RECORDING ACADEMY™
PRODUCERS & ENGINEERS WING®

DELIVERY RECOMMENDATIONS
FOR RECORDED MUSIC PROJECTS

FOREWORD

This document specifies the physical deliverables that are the culmination of the creative process, with the understanding that it is in the interest of all parties involved to make them accessible for both the short- and long-term. Thus, this document recommends reliable data management, backup, delivery and archiving methodologies for current audio technologies, which should ensure that music will be completely and reliably recoverable and protected from damage, obsolescence and loss.

The Producers and Engineers Wing® Delivery Specifications Committee, comprising producers, engineers, record company executives, and others, in conjunction with the AES Technical Committee on Studio Practices and Production and the AES Nashville Section, developed the original Delivery Recommendations in 2002. The committee met regularly at the Recording Academy™ Nashville Chapter offices to debate the issues surrounding the short- and long-term viability of the creative tools used in the recording process, and to design a specification in the interest of all parties involved in the process. Updated versions were published in 2004, 2005, 2008, and 2013. This current revision was completed in August 2017.

The Committee will continue to periodically review these Recommendations, along with future iterations of recording and storage techniques, hardware and formats to ensure its continuing relevance within commonly accepted industry practices, and is open to comment from all interested parties. Please contact us by emailing *pe.wing@grammy.com*.

DELIVERY SPECIFICATIONS REVIEW COMMITTEE (2017)

Chuck Ainlay
Jeff Balding (co-chair)
Alison Booth
Barry Cardinael
Joe Chiccarelli
Matt Hennessy
Jean-Marie Horvat
Jim Kaiser (co-chair)
Kyle Lehning

Bob Ludwig
George Massenburg
Pat McMakin
Nick Palladino
Michael Romanowski
Dan Rudin
Eric Schilling
John Spencer
Bil VornDick

DELIVERY SPECIFICATION REVIEW COMMITTEE (2013)

Chuck Ainlay
Jeff Balding
Alison Booth
Barry Cardinael
Jim Kaiser

Kyle Lehning
George Massenburg (co-chair)
Pat McMakin
John Spencer (co-chair)
Bil VornDick

MIX STEM DELIVERY RECOMMENDATIONS COMMITTEE (2013)

Chuck Ainlay
Jeff Balding (chair)
Joe Chiccarelli
Jimmy Douglass
Alia Fahlborg

Ben Fowler
James McKinney
Nick Palladino
Dan Rudin
Eric Schilling

DELIVERY SPECIFICATIONS SUBCOMMITTEE FOR REVISION (2007)

Chuck Ainlay
Jeff Balding
Alison Booth
Barry Cardinael
Jim Kaiser

Kyle Lehning
George Massenburg (co-chair)
Pat McMakin
John Spencer (co-chair)
Bil VornDick

DELIVERY SPECIFICATIONS COMMITTEE (2001-2005)

Chuck Ainlay
Jeff Balding
Steve Bishir
Alison Booth
Tony Brown
Barry Cardinael
Eric Conn
Sharon Corbitt
Garth Fundis
Susan Heard
Scott Hendricks
Kyle Lehning (co-chair)

Steve Marcantonio
George Massenburg (co-chair)
Pat McMakin
Marshall Morgan
Betsy Morley
Jake Nicely
Gary Paczosa
Mike Purcell
Traci Samczyk
Kay Smith
John Spencer
Bil VornDick

TABLE OF CONTENTS

SUMMARY OF THE DELIVERY RECOMMENDATIONS

There are two Recommendations for Music Delivery:

1. Minimum
2. Preferred (includes "Minimum")

For each of two recording technologies:

1. Analog Multitrack and Two Track Tape
2. Digital Audio Workstation (DAW) Hard Disk Drive

The **Minimum Delivery Recommendation** provides the capability to reuse the original recording in the short-term and, if necessary, to recreate the original recording and/or mix as closely as possible. This will allow the owner of the master (generally the Record Label) faster access to the elements of the project in use at conclusion of the mixing process.

The **Preferred Delivery Recommendation** provides a more robust solution to the long-term issues that confront Record Labels in their efforts to maintain their assets. It is therefore the Committee's recommendation that all audio tracks be consolidated and migrated to the Broadcast Wave File format.

> For further information about the file structure of the Broadcast Wave File, please read AES31-2-2012, the AES standard on network and file transfer between systems of different type and manufacture. You can find it here:
> *http://www.aes.org/publications/standards/search.cfm?docID=53*
>
> On the EBU Web site at *http://tech.ebu.ch/publications* you can also find supplements t3285-s1 through t3285-s5 for extensions to the basic file format.

The Delivery Specification Committee supports the use of interleaved stereo Broadcast Wave Files. The Committee is aware of the increase in usage of multichannel interleaved BWF files and is following the standards efforts closely. AES31-2, which addresses multichannel files, was first published in 2006 and updated in 2017. However, we still do NOT recommend the use of multichannel interleaved BWF files until this standard is more broadly implemented.

A standard file format, such as the Broadcast Wave format defined by AES31-2, along with enterprise-class storage media, will provide access to the audio files if the proprietary equipment used to create them is no longer available.

TO FULFILL THE MINIMUM DELIVERY RECOMMENDATION

Deliver to the Record Label the Primary Master (Table 1) and two Secondary Masters (Backups or "Safeties"). Secondary Masters should be delivered on two approved storage media taken from the Acceptable Transitional Master Backup Storage Media listing (Table 2). Secondary Masters should have sampling rates and precisions equal to the Original Master (88.2, 96, 176.4, 192, 352.8, and 384 kHz are recommended, as are 24 or greater bit depths). These same sampling rates and precisions are required for A/D conversion. Also, there should be no level adjustments, truncation, dither, noise-shaping, or modification of the digital signal. It is NOT advisable to up sample the Primary Master to create a Secondary Master.

The "Master" is defined as a collection of the various original components of the recording process for a given production, each in their originally recorded formats, and collected in a form that is ready for transition to the next phase of the process.

For example, the recorded Masters from the tracking and overdubbing processes are collected in a form that is ready for transition to the mixing process. The Approved Master Mixes are collected in a form that is ready for transition to the mastering process. The Mastered Mixes are then ready for transition to distribution.

Masters for delivery include (but are not limited to) all open reel tapes, hard disk drives (HDD), and incremental backups made during the recording process. They include all original components of the recording process for a given production, each in their originally recorded formats. There should be no deletions of useful material from the Masters, such as outtakes, artist talking, incomplete or unreleased recordings, etc. The constitution of "useful material" is determined by agreement between Record Label and Producer prior to the commencement of the recording project.

