

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

AMAZON.COM, INC. and AMAZON.COM SERVICES LLC,
Petitioner,

v.

NOKIA TECHNOLOGIES OY,
Patent Owner.

IPR2024-00725
Patent 8,204,134 B2

Before JAMESON LEE, STEVEN M. AMUNDSON,
and JASON M. REPKO, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Amazon.com, Inc. and Amazon.com Services LLC (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–22 (“challenged claims”) of U.S. Patent No. 8,204,134 B2 (Ex. 1001, “the ’134 patent”). Paper 3 (“Pet.”). Nokia Technologies Oy (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”). The Petition relies on the declaration testimony of Joseph P. Havlicek, Ph.D. (Ex. 1003). The Preliminary Response relies on the declaration testimony of Omid Kia, Ph.D. (Ex. 2001).

We have authority to determine whether to institute an *inter partes* review. See 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2024). An *inter partes* review may not be instituted unless the information presented in the Petition “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). The “reasonable likelihood” standard is “a higher standard than mere notice pleading” but “lower than the ‘preponderance’ standard to prevail in a final written decision.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential) (footnote omitted).

Upon consideration of the contentions of the parties and the evidence before us, we conclude that Petitioner has not shown a reasonable likelihood that it would prevail in establishing the unpatentability of at least one challenged claim of the ’134 patent. We decline to institute *inter partes* review.

II. BACKGROUND

A. *Real Parties in Interest*

Petitioner identifies itself and possibly Twitch Interactive, Inc. as real parties in interest. Pet. 75. Patent Owner identifies itself as real party in interest. Paper 4, 1.

B. *Related Matters*

The parties each identify the following litigations as related to the '134 patent:

Nokia Corp. v. Amazon.com, Inc., No. 1:23-cv-01232 (D. Del.);

Nokia Techs. Oy v. HP Inc., No. 1:23-cv-01237 (D. Del);

In the Matter of Certain Video Capable Electronic Devices, Including Computers, Streaming Devices, Televisions, Cameras, and Componentrs and Modules Thereof, Inv. No. 337-TA-1379 (USITC).

Pet. 75; Paper 4, 1.

C. *The '134 Patent*

The '134 patent notes that image frames in video files “are typically numbered according to an arithmetical series.” Ex. 1001, 3:19–20. It is explained that when a separate video sequence is inserted, or when a plurality of image frames are intentionally removed, the “deviating image numbering” may be incorrectly interpreted by a receiving terminal as lost image frames or protocol errors “and start unnecessary actions to reconstruct the image frames suspected as lost or to request a re-transmission thereof.” *Id.* at 3:62–4:17.

The disclosed invention is directed to a method and apparatus for decoding a compressed video sequence which had been encoded with intentional removal of certain image frames. Ex. 1001, 4:21–32. Image frames are entered into a buffer memory in connection with the decoding.

Id. at 4:32–33. The video sequence includes an indication relating to at least one discontinuity in the numbering of the image frames, and that indication is decoded from the video sequence. *Id.* at 4:33–36. In response to that indication, the buffer memory is configured to provide a number of image frames corresponding to a discontinuity in the numbering of the image frames, and these image frames provided from buffer memory are then used in the decoding process. *Id.* at 4:36–40. The '134 patent describes:

According to one embodiment, after the buffer memory has been configured to provide the number of image frames corresponding to the discontinuities in the numbering of the image frames, the entering of the image frames comprised by the video sequence in question into the buffer memory is continued from the correct image frame number.

According to an embodiment, a number of filler frames corresponding to the discontinuities in the numbering of the image frames is entered into the buffer memory. Preferably, said filler frames are designated by an identifier indicating that the filler frames do not belong to the actual video sequence.

According to an embodiment, the step of configuring the buffer memory to provide a number of image frames corresponding to the discontinuities in the numbering of the image frames is carried out by memory indications, whereby no data is entered into the buffer memory.

Ex. 1001, 4:48–64.

The '134 patent describes that an advantage of the disclosed procedure is that it provides the decoder with information on which gaps in the image frame numbering are intentional, so that the decoder does not start unnecessary error correction actions. Ex. 1001, 4:65–5:1. The '134 patent describes another advantage of the disclosed procedure is that the buffer memories of the encoder and the decoder can be kept in synchronism, which

enables a fluent operation of the process of reference picture selection. *Id.* at 5:1–4.

Figure 2 of the '134 patent is reproduced below:

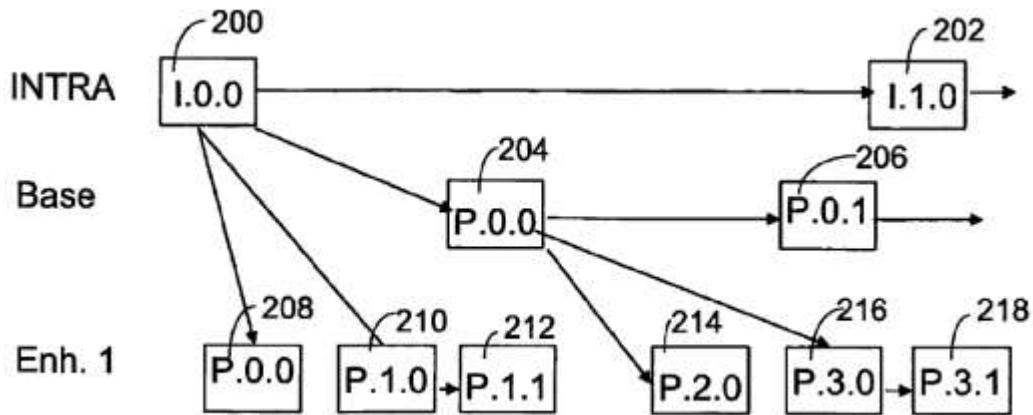


Figure 2 illustrates a scalable coding hierarchy of a preferred embodiment of the '134 patent. Ex. 1001, 5:14–15.

Figure 2 shows a part of a compressed video sequence having first frame 200, which is an INTRA frame or I-frame, and thus an independently determined video frame the image information of which is determined without using motion-compensated temporal prediction. Ex. 1001, 7:42–46. I-frame 200 is placed on a first scalability layer, which may be referred to as an INTRA layer, and each scalability layer is assigned a unique identifier, which may be a letter, a number, or a combination of a letter and a number. *Id.* at 7:46–52.

Sub-sequences consisting of groups of one or more video frames are determined for each scalability layer, and the sub-sequences of each scalability layer are assigned a unique identifier “using for example consecutive numbering starting with number 0 given for the first sub-sequence of a scalability layer.” Ex. 1001, 7:53–67. “Since the I-frame 200 is determined independently and can also be decoded independently upon

reception, irrespective of other image frames, it also forms in a way a separate sub-sequence.” *Id.* at 7:67–8:3. The ’134 patent describes:

Next, within each sub-sequence, the video frames of the sub-sequence are given image numbers, using for example consecutive numbering that starts with the number 0 given to the first video frame of the sub-sequence. Since the I-frame 200 also forms a separate sub-sequence, its image number is 0. In FIG. 2, the I-frame 200 shows the type (I), sub-sequence identifier and image number (0,0) of the frame.

Id. at 8:17–23.

Figure 2 also shows the next frame in the INTRA layer, i.e., I-frame 202, which has been independently determined without using motion-compensated temporal prediction. Ex. 1001, 8:24–27. The ’134 patent describes:

Since the I-frame 202 can be independently decoded, it also forms a separate sub-sequence. Since this is the second sub-sequence in the INTRA-layer, the consecutive numbering of the sub-sequence identifier of the I-frame 202 is 1. Further, since the I-frame 202 also forms a separate sub-sequence, i.e., it is the only video frame in the sub-sequence, its image number is 0. The I-frame 202 can thus be designated with identifier (I.1.0). Correspondingly, the identifier of the next I-frame on the INTRA layer is (I.2.0), etc. As a result, only independently determined I-frames in which the image information is not determined using motion-compensated temporal prediction are coded into the first scalability layer, i.e., the INTRA layer.

Id. at 8:32–44.

The next scalability layer is referred to as the “base layer,” and “comprises coded, motion-compensated INTER or P-frames typically predicted only from previous image frames, i.e., in this case from the I-frames of an upper INTRA layer.” Ex. 1001, 8:48–52. The ’134 patent describes:

The image information of the first P-frame 204 of the base layer shown in FIG. 2 is determined using the I-frame 200 of the INTRA layer. A P-frame 204 begins the first sub-sequence of the base layer, and therefore the sub-sequence identifier of the P-frame 204 is 0. Further, since the P-frame 204 is the first image frame of the first sub-sequence of the base layer, the image number of the P-frame 204 is 0. The P-frame 204 can thus be identified with (P.0.0).

