Datasheet for the decision
of 8 September 2017

Case Number: T 0358/12 - 3.5.07
Application Number: 07811582.1
Publication Number: 2057630
IPC: G11B27/00, G11B27/28
Language of the proceedings: EN

Title of invention:
Method and apparatus for receiving, storing, and presenting multimedia programming without indexing prior to storage

Applicant:
EchoStar Technologies L.L.C.

Headword:
Seeking in MPEG multimedia without indexing/ECHOSTAR

Relevant legal provisions:
EPC Art. 84, 123(2), 56

Keyword:
Inventive step - after amendment (yes)
Claims - clarity and support in the description - after amendment (yes)
Amendments - added subject-matter - after amendment (no)
Decisions cited:

Catchword:
Case Number: T 0358/12 - 3.5.07

DECISION
of Technical Board of Appeal 3.5.07
of 8 September 2017

Appellant: EchoStar Technologies L.L.C.
(Applicant)
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Decision under appeal: Decision of the Examining Division of the European Patent Office posted on 22 September 2011 refusing European patent application No. 07811582.1 pursuant to Article 97(2) EPC.

Composition of the Board:
Chairman R. Moufang
Members: P. San-Bento Furtado
R. de Man
Summary of Facts and Submissions

I. The appeal lies from the decision of the Examining Division to refuse European patent application No. 07811582.1, which was filed as international application PCT/US2007/018955 and published as WO 2008/027406, on the grounds of added subject-matter and lack of clarity and of inventive step in independent claims 1 and 7 of the set of claims filed at the oral proceedings. The starting point for inventive-step assessment was the following document: D1: WO 97/19552 A, published on 29 May 1997.

II. In the statement of grounds of appeal, the appellant submitted a new set of claims 1 to 9 to replace the claims on which the contested decision was based, along with amended description pages.

III. In a communication accompanying a summons to oral proceedings, the Board introduced the following document into the proceedings: D3: WO 2005/050999 A, published on 2 June 2005.

With regard to the new claims, the Board reviewed the objections under Articles 84 and 123(2) EPC raised in the contested decision. It also raised new issues with regard to clarity, support by the description and added subject-matter.

It expressed its preliminary opinion that the subject-matter of claim 1 was not inventive over the disclosure of document D1 in combination with the disclosure of document D3 and the common general knowledge of the skilled person.
IV. With a letter of reply the appellant filed a new set of claims to replace all previous claims on file, along with amended description pages.

V. Oral proceedings were held on 8 September 2017. During the oral proceedings the appellant replaced its request with a new request comprising claims 1 to 8 and description pages 3, 4, 4A and 4B. At the end of the oral proceedings, the chairman pronounced the Board's decision.

VI. The appellant's final request was that the decision under appeal be set aside and that a patent be granted on the basis of the following documents:
- claims 1 to 8 of the sole request filed in the oral proceedings in appeal;
- description pages 1, 2 and 5 to 16 as published and pages 3, 4, 4A and 4B as filed in the oral proceedings in appeal;
- drawings sheets 1/6 to 6/6 as published.

VII. Claim 1 of the sole request reads as follows:
"A method of making a special presentation of digital multimedia programming in an MPEG stream stored on a hard disk where the special presentation is a non-contiguous trick mode in which programming data is loaded from the hard disk non-contiguously, which programming had not been indexed prior to its storage, the method comprising:
receiving (610) a seek input indicating the special presentation to be made;
determining the read size of a portion of the stored multimedia programming and loading (660) the portion of the stored multimedia programming of determined read size into a read buffer from a starting position based on the seek input;"
analyzing (680) the loaded portion of the programming to determine if a complete intra-coded frame of data is present; and

if a complete intra-coded frame is located, forwarding (690) the loaded portion of the programming for display to make (690) the special presentation;

characterised in that statistical information including an average group of picture (GOP) size and an average frame size is provided, and in that the method further comprises:

calculating (630) the read size of the portion of the stored multimedia programming to be loaded, the read size being twice the average group of picture (GOP) size but less than the read buffer size; and

calculating a starting read or seek position (640) by calculating a seek vector equal to the product of the number of frames to be skipped (610) and the average frame size (600), adding the calculated seek vector to the current file pointer position, and adjusting the result by subtracting half of the average group of picture (GOP) size."

Dependent claims 2 to 5 further define features of the method of preceding claims.