A Glossary of Technical Terms is provided with this document. Some industry-standard nomenclature has been refined (e.g. "Masters" and "Tracks").

TO FULFILL THE PREFERRED DELIVERY RECOMMENDATIONS

In addition to the Master and Backups/Safeties described in the Minimum Delivery Recommendation above, each track of each song should be consolidated. The Broadcast Wave Files should then be transferred to an Approved Long-Term Master Backup Storage Medium (Table 3). In some situations, ancillary processing may be understood to be a key component of the final product (volume level automation, compression, etc.) This processing may be included in a separate flattened file in addition to the unprocessed flattened file, as mutually agreed by the Producer and the Record Label.

REGARDING TIME CODE FOR THE BROADCAST WAVE FILES

If time code was supported in the recording process, the original positional reference should be incorporated in the Broadcast Wave File format in the "Time Reference" field of the bext (Broadcast Extension) chunk as a high-precision, 64-bit integer representing the "first sample count since midnight," and equivalent to the time code value of the start of the file. All files/regions for each track should be consolidated to a single file. There should be no more than one file per track. Every effort should be made for each Broadcast Wave File to be a bit-for-bit copy of the original digital tracks.

If no time code or positional reference was used in the recording process, all recorded tracks should be converted to continuous Broadcast Wave File format with a start time of the sample count equivalent to 01:00:00:00 (wherever possible, e.g. 2-inch Analog Tape as well as AIFF files may have no time code present). All tracks, including partial tracks, such as guitar solos, background vocals, etc., should have the same start time to maintain proper time relationships between tracks.

TABLE 1. PRIMARY MASTER DELIVERY MEDIA

Recording Technology		Media
ANALOG RECORDER	24 track	2-inch analog tape
	16 track	2-inch or 1" analog tape
	8 track	2-inch or 1" analog tape
	2 track	¼-inch,½-inch or 1-inch analog tape
DIGITAL AUDIO WORKSTATION	Various	HDD (SATA, eSATA)

Note: The P&E Wing's Delivery Specifications Committee reviews this document vis à vis recording techniques, hardware and formats periodically for their continuing relevance within commonly accepted industry practices.

Hard Disk Drives should be delivered in shockproof cases, and utilize at least one industry-standard connectivity (e.g. USB 3.0 or Thunderbolt (USB-C)).
 7

TABLE 2. TRANSITIONAL MASTER BACKUP STORAGE MEDIA

Storage Technology	Media	Manufacturer
COMPUTER TAPE ARCHIVE	LTO 5/6/7	Quantum, Hewlett-Packard, IBM, and others
COMPUTER OPTICAL DISK	DVD±R	(many)
	DVD±RW	(many)
	DVD±DL (dual-layer)	(many)
	Blu-Ray	(many)
COMPUTER HARD DRIVE	HDD	(many)
	SSD (Enterprise-grade)	(many)

DELIVERY ADAPTED FOR THE FUTURE
The Committee expects that direct delivery (via secure connection on the Internet, etc.) will be commonplace in the future, and that uploading files to very large-scale digital libraries will be one of many options. Digital preservation files of the future should readily adapt to any general computing infrastructure that is in place, or anticipated to be put in place, by the owners of the masters.

The Committee continues to evaluate various technologies such as Solid State Drives (SSD) and Flash memory (e.g. NAND 3D). As of this document revision date, SSD drives are considered acceptable for use as Transitional Master Backup Storage Media ONLY, providing

they are "new" (i.e. not previously used) AND are "enterprise-grade" varieties, including SLC (Single Level Cell) and eMLC (Enterprise Multi-Level Cell).

ARCHIVING/STORAGE APPLICATIONS

The Committee recognizes the necessity of incremental archiving/storage applications. Currently there are many widely distributed commercial applications for Mac, PC and Linux; also available are several enterprise-class storage applications. Personal storage applications are available as well. The Committee views the significance of choosing an appropriate archiving application, commercial or not, in terms of the reliability of the archiving process as well as the reliability of long-term support. There are significant implications in the choice of storage applications, such as platform, vendor, operating system, and application version. Verification of a newly created archive is an integral part of the archiving workflow, and is essential. Many LTO tape-based libraries are written directly as TAR (Unix Tape Archive). Utilizing TAR by means of a command line interface requires a working knowledge of Unix commands, but is very powerful. If you are not writing a TAR archive, it is imperative that you document the application and operating system used to create the backup.

With the release of LTO-5, LTFS (Linear Tape File System) was introduced to the LTO community as an open-source program allowing users to create a directory of the contents of the LTO tape. This information can be saved as a PDF document to show the contents of the LTO tape. In addition, the LTFS file system allows LTO media to be mounted like a hard disk for drag and drop retrieval and storage of individual files of a mounted tape, without having to unpack the entire tape to save or retrieve a file. LTFS should be a consideration for those who have LTO-5 or higher drives.

Lastly, the bit-level integrity of the preservation files must be considered. There are a variety of freely available tools available to create checksums for individual files, and even tools that check for data errors when copying entire drives with various file types such as BagIt. Many of these tools can be found at the Federal Agencies Digitization Guidelines Initiative (FADGI) *www.digitizationguidelines.gov*. Whenever possible, the goal is to create bit-level accurate copies when moving files to another carrier.

We cannot emphasize enough that long-term restorability is the goal of the Committee and its Recommendations. A backup alone does not guarantee the safety or viability of the archived asset. Periodic migration of the backup media is also necessary. The expected shelf life of a carrier IS NOT sufficiently reliable information on which to make archival backup decisions.

Based on the preceding criteria, acceptable media for the Preferred deliverables are listed in Table 3, below:

TABLE 3. LONG-TERM MASTER BACKUP STORAGE MEDIA

Storage Technology	Media	Manufacturer
COMPUTER TAPE ARCHIVE	LTO-4 LTO-5 LTO-6	Fuji, Hewlett-Packard, IBM, and others

NOTE: LTO tapes are "n-2" read and "n-1" read/write capability. Those with archives on LTO-1, LTO-2 and LTO-3 should strongly consider moving to a later generation tape.

CREDITING AND DOCUMENTATION

It is the responsibility of the Producer of a recording project to work in concert with the Artist to assign recording credits, and to then supply accurate crediting information to the designated person at the Record Label or media company who is authorized to receive that information for use in metadata, official credits and liner notes, etc.

It is highly recommended that ALL documentation be stored in the metadata folder on the hard drive. Documentation can be created digitally, but if paper documentation is used it should also be scanned and then stored within the metadata folder. Traditionally, this documentation has included tracking sheets, engineer notes, set-up notes, sketches of microphone placement, and any other pertinent data.