Id. at 8:52–60. The succeeding P-frame 206 of the base layer is predicted from previous P-frame 204, and thus P-frames 204 and 206 belong to the same sub-sequence “whereby the P-frame 206 also receives the sub-sequence identifier 0.” *Id.* at 8:61–64. Because P-frame 206 is the second image frame in sub-sequence 0, the image number of P-frame 206 is 1, and P-frame 206 can be identified as (P.0.1). *Id.* at 8:64–67.

The next scalability layer is referred to as “enhancement layer.”

Ex. 1001, 9:1–2. This layer comprises coded, motion-compensated P-frames predicted only from I-frames of the INTRA layer or P-frames of the base layer. *Id.* at 9:2–5. The ’134 patent describes:

The P-frame 208 begins the first sub-sequence of enhancement layer 1, the sub-sequence identifier of the P-frame thus being 0. Further, since the P-frame 208 is the first and only image frame in said sub-sequence, the P-frame 208 receives the image number 0. The P-frame 208 can thus be identified with (P.0.0).

Since the second image frame 210 is also predicted only from the first image frame 200 of the INTRA layer, the P-frame 210 begins the second sub-sequence of enhancement layer 1 and the sub-sequence identifier of the P-frame 210 is therefore 1. Since the P-frame 210 is the first image frame in the sub-sequence, the image number of the P-frame 210 is 0. The P-frame can thus be identified with (P.1.0). The temporally succeeding P-frame 212 of enhancement layer 1 is predicted from the previous P-frame 210. The P-frames 210 and 212 thus belong to the same sub-sequence, and therefore the P-frame also

receives the sub-sequence identifier 1. The P-frame 212 is the second image frame in the sub-sequence 1, and therefore the P-frame receives the image number 1 and can be identified with (P.1.1).

The temporally fourth image frame 214 of enhancement layer 1 is predicted from the first image frame 204 of the base layer. The P-frame 214 thus begins a third sub-sequence of enhancement layer 1 and therefore the P-frame 214 receives the sub-sequence identifier 2. Further, since the P-frame 214 is the first and only image frame in the sub-sequence, the image number of the P-frame 214 is 0. The P-frame [214] can therefore be identified with (P.2.0).

Also the temporally fifth image frame 216 of enhancement layer 1 is predicted only from the first image frame 204 of the base layer, the P-frame 216 thus beginning the fourth sub-sequence of enhancement layer 1, and the sub-sequence identifier of the P-frame 216 is 3. In addition, since the P-frame 216 is the first one in the sub-sequence in question, the image number of the P-frame 216 is 0. The P-frame 216 can therefore be identified with (P.3.0). The temporally following P-frame 218 of enhancement layer 1 is predicted from the previous P-frame 216. The P-frames 216 and 218 thus belong to the same sub-sequence, and the sub-sequence identifier of the P-frame 218 is also 3. Since the P-frame 218 is the second image frame in the sub-sequence 3, the image number of the P-frame 218 is 1 and the identifier of the P-frame 218 is (P.3.1).

Ex. 1001, 9:8–51.

The '134 patent describes that the numbering of the image frames is sub-sequence-specific, in that a new sub-sequence always starts the numbering from the beginning. Ex. 1001, 13:18–20. The '134 patent also describes that “[t]he identification of an individual image frame thus requires the layer number, sub-sequence identifier and image frame number to be determined.” *Id.* at 13:20–23. The '134 patent further describes that “[t]he image frame identifier data transmitted together with the video

sequence are preferably included in the video sequence header fields or in the header fields of the transfer protocol to be used for transferring the video sequence.” *Id.* at 14:47–50. “In other words, the identifier data of predicted image frames are not included in the image data of the coded video sequence, but always into the header fields, whereby the dependencies of the image frames can be detected without decoding the images of the actual video sequence.” *Id.* at 14:50–55.

The ’134 additionally describes that

the beginning of the sub-sequence, i.e., its first image frame, can be indicated to the decoder for example by a separate flag added to the header field of a slice of the image frame. This allows the decoder to interpret the image numbers correctly and to find the correct image frame that initiates the sub-sequence from the video sequence image frames.

Ex. 1001, 11:41–47.

Figure 7 of the ’134 patent is reproduced below:

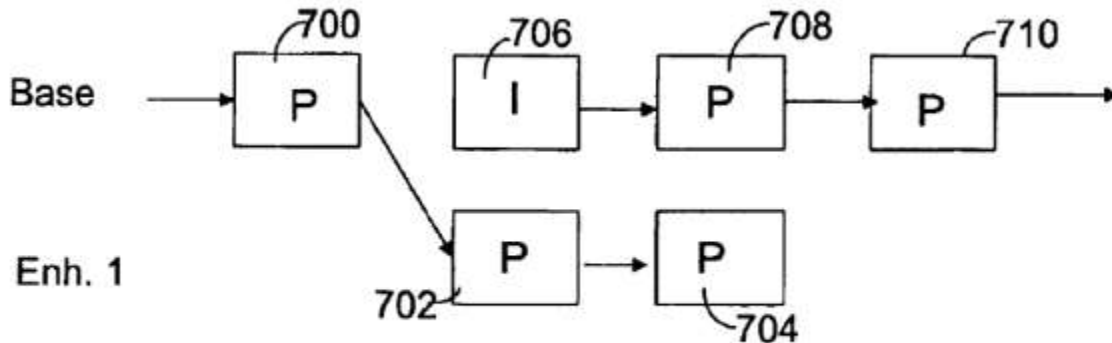


Figure 7 illustrates an embodiment which allows one or more scalability layers or independently decodable sub-sequences included in them to be removed from a video sequence. Ex. 1001, 18:29–37.

In the example of Figure 7, enhancement layer 1 is removed from the video sequence. Ex. 1001, 18:35–37. The ’134 patent describes:

The video sequence is thus only used for displaying the image frames 700, 706, 708 and 710 of the base layer. In other words, a direct transition from the first (terminating) scene to the second (initiating) scene takes place in the form of an abrupt scene transition, i.e. directly from the image frame 700 of the first scene into the I-image frame 706 that initiates the second scene. The transition is thus not a cross-faded scene transition but an abrupt scene transition. Nevertheless, the scene transition can be carried out in an advantageous manner without affecting the quality of the video sequence image, and the viewer usually does not experience an abrupt scene transition carried out instead of a cross-faded scene transition in any way disturbing or faulty. On the contrary, since the prior art implementation does not allow scalability layers to be removed, scene transition would often require image frequency to be reduced, which the viewer would find jerky and disturbing.

Ex. 1001, 18:37–53. In summary, the streaming server decides how many scalability layers and which sub-sequences are transmitted in the video sequence. *Id.* at 18:62–64.

The '134 patent explains that if image frames are indexed in different order in the buffers of the encoder and decoder, an incorrect reference image may be used in the decoder, and thus “it is essential that the decoder can be controlled to take into account image frames and sub-sequences that the encoder has intentionally removed from the video sequence.” Ex. 1001, 20:22–27. The '134 patent also explains that because a decoder typically interprets gaps in image frame numbering as errors and attempts to reconstruct image frames perceived as lost, “it is essential that the encoder is capable to inform the decoder that the discontinuities in the image numbering of the transmitted image frames are intentional.” *Id.* at 20:27–33.

The '134 patent describes that when the decoder is informed, the decoder enters into buffer memory random image frames corresponding to

the missing image numbers, and that these random image frames are designated by an “invalid” identifier to indicate that they do not belong to the actual video sequence but are only filler frames for buffer management.

Ex. 1001, 20:34–42.

Claims 1, 9, and 16 are independent and reproduced below:¹

1. [pre] A method for decoding a compressed video sequence, wherein image frames are entered into a buffer memory in connection with the decoding, the method comprising:

[a] decoding from the compressed video sequence an indication informing an intentional discontinuity of numbering of the image frames;

[b] configuring, in response to the indication, the buffer memory to provide a number of image frames corresponding to at least one discontinuity in the numbering of the image frames; and

[c] using the image frames in the buffer memory in the decoding process.

Ex. 1001, 22:56–67.

9. [pre] A video decoder for decoding a compressed video sequence, the video decoder being connected to a buffer memory wherein image frames are entered in connection with the decoding, the video decoder being configured to

[a] decode from the compressed video sequence an indication informing an intentional discontinuity of numbering of the image frames;

[b] configure, in response to the indication, the buffer memory to provide a number of image frames corresponding to at least one discontinuity in the numbering of the image frames; and

¹ The bracketed headings correspond to those used by Petitioner to reference the claim elements. *See* Pet. vii–xii. We use the same headings here for ease of reference, understanding, and consistency.

[c] use the image frames in the buffer memory in the decoding process.

Ex. 1001, 23:33–45.

16. [pre] A computer program product, stored on a non-transitory computer readable medium and executable in a data processing device, for decoding a compressed video sequence, image frames of said video sequence being entered into a buffer memory in connection with the decoding, the computer program product comprising:

[a] a computer program code for decoding from the compressed video sequence an indication informing an intentional discontinuity of numbering of the image frames;

[b] a computer program code for configuring, in response to the indication, the buffer memory to provide a number of image frames corresponding to at least one discontinuity in the numbering of the image frames; and

[c] a computer program code for including the image frames in the buffer memory in the decoding process.

