
Digitally-signed recording	✓	Digital signature is verified by the AXIS Camera Station client during video playback and export. Exported video can be protected with a password-based digital signature.



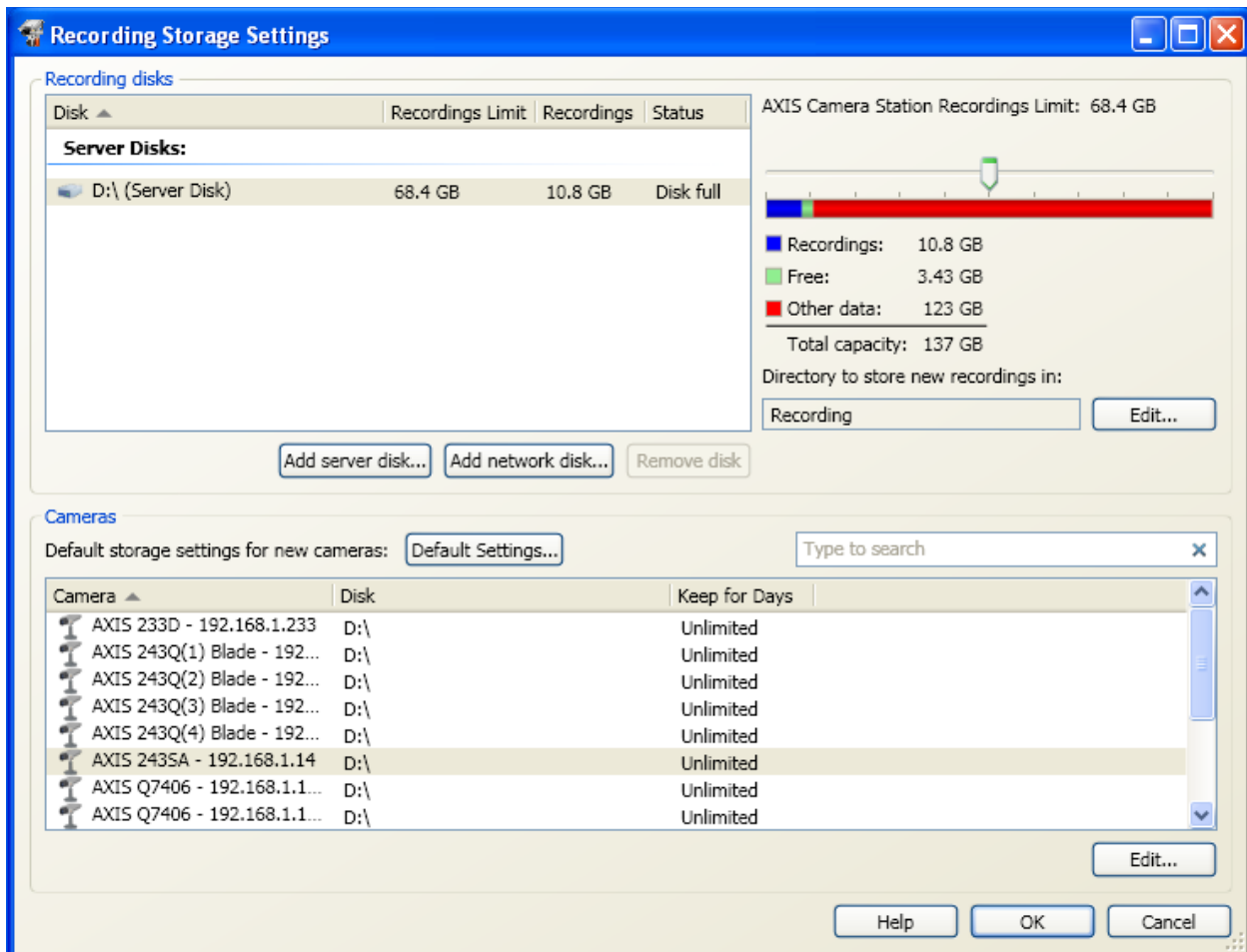
### NetVideo Analysis of Video Recording

-  Good support of all common recording methods (event, scheduled, continuous)
-  Audio/Video synchronization is very good.
-  Video recording can be selectively assigned to a disk on a per-camera basis. Any local disk or accessible network disk is a candidate for recording. The system can use multiple disks.
-  Configuration changes don't interrupt recording.
-  Multiple recording streams (for example, low bit-rate continuous, high bit-rate, high quality on alarm).