The Committee recommends that all Masters and Backups have comprehensive and concise labeling. We recommend a label such as the Media ID Label *http://content.grammy.com/PDFs/Recording_Academy/Producers_And_Engineers/Media_Label .pdf* which was developed by the Audio Engineering Society Nashville Section that can be completed and affixed to each master and backup/safety.

Also, documentation such as a Recording Map *(http://content.grammy.com/PDFs/Recording_Academy/Producers_And_Engineers/General_Recording_Map.pdf)* should be completed and maintained throughout the course of the recording project as it details information about the original sources, transfers and backups/safeties. This information can be stored digitally on the project hard drive within a documentation folder located in the Project Metadata folder (Chart A).

Documenting and saving credits and other information about the recording has become ever more critical in our digital world: This information is now called recording metadata. To standardize the collection and distribution of recording metadata, in October 2016 the international standards organization DDEX (Digital Data Exchange) released the music recording metadata standard RIN (Recording Information Notification). RIN is an XML (Extensible Markup Language) message that can capture and communicate metadata about all of the parties and tools that were involved in a recording. It is available via a free implementation license found on the DDEX website at *www.ddex.net/rin*. As of the date of this revision, several companies are working to implement RIN into software tools that can be used during the recording process. RIN also provides a template for DAW manufacturers to incorporate the XML message into their applications.

QUICK REFERENCE GUIDE
For Delivery of Masters and Backups/Safeties
(Or, "What The Producer Delivers To Receive Final Payment")

MINIMUM DELIVERY
As minimum delivery, the Producer should deliver to the Record Label/Client:

1. The Masters, in their originally-recorded formats (Table 1),
2. Two Secondary Backup/Safety Masters as follows:
   a. One Secondary Backup/Safety in one of the mediums from the "Currently Acceptable Transitional Storage Media Listing" (Table 2)
   b. A second Secondary Backup/Safety, in a different medium than the Backup/Safety archive as b.1), also listed on the "Currently Acceptable Transitional Storage Media Listing" (Table 2), and…
3. Catalog Files for HDD Backup/Safeties, if applicable
4. All Metadata, including all project credits and documentation (Lyrics, Charts,
   a. Orchestral Arrangements, Mix Documentation, Vocal chain, etc.)

NOTE: Digital Backups/Safeties should have sampling rates and precisions equal to or better than the Master.

As a guide to what constitutes documentation, we recommend using The Media ID Label for specific labeling of each element in the delivery, and The Recording Map for detailing the recording process and related methodologies as mentioned above in Crediting and Documentation.

PREFERRED DELIVERY
In addition to the Minimum Delivery elements listed above, the Preferred Delivery would include Consolidated Broadcast Wave Files of every multitrack and 2-track element on a currently approved Long-Term Master Backup Storage Medium (Table 3). In some situations, processing is considered a key component of the final product (volume level automation, compression, etc.) This may be included as a separate file in addition to the unprocessed Consolidated file, as mutually agreed to by the Producer and the Record Label.

IF YOU ARE RECORDING OR MIXING TO
Analog Multitrack or 2-Track, 2-inch, 1-inch, ½-inch, or ¼-inch Analog Tape is the Master.

Note: High resolution Analog to Digital conversion should be used to convert Analog Masters to Digital Backups/Safeties in either PCM or DSD form using sample rates of at least 88 kHz and 24 bits or greater depth. We strongly encourage all users of DSD technology to contact the DSD technology provider directly for further guidance. We would also warn that much of the available DSD technology is proprietary.

IF YOU ARE RECORDING OR MIXING TO
Digital Audio Workstation (DAW), the HDD is the Master.
NOTE: See Table 1 *Primary* Master Delivery Media for specifics regarding above.

RECOMMENDATIONS FOR MIX STEM DELIVERY AND MIX NAMING
The following Recommendations for Mix Stem Delivery and Mix Naming Conventions for Recorded Music Projects have been created to help ensure a client's needs are properly met.

The increased frequency of requests for stems and the uncertainty about their ultimate usage has made them a highly debated topic. To address this matter, the Recording Academy Producers & Engineers Wing convened a cross-genre, cross-geographical Mix Stem Committee of industry professionals. From this Committee's research and discussions, the following information was assembled.

The principal focus of this segment of the Recommendations is to establish a suggested deliverable stem set with a consistent audio file naming convention. In addition to this Committee's technical recommendations, there are several important other issues surrounding stems that also need to be addressed. These issues include, but are not limited to, fair compensation for mix stem creation, proper crediting for mix stem creation and use, and appropriate usage of mix stems, all of which this Committee considers equally important.

As the deliverable responsibilities for mix engineers have increased, so has the need for clear definitions of those deliverables along with reasonable expectations as to which deliverables are included as part of the mixer's base fee. Creating and printing stems is a process that normally incurs additional costs in engineering and studio time. These stem production costs should be included in the mix budget provided by the mixer to the label or content owner prior to the commencement of mixing. Stem production should not be considered part of the standard minimal mix delivery of versions. A standard minimal mix delivery would consist of the following versions: Master, Vocal Up, No Lead Vocal, and Instrumental.

Mix stems are comprised of actual components of the mix master. The vulnerable nature of mix stems allows the possibility of abuse and misuse, and integrity in the use of mix stems is highly encouraged by this Committee. Although mix stems comprise actual components of the mix master, their sum is not necessarily considered to be an acceptable replication of the mix master, and therefore should not be used as such. This committee also encourages that proper crediting be applied to mix stem creation and use, and that the crediting is embedded in the file name for the life of the stem.

Mix stems have many current uses and reuses as well as additional potential future uses. Some of the current uses include live concert stem playback, remixes, video games, and film. Stem delivery requirements vary greatly depending on their intended end use; even individual gaming companies require different stem sets. Therefore, the stem set outlined in this document is considered only a typical stem delivery set for general music production and is not specific to any single use.

The Committee recommends that all future contracts for music production, such as artist, producer, engineer, mixer, etc., contain language specifically addressing compensation for mix stem creation, crediting for mix stem creation, and, where possible, intended uses of the mix stem. It is also recommended that stem costs are built into the mix budget at the beginning of the mix process. The most cost-efficient time to print stems is during the printing process of the master mix versions. If a recall is required, the cost of printing stems is elevated.

DEFINITIONS

Mix Master — A mono, stereo or multichannel surround mix created during the mixing process containing all of the final desired elements of the multitrack production. The Master Mix is considered to be the final Mix Master approved by the artist, producer and engineer intended for commercial release.

Mix Version — Any mono, stereo or multichannel surround mix created during the mixing process containing all of the final desired elements of the multitrack production but with a changed perspective of any one or more of the mix's elements. For example, a "Lead Vocal Up" of the Mix Master would be considered a Mix Version.