Ex. 1001, 24:10–25.

D. The Applied Prior Art

Petitioner relies on the following evidence:²

² The '134 patent issued from Application No. 11/338,996, filed Jan. 25, 2006, which is a continuation of Application No. 10/306,942, filed Nov. 29, 2002, now Patent No. 7,894,521. Ex. 1001, codes (21), (22), (63).

Name	Patent Document	Exhibit
Ran ³	US Patent No. 5,768,533	1008
Yagasaki ⁴	US Patent No. 5,835,672	1005
Oliver ⁵	US Patent No. 6,064,693	1006
Lyon ⁶	WO 91/06182	1007

E. The Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims of the '134 patent are unpatentable based on the following grounds (Pet. 7, 51, 63, 68):

Claims Challenged	35 U.S.C. §	References/Basis
1–5, 9–12, 16–19	103(a) ⁷	Yagasaki
5, 7, 13, 15, 20, 22	103(a)	Yagasaki, Oliver
6, 14, 21	103(a)	Yagasaki, Oliver, Lyon
8	103(a)	Yagasaki, Ran

III. ANALYSIS

A. Legal Standards

A claim is unpatentable under 35 U.S.C. § 103(a) “if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said

³ Issued June 16, 1998. Ex. 1008, code (45).

⁴ Issued Nov. 10, 1998. Ex. 1005, code (45).

⁵ Issued May 16, 2000. Ex. 1006, code (45).

⁶ Published May 2, 1991. Ex. 1007, code (43).

⁷ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102 and 103. Because the '134 patent claims priority to an application filed before March 16, 2013 (the effective date of the amendments), the pre-AIA version of § 103 applies.

subject matter pertains.” 35 U.S.C. § 103(a); *see KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations of nonobviousness.⁸ *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

Citing testimony from Dr. Havlicek, Petitioner asserts a person of ordinary skill in the art (hereinafter “POSITA”) “would have had a (1) Bachelor’s degree in electrical engineering, computer engineering, computer science, or a comparable field of study such as physics, and (2) approximately two to three years of practical experience with video encoding/decoding.” Pet. 6 (citing Ex. 1003 ¶¶ 49–51).

Patent Owner proposes a slightly different level of ordinary skill in the art: a POSITA “would have at least a bachelor’s degree in electrical engineering, computer engineering, or a related field, with about two years of experience in video decoding or encoding technologies.” Prelim. Resp. 8 (citing Ex. 2001 ¶ 19). However, Patent Owner states: (1) “Patent Owner does not believe the ultimate definition of a POSITA impacts the issues presented herein for the purposes of Institution”; and (2) Patent Owner does not dispute Petitioner’s definition.” Prelim. Resp. 8–9.

On this record, we adopt Petitioner’s statement of the level of ordinary skill in the art. It is supported by the testimony of Dr. Havlicek and not

⁸ The record does not include any evidence of secondary considerations of nonobviousness.

disputed by Patent Owner. Further, it appears consistent with what is reflected by the content of the applied prior art. *Cf. Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (the applied prior art may reflect an appropriate level of skill). Also, our conclusion would be the same even if we applied Patent Owner’s stated level of ordinary skill in the art.

C. Claim Interpretation

We use the same claim construction standard that would be used to construe a claim in a civil action under 35 U.S.C. § 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.100(b). The claim construction standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), is applicable.

Claim terms are generally given their ordinary and customary meaning as would be understood by one with ordinary skill in the art in the context of the specification, the prosecution history, other claims, and extrinsic evidence including expert and inventor testimony, dictionaries, and learned treatises, although extrinsic evidence is less significant than the intrinsic record. *Phillips*, 415 F.3d at 1312–17. Usually, the specification is dispositive, and it is the single best guide to the meaning of a disputed term. *Id.* at 1315.

The specification may reveal a special definition given to a claim term by the patentee, or the specification or prosecution history may reveal an intentional disclaimer or disavowal of claim scope by the inventor. *Id.* at 1316. “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when

the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). The disavowal, if any, can be effectuated by language in the specification or the prosecution history. *Poly-Am., L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016).

Only those claim terms that are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

Petitioner has not proposed a construction for any claim term and asserts that “no constructions are necessary to resolve any disputes identified in this Petition.” Pet. 7 (footnote omitted). Patent Owner does not disagree and also has not itself proposed any construction. Prelim. Resp. 9. We find that no express construction for any claim term is necessary.

D. Alleged Obviousness of Claims 1–5, 9–12, and 16–19 over Yagasaki

1. Overview of Yagasaki (Exhibit 1005)

Yagasaki discloses a method for coding an input video signal to provide a coded signal. Ex. 1005, code (57). Duplicate pictures are detected in the input video signal, and duplicate pictures are eliminated from the input video signal to provide an encoder input signal. *Id.* The encoder input

signal is predictively coded using plural predictive coding methods to provide the coded signal. *Id.* A skip-picture flag is included in the coded signal in lieu of each eliminated duplicate picture. *Id.* A reference picture code identifying a field to be copied to provide each eliminated duplicate picture is also included in the coded signal. *Id.* A duplicate picture is one with little or no temporal change relative to another picture. *Id.* at 8:51–53.

Additionally, in a second embodiment, Yagasaki discloses that the encoder includes a temporal reference generating circuit which generates a temporal_reference code for each picture, which is a 10-bit code that indicates the display sequence of the picture in a group of pictures (“GOP”). *Id.* at 19:17–22; Fig. 17. The temporal_reference code is generated by incrementing a counter by one for each consecutive picture in the coder input signal VI. *Id.* at 19:22–25. The counter is reset to zero at the beginning of each GOP, or when the number of pictures in the GOP exceeds 1024. *Id.* at 19:25–27. Yagasaki expressly states that “The temporal reference generator feeds the temporal reference code to the variable-length coder 1006 *for inclusion in the coding apparatus output signal VC1.*” *Id.* at 19:27–29 (emphasis added).

Figure 3, illustrating the first embodiment, is reproduced below:

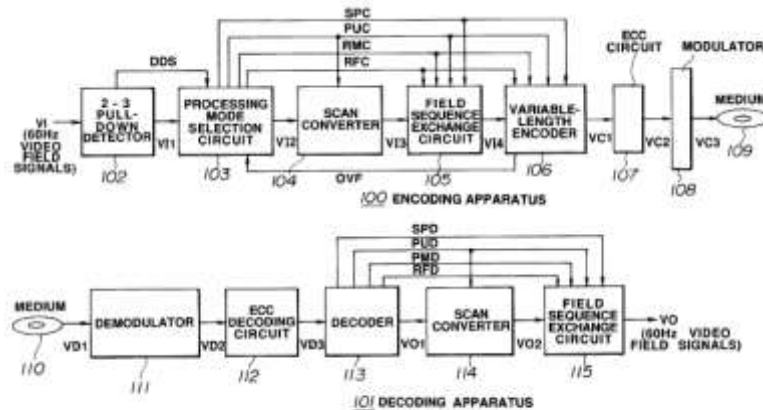


FIG.3

Figure 3 illustrates coding apparatus 100 and decoding apparatus 101 in a first embodiment of Yagasaki. Ex. 1005, 6:66–7:2.

Coding apparatus 100 includes 2–3 pull-down detection circuit 102 for detecting duplicate fields in coder input signal VI, which generates the duplication detection signal DDS. Ex. 1005, 7:2–8. The coding apparatus also includes processing mode selecting circuit 103 which generates, *inter alia*, for each picture in the coder input signal, in response to the DDS signal: (1) skip-picture flag (“SPC”) that indicates whether the picture is a duplicate; (2) processing unit flag (“PUC”) that indicates whether the picture is to be coded using field-mode or frame-mode coding; (3) prediction mode code (“PMC”) which indicates the prediction mode for coding the picture, i.e., I-picture (no prediction), P-picture (forward prediction from an earlier reference picture), or B-picture (backward prediction from a later reference picture, linear prediction between earlier and later reference pictures, or forward prediction from an earlier reference picture); and (4) reference picture code (“RFC”) that indicates, when the picture is a skip picture, the picture (field or frame) that will be used as the reference picture for reproducing the skip picture. *Id.* at 7:11–34.

Scan converter 104 converts two interlaced fields of the video signal VI2 into a progressive frame when the processing unit flag PUC indicates that the picture is to be coded using frame-mode coding. Ex. 1005, 7:38–42. Field sequence exchange circuit 105 changes the picture sequence of the video signal VI3 to the sequence required by encoder 106 in response to the skip picture flag SPC, prediction mode code PMC, and reference picture code RFC and outputs sequence-exchanged video signal as video signal VI4. *Id.* at 7:47–55.

