

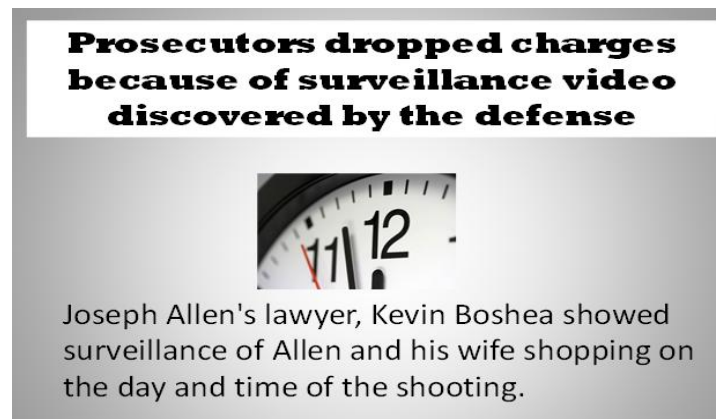


AUDIO/VIDEO

There are several different types of digital media audio and video files. The following common types of digital evidence in legal cases are outlined below and all require a rapid response to preserve or recover recently deleted media.

Digital Video

Closed Circuit Television (CCTV) surveillance, digital cameras and smart phones are everywhere and the amount of audio and video recordings produced increases daily. Due to many factors concerning the storage of digital media, there is a need for rapid response to preserve the evidence. Digital video recorders (DVR's) constantly overwrite older video with the newest video, so if the evidence is not obtained immediately it could be gone for good.



Cell Phones

Audio and/or video recordings made with a phone or digital camera that have been deleted may be recoverable by forensic tools if the examination is conducted before the data is overwritten or permanently deleted by the device operating system.

Social Media

Social media is not only useful in family and criminal litigation, but can influence personal injury, workers' compensation, product liability and commercial litigation and employment cases. The first step in using social media evidence is to commence discovery and preservation as early as possible. For additional information regarding social media and Internet evidence, see the Internet/Social Networking section of the Digital Evidence Toolbox.





Principles of Digital Evidence

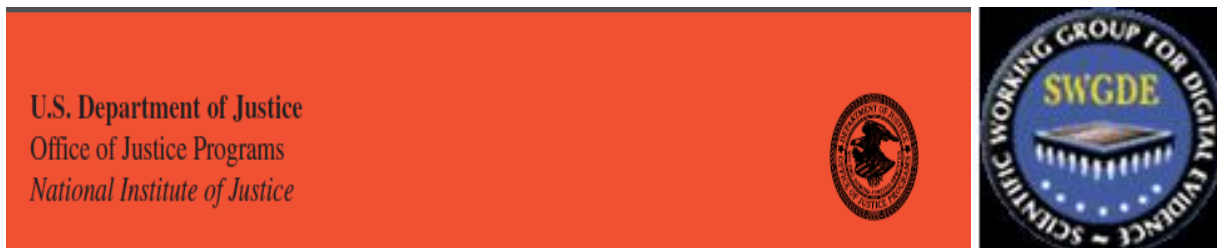
1. Investigation and analysis of digital evidence must be done in accordance with governing industry standards.
2. Actions taken to secure or analyze the digital evidence should not change the integrity of the evidence.
3. Persons conducting an examination of digital evidence should be trained for that purpose.
4. Activity relating to the seizure, examination, storage or transfer of digital evidence should be documented, preserved and available for review.

Preservation, Analysis and Reporting

There are industry standards and best practices concerning the recovery and enhancement of audio and video recordings to insure the best quality evidence is obtained. Even if the recordings are preserved using the best practices, a number of factors, such as poor lighting or excessive background noise, can make the quality of the video or audio less than desired. Enhancement can be applied to improve the image quality and sound clarity. By applying enhancement techniques, details that may have been overlooked in the original recording may be identified. The enhancement process should always preserve the source recording with the enhanced version created as a separate version.

Best Practices & Industry Standards

The prevailing governing standards are set forth by The Scientific Working Group of Digital Evidence (SWGDE) and The National Institute of Justice (NIJ).



International Organization Standardization - ISO

ISO is an independent, non-governmental international organization that sets specifications for products, services and systems, to ensure that they follow statutory and regulatory requirements related to a product or program quality, safety and efficiency. Pursuant to the best practices and industry standards, the examination of digital evidence should be conducted in accordance with a quality management system such as ISO 17020 or 17025.





