

# SurvayaCam White Paper

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## Introduction

The demand for rapidly deployable, covert surveillance systems is higher than ever before due to the very real risk of terrorist attacks in the world today.

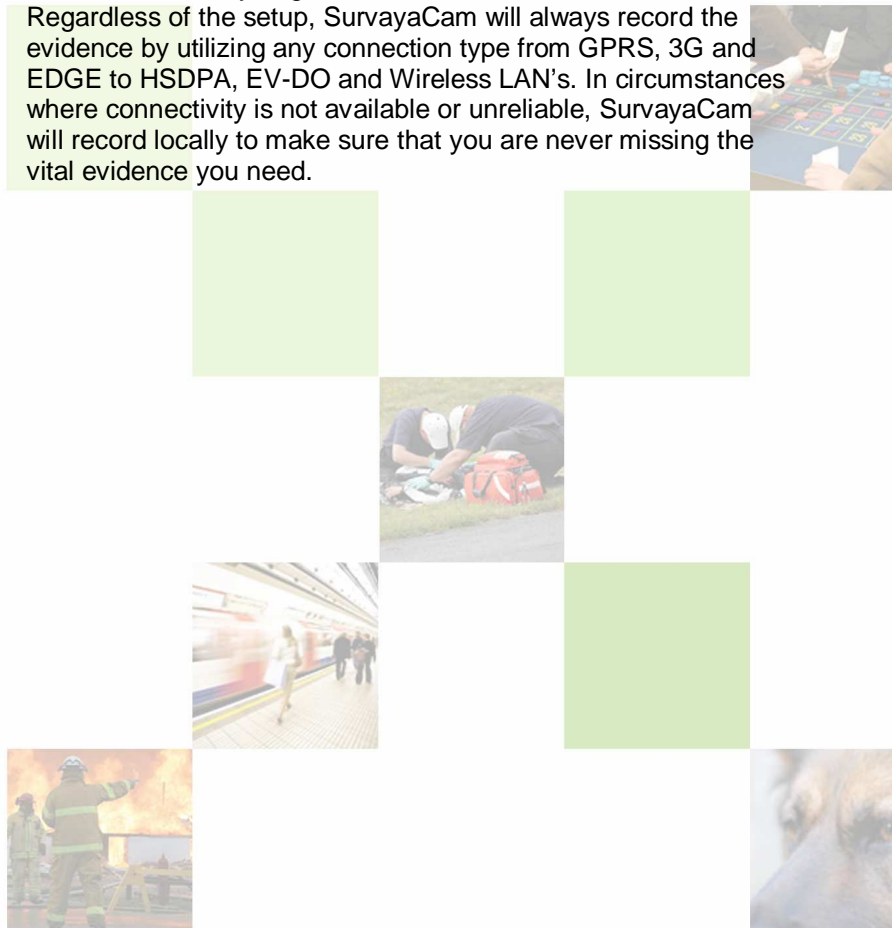
In today's world, body-worn, covert surveillance systems can play a key role in helping to stop would-be terrorists and criminals by gathering irrefutable video evidence that can be used to help guarantee a conviction.

