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**Datasheet for the decision
of 5 October 2007**

Case Number: T 1432/04 - 3.5.04

Application Number: 98300583.6

Publication Number: 0855715

IPC: G11B 27/10

Language of the proceedings: EN

Title of invention:

DVD audio disk reproducing device and method thereof

Applicant:

SAMSUNG ELECTRONICS CO., LTD.

Headword:

-

Relevant legal provisions:

EPC Art. 123(2), 56

Keyword:

"Main request: added subject-matter (yes)"

"Auxiliary requests: inventive step (no)"

Decisions cited:

-

Catchword:

-



Case Number: T 1432/04 - 3.5.04

D E C I S I O N
of the Technical Board of Appeal 3.5.04
of 5 October 2007

Appellant: SAMSUNG ELECTRONICS CO., LTD.
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 9 July 2004
refusing European application No. 98300583.6
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: F. Edlinger
Members: C. Kunzelmann
B. Müller

Summary of Facts and Submissions

- I. The appeal is against the decision of the examining division to refuse European patent application No. 98 300 583.6.
- II. With the statement of grounds of appeal the appellant filed claims 1 to 11 of a main request and claims 1 to 7 of a first auxiliary request. With a further letter dated 31 August 2007 the appellant filed claims 1 to 10 of a second auxiliary request.
- III. Claim 1 of the three current requests reads as follows.

Main request:

"A DVD disk, comprising:
information areas each storing an audio title information management table, wherein each audio title information management table includes bits indicating a first, second or third number of quantization bits of the audio data, bits indicating a first or second sampling frequency of the audio data, and information relating to a number of audio channels of the audio data; and
data areas each storing audio packs of a linear pulse code modulated (PCM) mode or a pseudo-lossless psychoacoustic coding mode, wherein each audio pack includes audio packets having bits indicating the first, second or third number of quantization bits, bits indicating the first or second sampling frequency and further having information relating to the number of audio channels corresponding to those bits and information which are recorded in each audio title

information management table, and the audio packets further containing corresponding portions of the audio data;

characterised in that:

the DVD disk is a DVD audio disk to store audio data, and,

the information relating to the number of audio channels is arranged to indicate more than eight audio channels."

The amendments of claim 1 of the first auxiliary request over claim 1 of the main request are indicated in *italics* and identical words which are missing are indicated by ellipses (...):

"A DVD disk, comprising:

information areas ...

data areas ... audio packets having bits indicating *one of the first, second or third number of quantization bits, bits indicating one of the first or second sampling frequency ...*

characterised in that:

the DVD disk is a DVD audio disk to store audio data;

the information relating to the number of audio channels is arranged to indicate more than eight audio channels;

the bits indicating the sampling frequency are arranged to indicate a first, second or third sampling frequency; and

wherein the respective data areas each store audio packs of either

(a) a linear PCM mode, and the first, second and third number of quantization bits are 16, 20, and 24 bits,

respectively, the first, second and third sampling frequencies are 48, 96, and 192KHz, respectively, a maximum number of the audio channels being 13, and the number of channels, N , being determined by the following equation:

$$N = \frac{Mbr}{Fs * Qb}$$

wherein, Fs is the sampling frequency (Hz) of the audio data, Qb is the number of quantization bits of the audio data, and Mbr is a maximum data transmission rate (10.08Mbps) of the DVD audio disk; or

(b) a pseudo-lossless psychoacoustic coding mode, and the pseudo-lossless psychoacoustic coding mode uses a Digital Theatre System (DTS) compressive coding mode, the first, second and third numbers of quantization bits of the audio data prior to compression are 16, 20, and 24 bits, respectively, the first, second and third sampling frequencies are 48, 96, and 192 KHz, respectively, a maximum number of the audio channels being 16 and, the number of channels, N , being determined by the following equation:

$$N = \frac{Mbr * Ccr}{Fs * Qb}$$

wherein, Fs is the sampling frequency (Hz), of the audio data, Qb is the number of quantization bits of the audio data, Mbr is a maximum data transmission rate (10.08Mbps) of the DVD audio disk, and Ccr is a compression ratio in accordance with the DTS compressive coding mode."