Encoder 106 encodes video signal VI4 in response to the skip picture flag SPC, the prediction mode code PMC, and the reference picture code RFC generated by processing mode selecting circuit 103, to generate the coded signal VC1. Ex. 1005, 7:56–60. Error correction coding (ECC) circuit 107 appends error correction codes to the encoded signal VC1 to generate the encoded signal VC2. *Id.* at 7:60–62. Modulating circuit 108 modulates coded signal VC2 to provide the recording signal VC3 for recording in recording medium 109. *Id.* at 7:62–65.

Decoding apparatus 101 of the first embodiment includes demodulating circuit 111 for demodulating the signal VD1 reproduced from recording medium 110 to provide decoded signal VD2. Ex. 1005, 7:66–8:2. Decoded signal VD2 passes to error correction code decoder (ECC decoder) 112, which detects and corrects errors in decoded signal VD2 to provide decoder input signal VD3. *Id.* at 8:4–7. Decoder 113 extracts from decoder input signal VD3 the skip picture flag SPC, the processing unit flag PUC, the prediction mode code PMC, and the reference picture code RFC that were generated by the processing mode selecting circuit 103, and provides these flags and codes as the skip picture flag SPD, the processing unit flag PUD, the prediction mode code PMD, and the reference picture code RFD, respectively. *Id.* at 8:7–13. Decoder 113 also decodes the coded picture signals in decoder input signal VD3 in response to these flags and codes to provide the decoder output signal VO1. *Id.* at 8:13–16.

Scan converting circuit 114 converts one frame of the decoder output signal VO1 into two fields of the video signal VO2 when the processing unit flag PUD from the decoder 113 indicates that the frame was processed in frame mode. Otherwise, when the processing unit flag PUD from decoder

113 indicates that the frame was processed in field mode, the scan converting circuit 114 supplies the video signal VO1 unmodified as two fields of video signal VO2. *Id.* at 8:17–24.

Sequence exchange circuit 115 restores the picture sequence of video signal VO2 to the picture sequence of coder input signal VI to provide the decoder apparatus output signal VO. *Ex.* 1005, 8:25–28. The sequence exchange circuit changes the picture sequence in response to the skip picture flag SPD, the processing unit flag PUD, the prediction mode code PMD, and the reference picture code RFD from decoder 113. *Id.* at 8:28–32. The resulting decoding apparatus output signal VO is a video signal that is suitable for display on a monitor after conversion to an analog signal. *Id.* at 8:32–34.

Figure 17, illustrating Yagasaki's second embodiment, is reproduced below:

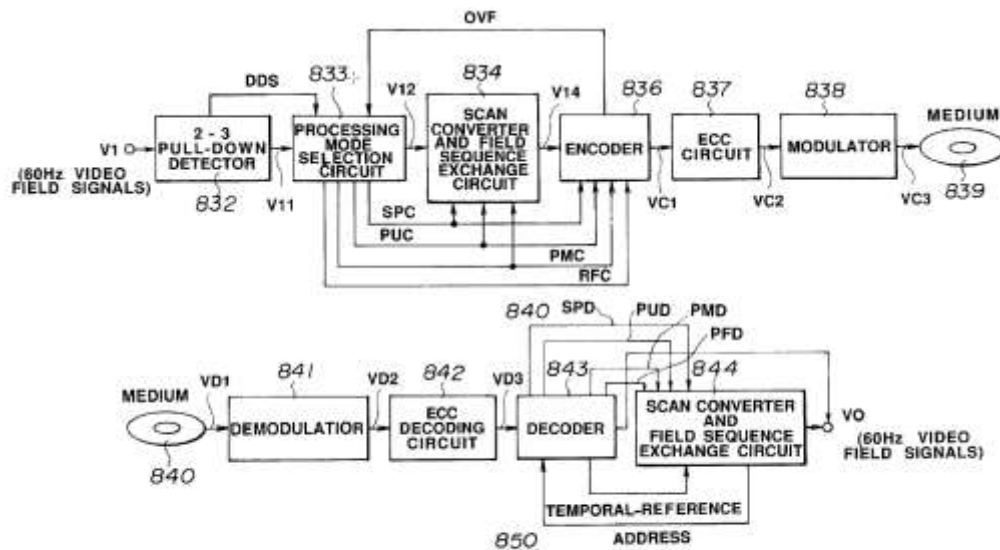


FIG.17

Figure 17 is a block diagram of a second embodiment of Yagasaki's coding and decoding apparatus. *Ex.* 1005, 6:41–43.

In the second embodiment, the encoder additionally includes a temporal reference generating circuit, which generates, in response to the prediction mode code PMC, a temporal_reference code for each picture.

Ex. 1005, 19:17–20. Yagasaki describes:

The temporal_reference code is a 10-bit code that indicates the display sequence of the picture in a group of pictures (GOP). The temporal_reference code is generated by incrementing a counter by one for each consecutive picture in the coder input signal VI. The counter is reset to zero at the beginning of each GOP, or when the number of pictures in the GOP exceeds 1024. *The temporal_reference generator feeds the temporal reference code to the variable-length coder 1006 for inclusion in the coding apparatus output signal VC1.*

Id. at 19:20–29 (emphasis added).

Yagasaki describes that encoder 863 of the second embodiment is substantially similar to the encoder of the first embodiment except that encoder 863 of the second embodiment includes a temporal reference generating circuit which generates, in response to the prediction mode code PMC a temporal_reference code for each picture. Ex. 1005, 19:15–20.

Yagasaki describes that decoder 843 of the second embodiment is similar to the decoder of the first embodiment except for the relationship between decoder 843 and field sequence exchanging and scan converting circuit 844. Ex. 1005, 19:38–43. Field sequence exchanging and scan converting circuit 844 now also receives and responds to the temporal_reference code extracted by decoder 843 from the decoder input signal. *Id.* at 19:44–65.

In the second embodiment, within the decoding apparatus, scan converter and field sequence exchange circuit 844 executes scan conversion and field sequence exchange in response to the skip picture flag SPD, the

processing unit flag PUD, the prediction mode code PMD, the reference picture code RFD, and *the temporal_reference extracted from the decoder input signal* by decoder 843. Ex. 1005, 19:44–50. Scan converter and field sequence exchange circuit 844 consists of an address controller which receives the skip picture flag SPD, the processing unit flag PUD, the prediction mode code PMD, the reference picture code RFD, and *the temporal_reference code extracted from the decoder input signal*. *Id.* at 19:50–55. In response to those codes and flags, circuit 844 feeds addresses to a set of field memories for readout. *Id.* at 19:55–65.

2. *Claim 1*

a. *Preamble recitation 1[pre]*

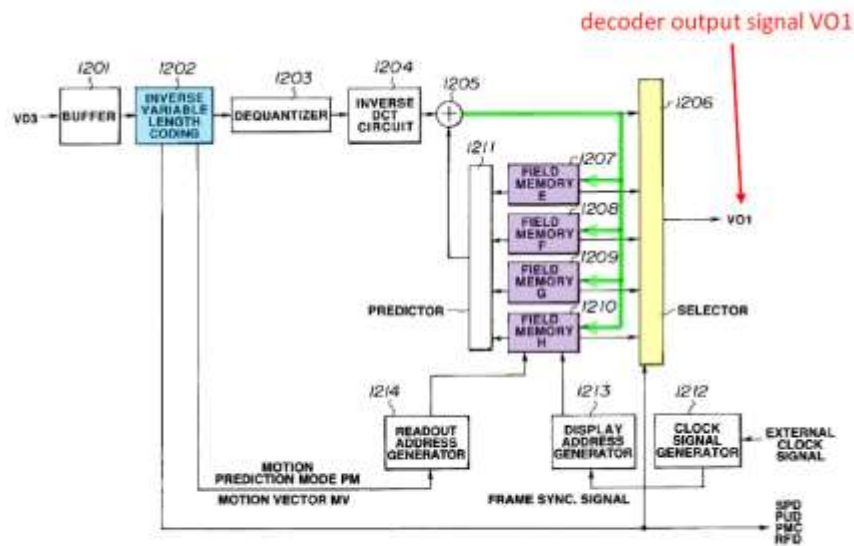
The preamble recites: “A method for decoding a compressed video sequence, wherein image frames are entered into a buffer memory in connection with the decoding, the method comprising.” Ex. 1001, 22:56–58. Petitioner asserts that Yagasaki discloses or renders obvious this preamble recitation. Pet. 19.

Petitioner cites to Yagasaki’s statement that its invention provides “a method for decoding a coded signal to provide an output video signal.” Pet. 19 (citing Ex. 1005, 3:36–37). Petitioner asserts that Yagasaki’s “coded signal” “teaches” the compressed video sequence in claim 1’s preamble. *Id.* at 20 (citing Ex. 1003 ¶¶ 81–82). Referring to Yagasaki’s Figure 17, Petitioner explains that encoder 836 predictively codes each picture signal as an I-, P-, or B-picture, and therefore Yagasaki’s coded signal teaches a compressed video sequence. *Id.* (citing Ex. 1003 ¶ 82, Ex. 1005, 16:23–28, 16:53–57).

