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# How to Do Audio Conversion, Recording and More With MP3s

## Topics Covered:

Audio Editing

Creating MP3 Files from Analog Sources

Ripping CDs

Recording Audio Streams

Converting MP3 Files into Audio CDs

How Audio Compression Works

Downloading MP3s from the Internet

MP3 Websites

Digital Rights Management (DRM)

Podcasts and Videos for MP3 Players

MP3 Ring Tones

MP3 Tags and Playlists

# How to Do Audio Conversion, Recording and More With MP3s

## Audio Editing

One of the great things about digital audio is the ease with which it can be edited. Unwanted noises like pops and scratches can be automatically removed, the volume can be increased or decreased, tracks can be rearranged and audio material can be inserted or deleted.

Some of this editing falls in the realm of special effects, but a lot of it is very useful for the average listener. For example, wouldn't it be nice to have all of your music collection play at the same relative level rather than having to adjust the volume for each track? And if you have MP3 files that were converted from an analog source such as cassette or record, the sound can be improved to near CD-quality.

There may be some MP3s in your music collection for which you no longer have the original source. If these MP3s are defective in any way you have three basic choices--put up with the imperfections, delete them or edit them to improve the sound.

Editing audio requires audio editing software. There is a whole range of this type of software available from professional to consumer levels. There are several freeware titles, but these tend to be limited in their editing capabilities. Commercial software specially designed for ripping, converting and editing audio is available at a reasonable cost.

If there are problems with MP3 files, which you have ripped yourself, the solution is simple--go back and rip it again. Problem MP3s from other sources (we won't ask from where) can often be salvaged with editing software.

For example, if the MP3 suddenly cuts off before the end of the song, editing software can be used to fade out the ending. Sure, you're missing some of the song but a fade is better than the 'arrggghh' feeling that a sudden cut off can create.

Another problem with some MP3s is digital noise that sounds like cats squealing. Many commercial programs have special filters to remove this kind of noise automatically. Simply set the level of noise reduction and the whole file is cleaned up in a matter of seconds.

Automatic noise reduction is also available for audio, which came from analog sources such as records and cassettes. Pops, scratches and tape hiss can easily be removed.

One of the most annoying things about MP3s is their varying volume level. This is particularly noticeable if you are listening to MP3s from various sources. You may have to change the volume for every song.

Fortunately, your whole music collection can be 'normalized'. Normalization works by making loud tracks softer and soft tracks louder so that on the whole, they average out. An entire

folder full of audio files can be normalized at the same time, or you can be more selective, choosing tracks which make up a certain playlist.

Normalization can also work on individual tracks by making soft sections louder and loud sections softer. Normalization is such a common process that it is included in almost every audio ripping program--freeware and commercial.

## **Creating MP3 Files from Analog Sources**

Converting CDs into MP3 files is an easy process because the audio stays in the digital domain. But what about old analog recordings like cassettes and records? Although the procedure is slightly more complicated, converting other audio sources into MP3 files is a do-able task.

Almost every computer has a soundcard that accepts inputs from various sources. A typical sound card will have one microphone input and one auxiliary input, which can be used for sound sources such as cassette players or radios.

These external sound sources are analog, meaning that the sound is a continuous wave form. Digital audio attempts to reproduce analog sound by slicing the waveform into discrete steps--each of which is represented by a number. In order to get an analog sound into a digital computer, it must pass through an analog to digital (A/D) converter.

The biggest limitation with budget sound cards is the A/D converter. A cheap sound card has a cheap converter, so will not give you the same results as a professional level card. However, considering that the sound source is likely to be old analog cassettes of questionable audio fidelity, the built-in sound card of most computers is sufficient.

Although most sound sources can be plugged into the sound card's auxiliary input, record players are a different matter. The output level of most record players is too low, so for best results it should pass through a preamplifier before being plugged into the computer.

Once you have your external sound source connected to your computer, you need a sound recording program to capture the audio. Microsoft Windows has a built-in sound recorder but its editing features are limited. You are better off using a dedicated audio program. There are plenty of commercial and freeware titles.

Now your audio software is up and running and your sound source is connected to the computer. Simply hit the play button (in the case of a cassette) or put the needle on the record and sit back and wait. This is not ripping - recording has to be done in real time.