Claim 6 reads as follows:
"A digital video recorder (100) arranged to make a special presentation of digital multimedia programming in an MPEG stream stored on a hard disk, where the special presentation is a non-contiguous trick mode in which programming data is loaded from the hard disk non-contiguously, the recorder (100) comprising:

a hard disk (150) for storing the programming without indexing;

processing means (160) for determining the read size of a portion of the stored multimedia programming;
a user interface at which a seek input is received indicating the special presentation to be made;

a read buffer (220) for receiving the portion of the stored multimedia programming of determined read size, from a starting position based on the seek input; and

presentation means (130) for making the special presentation of the programming loaded into the read buffer (220) if analysis indicates that the loaded portion of the programming includes a complete intra-coded frame of data;

wherein if a complete intra-coded frame is located, the loaded portion of the programming is forwarded (680) by the processing means (160) to the presentation means (130);

characterised in that the processing means (160) receives statistical information including an average group of picture (GOP) size and an average frame size, and in that where the special presentation is to be non-contiguous, the processing means (160) is arranged to:

   calculate (630) the read size of the portion of the stored multimedia programming to be loaded, the read size being twice the average group of picture (GOP) size, but less than the read buffer size; and

   calculate a starting read or seek position (640) by calculating a seek vector equal to the product of the number of frames to be skipped (610) and the average frame size (600), adding the calculated seek vector to the current file pointer position, and adjusting the result by subtracting half of the average group of picture (GOP) size."

Dependent claims 7 and 8 further define features of the digital video recorder according to the preceding claim.
VIII. The appellant's arguments relevant to this decision are discussed in detail below.

Reasons for the Decision

1. The appeal complies with the provisions referred to in Rule 101 EPC and is therefore admissible.

2. Invention

2.1 The invention concerns "special presentation" in a "non-contiguous trick mode" of multimedia programming in an MPEG (Motion Pictures Experts Group) stream without indexing of the multimedia programming prior to its storage (page 5, lines 3 to 21, and page 11, lines 5 to 10 of the international publication). Special presentation comprises reverse play, slow motion forward play or rewind, fast forward play or rewind or skip forward or back (page 17, claim 2).

2.2 The method according to the invention uses statistical information that can be generated during normal presentation (forward play). When a user invokes a special operation, i.e. when "a seek input" is received in the language of the claims, the size of the portion of multimedia programming to be loaded is determined on the basis of the statistical information (page 3, lines 13 to 20, page 3, line 26 to page 4, line 3, page 17, claim 1). If the loaded portion does not include a complete frame, a second portion is loaded (page 16, lines 3 to 5, page 18, claim 8).

2.3 As explained on page 10, lines 12 to 26, the MPEG standard compresses video data by representing certain frames as a delta from previous or subsequent frames. MPEG video uses pictures encoded without referencing
any other frame, called intra-coded frames (I-frames),
and pictures encoded by referencing the delta from
previous frames (predictive P-frames) and from previous
and subsequent frames (bi-predictive B-frames). The
statistical information used in the invention may
include (page 12, Table 2):

- **avg_frm_size**: the average frame size taken over all
  frames encountered during playback;

- **I_spacing**: the average integer number of frames
  from one I-frame to the next, also referred to as a
  group of pictures (GOP);

- **GOP_size**: average group of pictures size,
  calculated as **I_spacing** * **avg_frm_size**.

2.4 The method of presentation according to the embodiment
of Figure 6 (page 11, line 13 to page 16, line 12)
determines in step 630 the "**read size**", i.e. "The size
of stored MPEG transport stream file data to be
read" (page 13, lines 26 and 27), and in step 640 the
"**seek position**" relative to the current read position
in the MPEG transport stream file. The current read
position is indicated by a file pointer (page 14,
lines 13 to 15).

The method takes into account whether the mode is
contiguous or not. As explained on page 11, lines 9
and 10, a non-contiguous trick mode is any trick mode
that loads stored data non-contiguously. The
presentation mode is contiguous "if every frame is
displayed (e.g., linear(play)) or if the number of
frames to be skipped is fewer than or equal to
(**I_spacing**)" (page 13, lines 6 to 18).

For non-contiguous modes, the read size is twice the
average group of pictures size. According to the
description on page 14, lines 2 to 6, "By setting read
size at twice the GOP size but less than the maximum buffer size, system resources are conserved while maintaining a high probability that a complete I-frame is loaded to the read buffer.

The seek position is obtained (page 14, lines 21 to 28) by first calculating a seek vector equal to the product of the frames to be skipped (set at step 610) and the average frame size (determined at step 600), and then obtaining the seek position by means of the following formula, wherein Origin is the current file pointer position:

\[ \text{Seek\_Position} = \text{Origin} + \text{Seek\_vector} - \text{GOP\_size}/2. \]

According to the description, the adjustment by half of the GOP size increases accuracy (page 14, lines 23 and 24).