Petitioner asserts that Yagasaki discloses “decoding” the coded signal which is the claimed compressed video sequence, noting that according to Yagasaki, decoding apparatus 850 in Figure 17 produces “a video signal that is suitable for display on a monitor after conversion to an analog signal.” Pet. 20–21 (citing Ex. 1005, 17:42–45). Referring to Figure 17 of Yagasaki, Petitioner explains that decoder 843 extracts from decoder input signal VD3 and decodes the picture signal in the decoder input signal VD3 to provide the decoding apparatus output signal VO. *Id.* at 21 (citing Ex. 1005, 17:9–22).

Petitioner asserts that in Yagasaki’s method, image frames are entered into a buffer memory as is recited in the preamble of claim 1. Pet. 21 (citing Ex. 1003 ¶¶ 85–89). Petitioner explains that Yagasaki’s decoder 843 uses field memories 1207 through 1210 to store previously decoded pictures for use as reference pictures. *Id.* (citing Ex. 1005, 14:54–67, Fig. 14).

Petitioner provides an annotated version of Yagasaki’s Figure 14, reproduced below:



Yagasaki, Figure 14 (annotated).

Figure 14 is a block diagram of Yagasaki's decoder. Ex. 1005, 6:32–34, 19:38–43. Petitioner has shaded field memories 1207–1210 purple, data paths into field memories 1207–1210 green, and selector 1206 yellow, and added a red labeled arrow pointing to decoder output VO1. Pet. 23.

Petitioner asserts that for each picture signal in input signal VD3, reference pictures stored in field memories 1207–1210 are used to generate motion-compensated macroblocks for reconstituting a current picture. Pet. 22 (citing Ex. 1005, 14:60–67). Petitioner also asserts that the resulting picture is fed to the field memories 1207–1210 for storage and also fed to selector 1206 for output to the decoder output signal VO1. *Id.* (citing Ex. 1005, 14:54–60). Petitioner further asserts:

Each picture signal is thus decoded and stored in field memories 1207 through 1210 for use as reference pictures for decoding the remaining picture signals in input signal VD3. Havlicek, ¶88. Field memories 1207 through 1210 are a “buffer memory” because they are used to temporarily store these decoded pictures for subsequent use as temporal prediction pictures, including for retrieval and manipulation in the decoding and motion compensation calculation processes. Havlicek, ¶88.

Id. at 23 (emphasis added).

Petitioner's above-noted assertions regarding the claim 1's preamble are supported by the cited evidence and not disputed by Patent Owner. Petitioner sufficiently has shown that the preamble is met by Yagasaki. We need not determine whether the preamble is limiting.

b. Limitation 1[a]

Limitation 1[a] recites: “decoding from the compressed video sequence an indication informing an intentional discontinuity of numbering of the image frames.” Ex. 1001, 22:59–61. According to Petitioner, the antecedent basis for “the image frames” in limitation 1[a] is the images

frames entered into a buffer memory as recited in the preamble 1[pre].

Pet. 25 n.1.

Petitioner asserts that Yagasaki discloses or renders obvious limitation 1[a]. Pet. 24. Petitioner asserts that the coded signal in Yagasaki's first and second embodiments includes skip-picture flags in place of eliminated pictures. *Id.* (citing Ex. 1005, code (57), 3:18–35, 4:8–15, 4:30–41, 4:61–5:16, 5:45–64, 15:12–67, 18:25–32). Petitioner asserts that in Yagasaki's second embodiment, each eliminated picture corresponds to a discontinuity in “temporal_reference code[s]” assigned to every picture in the coded signal.” *Id.* Thus, Petitioner asserts that Yagasaki's skip-picture flag informs an intentional discontinuity of numbering of the image frames stored in field memories 1207 through 1210. *Id.* at 24–25.

On page 26 of the Petition, Petitioner presents an annotated version of the encoding apparatus (top half) of Yagasaki's Figure 17, reproduced below:

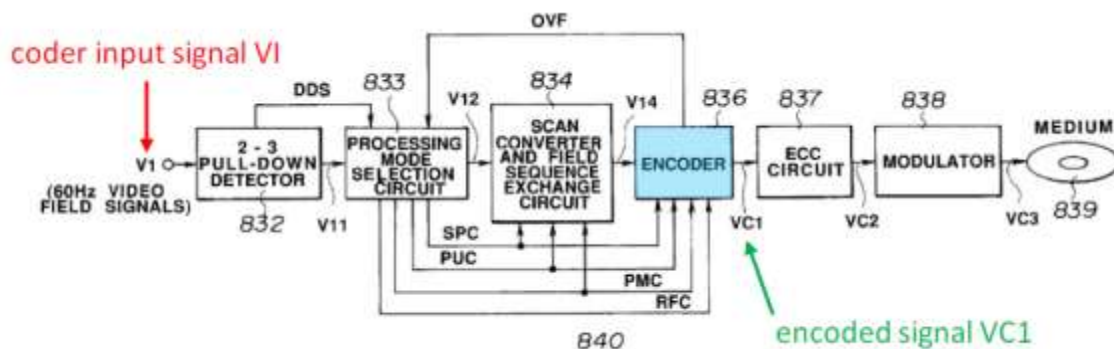


Figure 17 is a block diagram of the second embodiment of Yagasaki's coding and decoding apparatus. Ex. 1005, 6:41–43. Petitioner has colored encoder 836 blue, added green pointer and label “encoded signal VC1” to VC1, and added red pointer and label “coder input signal VI” to VI. Pet. 26.

Petitioner explains that encoder 836 generates a “temporal_reference code” for each consecutive picture in the coder input signal VI. Pet. 25 (citing Ex. 1005, 19:18–26). Petitioner identifies the “temporal_reference code” as the “numbering of the image claims” recited in limitation 1[a], and notes that Yagasaki describes that this temporal_reference code is generated by incrementing a counter by one for each consecutive picture in the coder input signal VI. *Id.* (citing Ex. 1005, 19:21–26). Petitioner further notes that encoder 836 includes each temporal_reference code in the coded signal VC1 highlighted in green in the above-reproduced portion of Figure 17. *Id.* (citing Ex. 1005, 19:28–30).

On page 27 of the Petition, Petitioner presents an annotated version of the decoding apparatus (bottom half) of Yagasaki’s Figure 17, reproduced below:

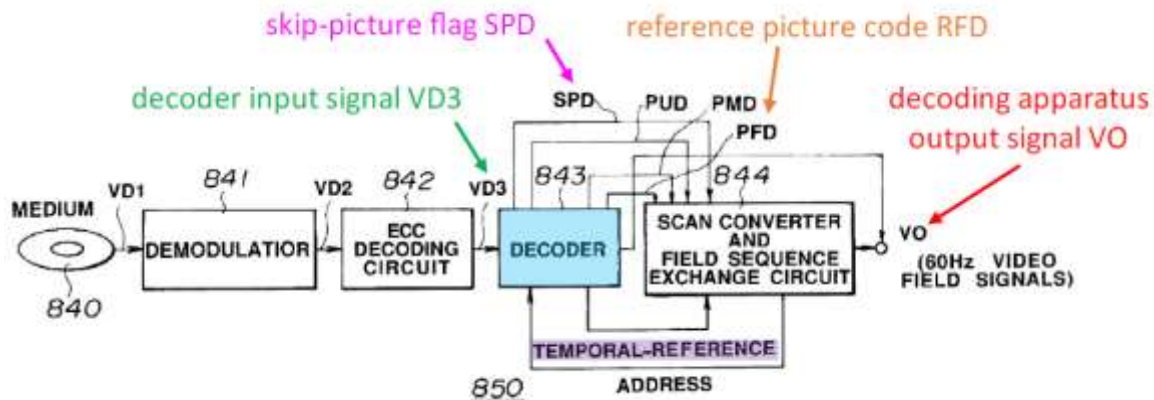


Figure 17 is a block diagram of the second embodiment of Yagasaki’s coding and decoding apparatus. Ex. 1005, 6:41–43. Petitioner has colored encoder 843 blue, added green pointer and label “decoder input signal VD3” to VD3, added pink pointer and label “skip-picture flag SPD” to “SPD,” added brown pointer and label “reference picture code RFD” to RFD, and

added red pointer and label “decoding apparatus output signal VO” to VO.
Pet. 26.

Petitioner asserts:

As discussed for 1[pre], during the decoding process, each picture signal in input signal VD3 (annotated green) is decoded and stored in field memories 1207 through 1210 of decoder 843 (shaded blue). Yagasaki, 14:37-67, Figure 14. Each decoded picture in field memories 1207 through 1210 is therefore associated with a temporal_reference code. See Yagasaki, 19:18–30, Figure 20; Havlicek, ¶93. Yagasaki’s temporal_reference code is thus a “*numbering*” applied to each of the decoded pictures stored in Yagasaki’s field memories 1207 through 1210, *i.e.*, “*the images.*” Havlicek, ¶93. Yagasaki therefore teaches “*numbering of the image frames.*”

Pet. 26.