Some recording software will automatically split the tracks into individual files, but most likely you'll end up with one big file. That's okay - it is relatively easy to split the file if your recording software has decent editing features. You should see a visual representation of the audio signal - this makes it easy to identify where each track begins and ends. Simply highlight that section and save it as an individual file.

If you are recording albums or cassettes, you may be disappointed in the sound quality once it is transferred to your computer. Records can be scratched, and cassettes can have an annoying hissing sound. A lot of this noise can be removed with special filters, so look for this feature when you are shopping for audio software.

After the audio has been captured and stored on your computer it will be in an uncompressed format such as WAV. Now you have two options - burn the WAV files to CD or convert them to a compressed format like MP3. For archival purposes it's a good idea to burn a CD so that your original cassette or record will not suffer any more degradation.

Compressing the audio is a good idea if you want to listen to it on a portable audio player or simply to save space on your computer hard drive. The most popular audio compression scheme is MP3, but newer formats such as WMA and AAC (used by the Apple iPod) offer similar sound quality with smaller file sizes.

## **Ripping CDs**

A typical music lover may have hundreds of CDs. Converting that music into MP3 files and transferring them to a portable audio player allows you to carry your whole collection in your hip pocket.

Copying CDs to a computer hard drive is called 'ripping' and there are plenty of free software tools for doing the job. Ripping is a very fast process because the sound card is not used. Rather, the digital data contained on an audio CD is copied to the computer and the whole process takes just a few minutes for a typical CD.

The only thing that is needed to rip an audio CD is a CD-ROM and ripping software. This software also allows you to convert the audio files into a compressed format like MP3, WMA or AAC. Compression saves a lot of space on your hard drive and allows you to store more songs on your MP3 player.

Before you begin ripping, several decisions must be made about the file format and the level of compression. The more compression that is used on an audio file the lower the sound quality, but also the smaller the file size. Each individual must make their own decisions about what is acceptable sound, but here are a few guidelines.

The 'standard' level of compression for MP3 files is 128 kb per second. Careful listeners may notice the loss of high frequencies and other details, but files encoded at this bitrate are similar in sound to FM radio. An A / B comparison with the original CD may allow you to hear the difference, but otherwise most people find this bitrate to be acceptable.

If you are converting your music into other formats like WMA or AAC, lower bitrates can be used while retaining similar sound quality.

One of the big advantages of MP3 (or WMA or AAC) over audio CDs is the ability to include information about the song in the file itself. Song title, artist, year and genre can be encoded in

the compressed file and displayed on playback. This information is included in 'tags' such as ID3.

Of course, there has to be a way to include all this information in the file. Tags can be edited manually, but a much simpler way is to get this information from a database so that it is included automatically as you rip the CD.

Tags are a handy feature for organizing your music collection, so most ripping software includes support for polling a database such as freedb. This is a free Internet service which contains information about millions of commercially released CDs. As you rip a CD, it is identified by the ripping software and all of the track titles and other CD information is downloaded automatically from the Internet. Even cover art may be available for download and this can be displayed on some portable audio players.

freedb is the most popular CD database on the Internet mainly because it is free. There are other databases such as Cddb, which charge a licensing fee for software developers, so most freeware CD rippers rely on freedb.

## **Legality**

There has been a lot of publicity concerning the legal murkiness of trading MP3 files. If the record companies had their way, MP3s would be banned from the surface of the planet because they are easy to exchange and theoretically cut down on music sales. The situation has settled down to the point where record companies have embraced online marketing and have found a way to sell songs individually on the Internet.

As far as ripping your own CDs goes, the general consensus is that this is part of the 'fair use' of CD ownership, although this varies from country to country. Making copies of CDs for your own use is generally acceptable - trading those copies on the Internet is illegal in many countries.

## **Recording Audio Streams**

Many music web sites offer 'streaming' audio that you can listen to by clicking a link. Streaming allows you to hear the audio as the file is being transferred rather than waiting for the complete file to download before it can be used.

Downloading a music file can take several minutes or even hours depending on the size of the file and the speed of your Internet connection, but sound from a streamed file can begin a few seconds after clicking the link.

The process is called streaming because it works by delivering a constant flow of data to your computer - a stream. The data is usually buffered to prevent pauses in the case of data flow interruption, but the buffer is small enough that the sound can begin almost immediately after the stream starts.