Common Sources of Audio & Video Evidence

- Cell phones and tablets
- Social media
- Digital surveillance camera system
- Voice mail recordings
- 911 dispatch recordings
- Police recorded witness interviews
- Police (Body cameras)

Volatile Memory

Digital devices might use volatile memory. Volatile memory is lost if the power supply to the device is interrupted and under certain situations the examination or data extraction might have to be performed in place or via remote access. Rapid identification, assessment and preservation of any possible digital evidence could prevent the loss of evidence.

Metadata

Metadata is the data about the data and is an important part of file authentication. The original recording system contains the data in its native format, original modified/access/creation (MAC) time stamps of files, internal time clock and the settings of the recording device. Several social media networks strip the metadata from the image or video for privacy to the user and are not viewable during examination.

Media Codec - Universal Playing and Control

Digital audio and video files in their standard state can be extremely large files. To overcome issues with the file size codecs have been developed. Codecs are programs which compress the file for storage and decompress the file for playback. Many systems use proprietary codecs that make playing back a file without the native player difficult, if not impossible. Many systems use proprietary codecs, VLC Media Player is a free, open-source media player that can play a large number of compressed media files.





CONSIDERATIONS OF DIGITAL VIDEO



1. Date and time of system could be off.
2. Video copied at different frame rates could drop frames.
3. Video copied as different aspect ratio could distort video.

Video Enhancement Techniques

A variety of adjustments can be applied to enhance the lighting, clarity and bringing out specific aspects. Some of the enhancements are as follows:

- **Sharpening:** Makes edges of images in the recording become more clear and distinct.
- **Video stabilization:** Reduces the amount of movement in the video, producing the smoothest possible playback.
- **Masking:** Covers the face or areas of the video that may protect a witness, victim or law enforcement officer.
- **Interlacing:** In an analog system, interlaced scanning is used to record images (a technique of combining two television fields in order to produce a full frame of video). A process called de-interlacing may be used to retrieve the information in both fields of video.
- **Demultiplexing:** Allows for isolation of each camera. In CCTV systems, a device called a multiplexer is used to combine multiple video signals into a single signal or separate a combined signal. These devices are frequently used in security and law enforcement applications for recording and/or displaying multiple camera images simultaneously or in succession.

Audio Enhancement Techniques

A variety of filters or adjustments can be applied to enhance the material, bringing out specific aspects or events present in the recording. Low audio levels can be increased while unwanted background noise is reduced.

- **Spectral Noise Reduction:** Reduces unwanted background noise or ambiance in the recording to increase the Signal to Noise Ratio (SNR).
- **Frequency Equalization:** Highly precise equalizers can be used to boost or cut specific bands of frequencies. This process makes speech more intelligible.





- **Amplitude Adjustments:** May be increased or decreased during this enhancement processes.
- **Compression & Normalization:** Quiet sounds in a recording such as whispering can be boosted by compressing the level of the signal so that the dynamic range of the material is reduced.

Notes

Digital evidence must be recognized early, treated as time sensitive and preserved in accordance with the best practices and industry standards before any analysis or enhancement can begin. In some cases the limitations of the source recording may prevent meaningful improvement.

Reference Standards

- SWGIT Section 23 Best Practices for the Analysis of Digital Video Recorders 06112012
- SWGDE Best Practices for Digital Audio Authentication 062316
- SWGDE Best Practices for Forensic Audio 063015
- SWGDE Best Practices for Photographic Comparison for All Disciplines 062316
- SWGDE Best Practices for the Forensic Use of Photogrammetry 092915
- SWGDE Core Competencies for Forensic Audio 091511
- SWGDE Digital Image Compression and File Formats Guidelines 062316
- SWGDE Image Processing Guidelines 020816
- SWGDE Proposed Techniques for Data Recovery from DVR Containing H264 062316
- SWGDE Recommendations and Guidelines for Using Video Security Systems 092915
- SWGDE Training Guidelines for Video Analysis, Image Analysis and Photography 020816
- SWGDE EFI and its Effect on Digital Forensics Imaging 020614
- SWGIT Section 24 Best Practices for the Retrieval of Digital Video 09-27-2013
- TSWG-Video Evidence From CCTV Systems Flipbook 10-2006

For more information on audio/video and digital evidence, call now and speak with a certified expert. I.R.I.S. LLC is available 24 hours in emergency cases.



cellebrite
delivering mobile expertise



WE'RE CERTIFIED.