Petitioner asserts that Yagasaki further teaches “*decoding from the compressed video sequence an indication*” as is recited in limitation 1[a]. Pet. 27. Specifically, Petitioner asserts that a variable-length decoder within decoder 843 extracts the skip-picture flag SPD (indication) from decoder input signal VD3 (compressed video sequence). Pet. 27–28.

Regarding the indication “informing an intentional discontinuity of the numbering of image frames” portion of limitation 1[a], Petitioner explains:

A POSITA would have further understood that the elimination of a skip picture by the encoder results in a discontinuity in the sequence of temporal_reference codes. Havlicek, ¶97. As Yagasaki explains, and as illustrated in the top half of Figure 17 below, a temporal_reference code is generated “for each consecutive picture in the coder input signal VI” (annotated red), *i.e.*, for each picture in the video signal that is provided as the initial input to coding apparatus 840. Yagasaki,

19:18-26. Yagasaki explains that skip pictures are eliminated during “the predictive coding step.” Yagasaki, claim 1 (“wherein the predictive coding step includes eliminating...fields from the input video signal”), claims 3-6; Havlicek, ¶97. The predictive coding step takes place in encoder 836 (shaded blue). See Yagasaki, 14:47-67, 19:38-43, Figure 14; Havlicek, ¶97. Because temporal_reference codes are associated with each picture in the input video signal before skip pictures are eliminated, each skipped picture corresponds to a “discontinuity” in the temporal_reference numbering, as described in the ’134 patent and recited in 1[a]. Havlicek, ¶¶97-98.

Pet. 28–29 (footnote omitted).

For reasons discussed below, Petitioner’s assertions and correspondingly cited evidence noted above do not sufficiently persuade us, for institution purposes, that Yagasaki discloses or suggests limitation 1[a].

According to limitation 1[a], the decoded “indication” must “inform[] an intentional discontinuity of numbering of the image frames.” Petitioner has not sufficiently shown any discontinuity of the numbering of image frames. Patent Owner asserts that “Petitioner relies on continuously incremented ‘temporal_reference codes’ as the claimed numbering, but these continuously incremented ‘temporal_reference codes’ never have a discontinuity.” Prelim. Resp. 11. We determine that Petitioner has not sufficiently shown, for institution purposes, a discontinuity in these temporal_reference codes.

Petitioner’s argument assumes, without adequate supporting basis, that when a duplicate picture is eliminated by the encoder such that no image picture content is provided in the encoder output, the temporal_reference code for that duplicate picture is also eliminated and not provided in the encoder output to be furnished to the decoder. To prevail, this alleged fact must be sufficiently shown and not assumed.

The Petition made no adequate showing. Yagasaki expressly states: “The temporal reference generator [within the encoder] feeds the temporal reference code to the variable-length coder 1006 for inclusion in the coding apparatus output signal VC1.” Ex. 1005, 19:27–29. We find no statement or indication of an exception for a duplicate picture of which the image data is “eliminated,” and Petitioner has not pointed us to any such description.

Dr. Kia, Patent Owner’s expert, testifies that “[t]he decoder input signal is fed into the decoder, which extracts from the decoder input signal the skip picture flag, the processing unit flag, the prediction mode code, the reference picture code, *and the temporal reference code for each picture*, each of which was encoded at the encoder.” Ex. 2001 ¶ 82 (citing Ex. 1005, 16:58–62, 17:9–22, 19:15–29, 19:44–63, 21:23–33) (emphasis added). The testimony is supported by the cited evidence.

Further, there are self-apparent reasons why in Yagasaki the temporal_reference code is provided in the encoder output for every picture including when eliminating duplicate picture content. For a duplicate picture, although the image data content is eliminated, metadata about the picture, such as the skip picture flag, the reference picture code, etc., are still provided to the decoder and the decoder uses that information to reconstruct the eliminated image data content. Ex. 1005, 3:32–36, 3:60–67. It seems implicit that this metadata is associated with the same frame number of the eliminated image, and also that the decoder-reconstructed image for the eliminated image is associated with the same frame number of the eliminated image. Petitioner provides no explanation to the contrary.

Also, we note that if the temporal_reference code for an eliminated duplicate picture is not provided, then the decoded picture formed by the

decoder and corresponding to the eliminated duplicate picture would have no frame number. Yet, Petitioner acknowledges that each decoded picture is associated with a temporal_reference code. Pet. 26.

Based on his analysis, Dr. Kia testifies that “Yagasaki is directed to a data compression technique and does not disclose any intentional discontinuities in temporal reference codes or any other numbering of frames.” Ex. 2001 ¶ 83. The testimony is supported by the testimony in paragraphs 81 and 82 of Dr. Kia’s declaration. *Id.* ¶¶ 81–82.

Although Yagasaki describes that a skip-picture flag is included in the coded signal in lieu of each eliminated duplicate picture (Ex. 1005, 3:18–35, 4:8–15, 4:30–41, 4:61–5:16, 5:45–64), it is an overly simplified and incorrect reading of Yagasaki to understand the description as conveying that the encoded video sequence as missing information about a picture entirely or that the decoded output video sequence has fewer pictures than the input video sequence at the encoder.

Rather, what the skip-picture flag indicates is that the encoded signal does not include picture content, i.e., image data, for the associated picture but the decoder can obtain the picture content for that picture by copying another picture identified by the reference picture code. Ex. 1005, 3:18–35, 4:10–15, 4:37–41, 4:63–5:4, 5:51–56. On this record, we agree more with Patent Owner’s position that Yagasaki does not actually remove a picture from the video sequence, but codes a duplicate picture in a very compressed form by eliminating its image content but preserving its place and numbering in the video sequence to permit reconstruction by the decoder based on other information sent for that “eliminated picture. See Prelim. Resp. 12.

Together with the skip-picture flag for any eliminated picture is provided a “reference picture code” which identifies a field to be copied by the decoder to provide the so-called eliminated picture. *Id.* at 3:18–35, 4:10–15, 4:37–41, 4:63–5:4, 5:51–56. Yagasaki describes that where a skip picture flag SPC is generated because there is little or no difference between the current picture and another picture, “prediction mode decision circuit 404 generates a reference picture code RFC indicating the other picture as the reference picture for reproducing the skip picture.” *Id.* at 18:4–14.

Petitioner has identified Yagasaki’s “temporal_reference code” as the claimed numbering of image frames. Pet. 25, 28–29. Petitioner asserts “[b]ecause temporal_reference codes are associated with each picture in the input video signal before skip pictures are eliminated, each skipped picture corresponds to a ‘discontinuity’ in the temporal_reference numbering.” Pet. 28–29 (citing Ex. 1003 ¶¶ 97–98) (emphasis omitted). We are not persuaded by that assertion, for reasons discussed above. Petitioner has not adequately shown that the “temporal_reference code” is excluded from the encoder output when an associated picture is determined by the encoder to be a duplicate and thus the content thereof skipped or eliminated and the decoder can copy the content from another picture.

Yagasaki describes that the encoder “includes the skip picture flag SPC, the processing unit flag PUC, the prediction mode code PMC and the reference picture code RFC from the processing mode selecting circuit 833, and the temporal-reference in the encoder output signal VC1.” Ex. 1005, 16:58–62. Yagasaki further describes:

The decoder input signal VD3 is fed into the decoder 843, which extracts from the decoder input signal VD3 *the skip picture flag SPC*, the processing unit flag PUC, the prediction

mode code PMC, *the reference picture code RFC*, and the *temporal reference for each picture*. These flags and codes were originally generated by the processing mode selecting circuit 833 and the temporal reference generator 1020 in the coding apparatus 840. The decoder provides these flags and codes as the *skip picture flag SPD*, the processing unit flag PUD, the prediction mode code PMD, *the reference picture code RFD*, and *the temporal reference*. The decoder 843 also decodes the picture signal in the decoder input signal VD3 to provide the decoding apparatus signal VO.

Ex. 1005, 17:9–22 (emphasis added). Yagasaki also describes that on a medium which records the encoded signal for subsequent decoding, “[t]he skip picture flag SPC, the processing unit flag PUC, the prediction mode code PMC, the reference picture code RFC . . . and the temporal_reference are included together with the signal for each picture.” *Id.* at 21:23–33.

Finally, and again, as noted above, Yagasaki expressly states: “The temporal reference generator feeds the temporal reference code to the variable-length coder 1006 for inclusion in the coding apparatus output signal VC1.” Ex. 1005, 19:27–29. Thus, it appears that even when the skip-picture flag for a picture indicates eliminated picture content, the “eliminated” picture still is coded with a temporal_reference code together with the skip picture flag and the reference_picture code. Because the temporal_reference code still appears to be provided to the decoder for a picture the content of which is eliminated by the encoder but to be reconstructed by the decoder, Petitioner has not sufficiently shown that eliminating picture content at the encoder creates a discontinuity in frame numbering within the video sequence.