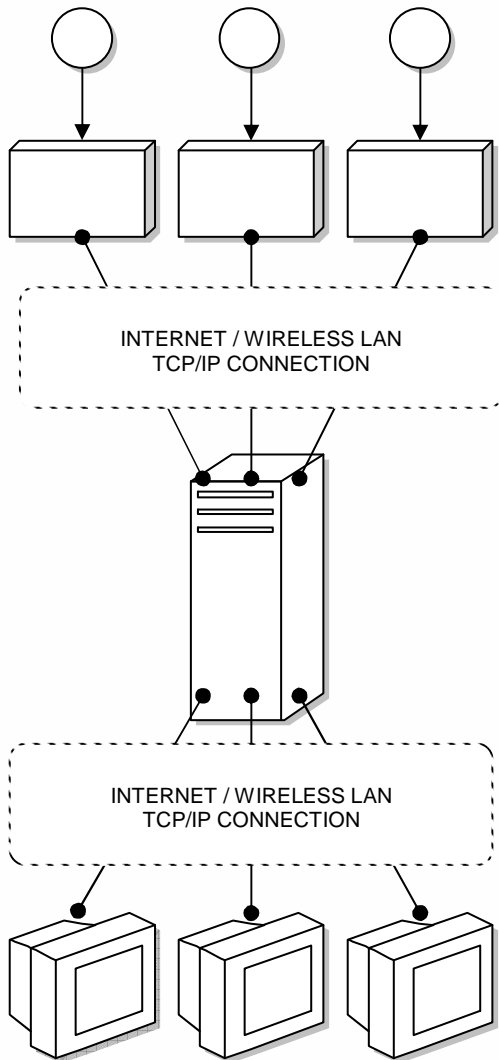
When unexpected terrorists attacks, natural disasters, or other emergencies take place, coordinating the emergency services as to how to deal with the situation in the most effective way is key to saving lives. Having access to the eyes and hears on the ground can help to gather a better understanding of the scale of the emergency and how to deploy the services where they are most needed.

SurvayaCam provides the solution for rapidly deployable, covert surveillance, giving you the eyes and hears on the ground to help saves lives and prevent crimes. With SurvayaCam, emergency services and security personnel issued with a SurvayaCam Transmitter unit will stream live real-time video back to a central control where it can be viewed by multiple operators and be used to assess the current situation.





With the ability to deploy multiple SurvayaCam Transmitter units at the scene, every angle can be seen and accessed.

Regardless of the setup, SurvayaCam will always record the evidence by utilizing any connection type from GPRS, 3G and EDGE to HSDPA, EV-DO and Wireless LAN's. In circumstances where connectivity is not available or unreliable, SurvayaCam will record locally to make sure that you are never missing the vital evidence you need.





**Key:**

-  Camera
-  Transmitter
-  Relay
-  Viewer

## System Overview

SurvayaCam is a mobile surveillance system that can be body-worn or be used as a fixed position CCTV unit. The system comprises of four software applications; the Relay, the Transmitter, the Viewer and the Video Verifier.

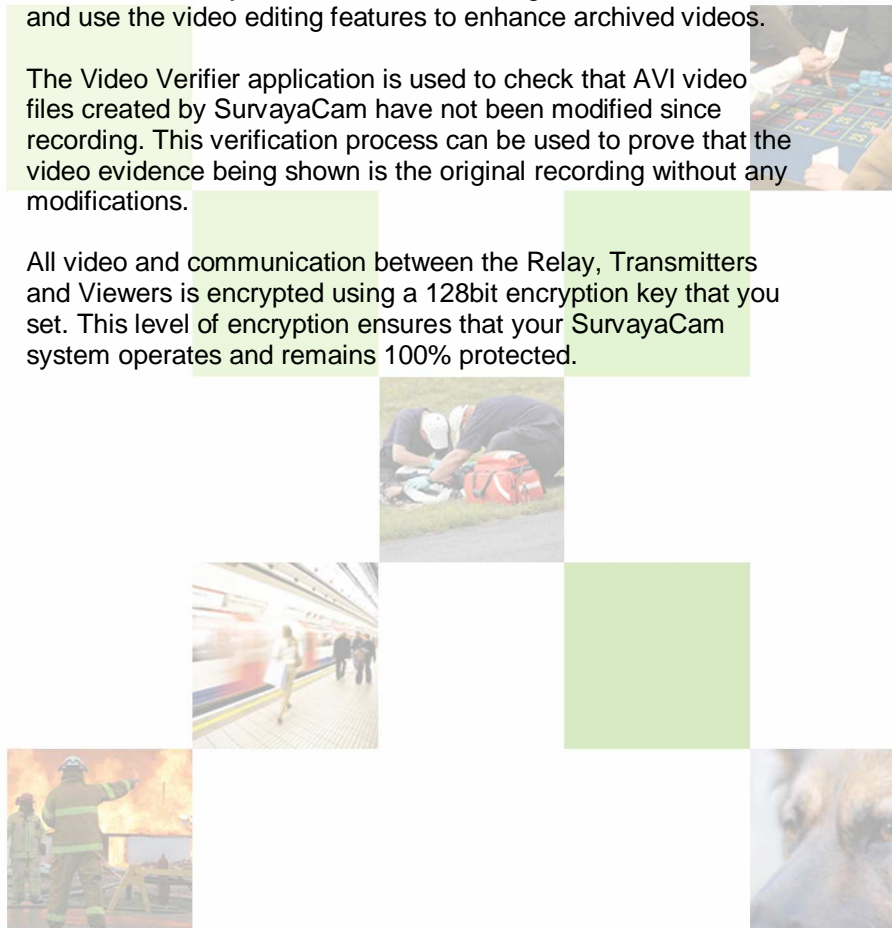
The Relay application controls all authentication of access to the system and 'relays' all incoming video streams from the connected Transmitters to the Viewers. Each video stream received by the Relay is automatically archived so that it can be viewed at a later date or be used as evidence. Although archived video files can be viewed at a later date the video data is never altered from the original recording and remains 128bit encrypted at all times.