Mix Stem — Any mono, stereo or multichannel surround version created during the mixing process that does not contain all the elements of the Mix Master. Mix Stems contain all relevant audio, processing, volume, panning and effects associated with that Stem's featured elements relevant to the Mix Master. For example, a "Drum Stem" would be only the drums contained in the Master Mix with all the processing and effects.

Instrumental Track — A complete replica of the Mix Master containing no vocals.

No Lead Vocal — A replica of the Mix Master that includes backing vocals but contains no lead vocal and/or no artist vocals. In the past, this has been referred to as "TV Track".

It's important to note that the "No Lead Vocal" mix and "Instrumental" mix are considered stems. However, since they are currently also considered part of a standard minimal mix delivery, for the purposes of this document, they are listed in the version category.

PARTICIPANT IDENTIFICATION

Crediting — For any future mix that uses previously created Mix Stems or Mix Stem Sets, a mixing credit should be given to the Mixer of those Stems along with any other Mixer credits.

ISRC Codes — The industry expects to see a more granular version of the ISRC code in the future. When that occurs, we expect that ISRC Codes can be assigned to Mix Stems and Mix Versions.

MIX STEM AND VERSION NAMING CONVENTIONS

With so many digital audio files involved in each audio project, it is important that Mix Version and Stem files contain all relevant information within their file names and are also easy to understand at a glance. For example:

AI_SongTitle_MI01_Master_96k24.wav

The above audio file name example contains the following information, each separated by an underscore:

Artist Initials (AI):
> The artist initials are usually two letters taken from the first and last name of the artist.

Song Title:
> Listed as the song title, or useful abbreviation thereof. Capitalize each word or word fragment. Title contains no spaces, punctuation or diacritical markings (accents), so names are universally file compatible. Song title names should be less than 15

characters if possible. Lengthy titles may be routinely abbreviated by other programs when imported.

Mixer Initials (MI) and Mix Revision Number (01):
> After the song title, list the mix or stem identifier. "Master" is the example shown above. This may also be "Snare+Rim" or any descriptive identifier for the audio file. Capitalize each word or word fragment so title contains no spaces.

Mix Version or Stem Name (Master):
> This describes what the audio file is.

Sample Rate and Bit Depth:
> The sample rate at which the audio file was created is listed followed by the bit depth. The single letter "k" is sufficient to abbreviate "kilohertz." The bit depth at which the session was created follows the sample rate. For example, a song recorded at a sample rate of 96 kHz and a bit depth of 24 bits is abbreviated, "96k24."

**File Extension:
> Generally generated during file creation. If you have the option to show or hide the file extension, it should always be shown. Only one period should be used in the title and should only be placed before the file extension.

**The overall file name length should not exceed 255 characters. Illegal characters include but are not limited to: / backslash, ? question mark, < left angle bracket, > right angle bracket, \ forward slash, : colon, ; semi colon, | pipe, ' single quote, " double quote, * asterisk, blank spaces, # pound sign, % percent sign, & ampersand, { left bracket, } right bracket, $ dollar sign, ! exclamation mark, @ at sign, = equal sign

FOLDER HIERARCHY

Chart A (below) shows the recommended folder hierarchy for Producers and Engineers to use during a project to preserve and organize all files during the recording, mixing and mastering phase of the project. This Committee recognizes that record label delivery requirements vary and depend upon the agreements between the Label, Producer and Artist. Therefore, a "Minimum Delivery Set" (the least or smallest amount recommended) is recommended by this Committee consisting of the Consolidated Multitracks, Approved Mixes and Credits.

Note: When a date is used in the file or folder name, the ISO (International Organization for Standardization) date format should be used. Without hyphens is acceptable (e.g. YYYYMMDD).
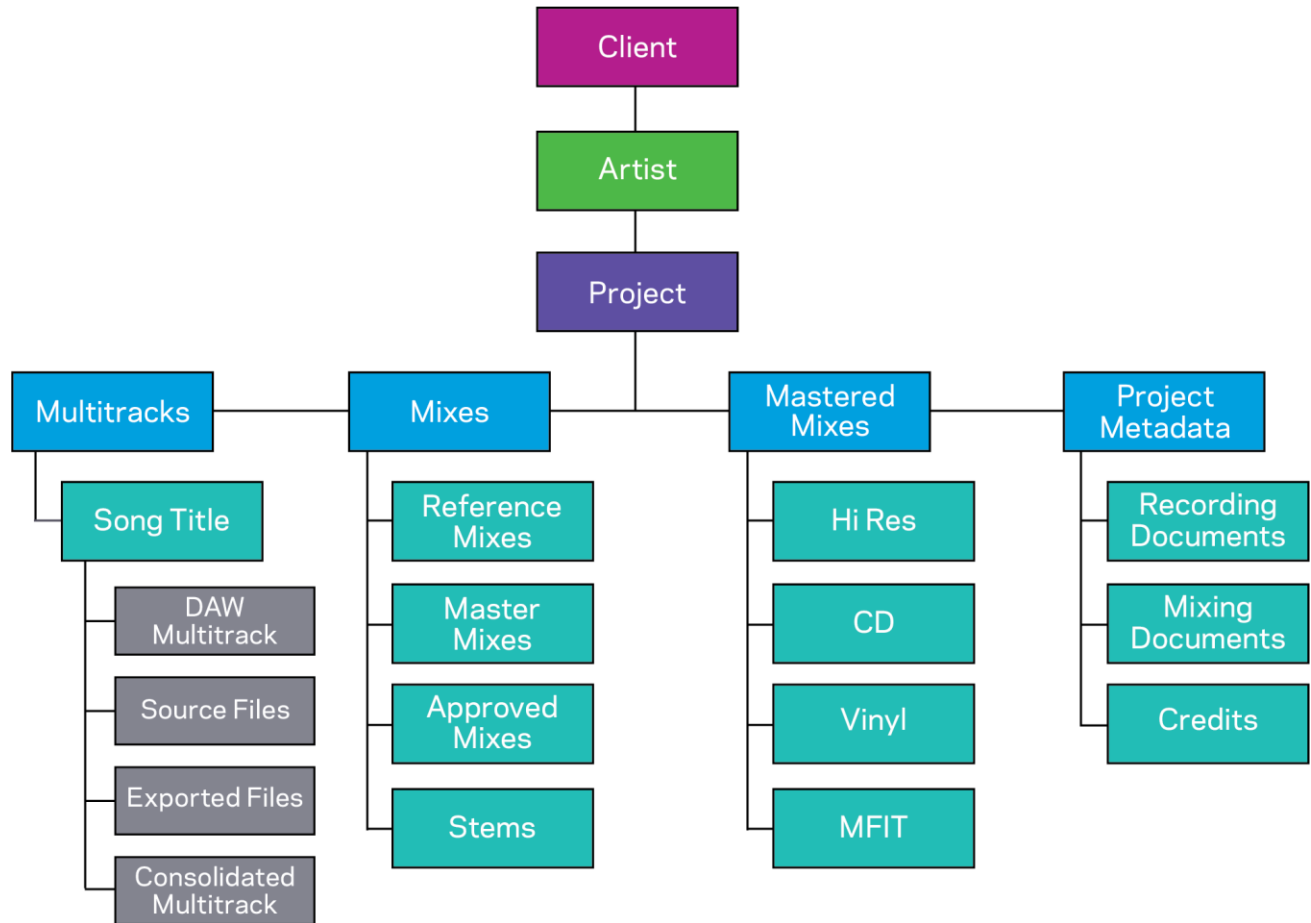
(Download Link for File)
Note: Additional folders can be added within the hierarchy to customize it as needed or appropriate for the project (e.g. "song version").