Petitioner further asserts:

Furthermore, the MPEG-2 standard explicitly states that when “the encoder . . . skip[s] one or more frames, “[t]his action is indicated by a **discontinuity in the value of temporal_reference** for the next picture.” MPEG-2, 150. A POSITA would have thus understood that Yagasaki, which discusses its invention in the context of MPEG (Yagasaki, 2:47-63), operates in the same way. Havlicek, ¶99.

Id. at 29–30 (emphasis omitted).

The assertion is misplaced and unpersuasive. Petitioner’s reliance on the MPEG-2 standard is inapposite because, as discussed above, Yagasaki does not actually skip, remove, or eliminate any picture or frame from the video sequence as the cited portion of the MPEG-2 standard discusses.

Rather, as explained above, Yagasaki codes a duplicate picture by eliminating picture content but including sufficient information for reconstruction of the picture content by the decoder. Yagasaki provides a temporal_reference code for every picture in the video sequence including a skip picture the content of which is eliminated by the encoder but can be copied from a source by the decoder. Ex. 1005, 16:58–62, 17:9–22, 21:23–33.

In Yagasaki, there is no actual skipping of pictures in the sense of elimination or removal of a picture from the video sequence entirely as though it does not exist. Thus, in Yagasaki there is no discontinuity in the numbering of image frames, i.e., the temporal_reference codes Yagasaki provides for every picture in the video sequence, even a skip picture. Petitioner has not sufficiently shown the contrary.

Petitioner additionally asserts:

During prosecution (*supra* §IV.C), the applicant admitted that Apostolopoulos discloses “discontinuities of numbering[.]” EX-1002, 2100, 2435 (repeating admission). For this element, the Examiner identified disclosure in Apostolopoulos describing a sequence of video frames that has been separated into subsequences of even frames and odd frames, with no indication that the frames are expressly numbered. EX-1002, 1831 (citing Apostolopoulos, 7:9-37), 2128 (same). Yagasaki discloses more than Apostolopoulos for this element. Havlicek, ¶100.

Pet. 29 n.13. The argument is unavailing, and we are not sufficiently persuaded. As discussed above, Yagasaki appears to disclose providing each picture in the video sequence a temporal_reference code, even pictures encoded with a skip picture flag SPD indicating removal of picture content, which content may be added back by the decoder via reference to a reference picture code RFC. This temporal_reference code in Yagasaki essentially ensures continuity in the numbering of the image frames. Thus, with respect to the discontinuity limitation, we disagree with Petitioner’s assertion that Yagasaki discloses more than Apostolopoulos.

Further, because Petitioner has not sufficiently shown any discontinuity in the numbering of image frames in Yagasaki, Petitioner has not sufficiently shown that the skip-picture flag in Yagasaki “inform[s] an intentional discontinuity of numbering of the image frames.” Yagasaki, instead, uses the skip-picture flag to inform the decoder to copy picture content from a previously stored picture identified by the reference picture code to restore eliminated picture content. Ex. 1005, 5:57–64.

Patent Owner argues that Yagasaki does not store the flags and codes in field memories 1207–1210. Prelim. Resp. 16–17. We need not resolve that question, because it does not matter whether the decoded flags and

codes are stored in field memories 1207–1210 with the picture content of the image frames. Whether or not the decoded flags and codes are so stored, Petitioner has not sufficiently shown a discontinuity in the associated temporal_reference codes of the pictures.

For the foregoing reasons, Petitioner has not sufficiently shown that Yamasaki discloses or suggests limitation 1[a].

c. Limitation 1[b]

Limitation 1[b] recites: “configuring, in response to the indication, the buffer memory to provide a number of image frames corresponding to at least one discontinuity in the numbering of the image frames; and.” Ex. 1001, 22:62–65. Limitation 1[b] is inextricably intertwined with limitation 1[a], because the antecedent basis for “the indication” is the indication recited in limitation 1[a].

For reasons discussed above in the context of limitation 1[a], Petitioner does not sufficiently persuade us that Yagasaki discloses or suggests the indication required in limitation 1[a]. Also, for reasons discussed above in the context of limitation 1[a], Petitioner does not sufficiently persuade us that Yagasaki discloses a discontinuity in the numbering of image frames. Accordingly, Petitioner does not sufficiently persuade us, for institution purposes, that Yagasaki discloses or suggests limitation 1[b].

d. Conclusion

Petitioner has not shown a reasonable likelihood that it would prevail in establishing the alleged obviousness of claim 1 over Yagasaki.

3. *Claims 9 and 16*

Claim 9 recites similar subject matter as claim 1, but in apparatus form for a “video decoder.” Ex. 1001, 23:33–45. The various steps recited in claim 1 are recited in claim 9 as functions performed by the video decoder. *Id.* Petitioner presents essentially the same arguments for claim 9 as it does for claim 1. Pet. 41–43. For substantially the same reasons as we explained above in the context of limitations 1[a] and 1[b] of claim 1, Petitioner has not sufficiently shown that limitations 9[a] and 9[b] are either disclosed or would have been suggested by Yagasaki.

Claim 16 recites similar subject matter as claim 1, but in the form of a computer program product, stored on a non-transitory computer readable medium and executable in a data processing device. Ex. 1001, 24:11–25. The various steps recited in claim 1 are recited in claim 16 as functionalities performed by computer program code. *Id.* Petitioner presents essentially the same arguments for claim 16 as it does for claim 1. Pet. 45–49. Petitioner adds that “[s]oftware-implemented decoders were well understood and recognized for their cost efficiency before the earliest priority date of the ’134 patent. *Id.* at 45 (citing Ex. 1003 ¶¶ 134–135).

For substantially the same reasons as we explained above in the context of limitations 1[a] and 1[b] of claim 1, Petitioner has not sufficiently shown that limitations 16[a] and 16[b] are either disclosed or would have been suggested by Yagasaki.

Petitioner has not shown a reasonable likelihood that it would prevail in establishing the alleged obviousness of claims 9 and 16 over Yagasaki.

4. *Dependent Claims 2–5, 10–12, and 17–19*

Each of claims 2–5 depends directly from claim 1. Ex. 1001, 23:1–18. Each of claims 10–12 depends directly from claim 9. *Id.* at 23:46–61. Each of claims 17–19 depends directly from claim 16. *Id.* at 23:26–45. The deficiency of Petitioner’s accounting for claim 1 equally applies to claims 2–5. The deficiency of Petitioner’s accounting for claim 9 equally applies to claims 10–12. The deficiency of Petitioner’s accounting for claim 16 equally applies to claims 17–19.

Petitioner has not shown a reasonable likelihood that it would prevail in establishing the alleged obviousness of claims 2–5, 10–12, and 17–19 over Yagasaki.

E. *Alleged Obviousness of Claims 5, 7, 13, 15, 20, and 22 over Yagasaki and Oliver*

1. *Overview of Oliver (Exhibit 1006)*

The title of Oliver is “SYSTEM AND METHOD FOR HANDLING UNDERRUN OF COMPRESSED SPEECH FRAMES DUE TO UNSYNCHRONIZED RECEIVE AND TRANSMIT CLOCK RATES.” Ex. 1006, code (54). Oliver states that “[d]evices which perform voice encoding and decoding are commonly referred to as voice encoder/decoders, or vocoders.” *Id.* at 1:67–2:2. Oliver describes a preexisting problem:

If a vocoder does not receive frames at its required frame receive rate, a condition referred to as data underrun occurs. When underrun occurs, the vocoder may produce an audio signal which has considerable audio distortion, or even total loss of intelligibility. Often the distortion is very unpleasant, noticeable and annoying to the listening subscriber.

Id. at 2:45–51. Oliver discloses “a system and method for compensating for slight variances between the transmit rate of a far end modem and the

required frame receive rate of a near end modem.” *Id.* at 4:44–47.

“However, the present invention is not limited to synchronizing transmitted frames of compressed speech data, but rather is applicable to any digital data which is transferred in frames, such as video data, and which may tolerate a certain amount of loss of frames and/or a certain amount of inserted filler frames.” *Id.* at 4:47–52. A “filler frame” is defined in Oliver as “a frame inserted into a stream of data frames to compensate for lack of reception of one or more frames in the transmission.” *Id.* at 4:52–55.