**Figure 3: The file signature tool validates the integrity of exported video clips for forensic evidence. The tool can be exported with the video clip.**



**Figure 4: AXIS Camera Station provides a simple configuration GUI to allocate storage disks for video recording. Maximum video retention (days) can be individually set for each camera.**

## Recorded Video Playback

**Table 3: Functional Summary for Video Search and Playback**

Recorded Video Playback		Comments
<b>Video Searches</b>		
Time/Date	✓	Time searches can be entered. The resulting search constrains the view of the timeline graph and clip list.
Events	✓	Events can be searched an event log; events can be selected for video playback.
Motion	✓	Motion searches can be performed on recorded video.
Text Bookmark	✓!	Text-annotated bookmarks can be searched.
Multiple NVR/DVR sources	⊘	Not supported.
<b>Video Playback</b>		
Multiple Video Playback Windows	✓	Up to 4 simultaneous windows
Synchronized Video Playback	✓	Supports up to 4 cameras for synchronous playback (with multiple timelines)
Play Exported Video Clip	⊘	Exported video is viewed with the Windows Media Player
<b>Video Tools and Controls</b>		
Digital Zoom	✓	
Save and Print Snap Shots	✓	
Add new Text Bookmarks	✓!	Users can create text-annotated bookmarks for easy reference and quick indexing for future playback and review.
Video Export	✓!	Exports video to ASF format
Validate igitally Signed Clips	✓	Digital signatures are automatically verified upon playback and export. A verification tool can be exported with the video clip to later verify the integrity of the clip.
Protect Video from deletion	✓!	Recorded video can be marked so that it is not deleted to make room for new recordings
<b>Video Controls and Navigation</b>		
Pause	✓	
Fast Forward Playback	✓	2x, 4x, 8x
Reverse Playback	⊘	Real-time reverse playback is not supported
Slow Forward Playback	✓	½, ¼, 1/8 frame-by-frame
Slow Reverse Playback	✓	Reverse frame-by-frame
Graphical Timeline of Video	✓!	Cursor can be positioned within the timeline to advance to a new playback time.





## NetVideo Analysis of Video Playback

- 👆 Very significant improvement over 2.11
- 👆 Excellent video search performance. A search over a period of 24 hours (70 GB, 14 cameras, over 1,000 clips) returns results in less than 3 seconds.
- 👆 Simple video search tool with basic search parameters (camera selection, date/time and bookmarks).
- 👆 Good visual timeline of recorded video with video playback selection with mouse navigation.
- 👆 Good implementation of “VCR” controls for playback.
- 👆 Multi camera, synchronous playback with navigable video timeline of up to 4 cameras.
- 👆 Event searches – The event logs can be filtered to search for specific events associated with specific dates, times and cameras.
- 👇 Motion searching provides limited results. A search of recorded video for motion within an area of interest is slow and time consuming. It is very dependent on setting the proper motion sensitivity.