Streamed audio, however, is not meant to be saved as a computer file that can be used at a later time. It's a one-shot deal, similar to listening to a radio broadcast. This is partly to prevent the unauthorized copying of audio content, as most music streams have copyright protection.

But just as you can record audio from the radio, you can also record audio streams from the Internet. There are several ways to do this.

### **Audio Capture**

The low-tech way to capture streaming audio is to simply record the actual audio. Sound from speakers can be recorded, but this will introduce a lot of background noise - not a method recommended for the 21st century.

A step above this is to connect the output of your soundcard back to the input. This is a background noise-free option, but the sound must pass through two converters - the Digital to Analog converter on the way out, and the Analog to Digital converter on the way back in. This can create digital distortion that is noticeable on playback.

### **Digital Capture**

It is far better to keep the audio stream in the digital domain. This way the sound can be reproduced exactly as it was heard the first time.

Some sound cards can be set up to route the output to the input without passing through the digital to analog converter. This option allows you to use any audio recording software to record the audio stream as it is received, entirely in the digital domain.

Most consumer audio cards don't have this routing function, however, so if you are using the standard audio connections that are included with your motherboard this may not be possible.

### **Software**

Finally we have the software solution. Most stream capturing software works by redirecting the audio stream from the output to the input, the same as our re-routing option mentioned above. This keeps the sound in the digital domain and the captured audio can usually be converted into one of several formats such as MP3, WAV or OGG.

Some software can automatically divide the audio stream into individual tracks and even add tag information such as artist, song and album.

### **Legalities**

Many Internet sites that offer streaming audio do not want their music to be recorded and may have license agreements for using their sites. This is especially true of online music vendors such as the iTunes Music Store or Rhapsody. Many of these sites are aware of how easy it is to record audio streams, and for this reason usually limit song previews to 30 seconds.

## **Converting MP3 Files into Audio CDs**

After collecting MP3 files for a time you are sure to build up a good sized collection. Storing them on your computer is risky because if your computer crashes all those files could be lost. Like any other data, MP3s should be backed up - with a difference. Rather than treating MP3 files as computer data, you can convert them into audio CDs.

Converting MP3 files into audio CDs is a relatively simple process. Most CD burning software can do the conversion for you automatically. Simply build up your playlist of MP3 songs and burn the CD.

Before the CD is burned, the MP3s are converted into CDA (Compact Disc Audio) files. This is done behind the scenes with a CD burning program like Nero but if you wish you can take more control of the process. For example, Nero has a simple audio editor that allows you to split files and apply filters such as noise reduction, equalization or stereo widening.

If your CD burning software does not have these features, you can still process the MP3 files before burning the CD. In this case, you need dedicated audio editing software - there are plenty of freeware and commercial titles available.

When preparing MP3 files for burning to CD, one of the most useful editing functions you can do is to 'normalize' all of the files. Normalization smoothes out the differences in volume between various tracks so that the entire CD will play at the same relative loudness. After you have finished editing your MP3 files, save them as WAV files so that they can be burned to CD.

You will most likely be burning your MP3s to a CD-R (Compact Disc Recordable). Most modern CD players can handle this type of CD, but older CD players may not recognize them.

MP3s do not have to be converted to audio CD - they can be burned directly to CD in their native MP3 format. This has the advantage of storing more music on one CD, perhaps 100 songs instead of 10. MP3 CDs can be played in a computer CD-ROM, and many hardware CD and DVD players can also play them.

The main problem with MP3 CDs is that with so many songs on one disc it can be hard to find a particular piece of music. If you are playing them on a non-portable hardware CD player, it probably doesn't even have a display.

One solution is to use them on a DVD player connected to a home theater system. DVD players can usually handle MP3 CDs and can even display their contents on the TV set. The filenames may be limited to eight characters, however, so thought must be given about how to organize your MP3s before you burn a CD.

Your best bet is to divide the songs into folders--one for each artist. Be careful when naming the MP3 files - the filename should start with the name of the song rather than the artist, otherwise all of the file names may be displayed exactly the same.

Renaming MP3 files is a breeze. Software designed for editing ID3 tags can rename MP3 files by any criteria. In this case, simply check the option that gives you the song title at the beginning of the filename, and your entire music collection can be renamed within seconds.

