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**Datasheet for the decision
of 21 May 2024**

Case Number: T 2021/20 - 3.5.04

Application Number: 13737509.3

Publication Number: 2868086

IPC: H04N7/00

Language of the proceedings: EN

Title of invention:

VIDEO PARAMETER SET FOR HEVC AND EXTENSIONS

Applicant:

QUALCOMM INCORPORATED

Headword:

Relevant legal provisions:

RPBA 2020 Art. 12(4), 12(6)
EPC Art. 56

Keyword:

Main request and first to third auxiliary requests - amendment admitted (yes)

Main request and first to third auxiliary requests - inventive step (no)

Fourth auxiliary request - should have been submitted in first-instance proceedings (yes)

Decisions cited:

Catchword:



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Case Number: T 2021/20 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 21 May 2024

Appellant: QUALCOMM INCORPORATED
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5775 Morehouse Drive
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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 6 July 2020
refusing European patent application
No. 13737509.3 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair B. Willems
Members: F. Sanahuja
G. Decker

Summary of Facts and Submissions

I. The appeal is against the examining division's decision to refuse European patent application No. 13 737 509.3.

II. The documents cited in the decision under appeal included the following:

D4 Y. K. Wang et al., "*AHG12: Video parameter set and its use in 3D-HEVC*", Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, 9th Meeting, Geneva, CH, 27 April to 7 May 2012, document no. JCTVC-I0571, server date: 28 April 2012, XP030112334

D6 B. Bross et al., "*High Efficiency Video Coding (HEVC) text specification draft 7*", Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, 9th Meeting, Geneva, CH, 27 April to 7 May 2012, document no. JCTVC-I1003_d0, server date: 10 May 2012, XP030112373

III. The application was refused on the following grounds.

(a) The subject-matter of claim 1 of the then-pending main request and auxiliary requests 1 and 2 lacked inventive step over the disclosure of document D4 combined with the disclosure of document D6 and the common general knowledge of the person skilled in the art (Article 56 EPC).

(b) Claim 1 of the then-pending auxiliary requests 1 and 2 was not clear (Article 84 EPC).

(c) The subject-matter of claim 1 of the then-pending auxiliary request 3 extended beyond the content of the application as filed (Article 123(2) EPC).

IV. The applicant (appellant) filed notice of appeal. With its statement of grounds of appeal, the appellant filed a main request and submitted that this main request corresponded to the main request on which the decision under appeal was based in which a typographical error had been addressed. The appellant also filed first to fourth auxiliary requests. It stated that those requests were based on the claim requests that had formed the basis of the contested decision and indicated a basis for the amendments. Moreover, the appellant addressed each ground for refusal of the application.

V. The appellant was summoned to oral proceedings. In a communication under Article 15(1) RPBA, the board introduced document

D7 G. Sullivan and J. R. Ohm, "*Meeting report of the ninth meeting of the Joint Collaborative Team on Video Coding (JCT-VC), Geneva, CH, 27 Apr - 7 May 2012*", Joint Collaborative Team on Video coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, 9th Meeting, Geneva, CH, 27 April to 7 May 2012, document no. JCTVC-I_Notes_dD, 8 May 2012, retrieved from: https://www.itu.int/wftp3/av-arch/jctvc-site/2012_04_I_Geneva/JCTVC-I_Notes_dD.doc

into the proceedings and gave the following preliminary opinion.

- (a) The subject-matter of claim 1 of the main request and the first to third auxiliary requests lacked inventive step over the combined disclosure of documents D4 and D6 and the common general knowledge of the person skilled in the art (Article 56 EPC).
- (b) The subject-matter of claim 1 of the main request and the first to third auxiliary requests lacked inventive step over the combined disclosure of documents D7 and D6 (Article 56 EPC).
- (c) The board was inclined not to admit the fourth auxiliary request into the proceedings under Article 12(6), second sentence, RPBA.

VI. By letter of 30 April 2024, the appellant withdrew its request for oral proceedings.

The oral proceedings were cancelled.

VII. It appears from the file that the appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of the claims according to the main request or, alternatively, one of the first to fourth auxiliary requests, all requests filed with the statement of grounds of appeal.