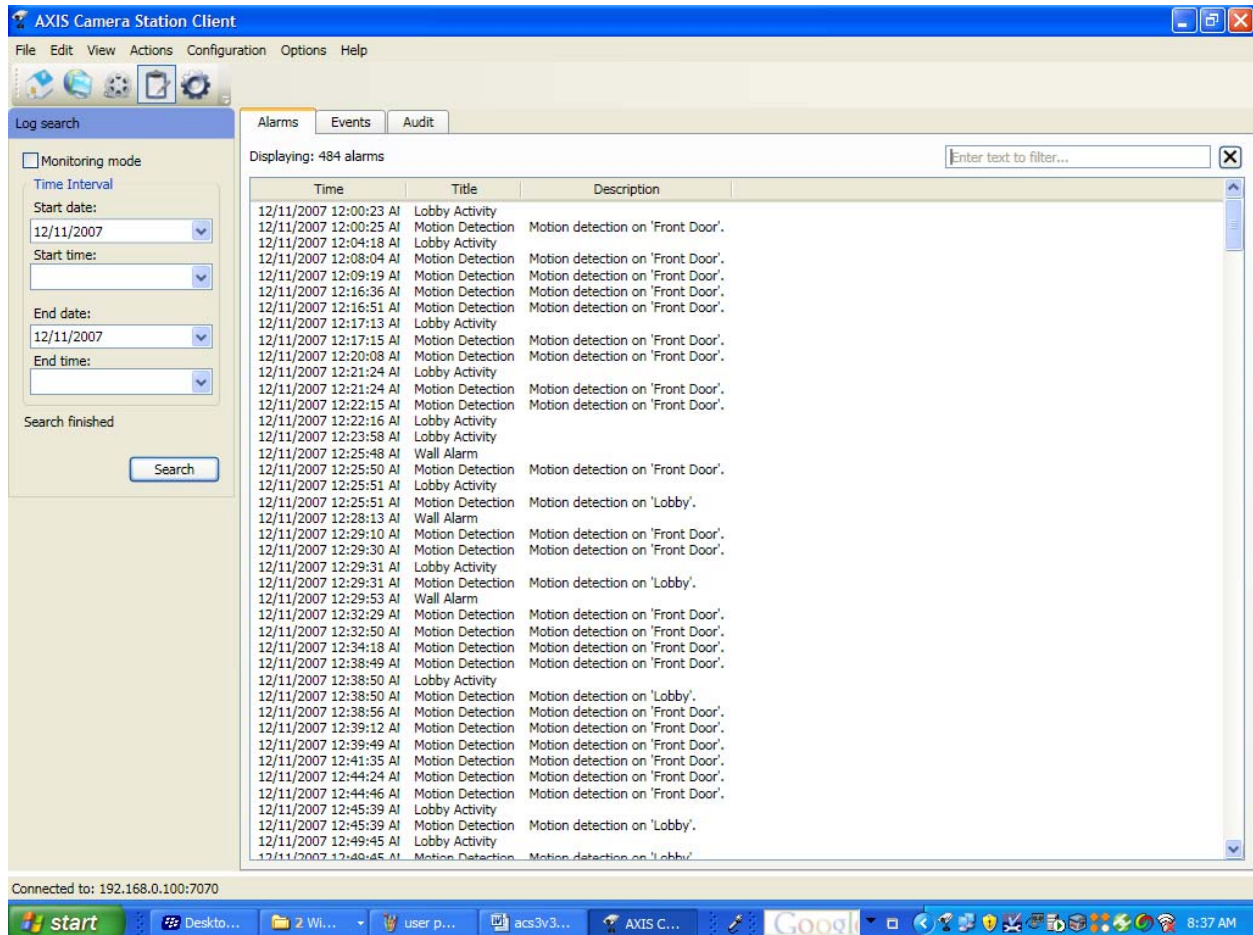