FOLDER DEFINITIONS

Client — This is the main client folder for the hierarchy tree based on ownership of the recording. This could be a Record Label or Artist. If the client folder is a label, all artists under this label would be contained in this client folder.

Suggested naming convention: Client name

Artist — This Artist folder would contain all subsequent folders and files regarding all projects associated with this artist. It is recommended to use the full artist name to title this folder.

Suggested naming convention: Full Artist Name

Project — Within the Artist folder would be a separate Project folder for each project of that artist. The Project folder could be an album, a single, a live recording, a surround mix, etc.

Suggested naming convention: Project Title

Multitracks — This folder is the parent Multitrack folder. Each Project folder would contain a Multitrack folder.

Suggested naming convention: Multitracks

Song Title — The Multitracks folder would contain a folder for each Song Title of the project. The Song Title folder would contain the DAW multitrack for that song.

Suggested naming convention: Artist Initials_Song Title

Song Version (not pictured in chart A) — This is an optional folder and used only if a Song Title has more than one recorded version of a song for the project (e.g. explicit and non-explicit). All multitrack files pertaining to each version of the song should be contained within its own version folder. These folders would be contained within the Song Title folder.

Suggested naming convention: Artist Initials_Song Title_Version Name

DAW Multitrack — This folder would contain the DAW Multitrack session file and audio.

Suggested naming convention:
ArtistInitials_SongTitle_DAWPlatformVersionMT(multitrack)_SampleRateBitDepth_Date

Source Files — Contained within the Song Title folder, this folder would contain the original files from an outside source that are imported into the DAW Multitrack folder. This would include source files received for the project, tuned vocal files, overdubs from outside sources, etc. While this folder might contain duplicate files of the DAW Multitrack folder it would retain them in their original format.

Suggested naming convention: Source Files

Exported Files — This folder would contain Exported Files or sessions specifically set up for vocal tuning, musicians to use for overdubs, etc. These could be stem sessions with a click, specialized track mix stem, and vocal stem. This would allow you to keep these sessions in case they're needed for future use.

Suggested naming convention: Exported Files

Consolidated Multitrack Delivery — Once the project is finished, delivery of the consolidated multitrack Master files maybe requested by the record label. Those consolidated Master multitrack sessions/audio files would be placed in this folder.

Suggested naming convention:
ArtistInitials_SongTitle_DAWPlatform(&)Version(&)MT(multitrack)_SampleRateBitDepth_Date

Mixes — This folder would contain all versions of the master mixes for the project organized by mix version and type of mix.

Suggested naming convention: Mixes

Reference Mixes — This folder would contain any Reference Mix that you print. It is suggested that all Reference Mixes sent to the client and artist are kept in case they're needed for future reference.

Suggested naming convention: Reference Mixes

Master Mixes — This folder would contain all Master Mix versions and all recall mix versions. Mixes would be separated into folders by version type such as Master Mix, Vocal Up, No Lead Vocal, and Instrumental. Master Mixes should be organized into folders as to version type such as Master Mixes, Vocal Up, Instrumental etc.

Suggested naming convention: Master Mixes

Approved Mixes — This folder would contain only those mixes approved by the client for mastering or release. These Approved Mixes would be duplicated from the Master Mixes folder. This folder makes it easy for the mastering engineer to easily locate and identify the approved mixes that are to be mastered.

Suggested naming convention: Approved Mixes

Stem — This folder would contain any stem audio or stem multitrack sessions created from a Master Mix that is delivered to the client.

Suggested naming convention: Stems

Mastered Mixes — This folder contains all mastered mix files from the mastering engineer organized by file format. Subfolders should be created within the Mastered Mixes folder to accommodate file formats such as "Hi Res," "CD," "Vinyl," "MFiT," "Video," etc. The following sub-folders are recommended within the Master Mixes folder:

Suggested naming convention: Mastered Mixes

Hi Res — This folder contains the Hi Res mastered files. 96k 24 bit or higher is recommended if the project has been recorded and mixed at 96k 24 bit or higher resolution. Mastered files should retain original mix resolution.

CD — This folder contains the 44.1k 16 bit DDP file or CD audio files.

Vinyl — This folder contains the audio files used to create the vinyl master. 96k 24 bit or higher is recommended.

MFIT — This folder contains the Mastered For iTunes audio files.

Video – This folder contains audio that is compliant for video delivery (e.g. 48k 24 bit audio files)

Suggested naming convention: Mastered Mixes

Project Metadata/Documentation – This folder would contain any Documentation for the project, including possible additional sub-folders for:

Recording Documents and Notes — Including but not limited to, notes for equipment used, signal path, photos of mic setup and location, vocal chain documentation, etc.

Mixing Documents and Notes — Including but not limited to, mixing recall/setup information,
client mix notes, etc.

Credits and Other Metadata — This would contain Metadata documentation for each song and for the overall project, including the performers, producers, engineers, musicians, songwriters, etc. This folder would also contain any codes such as ISRC, ISNI, UPC, etc., associated with the project.

Suggested naming convention: Documentation

RECOMMENDATIONS FOR MUSIC DELIVERY (NON-FILM, NON-GAME SPECIFIC)

A standard Master Mix delivery is considered to include the Mix Master, Vocal Up, and the following two stems: Instrumental and No Lead Vocal. In the event a mix is recalled, it would be considered a new delivery, thus a new set of mix versions should be created in a new version folder. When titling a file or folder, the first letter of each word should be capitalized.