3. Support by the application as originally filed

3.1 In the decision under appeal, the Examining Division noted that original independent claim 1 specified the step of "providing statistical information" and original independent claim 20 recited "processing means for receiving statistical information". The original application disclosed only two ways of generating the statistical information, i.e. broadcasting of such information or generation of such information at the video recorder by statistical analysis during normal presentation of the stored multimedia programming. The independent claims on which the decision was based referred to "statistical information", without however specifying it further. There was no basis in the original application for such a general "statistical information".
That objection no longer applies because the current independent claims specify that statistical information is provided which includes an average GOP size and an average frame size. A basis for that feature can be found in the application as filed, for instance on page 11, lines 15 and 16.

3.2 The method of claim 1 corresponds to the method of making a special presentation in non-contiguous trick mode of Figure 6, which is described in the application as originally filed on page 11, line 13 to page 16.

More specifically, the MPEG stream stored on a hard disk is mentioned e.g. on page 6, lines 20 to 22, and on page 13, lines 26 to 30, and the non-contiguous trick mode is defined on page 11, lines 9 and 10. It is clear, for example from the title on page 1 of the description and original claim 1, that the invention is directed to making a special presentation of multimedia programming without prior indexing. The statistical information is described on page 11, line 13 to page 12, line 9, including Table 2.

Step 610 of receiving seek input indicating the special presentation to be made is disclosed in original claims 1 and 11 and on page 12, lines 10 and 11. The step of determining the read size and the further specification of that feature as step 630 of calculating the read size are disclosed on page 13, line 26, to page 14, line 5. In the Board's opinion, the skilled person understands that the "maximum buffer size" mentioned on page 14, lines 2 to 5, is intended to refer to the size of the read buffer, i.e. to the "read buffer size" now mentioned in the claims.
Steps 660 and 680 of, respectively, loading the portion of stored multimedia and analysing the loaded portion are described on page 15, lines 1 to 3 and on page 15, line 26, to page 16, line 5; step 690 of forwarding the loaded portion is disclosed on page 16, lines 13 to 14; finally, step 640 of calculating a starting read or seek position is disclosed on page 14, lines 21 to 26.

3.3 The features of the digital video recorder defined in independent claim 6 are shown in Figure 1 and described on page 5, line 9 to page 7, line 16. The read buffer is mentioned e.g. on page 8, lines 4 to 9, and on page 15, lines 1 to 3. The other features of claim 6 are disclosed in the passages given above with regard to claim 1.

3.4 Dependent claims 2 to 5, 7 and 8 correspond to original claims 3, 6, 8, 15, 22 and 23, respectively. The features of dependent claims 7 and 8 are also disclosed in Figure 1.

3.5 The Board therefore concludes that the claims comply with Article 123(2) EPC.

4. Clarity and support by the description

4.1 In the contested decision, the Examining Division raised clarity objections with regard to the features "maximum size of the read buffer", "product of the frames to be skipped and the average frame size" and "average group of picture size".

The first two features, "maximum size of the read buffer" and "product of the frames to be skipped and the average frame size", are no longer recited in the
claims, so the corresponding objections no longer apply.

The Examining Division considered the expression "average group of picture size" to be unclear, because the claim was ambiguous as to what qualified as statistical information and did not specify on the basis of which groups of pictures the average was determined.

The appellant essentially argued that the term was known in the art and that the application described two possible ways of obtaining the value, either during normal presentation or from pre-generated statistical information referred to as "spoof" information in the application.

In the Board's opinion, the skilled person understands that the "average group of picture size" is an estimate of the average size of GOPs in the digital multimedia programming that could be determined in different ways. That person also understands from the claims how that estimate is used in the context of the claimed method. The Board therefore does not agree with the Examining Division's objection.

4.2 In its preliminary opinion, the Board expressed doubts with regard to clarity and support by the description of the features "where the special presentation is to be non-contiguous" and "adjusting the result by half of the average group of pictures (GOP) size".

These objections have been overcome by amendment. In particular, the present independent claims additionally specify that the non-contiguous trick mode is a special presentation "in which programming data is loaded from
the hard disk non-contiguously". This definition is clear and supported by the original description, see page 11, lines 9 and 10. The definition of the adjustment in the independent claims was also amended to recite that the result is adjusted "by subtracting half of the average group of picture (GOP) size", in accordance with the description on page 14, lines 23 to 26.

4.3 The fact that the claim does not specify how the file pointer position is updated does not prejudice the clarity of the claim. The Board considers that the skilled person knows how to implement the current file pointer so that the method works correctly; a more detailed description of the feature "current file pointer position" is thus not necessary.