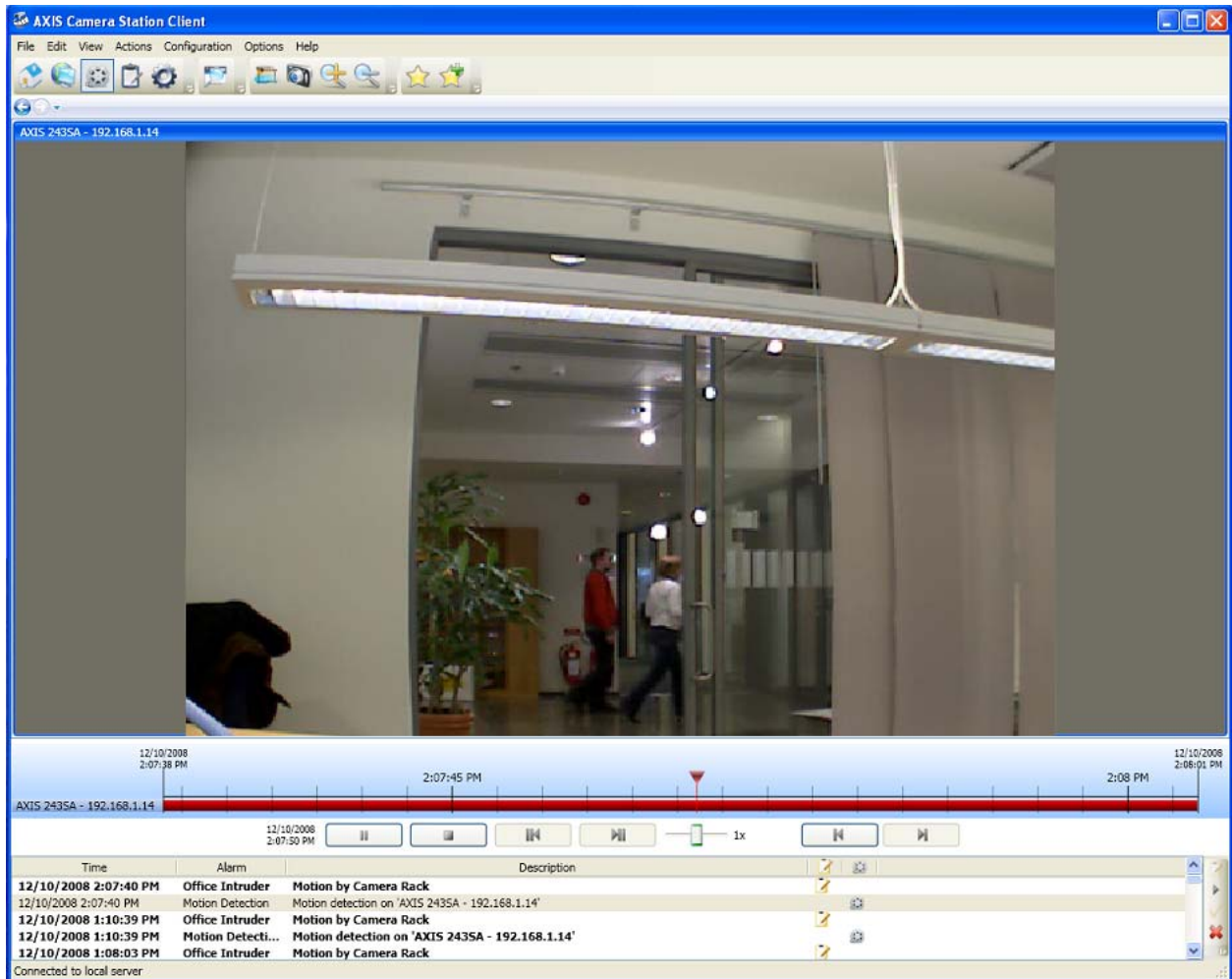


