High Resolution Audio

Presented to the

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by

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This presentation will discuss

- Goal of High Resolution Audio
- What is the definition of High Resolution Audio?
- Why now?
- How High Resolution Audio recordings differ from available CD, MP3 and AAC recordings?
- Where to get High Resolution Audio recordings?
- What equipment is required for proper playback of High Resolution Audio recordings?
- How the quality requirements affect the design of players, D/A converters, amplifiers, headphones and speakers?

Goal of High Resolution Audio

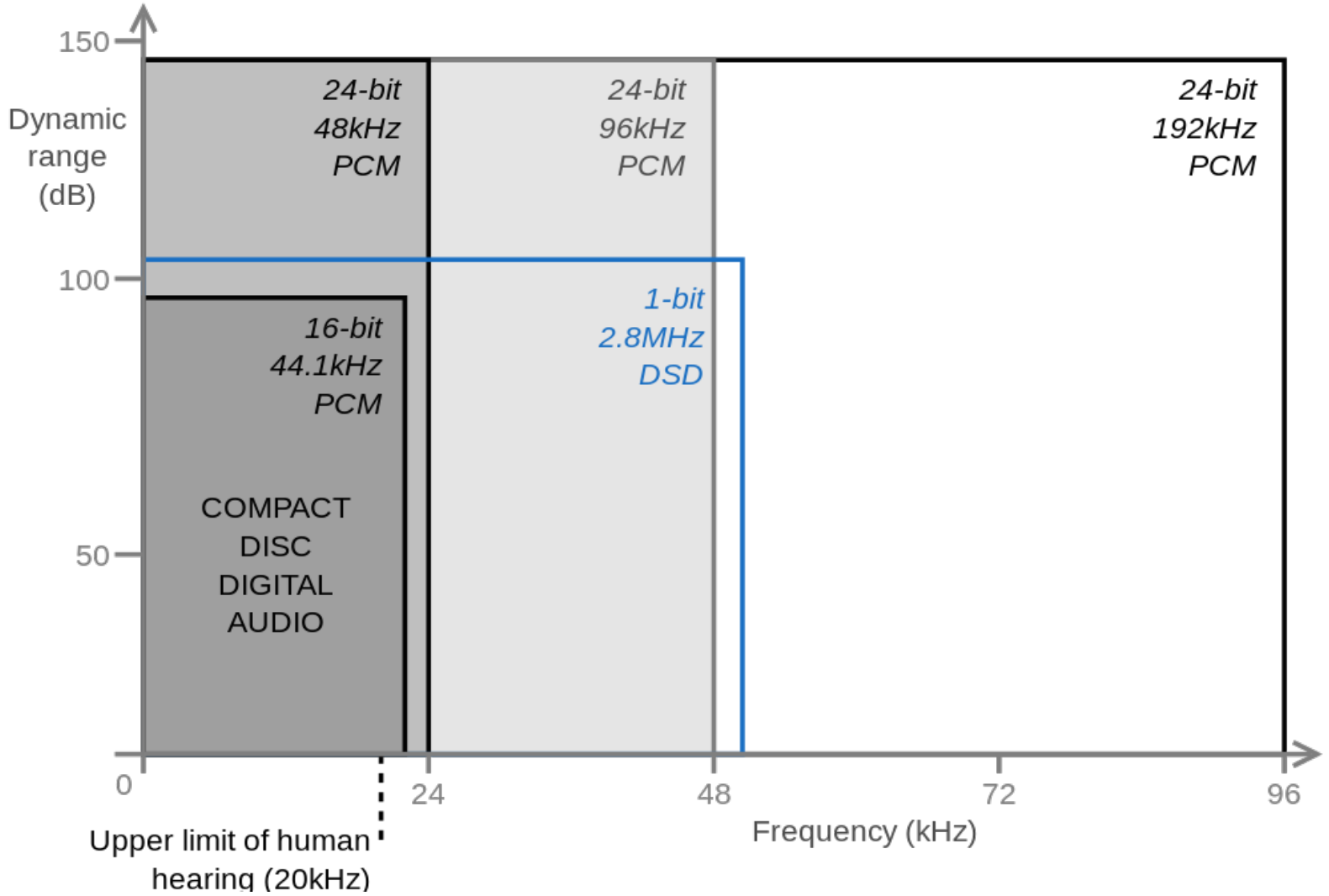
To allow the listener to hear exactly what the artist has been hearing in the studio while creating music.

