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Datasheet for the decision of 30 October 2013

Case Number: T 2124/12 - 3.5.04

Application Number: 08773865.4

Publication Number: 2297957

IPC: H04N7/24

Language of the proceedings: EN

Title of invention:
FAST CHANNEL SWITCHING IN TV BROADCAST SYSTEMS

Applicant:
Telefonaktiebolaget LM Ericsson (publ)

Headword:

Relevant legal provisions:
EPC Art. 83, 84

Keyword:
Sufficiency of disclosure - enabling disclosure (yes)
Claims - clarity - auxiliary request (yes)

Decisions cited:

Catchword:

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Case Number: T 2124/12 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 30 October 2013

Appellant: (Applicant)	Telefonaktiebolaget LM Ericsson (publ) 164 83 Stockholm (SE)
Representative:	Röthinger, Rainer c/o Wuesthoff & Wuesthoff Patent- und Rechtsanwälte Schweigerstraße 2 D-81541 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 19 March 2012 refusing European patent application No. 08773865.4 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: F. Edlinger
Members: R. Gerdes
B. Müller

Summary of Facts and Submissions

I. The appeal is directed against the decision to refuse European patent application No. 08 773 865.4, published as international application WO 2010/000288 A1.

II. The patent application was refused by the examining division on the grounds that claim 1 of all requests then on file did not comply with the requirements of Article 84 EPC. Furthermore, the examining division held that the application did not disclose the invention of claim 1 of each of the first to the fourth auxiliary requests in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 83 EPC).

III. The applicant appealed against this decision and with the statement of grounds of appeal submitted claims of a main request and a first and second auxiliary request replacing all requests on file. In support of its arguments relating to sufficiency of disclosure, the appellant introduced *inter alia* the following document

D6: Peterson, Larry L.; Davie, Bruce S.: "Computer Networks: A System Approach"; Sect. 5.4 "Transport for Real-Time Applications (RTP)", Elsevier, 1 March 2007.

IV. The board issued a summons to oral proceedings and indicated in the annex to the summons that it tended to agree with the appellant regarding the issue of Article 83 EPC. However, the board raised further objections with regard to clarity.

V. In reply the appellant submitted amended sets of claims of a main request and a first and second auxiliary request with a letter of 24 September 2013.

VI. Oral proceedings before the board were held on 30 October 2013. The appellant requested that the decision under appeal be set aside and that a patent be granted in the following version:

Claims:
Claims 1 to 14 of the main request filed with the letter of 24 September 2013, or
Claims 1 to 15 of the first auxiliary request filed in the oral proceedings, or
Claims 1 to 13 of the second auxiliary request filed in the oral proceedings.

Description:
Pages: 1, 9 to 14 and 17 as published.
Page: 2 filed with the letter of 16 March 2011.
Page: 6b filed with the letter of 24 September 2013.
Pages: 3 to 6, 6a, 7, 8, 15 and 16 filed in the oral proceedings.

Drawings:
Sheets: 1/8 to 8/8 as published.

VII. Independent claim 14 of the main request reads as follows:

"A channel switching information ("CSI") item provided for transmission on a secondary channel for supporting a fast channel switching in a system comprising multiple point-to-multipoint ("PTM") primary channels, wherein the CSI item (C_{AB}) comprises picture information associated with intra-coded pictures (I_A, I_B) of a pair of primary channels that are determined for a particular time instance (t_i) from one or more predictively coded pictures transmitted on the

corresponding primary channels, wherein the picture information represents a result of an XOR operation applied to the determined intra-coded picture (I_A) of a first one of the pair of primary channels and the determined intra-coded picture (I_B) of a second one of the pair of primary channels."

The remaining claims 1 to 13 of the main request have no bearing on the present decision.

VIII. The independent claims of the first auxiliary request are worded as follows:

"1. A method for supporting a fast channel switching in a system (100) comprising multiple point-to-multipoint ("PTM") primary channels, the method being performed on a transmitter (102) side and comprising the steps of:
- transmitting (402) pictures on each of the multiple PTM primary channels, wherein the pictures transmitted on the primary channels comprise predictively coded pictures; and
- transmitting (404) channel switching information ("CSI") items on a secondary channel for supporting a fast channel switching at a receiver (104) side, wherein the step of transmitting the CSI items comprises:
  - o determining (406) for particular time instances (t_i) intra-coded pictures (I_A, I_B, I_C) for the primary channels from one or more predictively coded pictures transmitted on the corresponding primary channels; and
  - o applying (408) an XOR operation to the determined intra-coded picture (I_A) for a first one of a pair of primary channels and the determined intra-coded picture (I_B) for a second one of the pair of

primary channels of a particular time instance (t_i) in order to generate a corresponding CSI item (C_{AB}), wherein each CSI item (C_{AB}) allows a determination of the intra-coded picture (I_B) of the second one of the pair of primary channels at the receiver (104) side based on the intra-coded picture (I_A) of the first one of the pair of primary channels."