Figure 5: Event and Alarm logs can be sorted by time, title and description to find events of interest. Individual logs can be selected to start instant replay of the event video. All results can be filtered by typing in the text of interest (e.g. filtering “Lobby” will only show events containing the word “Lobby”).





**Figure 6: The video playback screen provides classic VCR controls and a navigable video timeline for video control.**



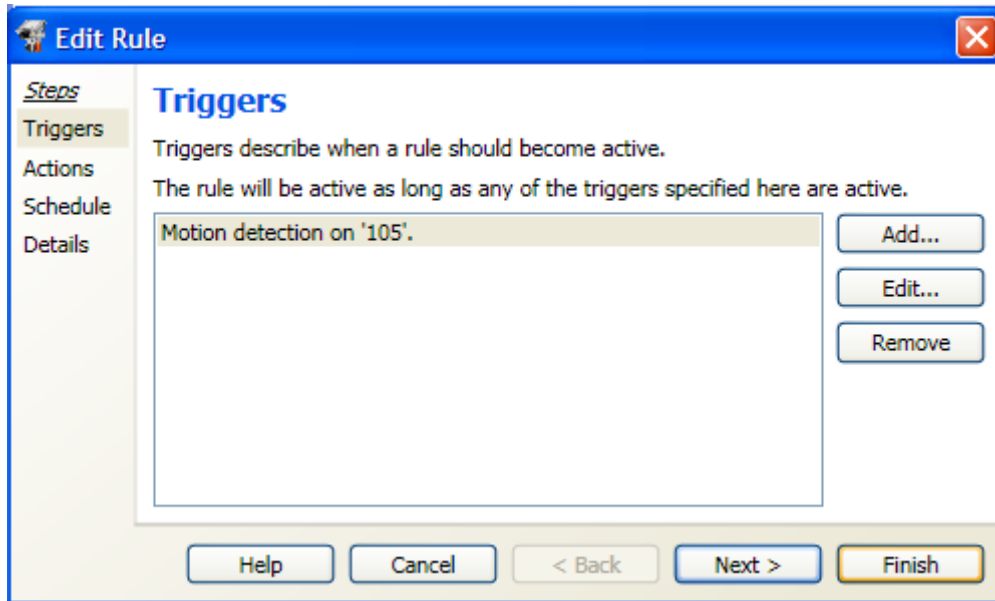
## Alarm/Event Management

Supported Events		Comments
Camera Motion Detection	✓	
Camera Inputs	✓	
Camera Audio Detection	⊘	Some Axis cameras support audio detection. These events are not supported by AXIS Camera Station.

**Table 4: System Event Management Features**

Automatic Responses to System Events	Test Results	Comments
<b>NVR Actions</b>		
Start Recording	✓	Will record up to 60 seconds before an event and 60 seconds after an event.
Stop Recording	⊘	Not supported. Post event recording is set by timer and can't be explicitly disabled by another event.
Add a Bookmark	⊘	Bookmarks can be manually added during video playback.
Change Recording Quality	✓	Different encoded streams can be used for motion recording. For example, the MPEG-4 stream can be used for continuous recording and the MJPEG stream can be configured for motion event recording.
<b>Monitoring Actions</b>		
View live video from a camera on PC Monitor (video pop-up)	✓	Live view can switch to a specific camera upon event.
View instant replay from a camera on PC monitor	⊘	Instant replay can be manually invoked.
View a map on PC Monitor	✓!	Interactive maps can be displayed in camera views.
Display user instructions	✓!	User instructions can be viewed from the alarm window in live view.
<b>PTZ Actions</b>		
Go to Preset	✓!	Alarms can move one or more PTZ cameras to preset positions.
Run a Pattern	✓!	Alarms can trigger a camera sequence that includes multiple preset positions.
<b>User Notification Actions</b>		
Send a text message to a PC Monitor	⊘	Event text for contact closures is configurable
Alarm Acknowledgment	✓!	Alarms can be acknowledged to indicate to other client operators that a problem is being addressed.
Play an alert sound at a PC	✓	Audio wav files are configurable.
Send an e-mail	✓	Emails can attach a JPEG snapshot of the event.
<b>Device Control Actions</b>		
Trigger Contact Closure	✓	Output contact closures can be invoked on any camera in the system.
Send a string to a serial port	⊘	Not supported





**Figure 7: The AXIS Camera Station event wizard provides a guided 4 step procedure to program the automated responses to system events such as motion detection**



## NetVideo Analysis of Event Management

- 📌 Very intuitive event configuration wizard
- 📌 A different video stream (e.g. of higher quality) can be used for event recording (versus a lower quality stream for continuous recording)
- 📌 Excellent array of automated actions including audible alerts, video recording, camera sequences camera switching and display of alarm procedures.



