

**Internal distribution code:**

- (A) [ - ] Publication in OJ  
(B) [ - ] To Chairmen and Members  
(C) [ - ] To Chairmen  
(D) [ X ] No distribution

**Datasheet for the decision  
of 15 January 2015**

**Case Number:** T 0854/10 - 3.5.04  
**Application Number:** 07717453.0  
**Publication Number:** 1985123  
**IPC:** H04N7/26, H04N7/50  
**Language of the proceedings:** EN  
**Title of invention:**  
ADAPTIVE FILTERING TO ENHANCE VIDEO ENCODER PERFORMANCE  
**Applicant:**  
QUALCOMM Incorporated  
**Headword:**  
  
**Relevant legal provisions:**  
EPC 1973 Art. 56, 84, 111(1)  
EPC 1973 R. 67  
**Keyword:**  
Inventive step - (no)  
Claims - clarity - auxiliary request (no)  
Reimbursement of appeal fee - (no)  
Remittal to the department of first instance - (yes)  
**Decisions cited:**  
G 0010/93  
**Catchword:**



**Beschwerdekammern  
Boards of Appeal  
Chambres de recours**

European Patent Office  
D-80298 MUNICH  
GERMANY  
Tel. +49 (0) 89 2399-0  
Fax +49 (0) 89 2399-4465

Case Number: T 0854/10 - 3.5.04

**D E C I S I O N  
of Technical Board of Appeal 3.5.04  
of 15 January 2015**

**Appellant:** QUALCOMM Incorporated  
(Applicant) Attn: International IP Administration  
5775 Morehouse Drive  
San Diego, CA 92121 (US)

**Representative:** Heselberger, Johannes  
Bardehle Pagenberg Partnerschaft mbB  
Patentanwälte, Rechtsanwälte  
Prinzregentenplatz 7  
81675 München (DE)

**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 3 December 2009  
refusing European patent application  
No. 07717453.0 pursuant to Article 97(2) 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. 07 717 453.0 under Article 97(2) of the European Patent Convention (EPC).
- II. The decision under appeal referred to the following prior-art documents:
- D1: EP 1 603 338 A1,  
D3: EP 0 984 634 A2, and  
D4: US 6 507 615 B1.
- III. The application was refused on the grounds that claim 1 of the main request was not clear (Article 84 EPC) and, said lack of clarity notwithstanding, its subject-matter did not involve an inventive step (Article 56 EPC) in view of D1. The subject-matter of claim 1 of the first, second and third auxiliary requests was found not to involve an inventive step in view of D1, D3 and D4.
- IV. The applicant appealed and requested that the decision be set aside. With the statement of grounds of appeal, the appellant (applicant) filed claim sets according to new auxiliary requests I to V and maintained the claims of the main request. Moreover, the appellant requested the reimbursement of the appeal fee.
- V. Claim 1 of the main request reads as follows:
- "A method comprising:  
applying a filter to a video frame;  
applying a video encoder using quantization parameter (QP) information to encode the filtered video frame;

receiving performance information relating to the video encoder; and  
adjusting the QP information and the filter based on the performance information, characterized in that the method further comprises obtaining video frame recording information indicating video frame size, encoding bit rate, and frame rate, wherein adjusting the QP information and the filter includes adjusting the QP information and the filter based on both the performance information and the recording information."

VI. Claim 1 of auxiliary request I reads as follows:

"A method comprising:  
applying a filter in a video front end which includes a video sensor and the filter to a video frame prior to transferring the video frame from the video front end to a video back end which includes a video encoder and a video record or transmit device, the video front end and the video back [end] being included in a video recording system;  
applying the video encoder using quantization parameter (QP) information to encode the filtered video frame;  
receiving performance information from the video back end, the performance information relating to the video encoder; and  
adjusting the QP information and the filter based on the performance information, characterized in that the method further comprises obtaining video frame recording information from a recording settings unit separate from the front end and the back end and included in the video recording system, the recording information indicating video frame size, encoding bit rate, and frame rate, wherein adjusting the QP information and the filter includes adjusting the QP

information and the filter based on both the performance information and the recording information."