"6. A method for supporting a fast channel switching in a system (100) comprising multiple point-to-multipoint ("PTM") primary channels, the method being performed on a receiver side (104) and comprising the steps of:
- receiving (602, 604) pictures on a first primary channel of the multiple PTM primary channels, wherein the received pictures comprise predictively coded pictures;
- receiving channel switching information ("CSI") items on a secondary channel, wherein each received CSI item (C_{AB}) comprises picture information associated with intra-coded pictures (I_A, I_B) of a pair of primary channels that are determined for a particular time instance (t_i) from one or more predictively coded pictures transmitted on the corresponding primary channels to the receiver, wherein the picture information represents the result of an XOR operation applied to the determined intra-coded picture (I_A) of a first one of the pair of primary channels and the determined intra-coded picture (I_B) of a second one of the pair of primary channels; and
- determining (606), in response to a request to switch from the first primary channel to a second primary channel of the multiple PTM primary channels at the particular time instance (t_i), an intra-coded picture (I_B) of the second primary channel by:

o determining (610) for the particular time instance (t_i) an intra-coded picture (I_A) from one or more received predictively coded pictures of the first primary channel; and
o performing (612) a first XOR operation on the determined intra-coded picture (I_A) of the first primary channel and the associated received CSI item for the particular time instance (t_i)."

"9. A computer program product comprising program code portions for performing the method of any one of the preceding claims when the computer program product is executed on one or more computing devices."

"11. A transmitter device adapted to support a fast channel switching in a system comprising multiple point-to-multipoint ("PTM") primary channels, the transmitter device (102) comprising:
- a first component (202) adapted to transmit pictures on each of the multiple PTM primary channels, wherein the pictures transmitted on the primary channels comprise predictively coded pictures; and
- a second component (108) adapted to transmit channel switching information ("CSI") items on a secondary channel for supporting a fast channel switching at a receiver side, wherein the second component (108) is further adapted to:
o determine for particular time instances (t_i) intra-coded pictures (I_A, I_B, I_C) from one or more predictively coded pictures transmitted on the corresponding primary channels; and
o apply an XOR operation to the determined intra-coded picture (I_A) of a first one of a pair of primary channels and the determined

intra-coded picture (I_B) of a second one of the pair of primary channels of a particular time instance in order to generate a corresponding CSI item (C_{AB}), wherein each CSI item (C_{AB}) allows a determination of the intra-coded picture (I_B) of the second one of the pair of primary channels at the receiver side based on the intra-coded picture (I_A) of the first one of the pair of primary channels."

"13. A receiver device adapted for a fast channel switching in a system comprising multiple point-to-multipoint ("PTM") primary channels, the receiver device (104) comprising:
- a first component (502) adapted to receive pictures on a first primary channel of the multiple PTM primary channels, wherein the received pictures comprise predictively coded pictures; and
- a second component (110) adapted to receive channel switching information ("CSI") items on a secondary channel, wherein each CSI item (C_{AB}) comprises picture information associated with intra-coded pictures (I_A, I_B) for a pair of primary channels that are determined for a particular time instance (t_i) from one or more predictively coded pictures transmitted on the corresponding primary channels to the receiver, wherein the picture information represents the result of an XOR operation applied to the determined intra-coded picture (I_A) of a first one of the pair of primary channels and the determined intra-coded picture (I_B) of a second one of the pair of primary channels, and wherein the second component (110) is further adapted to determine, in response to a request to switch from the first primary

channel to a second primary channel of the multiple PTM primary channels at the particular time instance (t_i), an intra-coded picture (I_B) of the second primary channel by

- o determining (610) for the particular time instance (t_i) an intra-coded picture (I_A) from one or more received predictively coded pictures of the first primary channel; and
- o performing (612) a first XOR operation on the determined intra-coded picture (I_A) of the first primary channel and the associated received CSI item for the particular time instance (t_i)."

The further claims 2 to 5, 7, 8, 10, 12, 14 and 15 are dependent on claims 1, 6, 9, 11 and 13, respectively.

IX. The claims of the second auxiliary request have no bearing on the present decision.

X. The examining division argued in the decision under appeal that there was an inconsistency in claim 1 between the size of the operands of the XOR operation applied to pairs of intra-coded pictures (I-pictures) generated from one or more predictively coded pictures. According to the examining division, the claimed XOR operator required the input of two operands, i.e. pairs of I-pictures, having exactly the same bit size. Since I-pictures were usually of variable size depending on their original picture content and since the application documents as filed did not provide any support for the interpretation that the generated I-pictures had the same bit size, it was unclear how the XOR operation was applied to a pair of intra-coded, i.e. compressed, pictures. In addition, there was no basis in the application for the assertion that padding

could be used to arrive at images of equal length or that special intra-coded images were generated.