The amendments of claim 1 of the second auxiliary request over claim 1 of the main request are indicated in *italics* and identical words which are missing are indicated by ellipses (...):

"A DVD disk, comprising:
information areas ... bits indicating a first, second or *third* sampling frequency ...
data areas each storing audio packs of a linear pulse code modulated, *PCM*, mode ... bits indicating the first, second *or third* sampling frequency ...
the information relating to the number of audio channels is arranged to indicate *from eight to sixteen* audio channels *for pseudo-lossless psychoacoustic coding mode or from eight to thirteen audio channels for the linear PCM coding mode.*"

IV. With respect to the current main request, the reasons for the decision under appeal referred to document

D1: EP 0 737 008 A2

and can be summarized as follows.

D1 related to a DVD-Audio disk because it explicitly disclosed that the disk could comprise only audio data. D1 was the closest prior art and was therefore taken as a starting point for assessing inventive step. D1 disclosed an optical disk from which the subject-matter of claim 1 differed in that the information relating to the number of audio channels was arranged to indicate more than eight audio channels. The problem to be solved could thus be regarded as enabling the use of

more than eight audio channels. The use of more bits for specifying more possibilities (e.g. the number of audio channels) was well-known in the art. Since D1 disclosed a reserved bit (b51) in the audio stream attributes (figures 11 and 23) which was not used for any specific application, the skilled person faced with the above-mentioned problem would consider using this bit for extending the number of audio channels. Thus the subject-matter of claim 1 did not involve an inventive step within the meaning of Article 56 EPC.

- V. In a communication dated 3 April 2007 and annexed to a summons to oral proceedings the board expressed doubts whether features in claim 1 of the main request were allowable under Article 123(2) EPC. These doubts concerned the reference to "bits indicating a first or second sampling frequency" because in the application as originally filed, in particular in claim 1, there was a consistent disclosure of information to indicate a first, second or third sampling frequency. The doubts also concerned the reference to "arranged to indicate more than eight audio channels", since in the application as originally filed a maximum number of audio channels that could be indicated was given by the four bits used for indicating this, even if, theoretically, the calculated number of recordable audio channels could be as high as 52.

With respect to inventive step, the board indicated that at the date of filing a generally accepted meaning of the term "DVD audio disk" did not appear to have existed, but that serious proposals to develop a DVD standard for high quality audio had been publicly available. The board referred to a document by Bruekers,

A.A.M.L et al.: "Lossless coding for DVD Audio", Preprints of papers presented at the AES Convention, November 1996, [Preprint 4358, 101st Convention], in the following referred to as A1; and to Reference [1] cited therein: Acoustic Renaissance for Audio, Technical Subcommittee, "A proposal for the High-Quality Audio Application of High-Density CD Carriers", January 1996. Version 1.3, in the following referred to as A2. Also the application itself made clear that video and audio data could be recorded on both a DVD-Video disk and a DVD-Audio disk.

Concerning the first auxiliary request, the formulae given in claim 1 appeared to express in mathematical terms the aim of the invention indicated in the description, namely to record audio signals up to the number of channels limited by the transmission velocity of the data (the number being determined by equations in original claims 2 and 4). The particular sampling frequencies appeared to be the ones known from D1 (48 kHz and 96 kHz) and the double of 96 kHz. Furthermore increasing the number of channels seemed to be an obvious measure in view of the trends and ongoing discussions at the priority date of the application.

VI. The appellant's arguments can be summarized as follows.

The examining division had misinterpreted the teaching of D1 in relation to the storage of only audio data on the DVD-Video disk disclosed in D1. Even when playback data consisted only of audio data in D1, it would be constructed using the video object unit as a unit. This teaching clearly demonstrated the difference between the audio portion of a DVD-Video disk as known from D1

and the inventive concept of a DVD-Audio disk. The present application made clear that there were two formats, one for video and one for enhanced audio, and that DVD-Video disks were not adapted for audio-specific reproduction. For DVD-Audio the DVD specification had been amended and reserved bits had been used for re-specification of the number of audio channels. The invention made better use of the available DVD data transmission capacity to enable high quality audio signals to be recorded on DVD or to enable a large number of audio signals to be recorded on a DVD-Audio disk. As one of the aims of the invention was to enable audio recording at increased quality, the use of a video object unit/GOP structure including predicted and bi-directional interpolated frames of data was undesirable. Thus a person skilled in the art would not have considered D1 as a promising starting point for the invention. The claimed DVD-Audio disk was not constrained by the video object unit/GOP data structures of the D1 DVD-Video disk. The system of D1 was not capable of indicating that more than eight audio channels were recorded, as only 3 bits were used for this information.