## Case Study: Office Intruder (Alarm and Event Management)

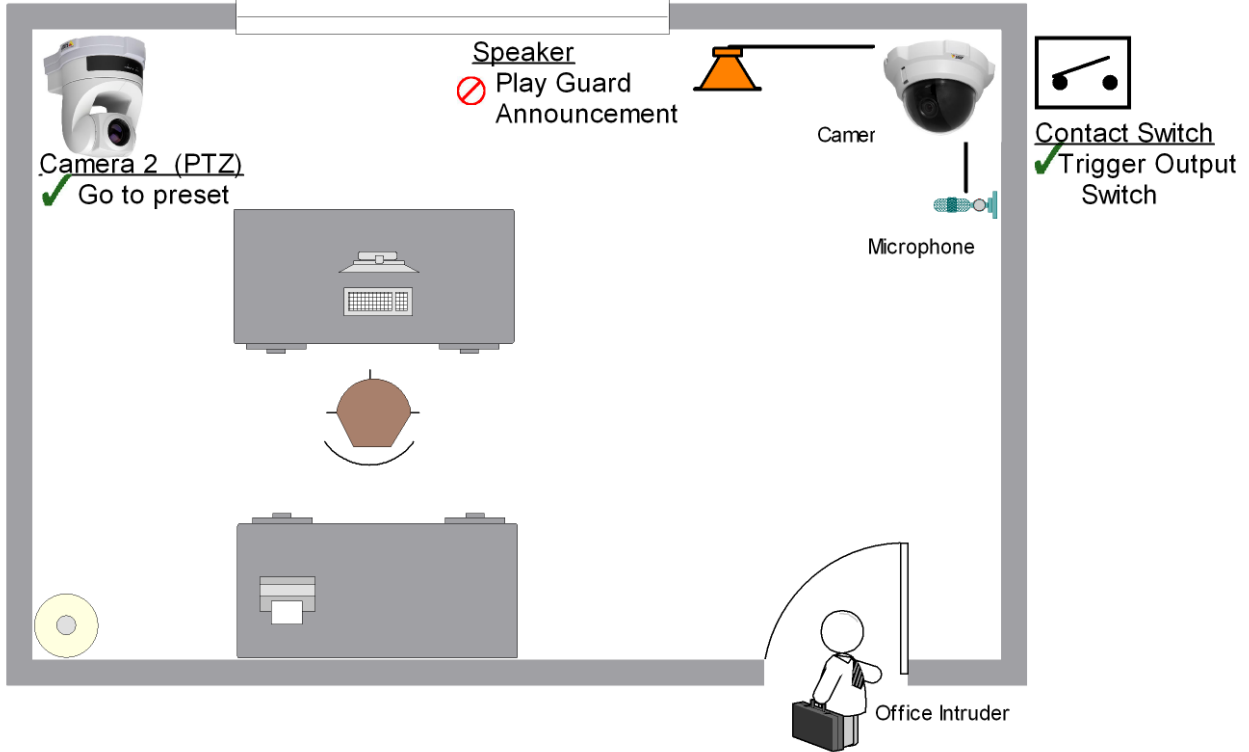
In this case study, we monitor an office with two cameras: a fixed camera and a PTZ. We set up regional motion detection on the fixed camera. When motion is detected at the doorway to the office, we would like to trigger a series of actions to start video recording, alert a security guard and trigger the building's lighting system by driving a contact closure to turn on the room lights.

### Test Scenario and Desired System Actions

We setup a motion event within a defined region of interest around the office door. In response to the event, the system is required to perform a series of automated actions.

- **Automated Action: Bookmark the event for later retrieval**
- **Automated Action: Record the event on Camera 1 and 2**
  - Pre-record time of 5 seconds
  - Post-event record time of 5 seconds
  - Bookmark the event for later retrieval
- **Automated Action: Alert the Security Guard**
  - Play annoying audio message
  - Pop-up Text message
  - Pop-up live video from the camera 1 on Guard's PC
  - Pop-up live video from the camera 1 on Guard's NTSC monitor
  - Go-to a preset on Camera 2
  - Pop-up live video from PTZ camera 2 on Guard PC
  - Pop-up instant replay from the camera
- **Automated Action: Turn on Building Lights**
  - Set an output relay to "on" to switch lights.
- **Required Operator Procedures**
  - Provide a series of procedures for the Guard in pop-up window
  - Make an intercom announcement to the intruder
  - Perform a video query on the event
  - Export the recorded event to a CD-ROM
  - Acknowledge the event/alarm





Security Guard PC

- ✓ Play audible alert
- ✓ Text message alert
- ✓ Switch live video to Camera 1
- ✓ Switch live video to Camera 2
- ⊘ Instant replay from Camera 1
- ✓ Display alarm procedures
- ⊘ Guard makes Intercom announcement to office speaker
- ✓ Guard acknowledges event
- ✓ Guard searches for event video
- ✓ Guard exports video to CD