VII. Claim 1 of auxiliary request II reads as follows:

"A method comprising:  
applying a filter in a video front end which includes a video sensor and the filter to a video frame prior to transferring the video frame from the video front end to a video back end which includes a video encoder and a video record or transmit device, the video front end and the video back [end] being included in a video recording system;  
applying the video encoder using quantization parameter (QP) information to encode the filtered video frame;  
receiving performance information from the video back end, the performance information relating to the video encoder; and  
adjusting the QP information and the filter based on the performance information, wherein the performance information relating to the video encoder includes frame variance information and bit-rate control information."

VIII. In a letter dated 24 March 2011 the appellant enclosed the "List of References cited by the examiner" of the parallel US case and requested that these documents (A to F) be taken into account during the further examination.

IX. The board issued a communication pursuant to Article 15(1) of the Rules of Procedure of the Boards of Appeal (RPBA), annexed to a summons to oral proceedings dated 30 September 2014. In this communication the board expressed doubts as to whether the technical meaning of certain expressions of claim 1

of the main request was clear in the context of the application (Article 84 EPC 1973). The board also expressed doubts that the subject-matter of claim 1 of the main request involved an inventive step (Article 56 EPC 1973) in view of D1. Some of the objections raised against claim 1 of the main request were also raised in the context of the auxiliary requests.

- X. No reply to the board's communication was received.
- XI. Oral proceedings before the board were held on 15 January 2015. In the oral proceedings, the appellant filed claims 1 to 17 of an auxiliary request IIa. The appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main request as underlying the decision under appeal, or to remit the case to the department of first instance with the order to grant a patent based on the main request or one of the auxiliary requests I and II, both filed with the statement of grounds of appeal, or auxiliary request IIa, submitted in the oral proceedings before the board, or auxiliary requests III to V, all filed with the statement of grounds of appeal. The appellant further requested reimbursement of the appeal fee. At the end of the oral proceedings the chairman announced the board's decision.
- XII. Claim 1 of auxiliary request IIa reads as follows:
- "A method comprising:  
applying a filter in a video front end which includes a video sensor and the filter to a video frame of a video sequence prior to transferring the video frame from the video front end to a video back end which includes a video encoder and a video record device, the video

front end and the video back [end] being included in a video recording system;  
applying the video encoder using quantization parameter (QP) information to encode the filtered video frame;  
receiving performance information from the video back end, the performance information relating to the video encoder; and  
adjusting the QP information and the filter based on frame variance and bit-rate control information included in the performance information, wherein the frame variance information indicates an amount of spatial complexity content in the frame, and the bit-rate control information indicates a number of encoding bits applied by the encoder in excess of a bit-rate threshold;  
the method further comprising:  
receiving a different video frame of the video sequence;  
applying the adjusted filter to the different video frame; and  
applying the adjusted QP information to the video encoder to encode the different video frame."

XIII. The wording of the claims of auxiliary requests III, IV and V has no bearing on the present decision.

XIV. The reasons for the decision under appeal may be summarised as follows:

Concerning the clarity of claim 1 of the main request, the two expressions "performance information relating to the video encoder" and "video frame recording information" were not standard wording in the domain of the invention. They were not sufficiently defined in the claim, either.

Concerning the inventive step of the method of claim 1 of the main request, document D1 was considered the closest prior art. The filter disclosed in D1 was a pre-filter aiming at solving the same problem as the one posed in the present application. D1 gave clear indications to use, in quantisation parameter control and in filter control, parameters which could be related to "performance information" and "recording information". The bit stream encode volume in D1 was considered to be "performance information relating to the video encoder", in particular bit-rate control information, and the target bit rate in D1 was considered to correspond to the encoding bit rate specified in claim 1 and consequently was considered to be "video frame recording information". It was obvious therefrom that frame size and rate would enter the calculation of the target bit rate in D1, which thus rendered obvious all the features of claim 1.

Claim 1 of the then first auxiliary request only differed from the method known from D1 in that the performance information further included frame variance information. Thus the problem to be solved could be regarded as taking into account the characteristics of the input video. It was known from D4 that including frame variance information of the input video in filter adjustment provided the same advantages as in the present application. And it was well-known that frame variance information ("intra-frame complexity" in D4) could be used also for quantisation parameter control. Thus it would have been a normal design option to include frame variance information as performance information in the method of D1 in order to solve the problem posed.