VIII. Claim 1 of the **main request** and the **first auxiliary request** reads as follows:

"A method of decoding High-Efficiency Video Coding, HEVC, or HEVC-extension video data, the method comprising:

receiving (221), in a video parameter set, one or more syntax elements that include information related to hypothetical reference decoder, HRD, parameters;

receiving (222), in the video data, a first sequence parameter set comprising a first syntax element identifying the video parameter set;

receiving (223), in the video data, a second sequence parameter set comprising a second syntax element identifying the video parameter set; and

decoding (224), based on the one or more syntax elements, a first set of video blocks associated with the first sequence parameter set and a second set of video blocks associated with the second sequence parameter set."

- IX. Claim 1 of the **second auxiliary request** differs from claim 1 of the main request in that the following text has been appended to the receiving step (221):

", wherein the one or more syntax elements that include information related to HRD parameters comprise a syntax element indicating the HRD parameters are signaled in the video data and further comprise one or more syntax elements indicating a coded picture buffer size"

- X. Claim 1 of the **third auxiliary request** differs from claim 1 of the second auxiliary request in that the following text has been appended to the receiving step (221):

"and further comprise a syntax element indicating a bitrate for the video data"

- XI. Claim 1 of the **fourth auxiliary request** differs from claim 1 of the third auxiliary request in that the following text has been added at the end of the claim:

"wherein one or more syntax elements of the VPS are conditionally present in a sequence parameter set, the one or more syntax elements conditionally present in the sequence parameter set overriding the one or more syntax of the VPS"

Reasons for the Decision

1. The appeal is admissible.
2. *Decision in written proceedings*

In reply to the summons to oral proceedings and the board's communication under Article 15(1) RPBA, the appellant withdrew its request for oral proceedings. Since in the case at hand the board does not consider holding oral proceedings to be expedient or necessary under Article 116(1) EPC, the oral proceedings were cancelled. As the case at hand is ready for decision and the requirements of Articles 113(1) and 116(1) EPC are complied with, the board issues the decision in written proceedings pursuant to Article 12(8) RPBA.

3. *The invention*
 - 3.1 The invention relates to coding image data.
 - 3.2 In High-Efficiency Video Coding (HEVC), both video parameter sets (VPSs) and sequence parameter sets (SPSs) are syntax structures containing syntax elements that apply to zero or more entire coded video sequences. A coded video sequence is a sequence of

access units that consists, in decoding order, of an instantaneous decoding refresh (IDR) access unit followed by zero or more non-IDR access units including all subsequent access units up to but not including any subsequent IDR access unit (see paragraph [0029] of the description and points 3.25 and 3.99 of D6).

Both structures allow for providing syntax elements which change infrequently. The VPS is one level above the SPS. That is, the applicable VPS set of parameters for an image is determined by a reference to a VPS in the SPS for that image (see paragraph [0029] and [0030] of the description).

- 3.3 The invention describes design methods for VPSs and SPSs, in particular for including information related to a hypothetical reference decoder (HRD) in a VPS.
4. *Main request and first to third auxiliary requests - admittance (Article 12(4) RPBA)*
 - 4.1 Under Article 12(2) and (4) RPBA, a submission constitutes an amendment if it is not directed to the requests, facts, objections, arguments and evidence on which the decision under appeal was based. Any such amendment may be admitted only at the discretion of the board.
 - 4.2 In the current case, the correction of a typographical error in claim 1 of the main request, the deletion of dependent claims in the first auxiliary request, and the amendments to the claims of the second and third auxiliary requests do not substantially change the subject-matter of the proceedings. Thus, the board exercises its discretion under Article 12(4) RPBA by admitting these requests into the appeal proceedings.

5. *Main request and first auxiliary request - inventive step starting from document D4 (Article 56 EPC)*
- 5.1 An invention is to be considered to involve an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art (Article 56 EPC).
- 5.2 The examining division identified document D4 as the closest prior art for the assessment of inventive step (see decision under appeal, point 1.1.2). The appellant did not dispute this, and the board considers that D4 is a suitable starting point.
- 5.3 It is undisputed that the subject-matter of claim 1 of the main request differs from the disclosure of document D4 in that the VPS includes HRD parameters (see point 1.1.3 of the decision under appeal and point 7.2 of the statement of grounds of appeal).
- 5.4 According to the appellant, the objective technical problem may be formulated as how to improve coding efficiency (see section 7.3 of the statement of grounds of appeal).
 - 5.4.1 The board considers that this problem is formulated too broadly and should be reformulated in view of the technical effect of the distinguishing features.
 - 5.4.2 The distinguishing feature reduces the bandwidth requirements by signalling information once in a VPS, the information being typically included in SPSs and being either the same for all the SPSs or the same for at least two SPSs (see paragraph [0094] of the description).

