



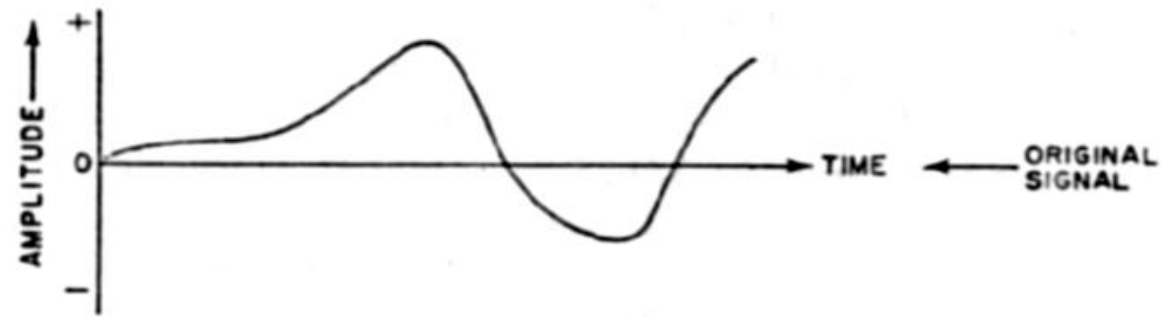
SO MANY BITS, IT HERTZ: DIGITAL RECORDINGS & SOUND QUALITY

Andrew Justice
University of North Texas



<http://youtu.be/YF0Si5JNH9E>

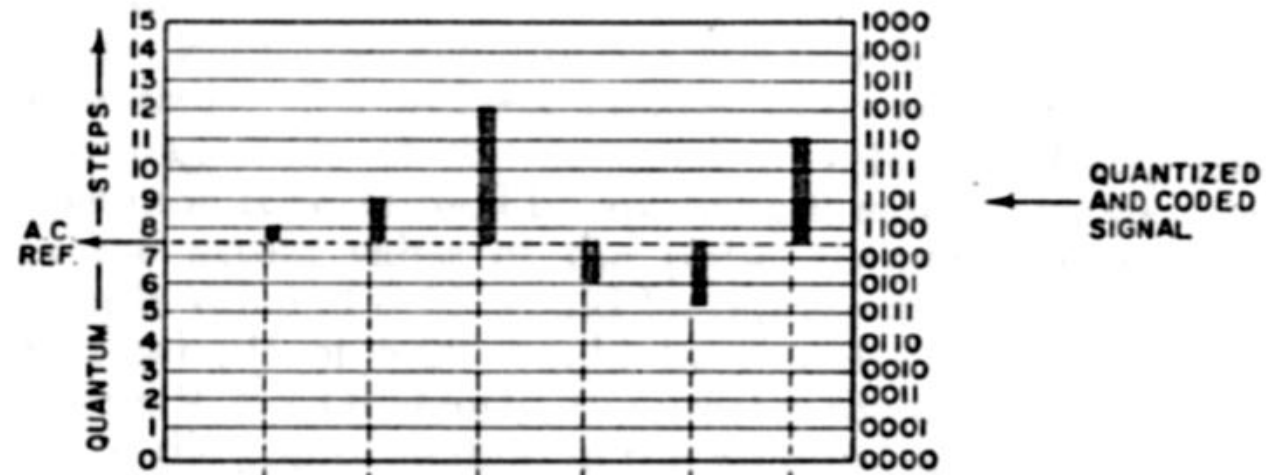
(A)



(B)



(C)