Security Guard Analog Monitor

- ⊘ Switch to video from Camera 1



Network Video Recorder

- ✓ Record Event
- ⊘ Bookmark Event







## Configuration and Administration

Table 5: Configuration and Administration

Camera Station Configuration and Administration	Rating	Comments
<b>User Configuration</b>		
Directory Integration	✓	AXIS Camera Station users can be imported from the local computer or an Active Directory user account.
Camera Permissions	✓	User access can be specified on a camera-by-camera basis.
Application Privileges	✓	Each user is classified as an Administrator, Operator or Viewer resulting in different application privileges.
PTZ Presets	✓!	PTZ Presets can be configured
<b>Camera Configuration</b>		
Device Discovery	✓	Built-in device discovery will find all Axis devices within multicast-enabled networks or all devices that share the subnet with the Axis Camera Station server.
Video Quality	✓	Frame rate, resolution, compression level and compression can be selected thru AXIS Camera Station. Other parameters must be configured through the browser access to the device.
Compression Mode (MJPEG, MPEG-4, H.264)	✓	Only 1 H.264 or MPEG-4 source is available per camera. (Cannot view live at a different quality from recorded video using H.264 or MPEG-4. This is a limitation of the camera)
Motion Detection on Device	✓	Configuration of device-based motion detection is integrated with AXIS Camera Station.
Video Attributes (Brightness, Contrast, Hue)	⊘	Not supported through Axis Camera Station. Device video attributes can be configured through the browser interface.
Network	⊘	Device network configuration is done through the browser interface.
Device Firmware Updates	⊘	Device firmware can be updated thru the AXIS Camera Management
Web access to Device	✓	Web access to the device is launched from the add/edit camera dialog.



### NetVideo Analysis of Configuration and Administration

-  Auto-discovery automatically adds discovered network devices to the system upon first-time client connection to the Axis Camera Station server.
-  Configuration is segmented into discrete tasks in the Configuration pull-down menu: Add cameras, recording configuration, live video configuration, storage configuration etc.
-  Configuration of camera-based motion detection and video parameters is integrated with AXIS Camera Station
-  Configuration changes do not disrupt recording or live view (from other clients)