## **How Audio Compression Works**

Uncompressed audio files can be very large--approximately 10 MB per minute of stereo sound. Without a way to compress this data, the portable audio players which are so popular today would likely not exist.

Luckily, there are many ways to compress digital data. Computer data files, for example, can be compressed with the popular ZIP format. The resulting zip file is usually much smaller than the original file and can be unzipped so that the original file is intact.

Compression formats which retain all of the original data are called 'lossless'. Certain types of files like audio, video and graphics can also be compressed by discarding some of the original data. This form of compression is called 'lossy'.

MP3 is a lossy format - there is no way to reconstruct an MP3 file to its original sonic quality. The advantage in this, however, is a much smaller file size.

The beauty of MP3 files is that they still retain acceptable audio quality while greatly reducing the size of the file. This is accomplished by discarding certain portions of the audio spectrum, which are considered to be less important. This includes high frequencies and sounds, which may be 'hidden' behind louder sounds.

Audio compression depends a lot on psychoacoustics - the study of how sound is perceived by the ear and by the brain. The compression codec uses a model that determines how a particular audio file is heard by the average person. This model can determine how much of the audio data can be removed while still retaining an acceptable sound.

There are various compression schemes, and each of them has their own model for determining which parts of the audio spectrum are removed. This results in different sound quality between MP3, WMA, Ogg Vorbis and AAC formats. Sound quality is subjective--some people may prefer one format over another.

## **Bitrate**

Besides the actual algorithm used for compressing audio, the bitrate has the biggest influence on sound quality. Bitrate represents the amount of streaming audio data and is expressed as kilobits per second. The 'standard' bitrate for MP3 files is 128 kb per second, and this represents a good compromise between sound quality and file size.

Higher bitrates remove less data and therefore have a higher quality sound. WMA and AAC can achieve similar sound quality to MP3 at lower bitrates, so these formats produce smaller file sizes.

In the early years of MP3, all files were encoded at a constant bitrate (CBR). This means that a bitrate of 128 kb per second (for example) is used for every section of the music no matter whether it was silent or loud. Musical passages, which are relatively dense, however, have more audio data than quiet passages, so variable bitrates (VBR) can be used to achieve a higher quality sound. As the music becomes more complex, the bitrate rises, and conversely when the music thins out, a lower bitrate is used.

If you are encoding your own music files it is useful and educational to try out various bitrates and file formats to see what sounds best to you. Keep in mind, however, that certain kinds of music may sound better with a particular codec. Ogg Vorbis, for example, is reportedly ideal for classical music.

## **Downloading MP3s from the Internet**

To many people, MP3 is synonymous with 'illegal music'. This is because of the well-publicized legal battle between the record companies and Internet music distribution services like Napster. The old Napster has closed down and a sanitized version, which meets the approval of the music industry has taken its place. But MP3 files are still widely available for download.

To clarify the issue, let's start by saying that there is nothing illegal about MP3 files. It is simply a file format for audio files. What the music companies object to is file sharing--something that is simplified by the small file sizes of MP3s.

Files can be shared over the Internet by connecting to a peer to peer (P2P) network. This is a network of computers, which do not have a centralized hub. Each computer on the P2P network has access to files on every other computer on the network, so files can be 'exchanged', although usually not on a one-to-one basis.

There is no charge for using these P2P networks, so MP3 files (as well as any other type of computer file) can be freely exchanged. This is what the music companies object to - if music fans can get the latest songs for free, why should they buy them?

By and large, the concerns of the music companies are justified. CD sales have fallen since the popularity of the Internet. But is the Internet to blame? Maybe not. Music fans claim they are justified in trading music files because the quality of CDs has gone down over the past 10 or 15 years. A commonly heard argument is that commercially released CDs often have only two or three good tracks on them, with the rest of the songs being 'filler'.

The music industry seems to have acknowledged this argument. Music services like Apple iTunes Music Store now allow users to buy individual songs and download them to their computer. Songs, which are available from the iTunes Music Store, are encoded with digital rights management (DRM) which places some restrictions on how the songs can be used. For example, there is a limit to the number of times songs can be burned to CD, and songs may not be broadcasted to more than five computers at a time.