RECOMMENDED MIX VERSIONS FOR DELIVERY

ArtistInitals_SongTitle_MixMaster_MixerInitials_MixVersion_SampleRateBitDepth

ArtistInitals_SongTitle_VocUp_MixerInitials_MixVersion_SampleRateBitDepth

ArtistInitals_Songtitle_InstOnly_MixerInitials_MixVersion_SampleRateBitDepth
This would be the same as the mix master excluding all lead, harmony and background vocals.

ArtistInitals_SongTitle_NoLdVoc_MixerInitials_MixVersion_SampleRateBitDepth
This would be the same as the mix master excluding any harmony or background vocals. Traditionally called TV Track.

*ArtistInitals_Songtitle_LdVocOnly_MixerInitials_MixVersion_SampleRateBitDepth
This would be the same as the mix master but would only include the lead vocal with all EQ, compression and effects.

*ArtistInitals_SongTitle_BgvOnly_MixerInitials_MixVersion_SampleRateBitDepth
This would be the same as the mix master but would only include the background vocals with all eq, compression and effects.

*Some refer to the lead vocal only and the background vocals only as "a cappella" stems. These stems are often used by the mix engineer to address vocal level changes to the mix when the client is not able to recall the mix.

Many labels are now requiring a mix stem set in their delivery requirements for recorded music projects. If a definitive stem set is not specified in those requirements, then the following basic stem set may be used.

RECOMMENDED STEM VERSIONS
ArtistInitals_SongTitle_LdVocWet_MixerInitials_MixVersion_SampleRateBitDepth
Wet — with effects i.e. reverb, delay, modulation, etc.

ArtistInitals_SongTitle_BgvWet_MixerInitials_MixVersion_SampleRateBitDepth
Wet — with effects i.e. reverb, delay, modulation, etc.

ArtistInitals_SongTitle_Drums_MixerInitials_MixVersion_SampleRateBitDepth
All instruments, acoustic, electric and programmed, that make up the essential "drum" groove.

ArtistInitals_SongTitle_AuxPerc_MixerInitials_MixVersion_SampleRateBitDepth
All other percussion instruments, loops, etc that enhance the primary groove.

ArtistInitals_SongTitle_Bass_MixerInitials_MixVersion_SampleRateBitDepth
All instruments, acoustic, electric and programmed, that make up the essential "bass" part.

ArtistInitals_SongTitle_EGtrs_MixerInitials_MixVersion_SampleRateBitDepth
All electric guitars

ArtistInitals_SongTitle_AGtrs_MixerInitials_MixVersion_SampleRateBitDepth
All acoustic guitars

ArtistInitals_SongTitle_Keys_MixerInitials_MixVersion_SampleRateBitDepth
All acoustic keyboard instruments

Additional stems sets may be requested by the client and could include specialty instrument stems or individual instrument stems. Additional stem breakouts would affect the mix budget due to the additional time required to run additional stems. Be sure to include this additional cost in the mix quote. Below are some examples of additional specialty stems.

ArtistInitals_SongTitle_Strings_MixerInitials_MixVersion_SampleRateBitDepth
All strings acoustic and programmed

ArtistInitals_SongTitle_Brass_MixerInitials_MixVersion_SampleRateBitDepth
All brass and wind instruments acoustic and programmed

ArtistInitals_SongTitle_Snare+Rim_MixerInitials_MixVersion_SampleRateBitDepth
Snare and Rim only with effects

ArtistInitals_SongTitle_SFX_MixerInitials_MixVersion_SampleRateBitDepth

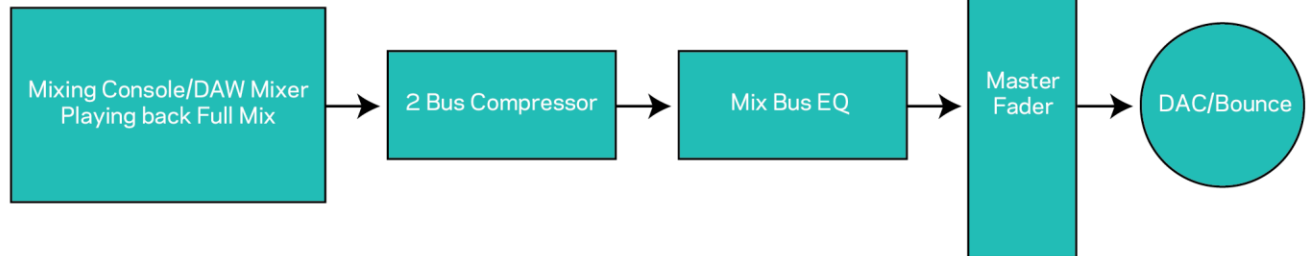*Any sound effects; dialog, sound bites of speeches, etc.*

All stems for a song should be consolidated or printed with the same start and end-point for uniformity. This will ensure that each stem is in time with each other if the stem audio is imported into a new session. Each stem should have a unique name and no duplicate names should be used.

HELPFUL HINT: KEYING THE 2-BUS COMPRESSOR TO PRINT STEMS
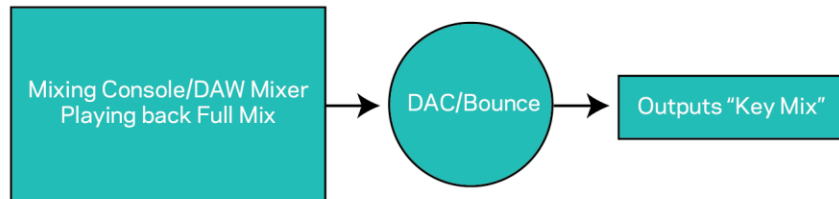Because the full stereo mix will drive the mix 2-bus compressor harder than the individual stem mixes, one of the biggest challenges when printing stems with a stereo 2-bus compressor is to have the mixed sum of the stems match the stereo mix. The solution to this problem is to use a 2-bus compressor that has a sidechain input and key the sidechain input with an uncompressed printed version of the stereo mix. This will ensure the 2-bus compressor reacts consistently when printing the stem mixes. Chart B (below) shows how to configure this for both an Analog Console Mix and a DAW Mix.
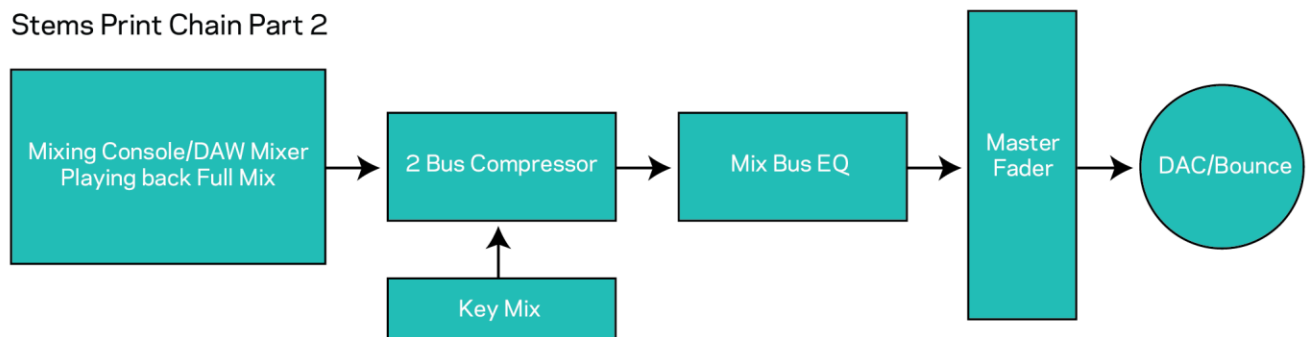
Chart B