The subject-matter of claim 1 of the second auxiliary request differed from the one of the main request in that the performance information included frame bit rate information, frame size information, the QP information, and frame motion information. However, D1 already included frame bit rate information and QP information for the purpose of controlling the QP information and the filter, and the parameters specified in claim 1 were well-known to be used for affecting the encoding bit rate. D1 gave clear indications that they might be used also for affecting the pre-filter.

Claim 1 of the third auxiliary request combined features of the higher-ranking requests relating to the "performance information". It also specified that the frame variance information indicated an amount of spatial complexity content in the frame, and that the bit rate control information indicated a number of encoding bits applied by the encoder in excess of a bit rate threshold. The parameters relating to the performance information could be equated with parameters disclosed in D1 or D4 or D3 or with further parameters well-known in the prior art for the purpose of bit rate control.

XV. The appellant's arguments may be summarised as follows:

The two expressions "performance information relating to the video encoder" and "video frame recording information" were broad but nevertheless clear. The former had the meaning of information about the performance of the video encoder and the latter of information about the recording of video frames. In particular, the performance information indicated the

result of the encoding process, not an encoding parameter used during the encoding process.

D1 could be considered as the closest prior art. However, D1 did not disclose that a video encoder obtained video frame recording information indicating video frame size, encoding bit rate and frame rate. Nor did D1 disclose that quantisation parameter information adjustment and a (pre-)filter adjustment each were made based on both this specific recording information and performance information. These features permitted avoiding excessive bit rate overshoot and resulting frame skipping which produced artifacts and undermined the quality of the video.

Thus the problem underlying the invention was to efficiently accelerate the adjustment of the filter and to further improve the video quality, or in more general terms, to find a better compromise to avoid overshooting in the case of claim 1 submitted in the oral proceedings (auxiliary request IIa).

D1 aimed at controlling the characteristics of the pre-filter without the need for any complicated computation. In particular, the pre-filter control was based on only one or two of the encoding parameters of the video encoder. However, these encoding parameters did not comprise any information about the performance of the video encoder. Performance indicated the result of the encoding process. Thus D1 guided a person skilled in the art to a different solution.

D1 also disclosed in the embodiment of figure 19 that a target bit rate could be input from an external source. However, this input only affected the pre-filter

adjustment, but not the quantisation parameter adjustment. Furthermore, any target bit rate in D1 could not be considered to be recording information but instead was encoding information.

D4 suggested the thinning of pixels and change of the resolution to reflect at least some of the characteristics of a series of moving pictures in a single real-time operation. This involved a simulation of the coding. Such a complicated measure was not compatible with the teaching of D1, which was to use only one or two encoding parameters for the pre-filter adjustment.

Auxiliary request I emphasised that the filter was applied prior to encoding and further clarified the distinction to be made between the recording information and the performance information. It also specified that the recording information was recording settings information received from a recording settings unit separate from the front end and the back end of the video recording system. These features were not suggested by any of the cited prior-art documents.

Auxiliary request II, in comparison with the main request, further specified that the performance information relating to the video encoder included frame variance information and bit rate control information. Variance was a generally known term, and a person skilled in the art would have understood its meaning in the context of giving feedback about the performance of the video encoder. Claim 1 thus clearly defined a feature of video encoder performance which was not known from any of the cited prior-art documents.

Auxiliary request IIa specified more precisely the parameters which were used to adjust the filter and the quantisation parameter information and clarified the nature of the feedback considered in the application. It also addressed the issue that some auxiliary requests referred to a recording settings unit even though they included the option of a video transmit device instead of a video record device.

The reimbursement of the appeal fee was requested because the examining division had not taken into account an essential argument of the applicant. In particular, the applicant had argued in the oral proceedings that the person skilled in the art would not have had an incentive to combine documents D1 and D4. This argument was reflected in the minutes of the oral proceedings. However, it was neither addressed nor reflected in the decision under appeal. This breached the applicant's right to a fair process and constituted a substantial procedural violation.