The Transmitter application is designed to run on PC's with touch screen or stylus pen input, streaming live video from the connected camera device over a mobile/cell or Wireless LAN connection, whilst also recording locally with video and audio. The camera device can be either a webcam or a high quality video camera, depending on your needs. Once setup, the transmitter can be left un-manned and can then be controlled remotely from the Viewer application.

The Viewer application is used to view all incoming video streams being sent by the connected Transmitters as well as searching through and playing back the archived video streams. From the Viewer you can control and configure the Transmitters and use the video editing features to enhance archived videos.

The Video Verifier application is used to check that AVI video files created by SurvayaCam have not been modified since recording. This verification process can be used to prove that the video evidence being shown is the original recording without any modifications.

All video and communication between the Relay, Transmitters and Viewers is encrypted using a 128bit encryption key that you set. This level of encryption ensures that your SurvayaCam system operates and remains 100% protected.



### Login Screen



### System Status Screen



### System Settings Screen



### Video Profiles Screen



## The Relay

The relay application is installed and run as a Windows Service. This means that you do not need to log into Windows for the relay application to run. Because the relay is a Windows Service we have made it so that access to the relay settings is done via your web browser, allowing you to remotely login from any location.

The relay application is what makes the whole system work. If the relay is not running then the viewer and transmitter applications cannot be used. The relay application stores all the user accounts used for accessing the system, its job therefore is to handle all login and information request from both the viewer application and transmitter application.

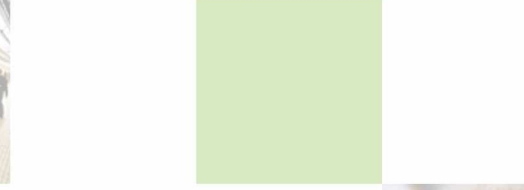
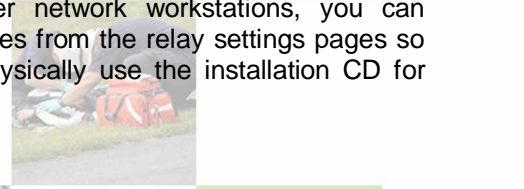
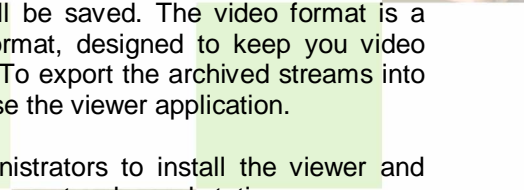
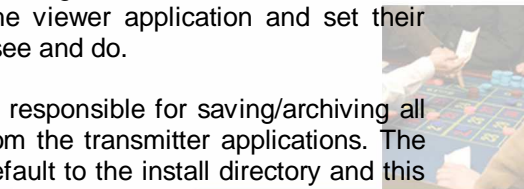
All communication and video between the three applications is done via one TCP/IP port, which is set to the port you choose. The relay settings pages are accessed via HTTP through your web browser on a port set by you, though the default port is 88.

