SafeAudio™

Audio CD Copy Protection Solution

- Multi-level security: Use one or more protection options for different needs
  - Coding protection
  - Timing protection
  - Hiding audio tracks on PCs
- Effective audio content protection
- Red Book-compatible CD audio discs
- Supports multi-session CDs with Digital Rights Management (DRM)
- High compatibility across player platforms and PC drives
- Transparent to the user
- No additional hardware required for mastering
- Supported by major encoder and test equipment manufacturers

Macrovision's SafeAudio is a 100% software-based, Red Book Compliant, audio copy protection solution for music CDs. It is designed to prevent unauthorized copying of CD albums or file-ripping of particular tracks on a CD — while ensuring excellent playability across all playback platforms. The SafeAudio process is applied during the mastering process at CD manufacturing facilities.

Protects Music CD Revenues

SafeAudio curbs unauthorized copying of audio CDs and reduces the loss of retail revenues from copying or ripping of music. Effective copy protection reduces unauthorized copying. Good compatibility reduces store returns and minimizes customer support costs. SafeAudio increases CD revenues for record labels and other parties who share revenues from music CD sales.

Multi-level Security

SafeAudio offers effective multi-level copy protection, which allows record labels to choose one or more protection techniques, depending on the record labels requirements for a particular title or genre of music.

Coding Protection Offers Maximum Compatibility

The coding protection feature was the first method implemented in SAFE**AUDIO** V1 and V2. To maximize compatibility with a wide range of playing devices including PCs and DVD players, this feature should be used without other options. The coding feature allows CDs to be played by PCs, therefore it is not necessary to include a second session containing DRM-protected music files, if this option is used.

Extensive lab and field tests have demonstrated that SAFEAUDIO**'s playability factor of the 'coding' option is 99+%.**

The SAFE**AUDIO** 'coding' option is compatible with ALL the following:

- Standard consumer CD players
- DVD players
- Modern players that play MP3 tracks from the CD
- Game console machines (e.g. Sony PS2)
- PCs including, non 32-bit Windows Operating Systems (e.g. MAC, Linux, Windows 3.1)
- Modern professional players that use PC drives (e.g. Meridian)

Compatibility is also referred to as "playability" and refers to the proportion of devices of all different brands/models of CD players and PC drives that can playback an original audio CD at original audio quality. A product with low compatibility on players and drives will cause a high level of consumer dissatisfaction, increased numbers of customer support calls, and results in store returns. Poor compatibility can easily wipe out any additional revenue that would have been gained by copy protecting the discs.

SAFE**AUDIO**'s 'coding' protection is applied within the disc structure, without altering the sound wave files produced by the studio and without affecting the quality, original sound or clarity of the recording in any audible manner. The SAFE**AUDIO** process ensures that the SAFE**AUDIO** protection is applied at a precisely targeted location on the CD, so that the CD player circuitry will be able to perfectly play the music. If audio tracks are ripped on a conformant CD drive, the resultant tracks (regardless of destination device) will be spoiled and rendered useless with bursts of loud clicks interlaced within the music. The system is effective on all types of music from heavy rock to classical.

The coding protection feature does not require any extra CD space — this means the full 74/80 minutes will be available for audio tracks.

Timing and Hiding Increases Effectiveness

The **'timing'** and **'hiding'** options may be used to increase the effectiveness of the protection. However, there will be trade-offs in terms of reduced compatibility with DVD and PC drive-based systems. When these options are used, DRM-protected compressed music files should be made available on the Yellow Book section of the CD, in order to allow the disc to be playable on PCs.

Timing Protection Feature

The 'timing' protection feature offers maximum security across all tracks by disrupting the workings of ripping and copying software. Attempts to rip or copy music protected with this feature on a conformant drive will either result in the attempt failing, or will result in the music 'jumping' or being distorted. This optional feature may be used on a single session or multi-session CD.

Hide Audio Tracks on PCs

The 'hiding' option prevents the CD Audio tracks from being played on most PCs, and prevents the copying and ripping of audio by common software. This feature reduces PC and DVD player compatibility. In order to allow music to be played on a PC, it is recommended that DRM-protected music files be added to the second session. This option is usually used on a multi-session CD. If this option is applied to a single session CD, the CD will automatically be converted to a multi-session CD.