The examining division thus concluded that the claims of the then first to fourth auxiliary requests were unclear and that the application did not disclose the invention in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art.

XI. The appellant's arguments can be summarised as follows:

The decision under appeal should be set aside because the examining division's objections regarding Article 83 and 84 EPC were not justified. The skilled person applying his common general knowledge would easily recognize that the application of an XOR operation on a pair of I-pictures required I-pictures of equal size. An XOR operation was a standard logical operation and was known to be a bit-wise operation performing a logical disjunction between respective bits of the input operands. There was no reason to assume that bit padding, alone or in combination with a quantization level adjustment, was not known to the skilled person, since bit padding was a popular and well-known technique for filling up the data size of pictures to a target data size. The appellant cited *inter alia* document D6 as proof of this common general knowledge.

Regarding the board's objection of lack of clarity of claim 14 according to the main request, the appellant argued that the claim specified a signal having a unique structure represented by a bit sequence. It was thus possible to distinguish the signal from other

digital signals. As a consequence, claim 14 was clear within the meaning of Article 84 EPC.

With respect to novelty and inventive step of the subject-matter of the independent claims according to the first auxiliary request, the appellant argued that the first examiner had already indicated in the International Preliminary Report on Patentability (see Item V, section 4) that the subject-matter of dependent claims 3 and 10 was considered to involve an inventive step. The features of these claims had now been incorporated into the independent claims. The documents referred to by the board in its communication relied on the use of SP- and SI-frames which were introduced in the H.264 standard. In contrast, the present invention allowed switching between any number of bitstreams in any direction by employing channel switching information (CSI) items that were generated by applying an XOR operation to every two I-frames.

Reasons for the Decision

1. The appeal is admissible.

2. The Invention

The invention relates to a method for fast channel switching in TV broadcast or similar systems. Generally, switching from a first channel A to a second channel B of a predictively coded video stream may only be effected with a considerable delay because - after having been tuned from channel A to channel B - the receiver has to wait for the next intra-coded picture (I-picture) of the second channel B in order to start

displaying that channel (see page 1, last paragraph to page 2, second paragraph).

The application proposes generating and transmitting channel switching information (CSI) items which allow reconstruction of an I-picture for channel B (to which the receiver switches). The generation of the CSI items on the transmitter side is effected in two steps. In the first step, I-pictures are generated for channels A and B for a particular time instance based on the predictively coded video stream. In the second step, a CSI item is generated by applying an XOR operation to the I-pictures for channels A and B. The CSI item is transmitted on a secondary channel in parallel to the coded video stream.

Before tuning to channel B the receiver obtains the predictively coded video stream of channel A and the CSI items. Based on the bitstream for channel A the receiver is able to generate a corresponding I-picture for the particular time instance. This I-picture and the CSI item can be combined at the receiver in an XOR operation to reconstruct the I-picture for the channel B for the particular time instance. Hence, the switching delay can be reduced (see page 7, last paragraph to page 8, second paragraph and page 13, first paragraph; page 14, first and second paragraphs; page 15, second paragraph together with figures 6A and 6B).

3. Main Request

3.1 According to Article 84 EPC, the claims shall define the matter for which protection is sought. They shall be clear and concise and be supported by the description.

3.2 Claim 14 relates to a channel switching information (CSI) item "wherein the CSI item (C_{AB}) comprises picture information associated with intra-coded pictures (I_A, I_B) of a pair of primary channels that are determined for a particular time instance (t_i) from one or more predictively coded pictures transmitted on the corresponding primary channels" and "wherein the picture information represents a result of an XOR operation applied to the determined intra-coded picture (I_A) of a first one of the pair of primary channels and the determined intra-coded picture (I_B) of a second one of the pair of primary channels."

3.3 Hence, according to claim 14 the CSI item is derived from two intra-coded pictures. Claim 14 in fact merely defines data representing picture information of given values which represent the result of an XOR operation. The values obtained by the XOR operation might be verified if the structure and the data of the given XORed intra-coded pictures were known. But even if they were, the result would merely constitute data which depended on the contents of the XORed pictures. No specific characteristics of the CSI items relating, for instance, to the structure of the CSI items are defined in the claim, nor are such specific and distinguishable characteristics disclosed in the application. As a result, claim 14 lacks clarity within the meaning of Article 84 EPC.

The board is not convinced by the appellant's argument that the CSI item can be considered as a bit sequence with a unique structure. The bit sequence resulting from the XOR operation depends entirely on the input values of the XOR operation, i.e. the I-pictures, and

can therefore not be distinguished from any other bit sequence without knowledge of the I-pictures.