- The highest resolution audio is achieved by listening to live music, with no intermediary record/playback chain.
- For recorded music, High Resolution Audio minimizes the degradation introduced by the record/playback chain electronics.

Definition of High Resolution Audio

- There is no standard definition.
- Generally described as audio with bandwidth and dynamic range better than CD-DA quality.
- Sampling rate must be at least 88.2kHz and at least 24 bits per sample.
- No lossy compression allowed.
- All components in the audio chain must be capable of supporting the extended audio bandwidth and dynamic range.

Sampling Rates and Dynamic Range



File Formats for High Resolution Audio

- Uncompressed PCM: WAV and AIFF
- Lossless PCM compression: FLAC and ALAC
- Single-Bit: DSD

Why High Resolution Audio now?

- High resolution audio streams use a much higher bit rate than previous audio formats.
- The wide availability of low cost mass storage (Hard disks, Flash memory), allow cheap storage for downloaded audio files.
- Low cost, high Internet download bandwidth allows consumers to stream music recordings using High Resolution Audio technology.

Existing High Resolution Audio Deliver Media

- DVD – up to 8 audio channels, at 96kHz sampling rate, 24-bit samples.
- DVD-Audio – Adds lossless compression and support for up 192kHz sampling rate.
- SACD – 2 or 6 channels at 88.2kHz sampling rate, and about 18-bit samples.
- Blu-Ray – can carry all high sampling rates.

High Resolution Audio vs CD

- The CD-DA format uses 44.1kHz sampling rate and linear PCM 16-bit samples.
- High Resolution Audio uses a minimum of 88.2kHz sampling rate and linear PCM 24-bit samples.
- A 1-hour CD uses approximately 0.635 GB of storage.
- A 1-hour stereo HD Audio file uses approximately 2 GB of storage.

High Resolution Audio vs MP3/AAC

- The MP3 and AAC (also called MP4) are compressed audio formats that are lossy.
- Lossy compression formats minimize the file size and the number of bits/s for streaming audio, at the expense of audio quality.
- High Resolution Audio does not allow lossy compression. The goal is to maximize audio quality.

Where to get High Resolution Audio recordings?

- By purchasing on line and downloading the files:
  - http://www.HDtracks.com
  - http://bluecoastrecords.com/
  - http://discover.store.sony.com/High-Resolution-Audio
  - http://store.acousticsounds.com/
  - Etc.
- By streaming:
  - http://tidal.com/us

What equipment is required for proper playback of High Resolution Audio recordings?

- Player – to read the audio file from storage. Can be a portable player, a smartphone or tablet, or a computer.
- High Resolution D/A converter – generally speaking will be an external D/A converter for smartphone/tablet/computer.
- High performance amplifier – to provide proper dynamic range and low distortion.
- High Resolution Audio transducer: headphones or speakers – must have wide bandwidth, up to ~40kHz.

High Resolution Audio Branding

High Resolution Audio Portable Player

High Resolution Audio Players

How the quality requirements affect the design of players, D/A converters, amplifiers, headphones and speakers?

- Players: require large storage capability, on the order of 128GB or more.
- D/A converters: must support at least 88.2kHz/96kHz sampling rate, support 24-bit audio samples, provide at least 40kHz bandwidth, and at least 105dB SNR/THD +N.
- Amplifiers: low distortion driving capability to handle the headphones and speakers without clipping.
- Headphones and speakers: capable of reproducing audio from 40Hz up to 40kHz, with low distortion.

For more information

- http://en.wikipedia.org/wiki/High-resolution_audio
- http://discover.store.sony.com/High-Resolution-Audio/
- https://ponomusic.force.com/
- http://www.ce.org/News/News-Releases/Press-Releases/2014/CEA-and-Japan-Audio-Society-to-Collaborate-on-Hi-R.aspx
- http://www.jaybirdcom.com/wp-content/uploads/2010/05/Hi-Res_Audio_Infographic_FINAL-1-6-15.pdf

Thank You

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