

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner,

v.

ADVANCED CODING TECHNOLOGIES, LLC,

Patent Owner.

Patent No. 9,042,448

Filing Date: May 28, 2009

Issue Date: May 26, 2015

Inventor: Satoru Sakazume

Title: MOVING PICTURE ENCODING SYSTEM, MOVING PICTURE
ENCODING METHOD, MOVING PICTURE ENCODING PROGRAM,
MOVING PICTURE DECODING SYSTEM, MOVING PICTURE DECODING
METHOD, MOVING PICTURE DECODING PROGRAM, MOVING PICTURE
REENCODING SYSTEM, MOVING PICTURE REENCODING METHOD,
AND MOVING PICTURE REENCODING SYSTEM

PATENT OWNER'S PRELIMINARY RESPONSE

Case No. IPR2025-01070

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LIST OF EXHIBITS

Exhibit No.	Description of Document
2001	Third Amended Docket Control Order, Dkt. 42, <i>Advanced Coding Techs. LLC v. Apple Inc.</i> , Case No. 2:24-cv-00572-JRG (E.D. Tex. October 29, 2024)
2002	Apple Inc.'s Second Supplementary Invalidity Contentions in <i>Advanced Coding Techs. LLC v. Apple Inc.</i> , Case No. 2:24-cv-00572-JRG (E.D. Tex.), dated July 3, 2025
2003	Advanced Coding Technologies LLC's Infringement Contentions and P.R. 3-1 and 3-2 Disclosures in <i>Advanced Coding Techs. LLC v. Apple Inc.</i> , Case No. 2:24-cv-00572-JRG (E.D. Tex.), dated September 18, 2024
2004	Joint Claim Construction and Prehearing Statement, Dkt. 72, <i>Advanced Coding Techs. LLC v. Apple Inc.</i> Case No. 2:24-cv-00572-JRG (E.D. Tex.), filed August 21, 2025

I. INTRODUCTION

On June 2, 2025, Apple Inc. (“Petitioner” or “Apple”) submitted a Petition (Paper 2, “Petition” or “Pet.”) to institute *inter partes* review (“IPR”) of U.S. Patent No. 9,042,448 (APPLE-1001, the “448 Patent”), challenging Claims 1-3 (the “Challenged Claims”). The Petition asserts that (i) the Challenged Claims are rendered obvious over the English Translation of Japanese Patent Publication No. P2007-316161A with Translation Certificate (“APPLE-1005” or “Phek”) in view of Segall et al., *Spatial Scalability Within the H.264/AVC Scalable Video Coding Extension*; IEEE Transactions on Circuits & Systems for Video Tech., Vol. 17, No. 9, September 2007 (“APPLE-1006” or “Segall”), and U.S. Patent Application Publication No. 2008/0137753 (“APPLE-1008” or “He”); (ii) the Challenged Claims are rendered obvious over Phek in view of Segall, He, and U.S. Patent Application Publication No. 2001/0043751 (“APPLE-1046” or “Takahashi”); (iii) the Challenged Claims are rendered obvious over Phek in view of Segall and Takahashi; and (iv) Claim 3 is rendered obvious over Phek in view of Takahashi. Pet. at 1. The Board should deny the Petition for at least the reasons described briefly below.

Petitioner fails to show that the combination of Phek, Segall, He, and Takahashi discloses at least “A moving picture encoding system that makes an encoding of a sequence of moving pictures with a resolution higher than a standard resolution using moving pictures contents which include a sequence of moving

pictures with the standard resolution and do not include a sequence of moving pictures with a resolution higher than the standard resolution, the moving picture encoding system,” “a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution,” “a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits, wherein a spatial resolution of the set of super-resolution enlarged pictures, that of the set of super-resolution enlarged decoded pictures, and that of the set of resolution converted enlarged decoded pictures are made equal,” and “wherein the third encoder controls a selection of a set of reference pictures and creates a set of data on the selection of the set of reference pictures to identify a selected set of reference pictures during the process for prediction of the third combination.”

First, the Petition is deficient because the Petition’s reliance on Phek’s disclosure ignores the limitations of the preamble. Specifically, the output of Phek’s

basic layer encoding processing device yields encoded standard resolution images that are not used in the “super-resolution processing device” (i.e., no *encoding* of a sequence of moving pictures with a resolution higher than a standard resolution) and Phek’s enhanced layer encoding processing device requires an extended layer bitstream (i.e., *does* include “a sequence of moving pictures with a resolution higher than the standard resolution”), in contravention of the claimed limitations.