All communication on the TCP/IP port is 128bit encrypted using the encryption key you set. This level of encryption ensures that your system operates and remains secure.

From the relay settings pages you can control and configure the entire system. You can see how many viewers and transmitters are connected and who is using them. You can create and control user accounts for the viewer application and set their privileges for what they can see and do.

The relay application is also responsible for saving/archiving all video streams it receives from the transmitter applications. The archive directory is set by default to the install directory and this is where all the streams will be saved. The video format is a securely encrypted video format, designed to keep you video files safe and tamper proof. To export the archived streams into a standard format you can use the viewer application.

To make it easier for administrators to install the viewer and transmitter applications over network workstations, you can download both installation files from the relay settings pages so that you do not need to physically use the installation CD for every workstation.



## System Specification

### Minimum

OS: Windows 2000 SP2  
CPU: Intel Pentium 3 800MHz  
Memory: 256MB  
HD: 20GB, approx 50 hours at 30fps  
Connection: 1Mbps  
Screen Size: 800x600 16bit  
Graphics: 16MB Memory

### Recommended

OS: Windows XP Home/Pro SP2  
CPU: Intel Pentium 4 3GHz  
Memory: 1GB or Higher  
HD: 200GB or Higher, approx 500 hours at 30fps  
Connection: 100Mbps or Higher  
Screen Size: 1024x768 32bit  
Graphics: 32MB or Higher

## Relay Features

### Upgrade License

The SurvayaCam system uses licenses to control the number of transmitters and viewer that can connect depend on your number of licenses. From here you can upgrade your license with your new license key.

### System Settings

You can control the communication on the relay by setting which TCP and HTTP ports are going to be used to handle the incoming and outgoing traffic. From here you can also set the encryption key to be used for the secure 128bit encrypted communication.

### Archive Settings

Every video stream that is sent to the relay from a transmitter is automatically archived so that it can be viewed at a later date. These settings allow you to set a maximum file size for an archive file as well as where they are saved.

### Video Profiles

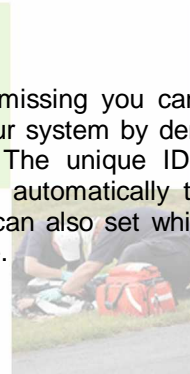
Because the transmitters can send video over mobile/cell or Wireless LAN connections you can configure video profiles for different transmitters. The transmitter will then download the video size and quality settings stored in the profile and use them for the video stream.

### User Accounts

To make sure only users that are authorised can access the system you have to create user accounts for the viewer application. Users have to enter their username and password to use the viewer application and HTTP viewer. Accounts also have privileges so that you can set what features the user can and cannot use.

### Transmitter List

If the transmitter PC goes missing you can ban the PC from being able to connect to your system by denying access to the Relay for that transmitter. The unique ID of the transmitter application will be assigned automatically the first time that it connects to the relay. You can also set which video profile the transmitter will use from here.



### Main Screen



### Settings Wizard



### Full Screen Preview



## The Transmitter

The transmitter application is used to capture a live video feed from a connected device and stream that live feed wirelessly back to the relay application over an internet or intranet connection.

The connection speed will determine which video profile the transmitter application uses. The video quality of each profile can be configured by logging in to the relay settings pages. The transmitter application can be used on any connection speed from GPRS and 3G to a 54kbps Wireless LAN's upwards.

The transmitter application has built in checks to make sure that if your internet or intranet connection is lost or drops in speed that the connection is redialled and that streaming resumes.