Typical Mix Print Chain

```
┌──────────────────────┐    ┌──────────────────┐    ┌──────────────┐    ┌────────┐    ╭──────────╮
│ Mixing Console/DAW    │    │                  │    │              │    │ Master │    │          │
│ Mixer Playing back    │──▶ │ 2 Bus Compressor │──▶ │  Mix Bus EQ  │──▶ │ Fader  │──▶│ DAC/     │
│ Full Mix              │    │                  │    │              │    │        │    │ Bounce   │
└──────────────────────┘    └──────────────────┘    └──────────────┘    └────────┘    ╰──────────╯
```

Stems Print Chain Part 1

```
┌──────────────────────┐    ╭──────────╮    ┌──────────────────┐
│ Mixing Console/DAW    │    │          │    │                  │
│ Mixer Playing back    │──▶ │ DAC/     │──▶ │ Outputs "Key Mix"│
│ Full Mix              │    │ Bounce   │    │                  │
└──────────────────────┘    ╰──────────╯    └──────────────────┘
```

Stems Print Chain Part 2

```
┌──────────────────────┐    ┌──────────────────┐    ┌──────────────┐    ┌────────┐    ╭──────────╮
│ Mixing Console/DAW    │    │                  │    │              │    │ Master │    │          │
│ Mixer Playing back    │──▶ │ 2 Bus Compressor │──▶ │  Mix Bus EQ  │──▶ │ Fader  │──▶│ DAC/     │
│ Full Mix              │    │                  │    │              │    │        │    │ Bounce   │
└──────────────────────┘    └────────▲─────────┘    └──────────────┘    └────────┘    ╰──────────╯
                                     │
                            ┌──────────────────┐
                            │     Key Mix       │
                            └──────────────────┘
```

ANALOG CONSOLE SETUP FOR KEYING THE 2-BUS COMPRESSOR TO PRINT STEMS

1. Use the patch point just before the 2-bus compressor input and print a mix back to your multitrack. It should be noted that this patch point is before the master fader on the console and will not include the 2-bus compressor, any gear patched after the 2-bus compressor or the master fader. This printed version will be referred to as the "Key Mix."

2. Send the output of the key mix to the sidechain input of your 2-bus compressor and set the detector on the compressor to read from the sidechain input.

3. To print stems, mute all the tracks on the analog console except for the track or stem group you are printing along with its associated effects returns. Print stems through the entire 2-bus chain and master fader with the Key Mix triggering the sidechain input of the 2-bus compressor. Repeat this process for each stem mix.

DAW SETUP FOR KEYING THE 2-BUS COMPRESSOR TO PRINT STEMS

1. Disable all plug-ins on the stereo bus of your DAW mixer.

2. Print back to the DAW multitrack (or bounce to disk) the final mix with the master plug-ins disabled. This printed version will be the Key Mix.

3. Re-enable all plug-ins on the stereo bus of your DAW and set the compressor sidechain input to read the Key Mix you printed. Do not assign the Key Mix to the stereo output. It should only feed the sidechain input of the compressor.

4. Mute all the tracks in the mix except for the track or stem group you are printing along with its associated effects returns. Repeat this process for each stem mix.

GLOSSARY OF TECHNICAL TERMS

32 / 44.1 / 48 / 88.2 / 96 / 176.4 / 192 / 352.8 / 384kHz — Refers to the sample rate of a PCM digital signal or recording (samples per second).

16 bit / 24 bit / 32 bit — Refers to the data bit width (sometimes called bit depth), or precision of a PCM digital signal (or recording).

AIFF — Audio Interchange File Format. A computer file type that contains digital audio data. Notably, the AIFF format does not support time stamping.

BagIt — A hierarchical file packaging format designed to support disk-based storage and network transfer of arbitrary digital content. A bag consists of a "payload" (the arbitrary content) and "tags," which are the metadata files intended to document the storage and transfer of the bag.

Bext Chunk — One of the extension chunks that can appear in a Broadcast Wave File.

Blu-ray — An optical disk technology that utilizes a short-wavelength (hence, "blue") laser to write and read, allowing far greater amounts of data to be reliably stored.

Broadcast Wave File (BWF) — A computer file type which contains, among other items, digital audio data. The AES31-2 Broadcast Wave File format originated as an EBU (European Broadcast Union) specification whose data format is based on the Microsoft RIFF wave format but carrying additional metadata, including a unique identifier and high-precision time reference. Technical specifications are available at *www.aes.org/publications/standards/search.cfm?docID=31*.

B-Wave — Broadcast Wave Format. Same as above.

CD — Compact Disc. 5.25-inch optical storage medium that allows storage of either 74 min./650 MB or 80 min./700 MB of information.

CD-R — Compact Disc, recordable one time. The CD-R is 5.25-inch optical media with same storage capability as CD.

CD–RW — Compact Disc Recordable/Writable. 5.25-inch Compact Disc format that may be written to, erased, and rewritten many times.

Channel — One indivisible stream of audio. One channel would refer to a mono source, two channels might refer to a stereo source, six channels (and perhaps more) could refer to a "Surround" source.

Consolidate — The process of taking the constituent audio files with edits, etc. for a single track ("vocal", "guitar" etc.) and combining the multiple clips into a single continuous audio file.

DAW — Digital Audio Workstation such as ProTools, Nuendo, Digital Performer, Apple Logic Pro X, Sonic Solutions, SADiE etc.

Deliverables — Materials turned into the Record Label or content owner upon completion of a project. Refers to all media and documentation. The Recording Academy Recommendations for Delivery of Recorded Music Projects set a Minimum and Recommended set of delivery requirements.

Dither — The practice of adding low volume noise to digital audio when converting from a higher to lower bit resolution in order to lessen the effect of short term errors by spreading them across the audio spectrum.