- 5.4.3 Therefore, the board agrees with the examining division that the objective technical problem may be formulated as how to reduce the bandwidth requirements of VPSs and SPSs (see point 1.1.5 of the decision under appeal).

- 5.5 The examining division opined that the person skilled in the art would learn from D4 that a VPS contained a set of parameters that applied to all SPSs (see point 1.1.6 of the decision under appeal). The board is not convinced that this statement is correct.
 - 5.5.1 The VPS disclosed in D4 includes a syntax element for identifying an instance (see `video_parameter_set_id` in section 1.2.1 and its definition in section 1.2.2). The SPS includes a syntax element for identifying a VPS referred to by the SPS (see `video_parameter_set_id` in section 1.2.3 and its definition in section 1.2.4).
 - 5.5.2 If a VPS applied to all SPSs, neither of these syntax elements would be necessary as there would be only one VPS and therefore no need to refer to it. Instead, according to D4 (see abstract), a VPS can be shared by multiple SPSs. Thus, a VPS should be understood as conveying information shared by multiple SPSs but not necessarily by all of them.

- 5.6 The draft HEVC text specification D6 discloses that the SPS contains syntax elements that apply to zero or more entire coded video sequences as determined by the content of a `seq_parameter_set_id` syntax element found in the picture parameter set referred to by the `pic_parameter_set_id` syntax element found in each slice header (see definition 3.99 in D6). The SPS is the

highest parameter set in that draft HEVC text specification.

- 5.6.1 The authors of D4 proposed including the VPS one level above the SPS (see abstract). The VPS should include a plurality of syntax elements previously located in the SPS (see the highlighted syntax elements in section 1.2.1 and their definitions in section 1.2.2).
- 5.6.2 It is undisputed that the person skilled in the art would have known that moving syntax elements from the SPS to the VPS improved the coding efficiency by reducing the required bandwidth (see the second full paragraph on page 13, section 7.5 of the statement of grounds of appeal and point 1.1.6 of the decision under appeal). The board considers that this is correct provided that the values of the syntax elements are shared among a plurality of SPSs.
- 5.6.3 The board therefore agrees with the examining division's reasoning that the person skilled in the art would be motivated to look for further values of SPS syntax elements shared by a plurality of SPSs since these, if moved to the VPS, would reduce the bandwidth requirements of VPSs and SPSs.

The board also shares the view that it was within the ordinary capabilities of the person skilled in the art to recognise that the HRD syntax elements in the SPS contained duplicated values in a plurality of SPSs and to include these syntax elements in the VPS to solve the problem posed (see point 1.1.7 of the decision under appeal). Indeed, starting from D4 and performing a limited number of routine tests according to their common general knowledge, the person skilled in the art would have identified repeated values of SPS syntax

elements in a plurality of SPSs. They would thus have selected and included these elements in the VPS to reduce the bandwidth requirements (see also point 1.1.9.1 of the decision under appeal).

5.7 The appellant submitted that document D6 disclosed that HRD information changed from one sequence to the next (see section 7.4 of the statement of grounds of appeal). The person skilled in the art would have known that by moving HRD syntax elements from the SPS to the VPS, the codec would not be able to encode/decode the video stream described in D6 where the HRD parameters varied between two SPSs. The person skilled in the art would have understood this to be a disadvantage, and thus D6 taught away from signalling HRD parameters in the VPS (see section 7.6 of the statement of grounds of appeal). Therefore, the person skilled in the art would only consider moving information from the SPS to the VPS if such information did not change from sequence to sequence because they would have wanted to signal information at the highest level at which it remained constant (see the second and third full paragraphs on page 13, section 7.5 of the statement of grounds of appeal).

5.7.1 The board acknowledges that HRD information may change between two SPSs. However, as discussed above (see points 5.5.2 and 5.6.2), signalling parameters in the VPS does not require that they remain constant. The description of the application in hand acknowledges this aspect: "*as VPSs apply to entire coded video sequences, the VPS includes syntax elements that change infrequently*" (see paragraph [0030]). It follows that the changes in HRD parameters provided for in D6 are not incompatible with the proposed VPS structure of D4. Therefore, the fact that the HRD parameters may change

between SPSs would not have deterred the person skilled in the art from including them in the VPS.