Although video is streamed back to the relay application, where it is archived, the transmitter application can also be configured to record locally. This means that if the connection to the relay is lost that the transmitter will keep on recording video so that no potential evidence is missed.

Local recordings can be verified at anytime by using the Video Verifier. The verifier is an optional install, but if you have installed it you can right-click on any locally recorded file and click the "Verify with SurvayaCam" option in the menu. This option will instruct the verifier to scan the file and check whether it has been tampered with. If the file has been modified you will be informed otherwise you will be shown the encrypted SurvayaCam information that is embedded into the file.

A local preview of the camera feed is shown on the interface so that the user can see what video the transmitter application is streaming back to the relay application. To see a larger preview of the camera feed the user can enable the full screen preview feature. This will make the whole screen of the PC become the preview from the camera.

If the PC that is running the transmitter application is lost or stolen, you can block that PC from being able to access your system by denying its connection request on the relay settings pages. The unique ID of the transmitter application is assigned automatically by the relay application the first time it connects.

The interface has been designed with touch screen and stylus pen input in mind, so each option is a simple Yes/No command and large, easy to press buttons have been used. Because the transmitter application will in most cases be run on a PC with a touch screen input, you can lock the interface so that no accidental input is detected by enabling the lock screen feature.



## System Specification

### Minimum

OS: Windows 2000 SP2  
CPU: Intel Celeron/Pentium M 1GHz  
Memory: 128MB  
HD: 20MB (10GB for local recording)  
Connection: 28Kbps  
Screen Size: 800x600 16bit  
Graphics: 64MB Memory  
Camera: USB Camera with support at 320x240

### Recommended

OS: Windows XP Home/Pro SP2  
CPU: Intel Pentium 4 2GHz  
Memory: 512MB or Higher  
Connection: 54Mbps or Higher  
Screen Size: 1024x768 32bit  
Graphics: 128MB Memory or Higher

Though the transmitter application has an interface, so that the user can control the different features, it can also be configured so that it is used as an in-situ, remote controlled unit.

To setup the transmitter to function this way you will need to run the setup application. From here you configure it so that the transmitter application runs when Windows loads, dials the correct connection and then automatically starts streaming back the video.

Once set up, you can then control and configure the transmitter application from the viewer application by using the control options. This remote control of the transmitters allows you to have full control over how and when your system records video.

## Transmitter Features

### Simple Navigation

The navigation of the transmitter interface has been designed with touch screen input in mind. All options are simple Yes/No commands.

### Camera Preview

The user can see a real-time camera feed preview from your connected device and choose whether to have a full screen or scaled preview.

### Intelligent Connection Detection

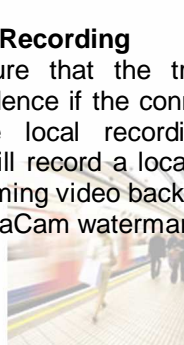
The transmitter can be configured to use a primary connection for streaming video back to the relay but to default to a backup secondary connection if required. This feature allows you to use a wireless LAN when available but to set the transmitter to dial a connection when needed. The primary connection will then be used again if/when it becomes available.

### Variable Frame Rate

To make sure that the transmitter sends the best possible video quality for your connection, the transmitter utilizes a variable frame rate method for streaming video. This means that as the bandwidth increases or decreases that the archive file automatically adjusts to account for the change in frame rate.

### Local Video Recording

To make sure that the transmitter doesn't miss recording potential evidence if the connection to the relay is lost, you can turn on the local recording feature. When enabled, the transmitter will record a local AVI file, with audio if enabled, as well as streaming video back to relay. The video is time stamped and a SurvayaCam watermark is added.



### **Lock Screen**

Because the transmitter application will, in most cases, be run on a PC with a touch screen input, you can lock the interface so that no accidental input is detected by enabling the lock screen feature.

### **Battery Indicator**

To give the user an accurate indication of the remaining battery life there is a permanent battery status indicator shown on the interface. The colour of the indicator will change from green to orange to red as the battery life reduces.