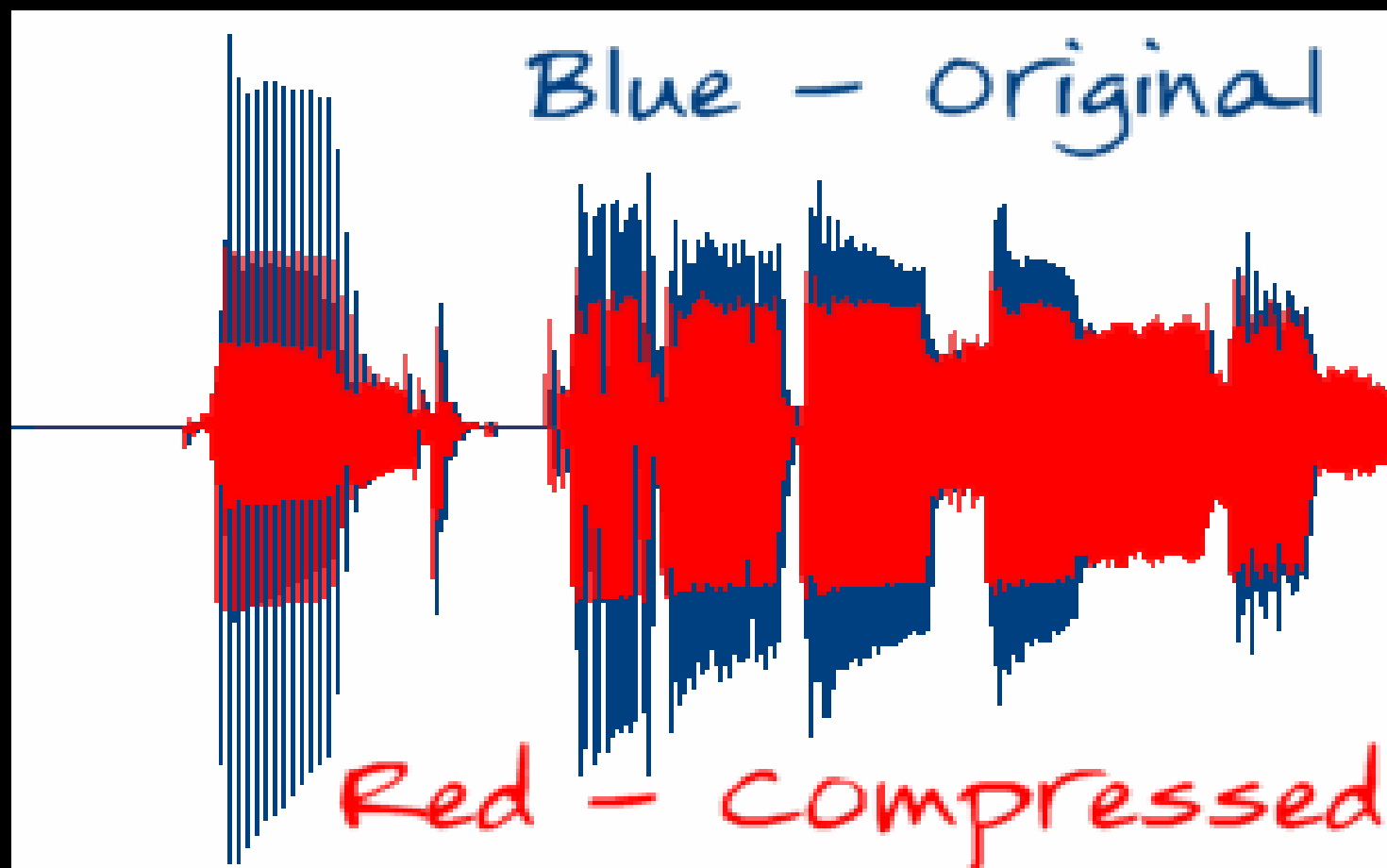


(D)









1983



<http://theghostinthemp3.com/theghostinthemp3.html>

Uncompressed (raw)

Waveform Audio File
Format (WAV)

Audio Interchange
File Format (AIFF)

Resource
Interchange File
Format (RIFF): bitstream
method for storing data in
chunks

Lossless Compression

Apple Lossless Audio
Codec (ALAC / MP4)

Free Lossless Audio
Codec (FLAC)

Shorten (SHN)

Windows Media
Lossless (WMA
Lossless)

Lossy Compression

Advanced Audio
Coding (AAC)

MPEG-2 Audio Layer III
(MP3)

Ogg Vorbis

Windows Media Audio
(WMA)

Key: bitrate.