The iTunes Music Store is very popular--more than one billion songs have been sold since they started operating in 2003. It has not stopped the P2P networks, however. They are still as popular as ever and account for a significant amount of MP3 distribution. Most of these (unlike Napster) are decentralized and cannot be shut down by legal action.

Napster was an easy target because it was a company that had employees and offices. Most P2P networks have no such organization--they are simply a community of computer users using the same software.

Nevertheless, the legality of downloading copyrighted material such as MP3 files needs to be considered. It is a murky area--some countries allow it and some countries try to control it. In the United States, the Recording Institute Association of America (RIAA) is lobbying strongly for laws against MP3 file trading in particular and P2P networks in general. Some countries in Europe have outlawed the use of P2P networks for sharing copyrighted material. However, not all members of the European Union are in agreement about this issue.

## **MP3 Websites**

For those who wish to avoid the legal murkiness of MP3 downloads, there are several Internet services which are completely sanctioned by the music industry. The most popular of these are Napster, the iTunes Music Store and MP3.com.

### **Napster**

Napster is the company that popularized MP3 downloads. Although the original version of Napster was shut down by court order, it has been revived as a commercial service offering music streaming and downloads.

Streaming is the Internet's answer to radio. It allows you to listen to music as it is being transferred to your computer. Rather than waiting for the whole song to download, users can hear the song shortly after it begins to transfer.

Streaming technology is designed to prevent users from capturing the audio for later use. It is intended as a one shot deal - listen to the stream but once it is finished the music is gone.

There are ways to capture streams, and this is one reason why Napster and other MP3 sites often limit their free streams to 30 seconds. Paid streams are another matter. Napster charges a monthly fee and in exchange you can listen to an unlimited number of songs. These songs can be stored on your computer but you need to maintain your Napster membership in order to access them. Songs can also be purchased. Purchasing songs gives you the right to burn them to CD or store them permanently on your computer hard drive.

### **iTunes Music Store**

The Apple iPod is the most popular portable audio player on the market. It is bundled with the iTunes software, which can be used to connect to the iTunes Music Store for purchasing songs.

Like Napster, the iTunes music store allows you to preview music clips before buying them. Songs are available for purchase and albums can be bought too.

Songs bought from the iTunes Music Store are protected with Digital Rights Management (DRM). This restricts the way they can be used. For example, they can only be burned to CD a limited number of times. The songs can be broadcast on a private network, but the number of computers that can receive the broadcast is limited to five at any one time.

The iTunes Music Store is the most popular music service on the Internet. It also carries other digital products such as videos and audio books, and all purchases can be transferred to the owner's iPod.

### **MP3.com**

MP3.com serves as a clearinghouse for a number of online music stores. It provides information about artists and songs and allows users to post their own reviews. 30 second previews are available, and if you like what you hear, you are directed to an online music store to buy the song. The stores associated with MP3.com include Napster, iTunes, Rhapsody and MSN Music.

In order to buy music from any of these stores, you must meet their normal requirements. For example, you must have an account set up with iTunes in order to buy music from them through MP3.com.

MP3.com also includes a good selection of free music and video streams. These are available on a rotating basis for promotional purposes, and also feature lesser-known independent artists.

### **Digital Rights Management (DRM)**

MP3 files can be traded very easily, creating a vast inventory of 'free' music. The music industry is strongly opposed to unrestricted MP3 distribution, of course, because of fears of lost revenue, and has sanctioned a form of Digital Rights Management (DRM) to protect their interests.

In the days before the CD, it was possible to copy records to tape but each subsequent generation would cause the audio signal to be degraded. Record companies weren't overly concerned about losing revenue to this type of copying, because they felt that consumers would not accept the inferior quality of copies. Digital media changed all that--exact copies can be made any number of times without degradation. Digital media is also much easier to distribute worldwide via Internet.

As soon as Internet MP3 trading became widespread the music industry clamped down hard. They filed lawsuits against music distribution services like Napster and Kazaa and succeeded in prosecuting individuals who were caught exchanging MP3s.

The music industry wanted a system to prevent consumers from freely copying and trading music. Several types of Digital Rights Management have been developed and at the present time, every online music store that operates in the United States uses some form of DRM.