Extensive Testing

SAFEAUDIO compatibility has been tested by extensive field trials, as well as on over 700 CD hardware devices in our research and development labs. Our inventory of hardware test equipment includes: consumer CD players, car players, portable players, DVD players, games consoles and PC drive 'robot' testers. Macrovision has also recruited its own field test group of testers. Test results are evaluated automatically by computers with digital signal processing equipment. Results are cross-checked by listening tests and PEAQ (Perceptual Evaluation of Audio Quality) ITU-R BS.1387.

Transparent to Legitimate User

SAFEAUDIO is transparent to the legitimate user and does not alter the user experience when compared to a non-copy protected CD. SAFEAUDIO protection does not affect the audio quality on compatible players. When SAFEAUDIO-protected discs are played on PCs, Consoles, MACs, etc., the user does not have to use a different or unfamiliar player with a different user experience, as with competing products. Users can choose their favorite software CD player.

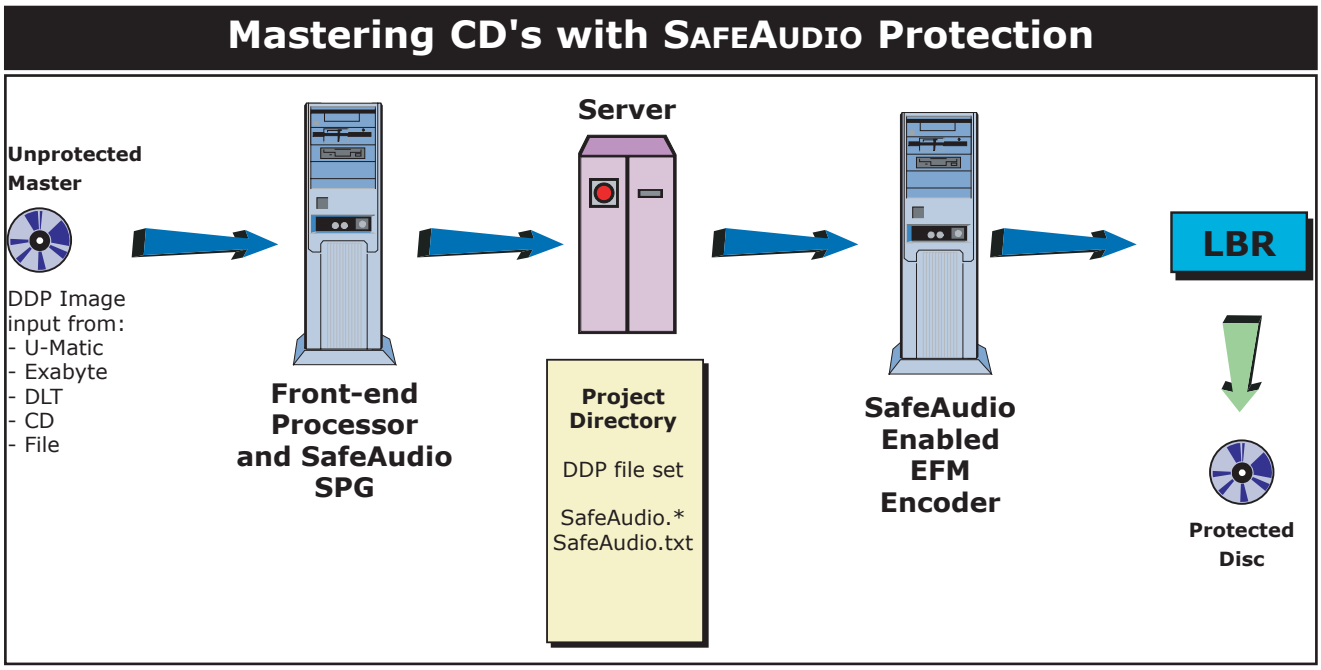
SafeAudio Application

SafeAudio ***coding*** discs are designed to be compliant with the Philips Red Book standard, to achieve virtually 100% player compatibility. Dependent on options selected, SafeAudio protection is applied within the main audio tracks of the disc or within the CD control information, without affecting the original recording or the audio quality. SafeAudio differentiates between ***playing*** vs. ***reading*** an audio CD when someone attempts to rip (or copy) the content.

SafeAudio is compatible with both unprotected music file formats (e.g MP3) and protected data file systems (e.g. Microsoft's DRM system). Either of these files may be combined with SafeAudio-protected music tracks.

The SafeAudio protection uses a multi-layered approach, so that different techniques may be added in order to maintain security as the market evolves.