Figure 2 of Oliver is reproduced below:

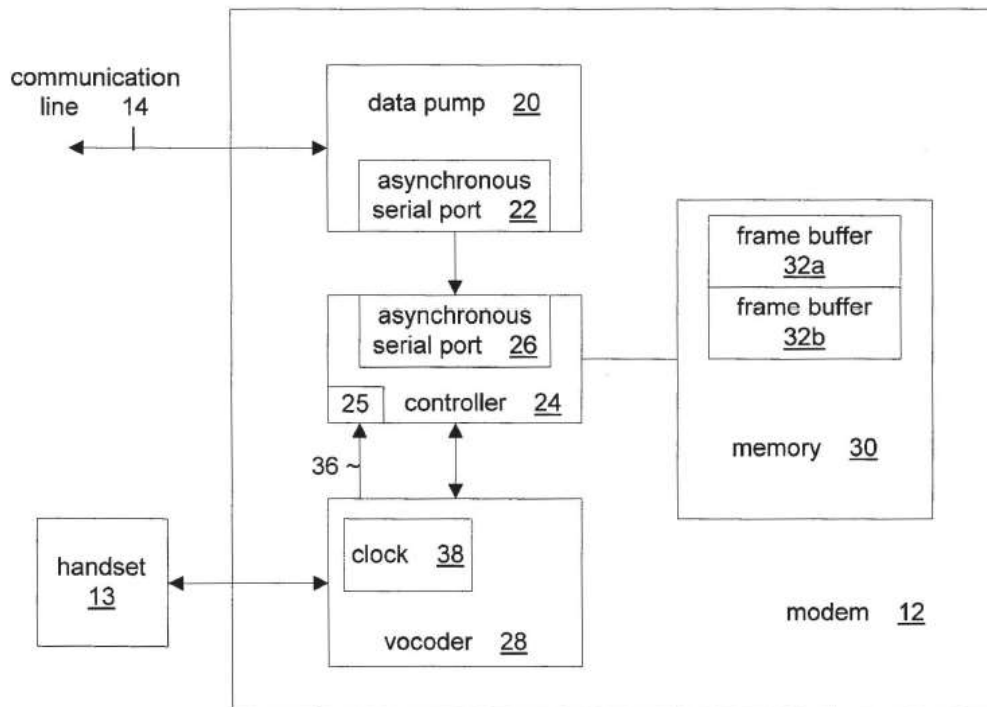


Figure 2

Figure 2 is a block diagram of a modem used in Oliver. Ex. 1006, 3:59. The illustrated modem is representative of either one or both of the far end and near end modems connected by communication line 14. *Id.* at 4:66–5:1.

Modem 12 includes data pump 20 coupled to communication line 14. Ex. 1006, 5:2–3. The data pump modulates data for transmission on line 14 and demodulates data received from line 14. *Id.* at 5:4–8. Controller 24 receives compressed speech frames, i.e., voice encoded speech, from data pump 20 to provide them to vocoder 28, and also receives compressed speech frames from vocoder 28 and provide them to data pump 20. *Id.* at 5:17–23. Memory 30 is coupled to controller 24 and comprises two or more buffers 32a and 32b for buffering frames received from data pump 20. *Id.* at 6:8–16.

Oliver describes:

[T]he controller 24 is operable to handle data overrun of data frames received from the data pump 20 by discarding frames as necessary, as will be described below. The controller 24 is also operable to handle data underrun of frames received from the data pump 20 by providing filler frames, preferably either “quiet” frames or repeat frames, as necessary, as will be described below in more detail.

Id. at 5:24–30. Specifically, controller 24 handles a data underrun condition by providing a “quiet frame” to the vocoder, to maintain synchronization between the transmit rate and the required receive rate. *Id.* at 8:52–57. A “quiet frame” comprises “a frame of compressed audio which was sampled with the microphone portion of a telephone subscriber handset removed from the circuit thereby producing a frame in which sound is essentially absent.” *Id.* at 7:52–56.

2. *Claims 5, 7, 13, 15, 20, and 22*

Each of claims 5 and 7 depends directly from claim 1. Ex. 1001, 23:15–18, 23:23–28. Each of claims 13 and 15 depends directly from

claim 9. *Id.* at 23:62–66, 24:5–10. Each of claims 20 and 22 depends directly from claim 16. *Id.* at 24:46–51, 24:57–63.

The deficiency of Petitioner’s accounting for claim 1 equally applies to claims 5 and 7. The deficiency of Petitioner’s accounting for claim 9 equally applies to claims 13 and 15. The deficiency of Petitioner’s accounting for claim 16 equally applies to claims 20 and 22. The disclosure of Oliver, as applied by Petitioner, does not cure these deficiencies.

Petitioner has not shown a reasonable likelihood that it would prevail in establishing the alleged obviousness of claims 5, 7, 13, 15, 20, and 22 over Yagasaki and Oliver.

F. Alleged Obviousness of Claims 6, 14, and 21 over Yagasaki, Oliver, and Lyon

1. Overview of Lyon (Exhibit 1007)

Lyon pertains to conversion of video signals. Ex. 1007, code (57). Lyon recognizes that edited video frames may exist in a video sequence. *Id.* at 5. Lyon states: “It has been recognised by the present inventors that the assumption of both fields of an intermediate video frame corresponding with the same film image, may occasionally break down if there has been editing of the NTSC video.” *Id.* Lyon explains:

[S]teps should be taken to ensure that any “artificial” intermediate video frames which consist not of odd and even scans of the same film frame but of the last field in one edited tape sequence and the first field in the succeeding sequence, are identified as such and processed accordingly. It will be understood that since the line interpolation algorithm assumes both fields of the intermediate video frame to represent the same image, the application of this algorithm to a pair of fields which are adjacent only through the coincidence of editing, may produce visually disturbing artefacts.

Id. at 5–6. Further, Lyon states: “[S]teps are preferably taken to ensure that a frame having fields from either side of a cut, is not treated in the same manner as a normal decoded frame.” *Id.* at 11.

2. *Claims 6, 14, and 21*

Claim 6 depends from claim 5 which depends from claim 1.

Ex. 1001, 23:15–22. Claim 14 depends from claim 13 which depends from claim 9. *Id.* at 23:62–24:4. Claim 21 depends from claim 20 which depends from claim 16. *Id.* at 24:46–56.

The deficiency of Petitioner’s accounting for claim 1 equally applies to claim 6. The deficiency of Petitioner’s accounting for claim 9 equally applies to claim 14. The deficiency of Petitioner’s accounting for claim 16 equally applies to claim 21. The disclosures of Oliver and Lyon, as applied by Petitioner, do not cure these deficiencies.

Petitioner has not shown a reasonable likelihood that it would prevail in establishing the alleged obviousness of claims 6, 14, and 21 over Yagasaki, Oliver, and Lyon.

G. *Alleged Obviousness of Claim 8 over Yagasaki and Ran*

1. *Overview of Ran (Exhibit 1008)*

Ran relates to coding, transmission, and display of video in a telecommunication system. Ex. 1008, 1:8–11. The system uses retransmission to correct channel errors in signals representing a moving image, and each frame of the moving image is displayed only after all necessary data for the frame has been received without errors that are detectable by a receiver. *Id.* at 2:25–30. The receiver requests retransmission when an error is detected in a code representing a frame segment. *Id.* at 2:41–43. Ran describes:

To determine when a frame is ready for display, the receiver contains a status buffer which contains entries corresponding to the frame segments in several consecutive frames. Each entry indicates whether a digital code for a frame segment has been received without errors and indicates whether the frame segment is inter or intra coded. A frame segment is considered displayable if the frame segment is intra coded and the code for the frame segment has been received without errors or if the frame segment is inter coded, the code for the frame segment has been received without errors, and the preceding frame segment in the same sub-sequence is displayable. A frame is displayable if all the frame segments in the frame are displayable.

Id. at 2:65–3:10. Ran explains that inter coded frame segments are decoded from previous data. *Id.* at 9:61–62.

In Ran, a sender transmits a series of video data packets to a receiver, and the packets represent a sequence of frames which form a moving image. Ex. 1008, 3:38–41. The receiver collects the packets from the sender and checks them for error. *Id.* at 3:42–43. “When a packet is received without errors, the receiver sets an entry in a video status buffer to indicate that a packet for a particular portion of a frame is ready. When the receiver detects an error, the receiver requests that the sender retransmit the packet which contained the error.” *Id.* at 3:43–48.

2. *Claim 8*

Claim 8 depends indirectly from claim 1. Ex. 1001, 23:28–32. The deficiency of Petitioner’s accounting for claim 1 equally applies to claim 8. The disclosure of Ran, as applied by Petitioner, does not cure that deficiency. Petitioner has not shown a reasonable likelihood that it would prevail in establishing the alleged obviousness of claim 8 over Yagasaki and Ran.

IV. CONCLUSION

Petitioner has not shown a reasonable likelihood that it would prevail in establishing that at least one of claims 1–22 of the '134 patent is unpatentable.

V. ORDER

In consideration of the foregoing, it is
ORDERED that no *inter partes* review is instituted in this proceeding.

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For PETITIONER:

Jessica Kaiser
Robin Brewer
Jonathan R. Carter
Ji Wang
PERKINS COIE LLP
Kaiser-ptab@perkinscoie.com
Brewer-ptab@perkinscoie.com
carter-ptab@perkinscoie.com
wang_ji_ptab@perkinscoie.com

For PATENT OWNER:

Christopher TL Douglas
John Haynes
Nicholas T. Tsui
Caleb J. Bean
Bryan Rodriguez
Alston & Bird LLP
christopher.douglas@alston.com
john.haynes@alston.com
nick.tsui@alston.com
caleb.bean@alston.com
bryan.rodriguez@alston.com