Consumers who buy songs from Internet music stores usually receive them in either WMA or AAC format. AAC is used for the Apple iPod, while WMA is used for most other types of MP3 players. DRM can be integrated into both of these formats.

A typical DRM scheme limits the number of times a song can be copied or burnt to CD. There may also be limits to how the songs are used on private networks--AAC songs can only be heard on five computers at one time.

Napster uses another approach--users can download and listen to any number of songs for a monthly fee, but those songs cannot be burnt to CD unless the user pays an extra fee. If a payment is missed, all of the songs on the computer are rendered inoperable.

### **Is DRM Good?**

Many view DRM as unnecessarily restrictive. After all, if you buy a CD from a music store, you have the right to copy that CD, rip it to your computer and sell the original copy. If you buy a song from an Internet music store you do not have any of those rights. What's more, the online vendor can change the terms of sale at any time after the purchase. We have already seen this with Apple--they changed the CD burning rights from ten copies to seven, applied retroactively.

In effect, the music that you 'buy' from an online music store is not yours. Your right to use it can be taken away at any time because of a change in policy or because you missed a monthly payment.

And in spite of the supposed 'protection' that DRM offers to copyright holders, it can easily be circumvented. DRM songs, which are burned to CDs have no restrictions--the CD can be used however the user wishes, including copying, ripping and converting to (non-restricted) MP3!

So DRM is restrictive, unfair and ineffective. It punishes consumers who are willing to play by the rules and does not prevent the illegal distribution of MP3s. Perhaps this 'punishment' is enough to drive consumers to find other (free) sources for music. If this is the case, the music industry has shot itself in the foot.

### **Podcasts and Videos for MP3 Players**

It seems that MP3 players are everywhere these days. Almost everybody is 'plugged in' listening to their own private playlists. Given the market saturation of MP3 players, what's next?

The answer is obvious--video! In fact, it is already here. Many MP3 players have video capability, the next new wave of portable devices are built around video storage and playback.

The Apple iPod is one of the leaders of the MP3/video hybrids, although there are several other MP3 players that are built for video. Because of the popularity of the iPod, however, it is seen as the leader in this field. The fifth generation iPod is fully integrated with video and video content can be purchased from the iTunes Music Store.

Just as with audio, video content is available for download from many sources. The big difference, of course, is the size of most video files. Even though video can be compressed (similar to MP3 or WMA) the file size of a 90-minute movie can be in the range of 700 MB. That means that video playback is better suited for hard drive MP3 players than flash memory players.

Of course, not all video content is feature films. TV shows, animations and home videos are all suitable for viewing on MP3 players. There's also a particular type of video practically designed for portable audio players--podcasts.

Podcasts can be either audio or video--they are like radio or TV broadcasts except that they are available for viewing or listening anytime. You can subscribe to podcasts so that they are automatically downloaded to your computer when a new one is produced. From the computer, it can be transferred to your MP3 player.

Podcasts are often amateur productions with a wide range of subject matter. Users of Apple iTunes can browse through podcasts to select which ones to subscribe to, and they are automatically transferred to the iPod when it is connected to the computer.

Even though the name 'podcasting' is a hybrid of 'iPod' and 'broadcasting,' podcasts can be viewed on any MP3 player that supports video and of course audio podcasts can be heard on virtually any MP3 player. The 'broadcasting' part of podcasting is also a misnomer--rather than being streamed in real-time, podcasts are archived and can be viewed any time.

### **Is Video a Bad Idea?**

Adding video capabilities to MP3 players seems like a good idea, but think for a minute how you are going to use it. If you use your MP3 player while driving the car, for example, how practical can video be? Similarly, if you have a portable audio player for jogging, you can't watch videos and run at the same time.

On the other hand, if you spend a lot of time commuting in buses or trains, a video player can be a great way to pass the time. Just remember that video takes a lot more battery power than audio, so you will need to recharge your batteries more often. Frequent recharges also means shorter battery life, so using your MP3 player for video playback will be more expensive than audio.

### **MP3 Ring Tones**

Portable entertainment devices are a relatively new phenomenon--they've been around for less than 10 years--that are finally reaching the maturity stage. With this maturity comes a blending of various technologies so that individual devices have several functions. The new MP3 players can also play videos and Palm top computers have integrated audio players and cell phones.