Second, the Petition is deficient because Petitioner incorrectly relies on Segall for the concept of multiple enhancement layers that are decoded and encoded with dependencies to obtain the recited “a resolution higher than the standard resolution.” However, the claimed “third resolution converter” does not process a different layer of resolution, or even different pictures, than what has already been independently processed by the claimed “second super-resolution enlarger.”

Third, the Petition is deficient because He’s deblocking control flags do not “control[] a selection of a set of reference pictures” as the Petition incorrectly alleges. He’s deblocking control flag merely selects between whether to use a deblock filter to remove block effects on the block boundaries of reconstructed frames or not. Further, He’s selection between a filtered reconstructed frame and an unfiltered reconstructed frame is not a selection between reference frames. The system of He creates reference frames from only filtered reconstructed frames. Similarly, Takahashi does not disclose the claimed “reference picture selection

information,” as the Petition incorrectly alleges. Takahashi’s predetermined selection factors only operate “a selection switch 19*b* [is] for selecting either the high-resolution predicted data Pg1 or the resolution converted signal CITg2, depending the coding mode.” Ex. 1046, [0176]. The Petition cannot show how Takahashi discloses multiple sets of reference pictures because selecting between two different sets requires two different processes that are both enabled, while only one process is enabled at a time in Takahashi.

Accordingly, the Board should deny institution of the Petition.

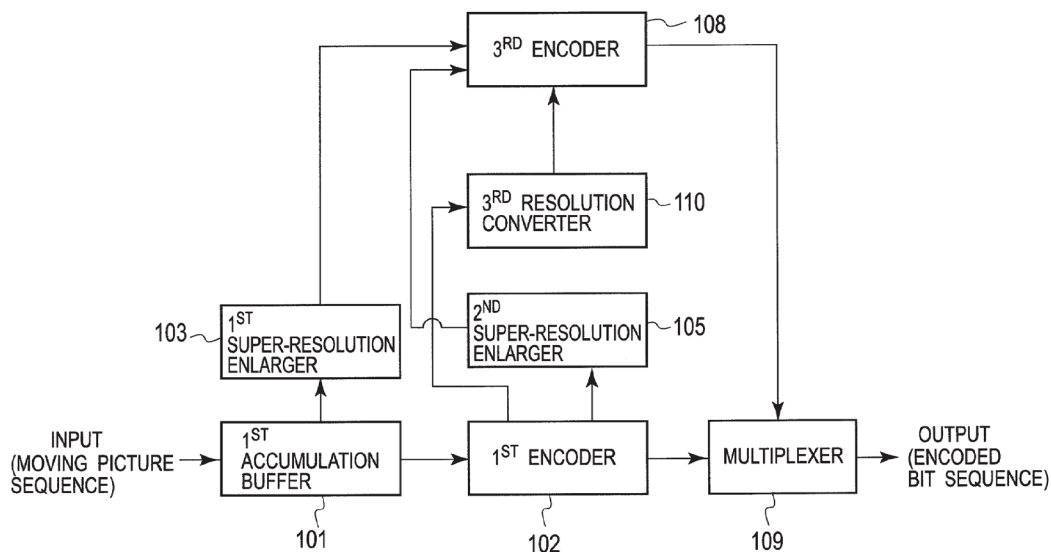
II. THE ’448 PATENT

The ’448 Patent relates to moving picture encoding and decoding “adapted to work on moving picture sequences to implement processes such as those for super-resolution enlargement.” ’448 Patent, 1:22-30. The ’448 Patent uses layered coding to increase coding efficiency and allow for the creation of high-resolution images. *Id.* The ’448 Patent describes that in prior art systems, videos were processed into a “base layer” and an “enhancement layer,” and frame predictions could be made only by using other frames from within its own layer. *Id.*, 1:34-51, 2:18-33. Known techniques using motion prediction to improve resolution upscaling were insufficient because they reduced encoding efficiencies and resulted in degraded image quality. *Id.*

The ’448 Patent describes a system that maintains coding efficiency and

image quality by disclosing an encoder (“3rd Encoder”) which receives three inputs, as shown in FIG. 13:

FIG. 13



Id., FIG. 13. It receives (1) a set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, (2) a set of super-resolution enlarged decoded pictures from the second super-resolution enlarger, and (3) a set of resolution converted enlarged decoded pictures from the third resolution converter. *Id.*, Claim 1. Either one of the a set of super-resolution enlarged decoded pictures from the second super-resolution enlarger, and a set of resolution converted enlarged decoded pictures from the third resolution converter can be used as sets of reference pictures by the third encoder to encode the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures that it received in order to create a sequence of encoded super-resolution pictures.