### **Hard Drive Space Indicator**

To give the user an accurate indication of the remaining hard drive space on the PC or memory card there is a permanent hard drive space indicator shown on the interface. The colour of the indicator will change from green to orange to red as the remaining space reduces.



## Login Screen



## Live Video Streams Screen



## Stream Player Window



## Archive Search Results Screen



## The Viewer

The viewer application is used to watch the incoming live video streams that are being sent from the transmitter applications. The streams are relayed by the relay application from the transmitter to the viewer applications.

To use the viewer application the user must first login to the system by entering their username and password. Once logged in the user will have access to the features that their account privileges allow. User accounts are set and stored on the relay application.

The first screen the user will see after login is the live stream screen, where a recent thumbnail image will be displayed for each of the live streams being sent by the transmitters. To watch these streams in real time the user simply clicks on the play option to show the player window for that stream.

The player window allows the user to see the incoming video stream and rewind through the streams history. The user can use the video, zoom, and drawing options to enhance the video they are watch, without affecting the original copy. Depending on the users privileges they can also control and configure the transmitter from the player window and export the video stream into an external video file.

Exported archives can be verified at anytime by using the Video Verifier. The verifier is an optional install, but if you have installed it you can right-click on any exported archive file and click the "Verify with SurvayaCam" option in the menu. This option will instruct the verifier to scan the file and check whether it has been tampered with. If the file has been modified you will be informed otherwise you will be shown the encrypted SurvayaCam information that is embedded into the file.

The user can also use the search archive option (depending on privileges) on the viewer to find archived video streams between specific dates or from a specific transmitter. Once the search has been performed the archived streams that meet the search criteria will be displayed in the list. From the list the user can choose to play one or all of the returned streams.

To help keep track of important archived streams the user can bookmark the returned streams (depending on privileges) so that when they go to their bookmarked streams, they are already listed without the user having to perform another search.

As well as the viewer application you can also watch live streams on a PDA or mobile phone via the devices web browser. The address is the IP address of the relay application, e.g. <http://127.0.0.1>, as long as the port on the relay settings is still set to 80.



## System Specification

### Minimum

OS: Windows 98 SE  
CPU: Intel Celeron/Pentium 3  
850MHz  
Memory: 128MB  
HD: 15MB  
Connection: 56Kbps  
Screen Size: 800x600 16bit  
Graphics: 64MB Memory

### Recommended

OS: Windows XP Home/Pro SP2  
CPU: Intel Pentium 4 2GHz  
Memory: 512MB or Higher  
Connection: 54Mbps or Higher  
Screen Size: 1024x768 32bit  
Graphics: 128MB Memory or Higher

If you go to the address in the devices web browser you will still have to login, but once logged in you will only be able to watch live stream and only one at a time. The HTTP viewer provides a truly mobile surveillance system.

## Viewer Features

### User Login

To make sure your system is only accessed by authorised users, the user must first login using their accounts details to gain access viewer features. Once logged in the account privileges will determine which features the user has access to.

### Live Streams

You can watch all incoming live video stream from the connected transmitters simply clicking the play option on the live stream thumbnail. This will create a player window in which you can watch the video stream.

### Archive Streams

Every stream that is send by the transmitters is archived by the relay. A user can run search queries to find specific video streams. From the returned results you select to watch one or more of the video streams.

### Bookmark Streams

Once a user has found the archive stream they were searching for they can bookmark the stream so they can access it again in future without performing another search. Bookmark streams are stored separately under each user account.

### Stream Playback Options

When viewing a video stream the user can control the video playback. They can rewind, fast forward, pause, stop, play and change the playback speed of the video.

### Stream Timeline Scanning

Every frame of video in a stream is time stamped and dated as it is received by the relay. A user can scan forwards or backwards through the timeline to find a specific event or just to review past events.