Claim 1 of the first auxiliary request specified how the number of channels recorded on the DVD-Audio disk was determined by the type of audio coding, sampling frequency and number of quantization bits used for recording the audio packs. Even if a person skilled in the art had recognised that the DVD-Video disk of D1 could make use of the reserved bit b51 to extend the number of audio channels, he would not have thought to regulate the extra data that the use of further audio channels entailed in the way specified in claim 1.

Claim 1 of the second auxiliary request was based on the claims of the main request and amended to address the board's doubts concerning compliance with Article 123(2) EPC. Claim 1 referred to first, second or third sampling frequencies, and it indicated "from eight to sixteen audio channels" for pseudo-lossless psychoacoustic coding and "from eight to thirteen audio channels" for linear PCM coding. Documents A1 and A2 referred to a scheme requiring seven channels (two for CD data, five for high quality audio data) which made use of the extra capacity of a DVD disk to provide high quality audio in addition to backward compatibility with two channel CD equipment. The cited prior art did not fully realize the potential of the DVD format.

- VII. With a letter dated 31 August 2007 the appellant announced that he would not attend the oral proceedings. The appellant also filed new description pages 1 to 50 and claims 1 to 10 of the second auxiliary request (see point II above).
- VIII. The appellant requested that the decision under appeal be set aside and that the case be remitted to the examining division for the continuation of the examination procedure, in particular, for the issue of a communication under Rule 51(4) EPC, with the set of claims of the primary request and the first auxiliary request enclosed with the statement of grounds of appeal, and the second auxiliary request submitted with the letter dated 31 August 2007. The description enclosed with the letter dated 31 August 2007 was to replace the description on file for all of the three pending requests.

IX. Oral proceedings were held on 5 October 2007 in the absence of the appellant, in accordance with Rule 71(2) EPC. At the end of the oral proceedings the board gave its decision.

Reasons for the Decision

1. The appeal is admissible.
2. *Main request: added subject-matter (Article 123(2) EPC)*
 - 2.1 In the communication annexed to the summons to oral proceedings (see point V above) the board expressed doubts as to the allowability of amendments to claim 1 under Article 123(2) EPC, namely the omission, from claim 1 as originally filed, of (bits indicating) a third sampling frequency, which had been consistently presented in the application as filed as part of the information present in the information management table. Furthermore the board saw no disclosure, in the application as filed, of "information ... arranged to indicate more than eight audio channels", but only the specific disclosure of four bits used for indicating the number of channels, i.e. a maximum of sixteen channels, or numbers of audio channels which were limited by the transmission velocity of the data (the number being determined by the equations in original claims 2 and 4).

2.2 The appellant has not indicated any passages in the application as filed from which these amendments can be derived nor provided any arguments to dispel the board's doubts in this respect.

2.3 Therefore the board does not see any reason to depart from the provisional opinion in this respect and judges that the amendments of claim 1 of the main request infringe Article 123(2) EPC.

3. *First auxiliary request: inventive step (Article 56 EPC)*

3.1 The meaning of the characterising feature "DVD audio disk" in claim 1

3.1.1 According to Article 84 EPC, the claims shall define the matter for which protection is sought. The meaning of the expressions used in the claims is determined by claim construction. In the present case, this applies in particular to the disputed meaning of the expression "DVD audio disk" in the characterising portion of claim 1.

3.1.2 It is common ground that a standard for DVD-Audio had not been established at the priority date and was still under discussion even at (and after) the filing date. Even if a standard had been established, it could have encompassed the storing of video and other data in addition to audio data. Furthermore, taking into account that non-standard DVDs were also conceivable, a generally accepted meaning of the expression "DVD audio disk" did not exist at the relevant date of the present application. Thus the reference to a "DVD audio disk" in claim 1 does not specify that the DVD disk of

claim 1 may store **only** audio data. The description confirms that video and audio data can be recorded on a DVD-**Video** disk (see page 2, lines 5 to 16) and that on a "DVD **audio** disk" in accordance with the invention the audio information is changed in the VTSI_MAT of a DVD-**Video** disk (see page 25, lines 4 to 12).