### **Reasons for the Decision**

1. The appeal is admissible.
2. *Main request: construction of claim 1*
  - 2.1 The examining division objected to the expressions "performance information relating to the video encoder" and "video frame recording information" in claim 1. However, as convincingly argued by the appellant, these expressions themselves are broad but nevertheless clear. The former has the meaning of information about the performance of the video encoder and the latter of information about the recording of video frames. In

particular, in the context of the application the performance of the video encoder may be reflected in the result of the encoding process and thus may also be dependent on the characteristics of the input video frame including the complexity of its contents.

2.2 For the purpose of the present decision the board sees no need to take a position on whether all the examples of performance information and recording information given in the description and the dependent claims may be considered as "performance information relating to the video encoder" or "video frame recording information" within the meaning of claim 1 of auxiliary request IIa.

3. *Main request:*  
*inventive step (Article 56 EPC 1973)*

3.1 It is uncontested that document D1 may be considered as the closest prior art for the assessment of the method of claim 1.

3.2 D1 discloses a video encoding method which is suitable for cellular phones, TV phone systems, and the like (see paragraph [0001]). The method comprises applying a filter (pre-filter 101) to a video frame before the video frame is forwarded to an encoder (encoding means 116) (see figures 1 and 19, and paragraphs [0010] to [0012]). The encoder encodes the filtered video frame (see paragraphs [0013] to [0056]). In particular, the encoder uses quantisation parameter information (quantiser scale  $Q_p$ ) to encode the filtered video frame (see paragraph [0023]). The method of D1 also comprises receiving performance information relating to the video encoder at a filter control means 117, 117a (see paragraph [0014] and figures 1 and 19). Examples

of performance information indicating the result of the encoding process are the encode volume and the parameters having a correlation with the encode volume, such as the inter/intra ratio (see paragraphs [0014] to [0017]). Furthermore, in D1 both the QP information and the filter are adjusted on the basis of the output of an encode volume control means 115, 115b (see paragraphs [0033] to [0036]). Details of the filter adjustment are described in paragraphs [0042] to [0052]. For instance the filter may be adjusted by providing filter characteristics control data K, which are determined based on both the encode volume and the inter/intra ratio, to the filter (see paragraph [0018] in conjunction with paragraph [0051]). The QP parameter is adjusted on the basis of the encode volume of the bit stream ultimately output by the encoder (see paragraph [0034]).

3.2.1 D1 also discloses in the context of the fourth embodiment illustrated in figure 19 the "external provision of parameters about controlling the encode volume", in particular in order to lower the target bit rate in the encoder if there are problems in the transmission path downstream of the encoder. Examples of such external input parameters are a compression rate and a bit rate. The external input parameter is input to the encode volume control means and the filter control means (see paragraphs [0080] to [0084]).

3.3 D1 does not disclose obtaining video frame recording information indicating video frame size, encoding bit rate, and frame rate. Consequently, D1 also does not disclose adjusting the QP information and the filter based on both the performance information and the recording information.

3.4 The board is not convinced that the inclusion of these features in their broad meaning allows the problem indicated by the appellant, i.e. to efficiently accelerate the adjustment of the filter and to further improve the video quality, to be solved. But the board accepts the more general problem formulated by the appellant, namely to find a better compromise to avoid overshooting as the problem underlying the invention. Indeed, in D1 the adjustment of both the QP information and the filter on the basis of the output of encode volume control means 115 constitutes a feedback loop which serves to control the encode volume (see paragraphs [0034] and [0036]). This feedback also allows a better control of the target bit rate, thereby avoiding overshooting (see D1, paragraphs [0090] and [0093]). This may lead to an improvement of the video quality at a given bit rate, or to a lower bit rate for a given video quality. Thus, in the present application the additional consideration of video frame recording information in the adjustment of the filter and the QP information is part of the considerations of a person skilled in the art, who always has to strive for a suitable compromise between coding bit rate and video quality.

3.5 It is common general knowledge that the bit stream output by the encoder should be in conformity with the external boundary conditions arising from the intended further use of the bit stream, such as transmission or recording in a desired quality. Also, the embodiments of D1 refer to target parameters (for instance, the target bit rate in paragraphs [0014] and [0017] concerning the first embodiment, or the target bit rate and the target compression rate in paragraphs [0081] and [0082] concerning the fourth embodiment). Such target parameters may arise from the external boundary

conditions as discussed in point 3.2.1 above. Thus it would have been obvious to a person skilled in the art to include in the feedback loop of D1 other parameters reflecting such external boundary conditions than those explicitly discussed in D1, such as video frame recording information reflecting desired recording settings.