### Video Options

If video from a transmitter is too dark or reduced in quality because of its connection speed, the video options allow dynamic adjustments of the contrast, brightness, sharpness and the option to smooth the video as well as invert it.

### Drawing Options

The drawing options are for highlighting areas of interest on the video stream for exporting. You can also blur out areas of video as well as zoom in on a selected area of the video frame.



### **Zoom Options**

If you need to get a closer look at something on the video, you can use the zoom options to zoom in and out of the video. Once zoomed in you can pan around the video using your right mouse button.

### **Export Options**

Using the export options you can save video stream as a video file, still image frame or print a frame of video. You can also set <A & B> markers to set the start (A) and the end (B) points in the video stream you want to export.

### **Audio Messages**

Audio messages are used to send audio information to the transmitter operator. Though the message is sent in text format, it is converted to audio by the transmitter application and played so that the user can hear the message.

### **Transmitter Control**

You can control the connected transmitters by using the configure options. This feature allows the user to remotely administration and change the setup of the transmitters.



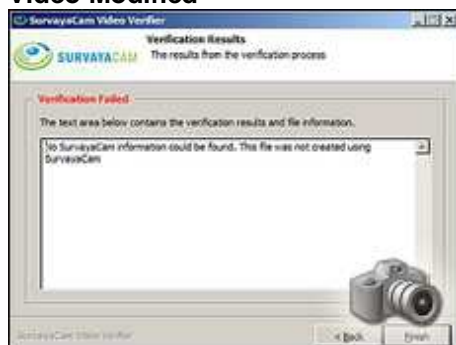
### Video Time Stamp and Watermark



### Video Verified



### Video Modified



## The Video Verifier

The video verifier application is used to check whether AVI video files that have been created by SurvayaCam, by either local recording or archive exporting, have been modified.

When an AVI video file is created by SurvayaCam encrypted data is also inserted in to the file take contains details about your SurvayaCam system as well as the original format and quality settings that the AVI file was recorded at.

To verify an AVI video file you must have the video verifier installed. Once installed you can right-click on any AVI video file and select the "Verify with SurvayaCam" option from the menu. The option will instruct the video verifier to open the file and check that the original details stored in the file still match the current details of the file.

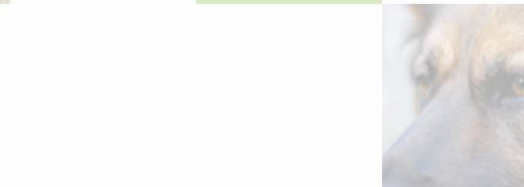
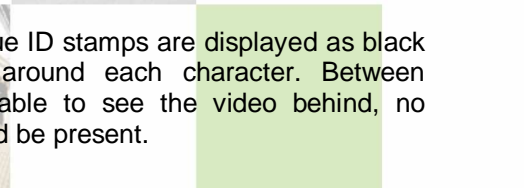
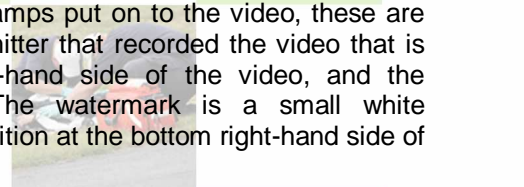
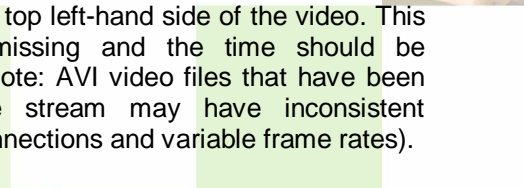
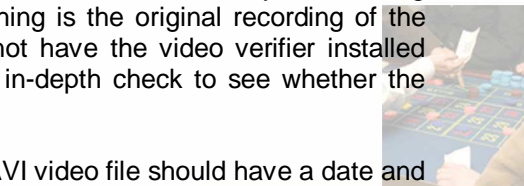
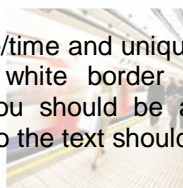
If all the data is still in the AVI video file and the video format and quality of the video are still the same as at the time of recording then the video verifier will inform you that the file has been verified and will then display the SurvayaCam system information stored in the file. If the details no longer match then the video verifier will inform you that the file has been changed, and where possible is will give you the details of what has been modified.

