Copy Protection Framework for DVD Audio

1) The content of prerecorded DVD Audio discs may be encrypted to prevent unauthorized direct bit copies of either the original music content or related content from being playable. Only 'participating' devices will have a license to decrypt the prerecorded DVD Audio content. 'Participating' devices will be required to implement a framework for copy control of audio content as described below. Whenever the prerecorded DVD Audio disc is encrypted, the music content may also contain an audio-watermark. When present, this audio-watermark will be detected by 'participating' devices to control recording or playback of unauthorized digital copies made from the unencrypted digital or analog music content.

2) Copying the original DVD-Audio music content and/or related content (beyond a first copy of the music content as specified below) will be permitted only as authorized by the content owner. This authorization is specified by copy control information (CCI) that may be included with the DVD-Audio content, or provided via an electronic transaction as described below.

3) Any authorized copy made by 'participating' recorders must be encrypted in order to maintain protection for that copy. However, for the purposes of compatibility, 'participating' recorders may make unencrypted authorized copies on *legacy media* with a *sound quality equivalent to CD-Audio*, or less. Also, these unencrypted authorized copies will be audio-watermarked and the recorder must recognize and respond to watermarks, as specified below.

- **a)** *Sound quality equivalent to CD-Audio*, or less means, specifically: 2-channels or less, no greater than 48KHz sample frequency, no more than 16 bits per sample.
- **b)** *Legacy Media* means CDR, CDRW, Mini-Disc or DAT.

4) One copy of the original audio content will be authorized for personal use, per recorder, provided that the copy is at the sound quality equivalent to CD-Audio, or less. However, content owners will have the option of allowing additional copies, in which case they will determine both the number and characteristics of such copies by selecting values for the following CCI parameters on a music track by music track basis:

- **a)** Copy Permission Parameter, **C**
- **b)** Sound Quality Parameter, **Q**
- **c)** Related Content Parameter, **R**
- **d)** Transaction Parameter, **T**

5) When the contents of a DVD-Audio disc are sent to a 'participating' recorder in encrypted form, all of the CCI parameter settings present at the source must also be securely included in the transmission to the recorder input. The following options define the permissible values for the CCI parameters, which must be supported at both source and recorder.

- **a)** Copy Permission Parameter, C, specifies the number (N) of, or other conditions for, copies authorized (at the sound quality specified by Q), per participating recorder.
  - **i)** N = 1,2,3.. M. N=1 is the default value. This option requires the presence of an ISRC entry. The ISRC entry is to be stored by the 'participating' recorder for the purpose of tracking the number of copies made of a given title. If the ISRC entry is absent, the default becomes option ii) below.
  - **ii)** Single generation
  - **iii)** No More Copy. All authorized copies must be re-coded with this value to indicate that no further copies may be made.
  - **iv)** Copy control is not used.

- **b)** Sound Quality Parameter, Q, specifies the maximum sound quality of the permitted recording. There are three values supported
  - **i)** Equivalent to CD-Audio quality, or less. (This is the default value)
  - **ii)** 2-channel Full quality, (i.e. same as original source, or less)

iii) Multi-channel Full quality (i.e. same as original source, or less)

c) Related Content Parameter, R, determines the authorization status for copies of each element of related content

i) Authorized

ii) Not Authorized. (This is the default value)

d) The Transaction Parameter (T) is a pointer to optional access control parameters that support an alternative set of authorizations supplied on a transactional basis. These options, if present, over-ride the settings of the CCI. Whether or not the 'participating' device supports such authorizations or transactions is optional to the equipment manufacturer.

6) When the contents of a DVD-Audio disc are sent to a 'participating' recorder in either the unencrypted digital or the analog form, only the options listed below for the Copy Permission Parameter, C, and the Sound Quality Parameter, Q, will be transmitted. This information will be transmitted as part of the CCI audio-watermark embedded into the audio signal stream. In order to make a copy, the 'participating' recorder must detect the watermark in any audio stream, and support the following options:

a) The Copy Permission Parameter options for the watermark data are

i) Equivalent to CD-Audio quality, or less, copy permitted. This is the initial setting of the Copy Permission Parameter in the embedded watermark data.

ii) No more copies permitted. All authorized copies must be re-coded with this value to indicate that no further copies may be made.

b) The Sound Quality Parameter setting has only a single option in the watermark data

i) Equivalent to CD-Audio quality, or less.

If the 'participating' recorder lacks the capability to decode the audio signal and detect a watermark, if present in a given stream, then it will not record that stream

7) With the exception of analog outputs and legacy IEC-958, all other outputs of copy-protected DVD-Audio content from 'participating' DVD devices must be encrypted by an approved method. In the case of IEC-958, the following rules apply:

a) Except for compressed (excluding loss-less compression) audio, the output sound quality is to be equivalent to CD-Audio, or less

b) The output must not contain any related content if copy protection is asserted

c) The output must be at a rate not to exceed real-time transmission of the audio content

d) The output must include SCMS information set according and equivalent to the CCI Copy Permission Parameter, C, defined in 6)a)i), above

In the case of analog, the outputs from 'participating' devices must be at a rate not to exceed real-time transmission of the audio content

8) Resistance and response to attack. The implementation of 'participating devices' will be required to be at a level of robustness similar to that under discussion in the context of the CSS technology. Where a 'participating device' is a software program, tampering with the list of titles maintained by its recorder function to comply with the "N=" function described above would result in disabling that record function, requiring a complete reinstallation of the program and loss of set-up and preference items.

It is intended that the system will provide for renewability through device key expiration in the event that participating devices are compromised or subverted. Such expiration capability should be used and implemented

a) Without discrimination between software and hardware devices;

b) Compatibly with DVD ROM and Mount Fuji command sets (possibly with some redefinition), and

c) Only in accordance with fairness and due process.

At the option of the implementor and/or participating software owner,
Content participants will carry upgrades to participating devices whose keys have been expired on the DVD-Audio disc.