Id., Claim 1, FIG. 13.

III. THE ALLEGED PRIOR ART

A. Phek

Phek attempts to solve the problem of “provid[ing] a super-resolution processing method and device that improves the resolution and quality of image sequences and that reduces grid artifacts.” APPLE-1005, Abstract. Specifically, Phek explains how its “present invention is novel”:

The present invention is novel in that it uses residual interpolation to prevent grid artifacts. Regularization can also prevent grid artifacts by adding smoothing constraints to high-resolution estimated images. However, because the smoothing constraints apply to the entire image, the smoothing strength has to be controlled. Blurring occurs in areas that do not require smoothing, and if the strength is not set properly, the blurring will be excessive or insufficient.

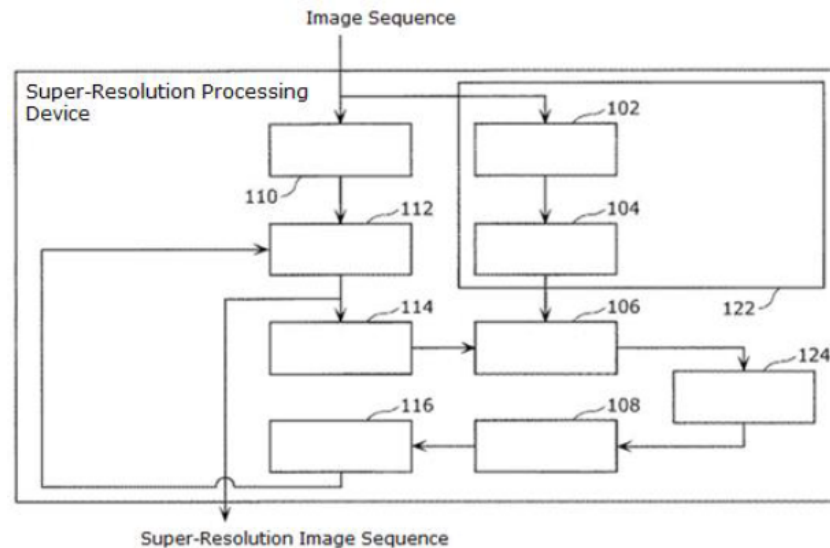
Since residual interpolation is performed on missing pixels, areas where no pixels are missing are not blurred. Also, the residual interpolation strength is established on the basis of the value of the residual itself. Hence, a larger residual value results in a larger interpolated value, and vice versa.

The result is a better super-resolution algorithm that produces sharper images compared to the use of regularization.

Residual interpolation can be combined with regularization. This combination can reduce the intensity of regularization and prevent excessive blurring.

Id., [0006]-[0009]. Fig. 1a shows an exemplary super-resolution process device of

Phek:



102: Motion detection processing device
104: Registration processing device
106: Frame difference processing device
108: Point spreading inverse function processing device
110: Interpolation processing device
112: High-resolution buffer
114: Point spreading function processing device
116: High-resolution estimation processing device
124: Residual interpolation processing device

Id., Fig. 1a.

B. Segall

Segall describes a “scalable extension to the H.264/AVC video coding standard” that “allows multiple resolutions of an image sequence to be contained in a single bit stream.” APPLE-1006, Abstract.

Segall explains that “[t]he enhancement layer encoder takes a higher resolution sequence as input” and “higher resolution video data is often referred to as the *enhancement layer*.” *Id.*, 2, Fig. 1.