The video verifier gives you a secure, reliable way of checking that the video you are watching is the original recording of the event. However, if you do not have the video verifier installed you can still perform a less in-depth check to see whether the video file has been modified.

Every frame of video in the AVI video file should have a date and time stamp positioned at the top left-hand side of the video. This stamp should never be missing and the time should be consistently incrementing (Note: AVI video files that have been exported from an archive stream may have inconsistent incrementing due to slow connections and variable frame rates).

There are also two other stamps put on to the video, these are the unique ID for the transmitter that recorded the video that is positioned at the top right-hand side of the video, and the SurvayaCam watermark. The watermark is a small white SurvayaCam logo that is position at the bottom right-hand side of the video.

Both the date/time and unique ID stamps are displayed as black text with a white border around each character. Between characters you should be able to see the video behind, no background to the text should be present.



## System Specification

### Minimum

OS: Windows 98 SE  
CPU: Intel Celeron/Pentium 3  
850MHz  
Memory: 64MB  
HD: 10MB  
Screen Size: 800x600 16bit  
Graphics: 32MB Memory

### Recommended

OS: Windows XP Home/Pro SP2  
Screen Size: 1024x768 32bit

If any one of these three stamps are missing or are not as describe above then the AVI video file has been modified and its use as evidence will have compromised.

## System Information

The SurvayaCam system information that is stored in every AVI video file that has been created by SurvayaCam stores information not only about the video format and quality but also the transmitter information, user information and more. Below is a list of the details stored in the AVI video files.

### Transmitter Information

The information stored about the transmitter is the system code of the SurvayaCam system, the unique ID of the transmitter, the name of the transmitter, and the MAC address of the PC that the transmitter was running on.

### File Information

The information stored about the file is the file type, which will be shown as Local Recording or Exported From Archive. The original file name that the file was created with and the file size are also stored.

### Format Information

The information stored about the video format is the dimensions of the video frames, the video codec used to compress the video, an indicator to show whether audio was also recorded and if so the audio codec will be shown. The frame rate of the video is also stored.

### File Date/Time Information

The information stored about the date and time is the record start and stop dates and times, the duration of the file, and the duration of the video data.

### Linked File Information

This information indicates whether a linked file was also created. A linked file is a recording, either archive or local recording, that was also recording at the same time by the same transmitter. This information allows you to find the archive file that was recorded at the same time as a local recording or visa-versa.

### Archive File Information

This information is only shown when the AVI video file has been created from an exported archive file. The information stored about the archive is the is the archive record start and stop dates and times, the duration of the archive file, and the username and full name of the user that exported the archive. An indicator to show whether drawings have been applied to the video is also shown.



## Contact Pixaya

**Pixaya (UK) Limited**  
33 Prince Street, Batley  
West Yorkshire  
WF17 5LB  
United Kingdom

Tel: +44 (0)1924 476042  
Fax: +44 (0)1924 473857  
Web: [www.pixaya.com](http://www.pixaya.com)  
Email: [info@pixaya.com](mailto:info@pixaya.com)

## Conclusion

SurvayaCam provides the ultimate solution for mobile surveillance. Regardless of the environment, SurvayaCam can be deployed quickly and effectively, anywhere, anytime.

By utilizing the mobile/cell and Wireless technologies, the SurvayaCam system is fully scalable to meet the end user requirements, whilst providing locally record video with audio as a backup for environments where connectivity problems persist.

With the ability to deploy multiple Transmitters instantly, all streaming live video from areas standard CCTV equipment simply cannot be used, SurvayaCam meets and far surpasses the demand for covert, mobile, real-time, video surveillance solutions.