SafeAudio is integrated into the standard CD manufacturing infrastructure, with a simple encoder software upgrade, and the SafeAudio Protection Generator (SPG) toolkit. No additional hardware installation is necessary at the mastering house.



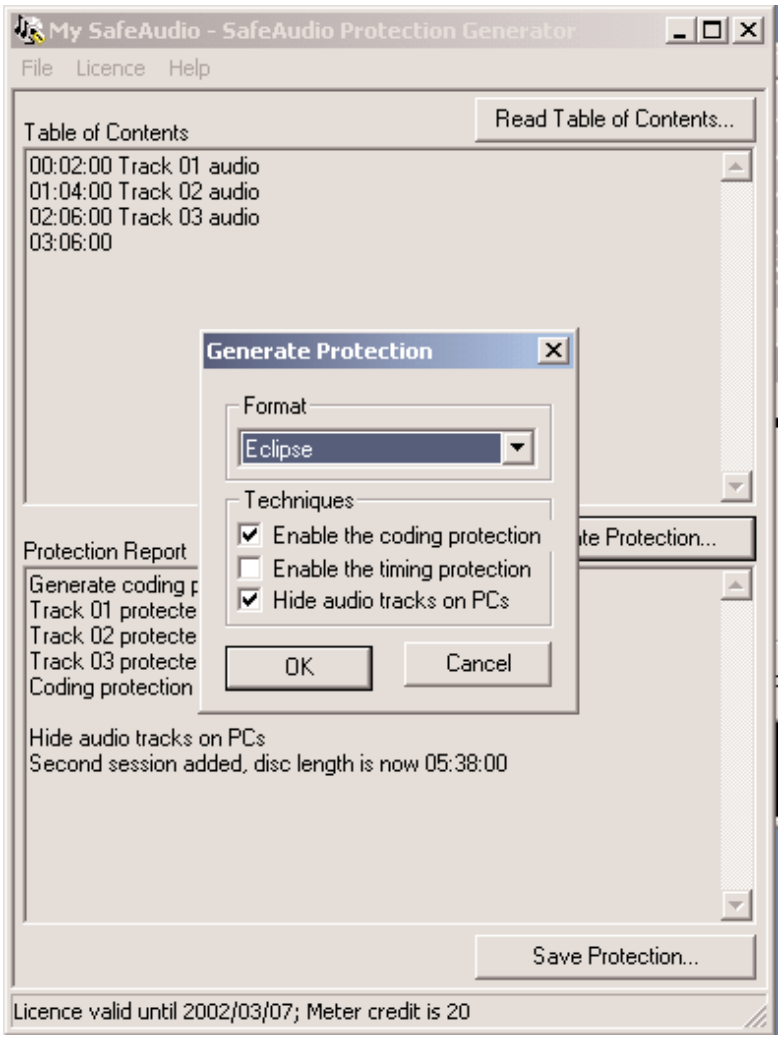
Note: Disc Description Protocol (DDP) is a trademark of DCA, Inc.

Easy To Use SAFEAUDIO Toolkit

SAFEAUDIO CD Mastering Process:

1. The unprotected master is sent to the mastering house with instructions that SAFEAUDIO be applied.
2. If the master is supplied in CD format rather than Disc Description Protocol (DDP), the mastering house imports the music into DDP format prior to using the SPG toolkit software.
3. The mastering house uses SPG toolkit software to create the SAFEAUDIO protection files.
4. A SAFEAUDIO-enabled encoder is then used to make the protected glass master by applying the protection file during the mastering process.

The SAFEAUDIO toolkit allows mastering houses to select specific versions of SAFEAUDIO protection. A mastering house enabled with the latest version of SAFEAUDIO can still apply previous versions of SAFEAUDIO, by selecting the SAFEAUDIO version from the Generate Protection screen in the SAFEAUDIO Protection Generator Toolkit.



Protecting Your Mastering and Testing Investment

Integrated With Standard Encoders

Authorized SafeAudio mastering houses use the easy-to-use SPG Toolkit to apply protection to the audio tracks. The SPG Toolkit is either installed on the Encoder PC or networked PC. The SafeAudio-enabled encoder is then used to create a SafeAudio-protected master, in the same way an unprotected master is produced.