3.4 It follows from the above that the main request is not allowable.

4. First Auxiliary Request, Article 123(2) EPC

4.1 Claim 1 according to the first auxiliary request is based on claims 1 to 3 of the application as published. The reference in claim 1 to "the particular time instances" can, for example, be derived from page 8 as published, lines 6 to 8. Independent claim 6 is based on claims 8 to 10 as published, claim 9 is based on claim 12 as published, claims 11 and 13 are based on claims 14 and 16 as published, with amendments being made corresponding to the method steps of claims 2 to 3 and claims 7 to 8, respectively. Dependent claims 2 to 5 correspond to claims 4 to 7 as published. Similarly, claims 8, 10, 12 and 15 correspond to claims 11, 13, 15 and 17, respectively. Claims 7 and 14 are based on claims 8 and 16 as published and page 15, lines 11 to 35.

4.2 Hence, the board is satisfied that the amendments do not contain subject-matter extending beyond the content of the application as filed.

5. First Auxiliary Request, Articles 83 and 84 EPC

5.1 The reasoning of the examining division with respect to the lack of clarity of claim 1 according to the first to fourth auxiliary requests underlying the decision under appeal focused on essentially the same argument as its reasoning with respect to insufficient disclosure, which was that the skilled person would not

have been able to infer from the application as filed how to apply an XOR operation to two intra-coded pictures of typically different bit size.

The examining division argued in particular that "The XOR operator of step 408 requires operands of the same size" and "there exists an inconsistency between the size of the operands which are generated in step 406, and the size of the operands which are applied in step 408" (see decision under appeal, point 2.1.2, page 6). It likewise argued with respect to Article 83 EPC that "the application as filed provides no teaching whatsoever about the size of the operands, let alone *how* the skilled person would arrive at operands of the same size" (see page 8 of the decision, point 2.2.1).

5.2 Claim 1 of the present first auxiliary request also comprises a step of applying an XOR operation to two intra-coded pictures. Hence, the examining division's reasoning applies to claim 1 of the first auxiliary request.

5.3 The examining division correctly noted that the bit size of the different intra-coded pictures would typically be different, that the (bit-wise) XOR operation would need two operands of the same bit length and that there was no explicit teaching in the application of "how the skilled person would arrive at operands of the same size". The decisive issue, however, is whether the person skilled in the art would have needed this explicit information in view of the overall disclosure of the invention, in particular the technical effects achieved by the claimed combination. The XOR operation was disclosed as a specific example of how CSI items may be generated which tie pairs of intra-coded pictures (I_A, I_B) at predetermined time

instances (t_i) so that a determination of an intra-coded picture (I_B) of one of a pair of primary channels based on a picture (I_A) of the other of the pair of primary channels is made possible (see in particular the paragraph bridging pages 7 and 8 and claim 18 of the application as published). The board agrees with the appellant that, when presented with the task of carrying out an XOR operation on two pictures of different size, the skilled person would have known that operands of the same size could be obtained by extending the shorter of the two pictures to the length of the other picture, or, alternatively, by extending both pictures to a fixed target size (see also D6, page 431). The board also accepts the appellant's argument that "bit padding is a popular and well-known technique ... for filling up the data size of pictures to a target data size" (see statement of grounds, page 8, fourth paragraph).

5.4 Hence, the board holds that the claims according to the first auxiliary request are clear within the meaning of Article 84 EPC, and that the claimed subject-matter complies with Article 83 EPC.

6. First Auxiliary Request, Article 56 EPC

Claim 1 is based on claims 1 to 3 of the application as published (see point 4.1 above). The decision under appeal did not address the issue of inventive step. The first examiner had already indicated in the International Preliminary Report on Patentability (see Item V, section 4) that the subject-matter of dependent claims 3 and 10 was considered to involve an inventive step (see point XII above). The board concurs with this opinion that this combination of features is not rendered obvious by the available prior art.

6.1 The further independent claims 6, 9, 11 and 13 specify the corresponding method performed on the receiver side, the corresponding computer program product, the transmitter and the receiver. The further claims 2 to 5, 7, 8, 10, 12, 14 and 15 are dependent on claims 1, 6, 9, 11 and 13.

6.2 Hence, the board finds that the claims according to the first auxiliary request are allowable.

7. *Second Auxiliary Request*

Since the board found the first auxiliary request to be allowable, the second auxiliary request did not need to be considered.

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 in the following version:

Description:
Pages: 1, 9 to 14 and 17 as published.
Page: 2 filed with the letter of 16 March 2011.
Page: 6b filed with the letter of 24 September 2013.
Pages: 3 to 6, 6a, 7, 8, 15 and 16 filed in the oral proceedings.

Claims:
Nos.: 1 to 15 according to the first auxiliary request filed in the oral proceedings.
Drawings:
Sheets: 1/8 to 8/8 as published.

The Registrar: The Chairman:

K. Boelicke F. Edlinger

Decision electronically authenticated