

## Frequently Asked Questions (FAQ) About Digital Audio and Video Records

This FAQ is provided to Federal agencies to assist them in meeting their records management responsibilities under 44 U.S.C. ch. 31. Agency records officers can use this FAQ as a technical resource in working with staff that create and manage digital audio and video records.

### Overview

*1. How should I evaluate the suitability of digital audio and video formats for records that need to be retained over the long term (i.e. over multiple generations of technology)?*

When selecting a format consider the following aspects:

- The format should be publicly and [openly](#) documented.
- The format is non-proprietary.
- The format is in widespread use.
- The format is [self-documenting](#).
- The format can be opened, read, and accessed using readily-available tools.

*2. Why isn't NARA issuing formal digital audio and digital video file format transfer guidance at this time?*

Due to the rapidly evolving nature of digital audio and video formats and the lack of any open, national or international consensus standards for the creation and preservation of digital audio and video, NARA can not mandate formal transfer guidance at this time.

*3. When converting analog material (audio and video cassettes, record albums, reel-to-reel audio and video tapes, etc.) to digital, what factors should be considered?*

The successful production of high-quality digital versions of analog material is dependent on many factors, including the quality and condition of the analog source, equipment, and software.

*4. Should agency-created metadata accompany the digital audio or video files when transferred to NARA?*

Yes, agencies should include metadata about digital audio or video files as part of transfers to NARA. Usually, the metadata is contained within a separate data file. However, in cases where the metadata is included within the data stream (e.g., as part of the record format), agencies should indicate its presence in the file and provide access instructions.

5. *What is the typical data structure of a digital audio or video file?*

A digital audio or video file consists of a container holding source data which has been processed through a codec. A codec (coder-decoder, compressor-decompressor, compress-decompress) transforms the analog signal (from a microphone, video camera, etc.) into the ones and zeros of a digital file. A codec also can be used to encode material already existing in digital format into another digital format.

6. *What types of codecs are there?*

There are two broad categories of codecs:

**Lossy Codec:** A lossy codec is one that discards certain portions of the signal in order to achieve a smaller file size; for example, mp3 codecs attempt to identify and remove portions of the signal that would not result in a perceived loss of quality of the sound to make the file smaller. These losses are sometimes noticeable and sometimes not. The more aggressive the compression setting chosen, the more data is removed. This can result in digital artifacts, which are audible errors created by the compression.

**Lossless Codec:** A lossless codec is one that achieves smaller file sizes through means other than removing data. This can include using a variable bit rate which would use fewer bits to encode silences as compared to an active section of music.

Some codecs may be configured to be either lossy or lossless.

Digital Audio

7. *What digital audio formats does NARA recommend for Federal records?*

Based on the suitability characteristics identified earlier, the following formats are acceptable for files containing exclusively audio material, either spoken word or music. In many cases, the acronyms are also the file extensions for that file format.

- Audio Interchange File Format (AIFF)
- Waveform audio format (WAV)
- Audio format (AU)
- Broadcast Wave Format (BWF)
- Free format Lossless Audio Codec (FLAC)
- Motion Pictures Expert Group (MPEG) 4 Audio Lossless Coding format (ALS)

8. *What is the preferred codec for digital audio?*

NARA recommends recording or digitizing audio using a lossless codec, such as WAV-PCM.

*9. What is the preferred bit depth for digital audio?*

“Bit depth” is the amount of data used to describe a specific section of source material. The preferred bit depth for audio recording is 24 bits per sample. The minimum bit depth is 16 bits per sample.

*10. What is the minimum preferred sampling rate for digital audio?*

The sampling rate is the number of periodic samples of the source material taken in order to reproduce it accurately. All audio should be recorded at a minimum sample rate of 44.1 KHz, although sampling at 96 KHz is encouraged.

*11. Are there any digital audio formats that do not have sufficient quality for archival retention?*

NARA does not consider the following digital audio files to have sufficient quality for archival retention:

- Files created for “streaming” broadcast (e.g. RealAudio, Windows Media) – these files sacrifice quality for file size. They are often reduced from high-resolution files by removing high and low frequency ranges and compressing the remaining signal.
- Reference files of lower quality than original (e.g. for web site use) – again, these files sacrifice quality for file size.
- Most audio files in the MPEG format (e.g. .mp3) – many varieties of the MPEG format are lossy, sacrificing quality for file size.

Further information on this issue will be provided when NARA promulgates formal transfer guidance on this topic.

### Digital Video

*12. What digital video formats does NARA recommend for Federal records?*

Based on the suitability characteristics identified earlier, the following formats are acceptable for digital video files:

- Audio-Video Interleave format (AVI)
- Material Exchange Format (MXF)
- Quicktime format (MOV)

*13. What are the preferred codecs for digital video formats?*

NARA recommends lossless open codecs such as Motion JPEG 2000 available at <http://www.iso.org/iso/en/CatalogueDetailPage.CatalogueDetail?CSNUMBER=33875> or HuffYUV available at <http://neuron2.net/www.math.berkley.edu/benrg/huffyuv.html>

However, when lossless codecs are not practical (e.g., business requirements for smaller file sizes), NARA suggests the following lossy codecs:

- MPEG2
- MPEG4
- DV
- MJPEG2000

*14. What are the height and width requirements for digital video?*

NARA usually will accept whatever height and width the agency selects for its business needs; however NARA recommends 720x486 pixels at 30 frames per second.

*15. What are the color requirements for digital video?*

The color depth of a digital video should match the number of colors as well as the color encoding and luminance of the original material. Black and white originals should be recorded in grayscale; color originals should be recorded in full-range color (3 channel, 24bit).

*16. Are there any specific quality requirements for the audio track of a digital video recording?*

Two primary considerations are:

- Agencies should record the audio tracks of digital video recordings at 48 KHz.
- Agencies also need to address other audio considerations such as audio-video synchronization.

*17. Are there any digital video formats that do not have sufficient quality for archival retention?*

NARA does not consider the following digital video files to have sufficient quality for archival retention:

- Files created for “streaming” broadcast (e.g. RealAudio, Windows Media) – these files sacrifice quality for file size. They are often reduced from high-resolution files by removing high and low frequency ranges and compressing the remaining signal.
- Reference files of lower quality than original (e.g. for web site use) – again, these sacrifice quality for file size.