3.6 Also, the present application indicates that the specific parameters included in the video frame recording information specified in claim 1, namely video frame size, encoding bit rate, and frame rate, are the settings selected for recording a video sequence (see in particular paragraph [0032]). These settings may be selected by a user or an application and may refer to qualitative information such as high quality or large frame size (see paragraph [0037]). There is no disclosure in the present application of a specific relationship between the recording settings and the adjustment of the QP information and the filter. Instead, video frame size, encoding bit rate, and frame rate are merely examples of recording settings (see paragraphs [0044], [0054], [0065], [0068] and [0071]).

3.7 The appellant's argument that in the embodiment of figure 19 in D1 the filter was not adjusted on the basis of the input bit rate did not convince the board in view of the disclosure in paragraphs [0080], [0081] and [0090] and figure 19 of D1. Also the argument that in D1 the pre-filter control was based on only one or two of the encoding parameters of the video encoder, and thus led a person skilled in the art away from using additionally recording information, did not convince the board, in particular in view of the disclosure of the fourth embodiment. The disclosure of



D1 as a whole aims at reducing the volume of computation by providing a data table (see D1, paragraphs [0005] and [0043]). This does not dissuade a person skilled in the art from taking into account parameters reflecting external boundary conditions.

3.8 In view of the above the board finds that the method of claim 1 of the main request does not involve an inventive step (Article 56 EPC 1973).

4. *Auxiliary request I:  
inventive step (Article 56 EPC 1973)*

4.1 Claim 1 of auxiliary request I further clarifies the technical context of the invention in that it specifies a video recording system including a video front end, a video back end and a recording settings unit. The video front end includes a video sensor and the adjustable filter discussed above in the context of the main request, and the video back end includes the encoder discussed above and a video record or transmit device. This further distinguishes recording information originating from the recording settings unit and performance information originating from the video back end.

4.2 However, the application does not indicate that the general structure of a video recording system including a video front end, a video back end and a recording settings unit has an effect on the filtering or encoding. In particular, the application does not indicate that the filter adjustment and the QP information adjustment discussed in the context of the main request might be affected by the fact that the filter is included in a video front end and the encoder is included in a video back end. Also, the separate

- recording settings unit included in the video recording system according to the application merely allows the obtaining of the recording settings, i.e. the video frame recording information, but has otherwise no technical effect.
- 4.3 The appellant has not submitted any arguments based on this general structure of the video recording system which would change the assessment of inventive step made above in the context of the main request, and the board does not see any such arguments, either.
- 4.4 In view of the above the board finds that the method of claim 1 does not involve an inventive step (Article 56 EPC 1973).
5. *Auxiliary request II:  
clarity (Article 84 EPC 1973)*
- 5.1 Claim 1 of auxiliary request II includes the feature that the performance information includes "frame variance information and bit-rate control information".
- 5.2 The expression "frame variance information" may have a number of different technical meanings, dependent on context. In the technical context of the present application a number of different meanings are conceivable. For instance, it could mean information about some content variation between different frames (temporal variation), or information about some content variation within a frame (spatial variation). Temporal variation might for instance concern consecutive or non-consecutive frames, or might concern entire frames or particular blocks within frames. Spatial variation might for instance concern luminance, chrominance or other colour-related value variations within a frame.

Frame variance information might also mean the variation of some encoding parameter used when encoding different frames.

5.3 Thus the technical meaning of the expression "frame variance information" in the context of claim 1 is not clear. Also the fact that it is included in the "performance information relating to the video encoder" only excludes meanings which are independent of the performance of the video encoder.

5.4 In view of the above the board finds that claim 1 of auxiliary request II is not clear (Article 84 EPC 1973).

6. *Auxiliary request IIa:  
remittal (Article 111(1) EPC 1973)*

6.1 The board admitted auxiliary request IIa into the appeal proceedings as a reasonable reaction to objections and arguments raised for the first time in the oral proceedings before the board.