4.4 The Board has no other objections and is therefore satisfied that the claims satisfy the requirements of Article 84 EPC.

5. **Inventive step**

5.1 In the decision under appeal and in the Board's preliminary opinion, document D1 was the starting point for assessing inventive step for the claimed invention.

Document D1 discloses a method for retrieving I-frames for fast forward or reverse playback without previously known address information (Figure 3, pages 24 to 27). The method uses a sequence number \( I \) of the next I-frame to be displayed which is determined on the basis of the current playback mode, and a storage block counter \( K \), which is used to identify the storage block to be read. After setting \( K \) to an initial block to be read, the value of \( K \) is set each time to an estimate
corresponding to the beginning of the next I-frame. The estimate is calculated from its previous value by adding or subtracting a constant M for forward or reverse playback respectively. The value of M "can be specified based on the compression ratio and the playback speed or it may be continuously adjusted based on the observed number of storage blocks separating the most recently-retrieved I-frames" (page 24, lines 1 to 20).

After retrieving the storage block identified by K, the method of document D1 examines the sequence to identify I-frames. If the loaded block does not have an I-frame, then an adjacent storage block is retrieved (page 24, line 21 to page 25, line 7). Once the beginning of the desired I-frame is found, the data is provided to the decoder for displaying.

In the Board's opinion, in document D1 a starting read or seek position is calculated on the basis of statistical information, namely the "observed number of storage blocks separating the most recently-retrieved I-frames". Adding M to K corresponds to "adding the calculated seek vector to the current file pointer position".

5.1.1 The method of claim 1 differs from that of document D1 essentially in that

(i) the read size of the portion of the stored multimedia programming to be loaded is twice the average GOP size but less than the read buffer size;

(ii) the seek vector is equal to the product of the number of frames to be skipped and the average frame size;
(iii) the result of adding the seek vector to the current file pointer position is adjusted by subtracting half the average GOP size.

5.2 As discussed at the oral proceedings, document D3 is also an adequate starting point and discloses feature (ii).

Specifically, document D3 discloses a method for reproducing a trick play signal from an "encrypted video stream" or "conditional access video stream" of MPEG information stored in a storage device such as a hard disk (page 1, lines 1 to 16, page 3, line 28 to page 4, line 4, Figure 1). The method enables non-contiguous trick mode replay, for example fast forward at 2, 4, 8 or 16 times the normal rate, without previously indexing the stored video stream (page 2, lines 18 to 21, page 4, lines 14 to 19).

In order to reproduce a video stream, the access controller of the system of document D3 supplies a series of segment starting addresses and segment length information to the storage device in order to retrieve the segments (page 4, lines 4 to 10). During trick play, the system of document D3 searches for the first occurring I-frame in each segment and outputs only that frame for display (page 4, lines 16 to 19). Document D3 discloses on page 6, lines 28 and 29, that when a segment does not contain a complete I-frame, display of a previous I-frame may be repeated.

The method of document D3 also calculates an average GOP size and an average frame length, the latter corresponding to the average frame size (page 5, line 28 to page 6, line 8, page 7, lines 9 to 18). Document D3 discloses different ways to set the value
of the segment length. For example, that value can be initially set to the average GOP size plus the maximum I-frame size for fetching successive segments (page 6, lines 1 to 8). It may also be adapted dynamically during replay, using a feedback loop, so that on average the number of I-frames in each data segment equals a predetermined value such as 1.0 or 1.2 (page 4, line 33, to page 5, line 4, page 7, lines 19 to 30).

The distance between the starting addresses is adapted to the stream and trick play speed, and is calculated for example as the product of the distance in frames and average frame length. The distance in frames equals the trick play speed factor relative to the normal play speed (page 6, line 32 to page 7, line 7). The method of document D3 therefore also discloses calculating a starting read or seek position by calculating a seek vector in the same way as in the method of claim 1.

5.2.1 The subject-matter of claim 1 differs from the method of document D3 in that:
(a) the read size is twice the average GOP size
(a') but less than the read buffer size;
(b) the result of adding the seek vector to the current file pointer position is adjusted by subtracting half the average GOP size.

5.3 The Board has no doubts that the claimed method in general, and the distinguishing features in particular, have technical character, since they contribute to the technical problem of retrieving from a stored MPEG stream a desired video frame, without knowledge of the storage area (address and length) in which the necessary stream data is stored.
5.4 The distinguishing features identified in the decision under appeal with regard to document D1 also included features (a), (a') and (b). According to the contested decision, the particular choice of the read size of the claimed invention, including feature (a), could not be regarded as being better than the read size of document D1. Whether the distinguishing features led to faster processing in the context of a special presentation depended on many factors not known from the claim (e.g. the variation of the GOP sizes).