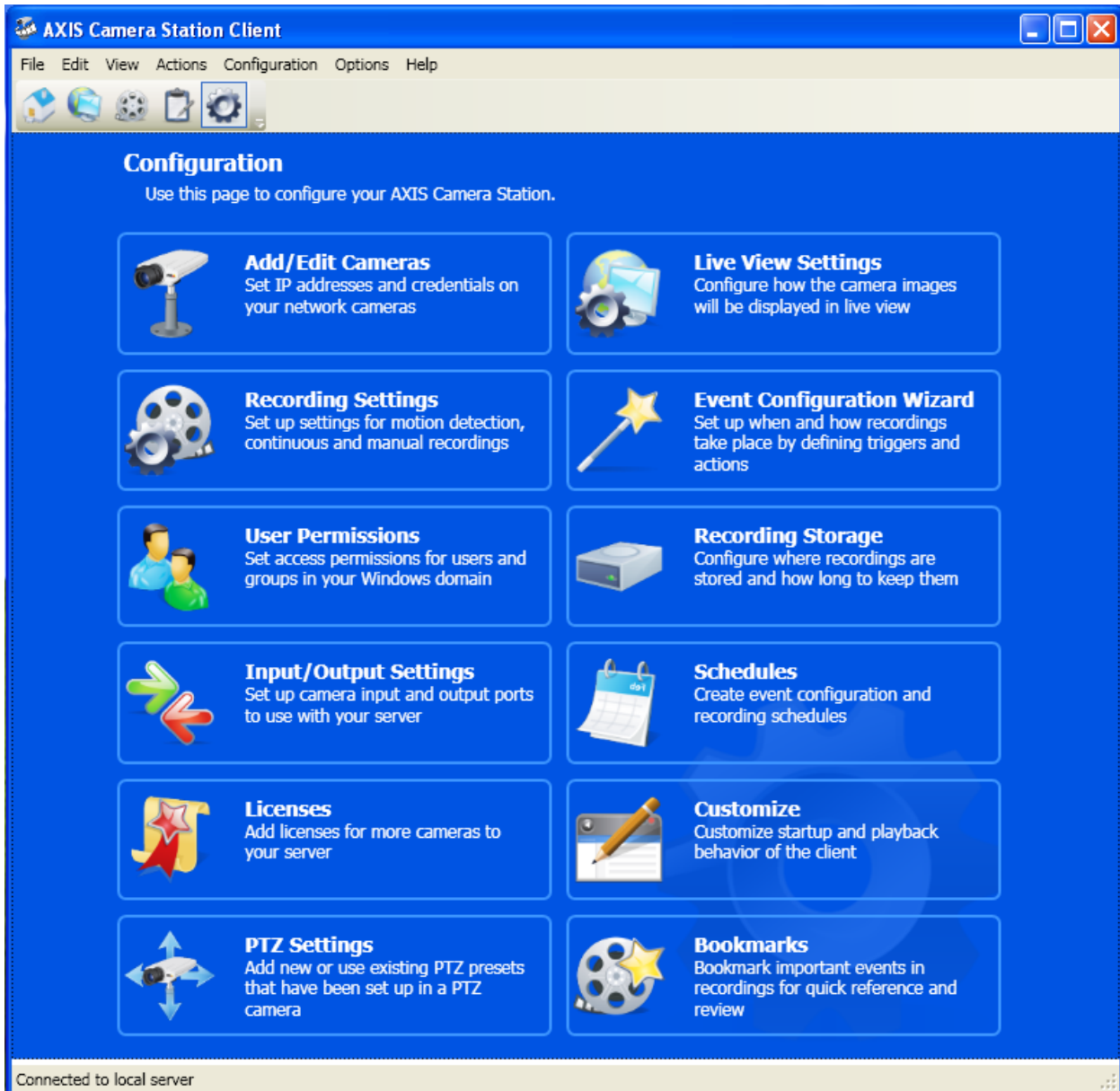


Figure 7: The AXIS Camera Station configuration menu segments configuration tasks into individual dialogs.

## IT Friendliness

**Table 6: IT Friendliness: Camera Station**

IT Friendliness	Rating	Comments
Directory Integration	✓	AXIS Camera Station users can be imported from the local computer or an Active Directory user account.
Multicasting	✗	AXIS Camera Station multicasting from the server is not supported.
Dual Encoding	✓	Different encoded video streams can be used for live versus recording
DHCP Support for cameras/encoders	✗	Camera addresses cannot be modified.
Ease of installation	✓	Simple wizard driven installation from CD provided with each IP camera. Finds and adds all cameras.
Network Security	✓	Does not require dangerous network ports.
System Health Monitoring (SNMP)	✗	Not supported.
Standard Database	✓	Uses Firebird SQL database for video recording.



### NetVideo Analysis of IT Friendliness

- ▲ Wizard driven installation is very straightforward for the server. The client requires a separate installation of Windows Media, if it's not already installed in the PC.
- ▲ The Camera Station software is generally safe for the network. A network scan revealed that no dangerous network ports are required to enable remote video streaming or camera control. The system supports dual streaming. For example video recording can be performed in MJPEG format while live viewing is performed in H.264 or MPEG-4 compression at a lower data-rate for remote access.
- ▲ AXIS Camera Station users can be imported from Microsoft Active Directory, eliminating the need to maintain separate user accounts for the application. Specific users can be granted administrative access. Camera permissions can be granted on a camera-by-camera basis.
- ▼ DHCP is not supported for the network cameras. Cameras must have a static IP address.






## Performance Metrics

**Table 7: Performance Metrics: Camera Station**

Performance	Test Result	Comments
Average Live Video Latency <sup>1</sup> (MJPEG)	.250 seconds	Good Performance
Average Live Video Latency (MPEG-4)	.180 seconds	Excellent performance
Average Live Video Latency (Megapixel)	N/A	Not Tested
Video Search (Time/Date)	<3 seconds (14 camera search over 24 hour period and > 1,000 recorded clips, 70 GB)	Quick video query - minimal delay on large searches



### NetVideo Analysis Summary of Key Performance Measures

-  The video streaming latencies to render live video in the remote client are very low for MPEG-4 sources.
-  Video switching on camera sequences is crisp with no visible gaps in video
-  Live Video Camera Selection - camera video is rendered very quickly (<<1 second) on remote client

<sup>1</sup> Live Video Latency was measured with an Axis 243Q encoder camera configured at 30 fps, 4CIF.