5.7.2 Rather, the criterion for moving syntax elements from the SPS to the VPS seems to be whether the information conveyed by the syntax elements is shared by a plurality of SPSs. In such a case, including these syntax elements in a VPS and referencing the VPS from the SPS enables a reduction of the required bandwidth. Since this is the case for HRD information, the potential reduction in bandwidth by including HRD syntax elements in the VPS would have been apparent to the person skilled in the art.

5.8 The appellant also argued that the decision under appeal failed to substantiate how or why the person skilled in the art would have identified that HRD parameters were redundantly signalled in several SPSs (see section 7.6 of the statement of grounds of appeal).

5.8.1 However, the contested decision addresses this issue.

5.8.2 The examining division considered, and the appellant did not dispute, that the person skilled in the art would have known that moving syntax elements from the SPS to the VPS would reduce the required bandwidth in certain circumstances (see point 1.1.6 of the decision under appeal and point 5.6.2 above). Therefore, the person skilled in the art would have been motivated to test further SPS syntax elements.

5.8.3 Furthermore, the board agrees with the examining division that the person skilled in the art would have had no difficulty in identifying that SPSs included duplicated HRD parameters (see point 1.1.9.1 of the

decision under appeal). By ordinary observation or analysis of the values of the syntax elements of the SPS, they would have identified syntax elements of the SPS suitable to be included in the VPS.

5.9 According to the appellant (see point 8 of the statement of grounds of appeal), the independent claims of the first auxiliary request are unchanged from the independent claims of the main request. Therefore, the comments above apply to claim 1 of the first auxiliary request.

5.10 In view of the above, the subject-matter of claim 1 of the main request and the first auxiliary request lacks inventive step over the disclosure of document D4 combined with the disclosure of document D6 and the common general knowledge of the person skilled in the art (Article 56 EPC).

6. *Second and third auxiliary requests - inventive step starting from document D4 (Article 56 EPC)*

6.1 The subject-matter of claim 1 of the second and third auxiliary requests further defines the HRD syntax elements included in the VPS. These include "*a syntax element indicating the [sic] HRD parameters are signaled in the video data*" and "*one or more syntax elements indicating a coded picture buffer size*" in claim 1 of the second auxiliary request. The HRD parameters defined in claim 1 of the third auxiliary request further comprise "*a syntax element indicating a bitrate for the video data*".

6.2 It is undisputed that these syntax elements are not disclosed in D4 and thus constitute further

distinguishing features (see sections 9 and 10 of the statement of grounds of appeal).

6.3 The HEVC text specification draft D6 discloses the HRD syntax elements specified in claim 1 of the second and third auxiliary requests. They are located in the video usability information (VUI) in the SPS (see D6, `vui_parameters` in section 7.3.2.1 and syntax elements `nal_hrd_parameters_present_flag`, `bit_rate_value_minus1` and `cpb_size_value_minus1` in sections E.1.1 and E.1.2, and their definitions in sections E.2.1 and E.2.2). The distinguishing features thus shift known HRD parameters from the SPS to the VPS. The technical effect and the objective technical problem remain those of reducing the bandwidth requirements of VPSs and SPSS (see also points 5.4.2 and 5.4.3 above).

6.4 As set out in point 5.6 above, the person skilled in the art would have identified the potential bandwidth savings of moving the HRD parameters from the SPS to the VPS and would have moved them using only ordinary skills.

6.5 Therefore, the subject-matter of claim 1 of the second and third auxiliary requests lacks inventive step over the disclosure of document D4 combined with the disclosure of document D6 and the common general knowledge of the person skilled in the art (Article 56 EPC).

7. *Main request and first to third auxiliary requests - inventive step starting from document D7 (Article 56 EPC)*

7.1 D7 contains the minutes of discussions on the review of technical input documents (see the third paragraph in

the section entitled "Summary" on page 1). It reflects the discussions on a number of input documents such as D4 introducing higher layer parameter sets (see the section entitled "a. NAL Unit Header and high layer parameter set related" starting on page 62). Because document D7 reflects the contents of document D4, the board considers that D7 is an equally appropriate starting point for the assessment of inventive step as D4.