6.2 Claim 1 of auxiliary request IIa further specifies claim 1 of auxiliary request II and includes features of claim 1 of the first and third auxiliary requests on which the decision under appeal is based.

6.3 However, the arguments given in the decision under appeal with respect to the then first and third auxiliary requests do not directly apply to claim 1 of the auxiliary request IIa.

6.3.1 First, claim 1 of auxiliary request IIa clearly specifies that the frame variance is included in the performance information relating to the encoder **and**

indicates an amount of spatial complexity content in the frame (emphasis by the board). This implies that the spatial complexity of the encoded frame is being considered, not the spatial complexity of the input frame. The unencoded input frame does not reflect encoder performance. Of course, the two spatial complexities are interrelated, but they are not identical (see also paragraph [0040]). As convincingly argued by the appellant, the encoding process, for instance the quantisation, may influence the spatial complexity of the encoded frame. As a consequence, the relevance of D4 needs to be reconsidered, since the parts of D4 referred to in the decision under appeal take into consideration the complexity of the input frame (see equation (1) in column 17 of D4).

- 6.3.2 Furthermore, upon correct interpretation claim 1 of auxiliary request IIa specifies that each of the QP information and the filter are adjusted based on both frame variance and bit-rate control information as defined in claim 1.
- 6.3.3 Furthermore, the reasoning in the decision under appeal included the understanding that the problem to be solved (when compared with D1) could be formulated as "taking into account the characteristics of the input video". This formulation of the problem is, at least, not appropriate in view of the present wording of claim 1. This also entails the necessity of a fresh analysis of prior-art documents such as D1 and D4.
- 6.4 Moreover, the appellant has also requested that the further prior-art documents cited in the parallel US case be taken into account. Thus full examination of the amended claims is now necessary.

6.5 In view of the above, the board considers it appropriate that the examination of the amended claims and the further prior-art documents be carried out by the examining division. Full examination is the task of the examining division, not the board of appeal (see Decision of the Enlarged Board of Appeal G 10/93, OJ EPO 1995, 172, point 4 of the Reasons).

6.6 Thus the board decided to exercise its discretion under Article 111(1) EPC 1973 in remitting the case to the department of first instance for further prosecution.

7. *Reimbursement of the appeal fee (Rule 67 EPC 1973)*

7.1 The appellant requested the reimbursement of the appeal fee because the examining division allegedly had not taken into account in its decision the essential argument that the person skilled in the art would not have had an incentive to combine documents D1 and D4.

7.2 In the context of deciding on claim 1 of the first auxiliary request, the examining division analysed in point 4.1 of the decision under appeal the features of claim 1 which were known from D1, and in point 4.2 concluded that the subject-matter of claim 1 differed from the known method in that the performance information further included frame variance information. In point 4.3 it formulated the problem which it considered to be relevant for the assessment of inventive step, and in point 4.4 it stated that the differing feature was known from D4. It also stated that "it is well-known that intra-frame complexity, as defined in document D4, may be used also for quantisation parameter control, even if the wording of the claim is broad enough to include the case that only the filter is adjusted based on frame variance

information, as disclosed in document D1." Point 4.5 then states that "the skilled person would therefore regard it as a normal design option to include this feature in the method described in document D1 in order to solve the problem posed."

7.3 Thus the examining division took the view that a person skilled in the art would have combined documents D1 and D4 because it was a normal design option to include the feature described in D4 in the method of D1. This is also consistent with the more complete discussion of the appellant's argument in the oral proceedings (see page 4 of the minutes: "The examining division argued that in the current application there are different embodiments using different control parameters and there is no detail on how these parameters are used in combination. No special technical effect could be seen in using particular parameters in combination. Since the application does not present a synergy effect using different parameters, the separate teachings of D1 and D4 could be combined to assess inventive step.")

7.4 Hence the appellant's allegation that the examining division had not taken into account the essential argument mentioned in point 7.1 above is not correct. The argument was implicitly taken into account, albeit in a manner which apparently did not convince the appellant.

7.5 In view of the above, the request for reimbursement of the appeal fee must be refused.

## 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 for further prosecution.
3. The request for reimbursement of the appeal fee is refused.

The Registrar:

The Chairman:



V. Commare

F. Edlinger

Decision electronically authenticated