Discrimination between a known DVD-Video and "DVD audio" is made, according to an embodiment of the present application, by comparing the number of audio channels or the value of the sampling frequencies with the values known for DVD-Video (see page 47, lines 12 to 35, and figure 21).

3.1.3 Furthermore, in both alternatives (a) and (b) specified in claim 1, the number of audio channels N is indicated as having a value of more than eight and of less than or equal to the respective maximum number given. And in the alternative (b) the maximum number of audio channels which is indicated is 16, even if the number of recordable audio channels, calculated using the equation specified in the claim, can be as high as 52 (see page 35, line 28, to page 37, line 4). Thus, even though the description envisages recording of audio data "up to the number of channels limited by the transmission velocity of the data and the coding mode" (see page 21, line 25, to page 22, line 2), claim 1 does not specify that the DVD disk may store **only** audio data.

3.1.4 The board therefore construes the expression "DVD audio disk" in the context of present claim 1 as a DVD which is suitable for use with only audio data, but may have video data.

3.2 The closest prior art

3.2.1 It was generally known before the priority date of the present application that the high capacity of the DVD ("Digital Versatile Disk") opened the way to numerous applications, for instance high quality audio or audio-only applications, for which standards were under discussion (see A1, Abstract and A2, "1. Introduction" on page 3). The appellant's argument that DVD-Video disks are not adapted for audio-specific reproduction does not take into account that such discussions existed and thus does not convince the board. Hence a DVD-Video disk was a realistic starting point for the development of a DVD suitable for use with only audio data.

3.2.2 It is uncontested that D1 discloses a DVD which comprises the features of the preamble of present claim 1 and which is suitable for use with only audio data. The board thus agrees with the decision under appeal that D1 may be taken as a starting point for assessing inventive step.

3.2.3 The appellant's argument that the DVD specified in claim 1 was not constrained by the video object/GOP data structures of the DVD of D1 did not convince the board because the DVD specified in claim 1 is not restricted to audio-only applications and the audio data transfer, depending on the amount of video data stored, may be constrained to a similar degree as in the DVD of D1.

3.3 The problem solved by the DVD specified in claim 1

3.3.1 With respect to the features distinguishing the DVD of claim 1 from that known from D1, the appellant has indicated that the system of D1 was not capable of indicating that more than eight audio channels were recorded, as only three bits were used for this information. Furthermore claim 1 specified how the number of channels recorded on the DVD-Audio disk was determined by the type of audio coding, sampling frequency and number of quantization bits used for recording the audio packs.

3.3.2 These features of claim 1 provide a DVD which allows better use to be made of the available DVD data transmission capacity, enabling high quality audio signals to be recorded on DVD or enabling a large number of audio signals to be recorded on a DVD-Audio disk. Embodiments relating to audio-only applications and higher quality audio are made possible, but claim 1 is not limited to such applications (see page 50, lines 4 to 16, of the description and points 3.1.2 and 3.1.3 above). In particular, the sampling frequencies of 48 kHz or 96 kHz and the 16, 20 or 24 quantization bits specified in claim 1 may be the same as in the DVD-Video of D1 (see column 24, lines 9 to 25), and the audio coding may be linear PCM as in D1 (see column 23, lines 34 to 36).

3.3.3 Claim 1 states that "the respective data areas each store audio packs of either (a) ... or (b) ...". These two alternatives, in combination with the remaining features of claim 1, each define a separate group of DVD disks, one using a linear PCM mode (alternative (a))

and the other using a pseudo-lossless psychoacoustic (compressive) coding mode. These alternatives may therefore be examined individually concerning the question of inventive step.

3.4 Solutions to the problem suggested in the prior art

3.4.1 It was already known at the priority date of the present application that the high capacity of the DVD opened, in particular, the way to high quality audio applications (see point 3.2.1 above). A number of different formats had been proposed for DVD-Audio, all claiming to fulfil requirements set by consumers, content providers, equipment manufacturers, and others. There was even an ongoing discussion within the audio community on creating a DVD standard for audio applications. The parameters essential for high quality audio applications were considered to be *inter alia* the number of channels, the sampling frequency and the number of bits per sample. Most of the proposals were enhancements of these parameters (see for instance A1, Abstract and the paragraph "Introduction"). Thus a person skilled in the art taking part in this discussion would have explored how an increased number of audio channels and an increased sampling frequency for high quality audio applications were achievable with a DVD as disclosed in D1.