COMPARISON: POP



Michael Jackson: "Wanna Be Startin' Somethin" (1982 / 2001 remaster)

1. WAV (uncompressed)
2. FLAC (lossless)
3. MP3 @ 320 kbps
4. MP3 @ 192 kbps
5. MP3 @ 64 kbps
6. WAV



COMPARISON: CLASSICAL



Sibelius: Symphony No. 1, III.
Scherzo (Minnesota Orchestra /
Vänskä, 2013)



WAV



MP3 @ 192kbps



MP3 @ 64kbps

COMPARISON: JAZZ



John Coltrane: "Moment's Notice"
(1957 / 1997 remaster)



WAV



MP3 @ 192kbps



MP3 @ 64kbps

STREAMING SERVICES



AAC (lossy)

Bitrate: 64-128 mono,
128-384 stereo, 196-512
Dolby 5.1

“High quality uploads
for creators with
enterprise quality
internet connections”

Extremely dependent
upon the uploader



Spotify®

Ogg Vorbis (lossy)

~96: Normal quality on
mobile

~160: Standard quality
on desktop & web
player, high quality on
mobile

~320 (Premium): High
quality on desktop,
extreme quality on
mobile



AAC+ (lossy)

Web: 64 free & 192 for
subscribers

In-home devices: 128

Mobile devices “receive
a variety of different rates
depending on the
capability of the device
& network but never
more than 64”



AAC (lossy)

Dependent on
Internet connection

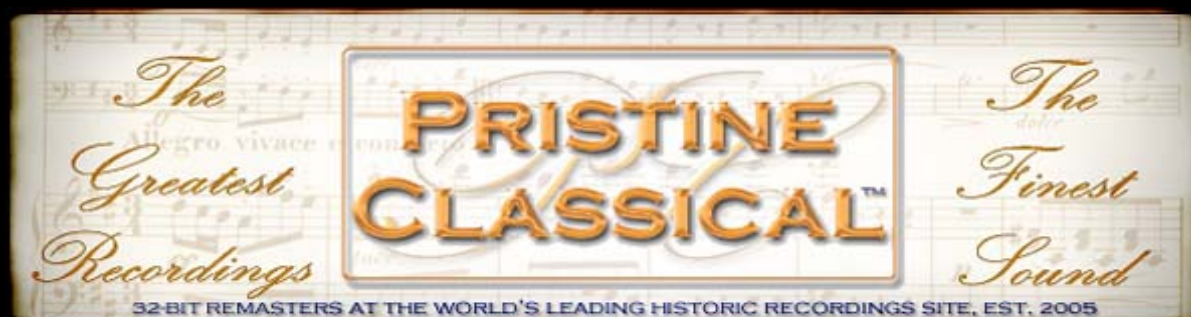
Broadband: 128
(CD)

DSL: 64 (near CD)

Dial-up: 20 (FM)



ATMA Classique





SIGNAL PROCESSING

YOU'RE DOING IT COMPLETELY WRONG.

2.2 Sampling Rate: The sampling rate fixes the maximum limit on frequency response. When producing digital copies of analogue material IASA recommends a minimum sampling rate of 48 kHz for any material. However, higher sampling rates are readily available and may be advantageous for many content types. Although the higher sampling rates encode audio outside of the human hearing range, the net effect of higher sampling rate and conversion technology improves the audio quality within the ideal range of human hearing. The unintended and undesirable artefacts in a recording are also part of the sound document, whether they were inherent in the manufacture of the recording or have been subsequently added to the original signal by wear, mishandling or poor storage. Both must be preserved with utmost accuracy. For certain signals and some types of noise, sampling rates in excess of 48 kHz may be advantageous. IASA recommends 96 kHz as a higher sampling rate, though this is intended only as a guide, not an upper limit; however, for most general audio materials the sampling rates described should be adequate. For audio digital-original items, the sampling rate of the storage technology should equal that of the original item.



1294-21



THANK YOU!

andrew.justice@unt.edu