DVD — Digital Versatile Disc — 5.25-inch optical storage format that allows for storage of 4.7 GB for single-sided media and 9.4 GB for double-sided media. There are many types of consumer DVD's (e.g., the well-known DVD-Video, and more recently DVD-A, which provides multiple formats including 5.1, or surround, audio) and personal computer formats (DVD-R, DVD-RW, DVD+RW, DVDRAM), some of which are not compatible with certain players.

eMLC — Enterprise Multi Level Cell; good performance, enterprise-grade flash memory used in solid state drives (SSD).

Enterprise-Class Storage Media — Media types that are in use by large corporations (Fortune 500, etc.). These storage types include LTO.

eSATA — Specialized computer port used for external connection to a SATA drive.

FAT32 — Logical disk format method used by Windows-compatible machines and most others. Directly compatible with AES31-1-2001, AES standard for network and file transfer of audio - Audio-file transfer and exchange Part 1: Disk format.

Firewire Drive — Hard disk utilizing an IEEE1394/**Firewire** physical interface and typically composed of a Firewire to IDE bridge chip and, inside the box, most often an IDE/EIDE drive.

FLAC — Free Lossless Audio Codec. A 100% lossless format, like ALAC (Apple Lossless) in that it can support metadata and decrease file size about 50-60% except that FLAC is open-source, thus free of any licensing fees. The FLAC reference encoder supports any sample rate and bit depths up to 24 bit-fixed. When encoding FLAC, a setting of -5 is recommended to balance file size vs. encode time.

Flattened Audio File — Refers to a single continuous rendered digital audio file that has all edits, automation and all plug-in and hardware processing incorporated into it.

HDD — Hard Disk Drive.

Interleaved Stereo Broadcast Wav File — A stereo Broadcast Wav File where the data making up the left and right channels are stored together as one contiguous block of data.

International Organization for Standardization (ISO) — ISO 8601, Data Elements and Interchange Formats — Information Interchange — Representation of Dates and Times, is an international standard covering the exchange of date and time-related data. First published in 1988, it organizes the date as: year_month_day: e.g. YYYYMMDD.

Linux / Unix <tar> — Logical format originally developed for archival of files on

Unix Machines. Tar is an acronym for "Tape Archive". Tar format is accepted as a universal and open-source logical storage format. It is most often used with streaming tape physical media.

LTO — Linear Tape Open. Magnetic Tape Format co-developed by Hewlett-Packard, Seagate and IBM. Multiple vendors for both drives and media.

Master — A "Master" is defined as a collection of the various original components of the recording, mixing and mastering process for a given production; each in their originally recorded formats, and collected in a form that is ready for transition to the next phase of the process.

> **Original Master** — The first (or original) collection of the various components of the recording process for a given production in its original recorded format.

> **Primary Masters** — Include (but are not limited to) all analog master tapes, hard disks, optical media, and all backups made of these during the recording, mixing and mastering process. Masters include all the various original components in each of their originally recorded formats. These Masters should have no deletions of useful material (outtakes, artist talking, incomplete or unreleased recordings, etc.). The constitution of "useful material" is determined by agreement between Record Company and Producer prior to the commencement of the recording project.

Metadata — In this context, Metadata is data (or "information") about the recorded music project. It would include information such as performers, performer roles, producers, engineers, songwriters, musicians, project, equipment, data carrier etc.

Minimum — The least or smallest amount recommended.

MLC — Multi Level Cell; average performance, consumer-grade flash memory used in solid state drives (SSD).

MO — Magneto-Optical. Storage method which uses an optical laser and a magnetic field to record data on an optical disk.

Optical Storage Media — Understood as recordable media which consists of several materials, one of which is heated with a laser to allow absorption (instead of reflection) to expose the "pits" in the material which, when read by a laser, can be interpreted as data. E.g. CD-R, CD-RW DVD-R, DVD-RW & etc.

PCM — Pulse Code Modulation refers to an encoding process used when converting analog audio to a binary digital file that may be written in a variety of formats.

PDF — Portable Document Format. An Adobe product standard that generalizes document format; it allows the same document format to be created on, and transferred between many different types of computers.

Positional Reference — Timing reference used during the recording/overdub/mixing process to synchronize devices and mix automation.

SACD — Super Audio Compact Disc. 5.25-inch optical format utilizing Direct Stream Digital (DSD) technology to record and play music with a "single-bit" running at a high sampling frequency (2.8224 MHz).

SATA (Serial ATA) — The standard hardware interface for connecting hard drives, solid state drives, and optical drives to a computer motherboard. Specialized 'eSATA' ports on a computer allow connection of external SATA drives.

SLC — Single Level Cell; highest performance, highest cost, enterprise-grade flash memory used in solid state drives (SSD).

SSD (Solid State Drive) — A storage device containing nonvolatile flash memory, used in place of a hard disk. They have no moving parts, offer faster read and write access, and are more durable and quieter than hard disks. Enterprise-grade varieties include SLC (Single Level Cell) and eMLC (Enterprise Multi Level Cell). MLC (Multi Level Cell) is consumer-grade.

SDII — Sound Designer II. Used to refer to a type of audio data file originally developed by Digidesign. Limited to a maximum sample rate of 48kHz. Not recommended for any use.

Time Code — The most common type of Positional Reference, usually refers to SMPTE time code (developed by the Society of Motion Picture and Television Engineers). The number (30, 29.97, 29.97drop-frame, 25, 24) specifies the timecode reference in number in frames per second.

Track — "Track", for the purpose of audio storage, is a place where elements of program (music, etc.) material are put. Meanings abound, however….

> Track (n.): Originally, in analog tape recording, a term synonymous with one channel of content. An Ampex 301 3-track recorder had the capability of three separate channels of audio.

> Track (n.): (Proposed modern definition for audio recording) A unique, irreducible element in the context of a "production." A modern "track" may contain one or more channels of program material (e.g., the "lead vocal track," would most often be a single-channel track, whereas the "live room track" recorded on a DAW in surround, may have four or more "channels" of audio). Tracks might also include, or even be limited to, MIDI or sequencing data.

> The word "track" has various additional meanings in and around music and production.

> Track (n.): One individual selection on a CD or an "LP" or etc.

> Track (v.): The process of recording (e.g., "to track a session").

> Track (v.): Logistically, to locate (e.g., "can you track down a drummer who can play in tempo?").

Truncation — Word length reduction (e.g. reducing a 24 bit audio file to a 16 bit audio file)

XML — Extensible Markup Language. A file with a .xml file extension is a plain text file that describes the transportation, structure, and storage of data.