Mastering houses can easily upgrade their encoder software to become SafeAudio-enabled. No additional hardware is required. The encoders recognize a SafeAudio production job, and then apply the protection while encoding the EFM stream. SafeAudio operations require only minimal training.

Encoder Support

- SafeAudio is implemented 100% in the software and is supported by the leading encoder manufacturers:
  - > **ODME B.V. (formerly Toolex International)** www.odme.nl
  - > **Eclipse Data Technologies** www.eclipsedata.com
  - > **DCA, Inc. (formerly Doug Carson & Associates)** www.dcainc.com
- SafeAudio processing can be done off-line, and 'SafeAudio-ready' images can be stored on the mastering house production network. Networked encoders are fully supported.
- SafeAudio does not slow down the glass-mastering process.
- SafeAudio is compatible with network-based mastering systems, and operates at the normal speed of the LBR without any performance overhead.

SafeAudio Compatible Testers and Verification Equipment

Macrovision is working with industry leaders to establish a standard that will enable equipment manufacturers to recognize and correctly test SafeAudio-protected CDs. Macrovision recognizes that proper testing is vital to manufacturing plants as evidenced by our good track record of working with equipment manufacturers to enable worldwide support for our industry-leading SafeDisc® product. This effort is being continued with SafeAudio.

Currently, the SafeAudio manufacturing process is supported by equipment from DaTARIUS and Eclipse Data Technologies.

DaTARIUS: Software upgrades supporting SafeAudio are available for the CS 4-series stamper and CD test systems.

Eclipse: SafeAudio plug-in modules are available for the *ImageAnalysis* and *ImageVerify* data analysis and verification systems, allowing bit level implementation authentication and error reporting.

System Specifications

PROTECTED DISCS

–Coding Option

- Produces Philips Red Book-compatible CD-Audio discs. No Yellow Book (data) session is necessary. However, Macrovision supports a range of solutions to enhance and protect content in the data track.
- Transparent to the user regardless of playing device, and does not change the user experience.
- Protected discs are highly compatible with all types of players, including PCs and consoles.
- No format change is necessary on the protected disc.
- No additional space is used on the protected disc.

–Timing Option

- Used to provide maximum SafeAudio protection.
- Reduces compatibility with PC and DVD players. It is recommended this option be used in conjunction with DRM technology to provide PC playability.
- May be used on single session or multi-session CDs.
- Transparent to the user, and does not change the user experience.
- No format change is necessary on the protected disc.
- No additional space is used on the protected disc.

–Hide Audio Tracks on PCs Option

- Increases the effectiveness of SafeAudio protection.
- CD audio tracks are hidden on PCs and typically, a Yellow Book (data) session is shown containing DRM-protected music files that are playable on PCs.
- Reduces Red Book audio compatibility with PCs and some DVD players. It is recommended this option be used in conjunction with DRM technology to provide PC playability.
- Does not change user experience on standard CD players.
- May be used on single session or multi-session CDs. Single session CDs are converted to multi-session CDs.
- No additional space is used on the protected disc. However, multi-session CDs use more disc space than single session CDs, and DRM files, if used, will use about 10% of the CD's capacity.

SafeAudio Protection Generator Toolkit

- Processes audio tracks prior to mastering.
- Easy to use and may operate on the same machine as the encoder.
- Supports input in DDP format. The use of DDP allows SafeAudio to be applied after importing from various tape devices and from high-speed connections used between studios and factories.
- When the master is supplied as an audio CD, the image must first be converted to DDP format.
- Operates on Windows NT4 and Windows 2000.

Mastering and Replication Partners

For a current list of mastering and replication partners, or to become a SAFEAUDIO authorized facility, please contact your local Macrovision office.

SAFEAUDIO Protection Resellers

For a current list of SAFEAUDIO resellers, or to become a SAFEAUDIO authorized reseller, please contact your local Macrovision office.

www.macrovision.com

About Macrovision

Macrovision develops and markets digital rights management, electronic license management and copy protection technologies for the consumer interactive software, enterprise software, home video and music markets. Since 1986, Macrovision's copy protection technologies have been successfully utilized on over 4 billion CD-ROMs, DVDs and videocassettes in the consumer market. Macrovision has its corporate headquarters in Sunnyvale, California, with European headquarters in London and Asia-Pacific headquarters in Tokyo.

Macrovision's stock is publicly traded (NASDAQ: MVSN)

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Information subject to change without notice.
SAFEAUDIO V3.0 (document V3.0) 01/02