Document D7 acknowledges that the draft HEVC text specification at that time did not have *"a way to indicate a different profile, level or different HRD parameters, for different temporal layers"* and that the *"VPS would contain some of that"* (see page 64).

The claimed HRD parameters were known from the draft HEVC text specification D6 (see the relevant references to D6 in point 6.3 above). In view of the proposal to include HRD parameters for different layers in the VPS, it would have been obvious to the person skilled in the art, motivated by the associated bandwidth reduction, to include the HRD syntax elements for different temporal layers in the VPS.

7.2 Therefore, the subject-matter of claim 1 of each of the main request and the first to third auxiliary requests lacks inventive step over the combined disclosure of documents D7 and D6 (Article 56 EPC).

8. *Fourth auxiliary request - admittance (Article 12(6) RPBA)*

8.1 Under Article 12(6), second sentence, RPBA, the board must not admit requests, facts, objections or evidence which should have been submitted, or which were no

longer maintained, in the proceedings leading to the decision under appeal, unless the circumstances of the appeal case justify their admittance.

8.2 According to the appellant, the claims of the fourth auxiliary request are based on those of the third auxiliary request on which the decision under appeal was based (see section 3 of the statement of grounds of appeal).

8.2.1 The amendments to claim 1 of the fourth auxiliary request include the feature that *"one or more syntax elements of the VPS are conditionally present in a sequence parameter set, the one or more syntax elements conditionally present in the sequence parameter set overriding the one or more syntax of the VPS"* (see point 4.4 of the statement of grounds of appeal).

The appellant also submitted that the claims of the fourth auxiliary request omitted the features of claim 1 of the third auxiliary request on which the decision was based which the examining division had objected to for not being disclosed in the application as filed (Article 123(2) EPC). Thus, in the appellant's opinion, the examining division's objection no longer applied to these claims (see point 5.1 of the statement of grounds of appeal).

8.2.2 The appellant did not justify the filing of the fourth auxiliary request at this stage of the proceedings.

8.3 The board is of the view that the fourth auxiliary request should have been submitted in the proceedings leading to the decision under appeal for the following reasons.

- 8.3.1 It is apparent from the minutes of the oral proceedings before the examining division that, in response to the conclusion that the then-pending third auxiliary request did not meet the requirements of Article 123(2) EPC, the appellant chose not to file further requests (see points 7.1, 9 and 10 of the minutes).
- 8.3.2 Furthermore, the amendment to claim 1 identified in point 8.2.1 above has no equivalent in the original claims and is not included in any set of claims submitted before the examining division. The appellant indicated paragraphs [0007], [0039], [0107], [0108] and [0128] together with Tables 7, 8 and 9 of the application as filed as a basis for the amended feature (see point 4.4 of the statement of grounds of appeal).
- 8.3.3 If the appellant considered that the combination of features of claim 1 of the fourth auxiliary request filed with the statement of grounds of appeal overcame the objection under Article 123(2) EPC or contributed to novelty or inventive step, it should have filed an auxiliary request with such a claim during the first-instance proceedings and sought a decision of the examining division on that request.
- 8.3.4 The appellant has not pointed to any circumstances of the appeal case, and the board cannot identify any, justifying the admittance of the fourth auxiliary request.
- 8.3.5 The appellant's deliberate choice not to file further requests, in particular not to file a request corresponding to the fourth auxiliary request filed with the statement of grounds of appeal, prevented the examining division from issuing a decision on this request. Consequently, the subject-matter of claim 1 of

the fourth auxiliary request was never examined by the examining division.

If the board were to admit this request into the appeal proceedings, it would either have to examine fresh subject-matter and decide on it for the first time - which would be contrary to the primary object of the appeal proceedings to review the decision under appeal in a judicial manner (see Article 12(2) RPBA) - or it would have to remit the case to the examining division. Both options would be contrary to the principle of procedural economy.

8.3.6 In view of points 8.2 to 8.3.5 above, the board exercises its discretion under Article 12(6), second sentence, RPBA by not admitting the fourth auxiliary request into the proceedings.

9. *Conclusion*

9.1 The main request and the first to third auxiliary requests are not allowable because claim 1 of each of these requests does not meet the requirements of Article 56 EPC. The fourth auxiliary request is not admitted into the appeal proceedings. Since none of the appellant's requests is allowable, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chair:



K. Boelicke

B. Willems

Decision electronically authenticated