3.4.2 In particular, such a suggested increase in the number of audio channels requires that these channels can be indicated on the DVD. In this context, the board agrees with the decision under appeal that a person skilled in the art would have considered using the reserved bit

b51 known from D1 (figures 11 and 23) to extend the number of audio channels indicated by bits b50 to b48.

3.4.3 The board is not convinced by the appellant's argument that a person skilled in the art would not have thought to regulate the extra data that the use of further audio channels entailed in the way specified in claim 1. The parameters mentioned in claim 1 (number of audio channels, sampling frequency, number of quantization bits) are the ones whose enhancement was being discussed (see point 3.4.1 above). Most of the numerical values given are known from D1 (see point 3.3.2 above). And the optional enhancement of the sampling frequency used for recording consists in a straightforward doubling of the highest value disclosed in D1, which already anticipates the possibility of indicating additional sampling frequencies (see D1, column 24, lines 22 to 25). The equations given in claim 1 express in mathematical terms that audio signals can be recorded up to the number of channels limited by the transmission velocity of the data. In particular, the maximum value specified in alternative (a) of claim 1 (13 channels for linear PCM) is the integer part of a value which can be calculated by applying the equation to the parameter couple of 48KHz and 16 bits (see Table 19 on page 28). And the maximum value specified in alternative (b) of claim 1 (16 channels for DTS compressive coding) is the number of audio channels which can be indicated using the four bits b51 to b48 (see figure 11, Table 18, and point 3.4.2 above), as the number calculated using the corresponding equation is higher.

3.5 In view of the above, the board is of the opinion that the subject-matter of at least alternative (a) covered by present claim 1, having regard to the state of the art at the priority date, merely represents a matter of normal design to implement a DVD-Audio application which was under discussion. The board thus judges that the DVD disk specified in claim 1 of the first auxiliary request covers embodiments which do not involve an inventive step (Article 56 EPC). Under these circumstances alternative (b) of claim 1 need not be examined in detail.

4. *Second auxiliary request: inventive step (Article 56 EPC)*

4.1 Claim 1 of the second auxiliary request is a generalisation of claim 1 of the first auxiliary request. The equations given in claim 1 of the first auxiliary request as well as the values of the parameters appearing therein have been omitted, and the feature of a third sampling frequency has been shifted from the characterising portion to the precharacterising portion. Hence, in accordance with the characterising portion, claim 1 of the second auxiliary request specifies DVD disks wherein "the information relating to the number of audio channels is arranged to indicate from eight to sixteen audio channels for pseudo-lossless psychoacoustic coding mode or from eight to thirteen audio channels for the linear PCM coding mode." The other amendments are editorial amendments in the precharacterising portion.

4.2 In view of the generalising amendments with respect to claim 1 of the first auxiliary request, the

argumentation as to a lack of inventive step in point 3 above also applies to the alternative of claim 1 of the second auxiliary request relating to the linear PCM coding mode.

- 4.3 The appellant's argument based on the backward compatibility with two channel CD equipment mentioned in A1 does not convince the board. The board agrees with the appellant that A1 specifies that "in total, $2 + 5 = 7$ separate channels are required". But the discussions on creating a DVD standard for audio applications (see point 3.4.1 above) were not limited to a maximum of 7 channels. For instance, A2 shows in Table 3 on page 13 that more than 7 channels were also being discussed.
- 4.4 The further argument that the cited prior art did not fully realize the potential of the DVD format does not convince the board either. While it is true that some of the particular parameter values specified in claim 1 were not disclosed in the available prior art, the board nevertheless holds that the subject-matter of present claim 1, having regard to the state of the art at the priority date, represents a matter of normal design to implement a DVD-Audio application which was under discussion.
- 4.5 The board thus judges that the DVD disk specified in claim 1 does not involve an inventive step (Article 56 EPC).

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

D. Sauter

F. Edlinger