No surprise, then, that the new crop of cell phones do much more than just take phone calls. Built-in video cameras, web browsers, data organizers and MP3 players are now part of the

typical mobile phone. The MP3s on a cell phone can be used for listening pleasure (via headphones) or as ring tones.

Customized ring tones have been a feature of cell phones almost since their introduction. People love using tunes or sound effects when their phone rings so that their phone has a customized sound. Ring tones can also be used to identify callers--one tone for family, one tone for friends, another for business.

The original ring tones were kind of crappy - monotone (one note sounding at a time) and thin sounding. Polyphonic (many notes playing at the same time) ring tones soon came to the forefront, and then we had True Tones--real audio recordings.

The first True Tone phones could play short audio clips, but as cell phone memory became bigger, it was possible to use whole songs as ring tones. The audio is usually recorded in a compressed format such as MP3, AAC or WMA and can be music, sound effects or voice recordings.

Of course, a whole song for a ring tone is a bit of an overkill since the phone will only ring for about 30 seconds or so before being diverted to voice mail. If you have limited memory on your cell phone, a bit of MP3 editing is in order.

This is quite easy to do with your computer and free software. Simply cut off the song at about 40 seconds and fade out the last 2 seconds so it doesn't abruptly cut off. Better yet, select a point where the audio can repeat and make a loop - the music will repeat endlessly while taking up relatively little memory space.

Lack of memory is definitely NOT a problem with the latest batch of cell phones. The Motorola SLVR, for example, can store up to 100 full-length songs and comes with integrated software to allow you to buy new music from the Apple iTunes Music Store.

Almost all the major manufacturers now have cell phones that double as MP3 players, and many of them also have video recorders. These 'all-purpose' phones are just slightly more expensive than the top-of-the-line MP3 players, and about the same as video-ready Portable Entertainment Devices. Cell-phone users have an easy choice - skip the MP3 player and get an MP3 phone instead. You can use the MP3 files as ring tones and listen to music in between calls.

## **MP3 Tags and Playlists**

MP3 and other audio compression formats are popular because they greatly reduce the storage requirements for audio files. They make it possible for a tiny portable audio player to carry thousands of songs.

Besides the compression, MP3 has another big advantage. The MP3 format can store information about the music including the title, the artist, the album, the year, the genre and

much more. This information is displayed as the song plays and can be used to organize your music collection and find songs quickly.

ID3 tags were developed back in 1996 as a way of including metadata in an MP3 file. The original specification allowed the song title, artist, album, year, comments, track number and genre to be added to the end of the file.

The original ID3 format was expanded to ID3 version 2 to allow more information to be included in the tag. Besides this extra information, ID3v2 has a number of other advantages. For one, ID3v2 is situated at the beginning of the MP3 file instead of at the end as in the original ID3. This makes it suitable for streaming--playing the file as it downloads from the Internet.

ID3v2 can display all of the data of the original ID3 format as well as extra fields for the composer, conductor, media type and copyright message. It can be expanded to almost any length to include whatever information the user desires.

It can also contain song lyrics, allowing MP3 files to be used for karaoke. Because ID3v2 supports Unicode (the near universal encoding format for world languages) lyrics and other information can be displayed in almost any language.

ID3 tags are specifically designed for the MP3 format, but other audio formats can also include metadata. Both WMA and AAC formats support metadata, which has similar characteristics to ID3 tags.

Metadata can be edited manually, but if you have thousands of MP3 files that is going to be a daunting task. Thankfully, the process can be automated. Most MP3 software can download metadata from the Internet and update the tags automatically.

Another big advantage of MP3 files is the ability to organize your music collection into playlists. These are simply lists of songs to be played sequentially (or randomly), so you can build a program of songs to create a certain mood, similar to what a radio disc jockey does.

Although playlists are not specific to MP3 files (any collection of audio files can be organized in this way) most MP3 software designed for building and editing metadata also has a playlist function. This makes it easy to organize songs by genre, by year or by any other criteria.

Playlists can also be built on portable audio players. Many popular MP3 players like the Apple iPod allow you to add songs to a playlist on-the-fly.

Once your playlists are built and organized, simply load one of them into your MP3 player and the songs will play as specified. This is a great feature for organizing your favorite songs and to create musical moods for different times of the day.

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