In the grounds of appeal the appellant argued that there was no requirement in the EPC that an invention should be better or have an advantage. The obviousness argument was based on ex post facto analysis.

Although the Board tends to agree with the Examining Division that faster processing of a special presentation is not achieved by the distinguishing features in all cases, some arguments of the contested decision are not convincing. In particular, it is in principle sufficient that the effect of the invention is achievable for an identifiable class of cases and, as argued by the appellant, there is no requirement in the EPC that an invention be better or advantageous. Whether generating the statistical information involves as much overhead as creating an index is not directly relevant to the question of efficiency or inventive step, because the statistical information could be created once and used several times and, anyway, the problem solved by the distinguishing technical features could be seen as finding an alternative solution.

5.5 In line with the decision under appeal, the Board finds obvious that the data read from disk should not exceed the read buffer size, as recited in feature (a').
5.6 In its reply to the Board's preliminary opinion and at the oral proceedings, the appellant argued that all three factors used to determine which portion of data to read - read size, seek vector, and adjustment - contributed to obtaining a target I-frame to be displayed. Setting all three on the basis of the average GOP size brought additional advantages of maintaining accuracy across different average GOP sizes. In practice, half the time the portion of programming being processed had a size shorter, and half the time longer, than the average GOP size. Where it had a shorter-than-average GOP size, the pointer position would overshoot the actual position of the target I-frame. Thus, at least half the time, the methods known from the prior art would initially miss the target I-frame, requiring more data to be read to find it, or else degrading the playback quality of the trick mode.

The technical problem named by the appellant presumes that the method of the invention intends to retrieve a particular I-frame, the "target I-frame". The description of the present application explains on page 14, lines 23 and 24, that the purpose of the adjustment is to increase accuracy, and discloses on page 12, lines 10 to 20, that the system determines the number of frames to skip for the particular special presentation chosen by the user. The Board finds that the purpose of obtaining a target I-frame can be derived from those passages, where the target I-frame is the particular I-frame to be retrieved such that a specific number of frames is skipped.

The Board therefore recognises at least in part the effect mentioned by the appellant insofar as it
acknowledges that feature (a) contributes to obtaining a complete I-frame and feature (b) increases accuracy of the seek to a target I-frame.

5.7 With regard to feature (b), the Examining Division argued that it was common practice to apply an adjustment when seeking to a new position in magnetic and optical disc devices, in order to prevent an overshoot and sequential backward seek operation. The Board however is not convinced that it was obvious to apply that idea in the present case. Such adjustments are commonly used to compensate for inaccuracy due to user reaction time or due to lack of precision of the hardware, but those contexts are remote from the present one. In the present case, the MPEG stream is stored on a disk, the exact position is unknown and there is no sequential backward seek operation. It is therefore not obvious to apply such an adjustment in the present different context.

The Board is not convinced that, without further hints, the skilled person would consider solving the problem stated above by subtracting half the GOP size to adjust the file position (b). None of the cited prior-art documents discloses or suggests feature (b).

Since the Board is convinced that feature (b) is inventive, it does not have to decide whether features (a) and (b) interact to achieve a combined effect, as argued by the appellant.

5.8 Features (a), (a') and (b) correspond to features (i) and (iii), distinguishing the subject-matter of claim 1 from the method of document D1. Starting inventive-step assessment from document D1 will therefore lead to the same conclusion as that reached for document D3.
5.9 The Board is therefore satisfied that the subject-matter of claim 1, and of corresponding independent claim 6, is inventive over the cited prior art within the meaning of Article 56 EPC. Since the subject-matter of the dependent claims includes all the features of the corresponding independent claims, their subject-matter is also inventive.

6. Conclusion

From the above, the Board concludes that the claims comply with Articles 84, 123(2), 52(1) and 56 EPC. The description has been adapted to the present claims. No other deficiencies can be identified with regard to the application documents on file. The case is therefore to be remitted to the department of first instance with the order to grant a patent.
Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to grant a patent on the basis of the following documents:
   - claims 1 to 8 of the sole request as filed in the oral proceedings in appeal;
   - description pages 1, 2 and 5 to 16 as published and 3, 4, 4A and 4B as filed in the oral proceedings in appeal;
   - drawings sheets 1/6 to 6/6 as published.

The Registrar: The Chairman:

I. Aperribay R. Moufang

Decision electronically authenticated