Segall also discloses a multilayer system that utilizes image pyramids. *Id.*, 3-

4, 13 (“At the high level, the design is conceptually an image pyramid”). Segall further explains that “[i]mage pyramids describe a relationship between lower resolution and higher resolution versions of an image” where “the sequence of pictures at the lowest of these resolutions is coded in a manner such that it can be decoded independently” and “[e]ach higher resolution video sequence is coded relative to a decoded lower resolution sequence.” *Id.* at 3. Therefore, Segall’s addition of a second enhancement layer is part of an image pyramid that depends upon the first enhancement layer, which in turn depends upon a base layer, which is the only layer that “can be decoded independently.” *Id.*

C. He

He “relates in general to video information processing, and more specifically to a system and method of determining a deblocking control flag of scalable video system for indicating presentation of deblocking parameters for multiple layers for reducing bits in the bitstream.” APPLE-1008, [0002].

He describes a deblocking control flag that enables and disables the use of a deblock filter on reconstructed frames. *Id.*, [0006]-[0008]. Specifically, He describes that “[t]he deblocking filter enhances the decoded picture quality and increases the encoding efficiency by removing the block effects in the boundary of each 4x4, 8x8, and/or 16x16 block.” *Id.*, [0006]. Therefore, at a fundamental level, He’s deblocking control flag merely selects between whether to use a deblock filter to remove block

effects on the block boundaries of reconstructed frames or not. *Id.*

He's FIG. 2 and its supporting disclosure show the creation of reference frames from filtered reconstructed frames but not unfiltered reconstructed frames:

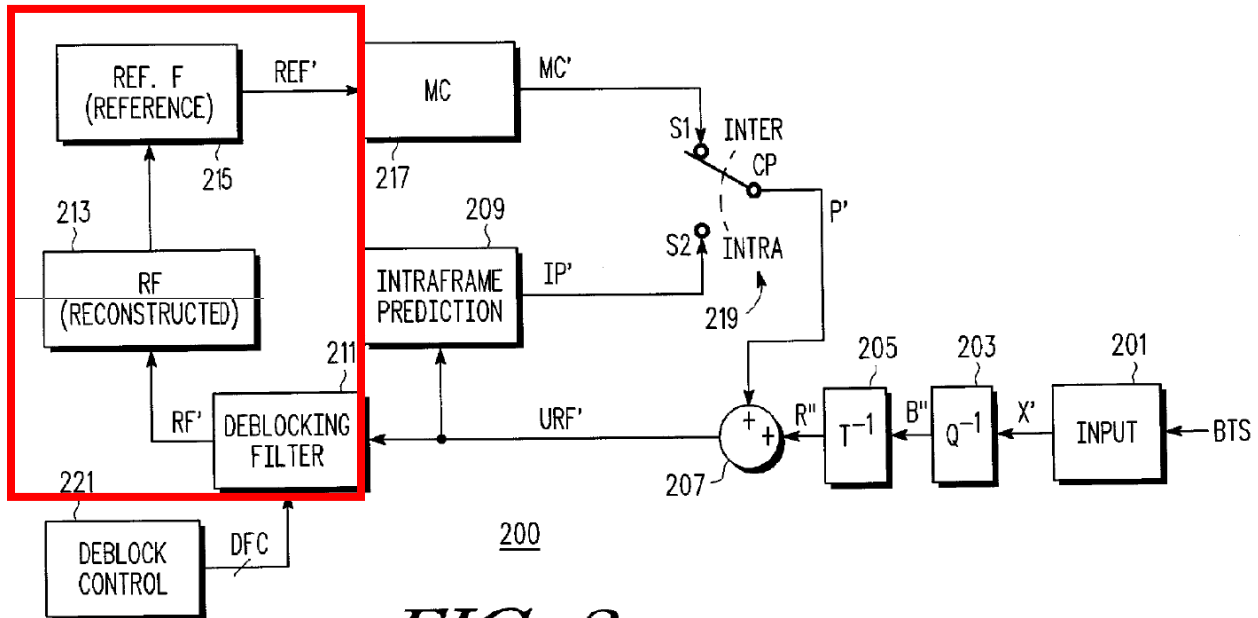


FIG. 2

Id., FIG. 2 (annotated), [0033] (“One or two previously encoded and decoded (and selectively filtered) frames from the RF buffer 213 are provided to a frame storage 215, which provides *reference information REF' to the input of a motion compensation (MC) circuit 217.*”) (emphasis added).

He's unfiltered reconstructed frame may act as an intra-predicted frame providing intraframe prediction information IP' :

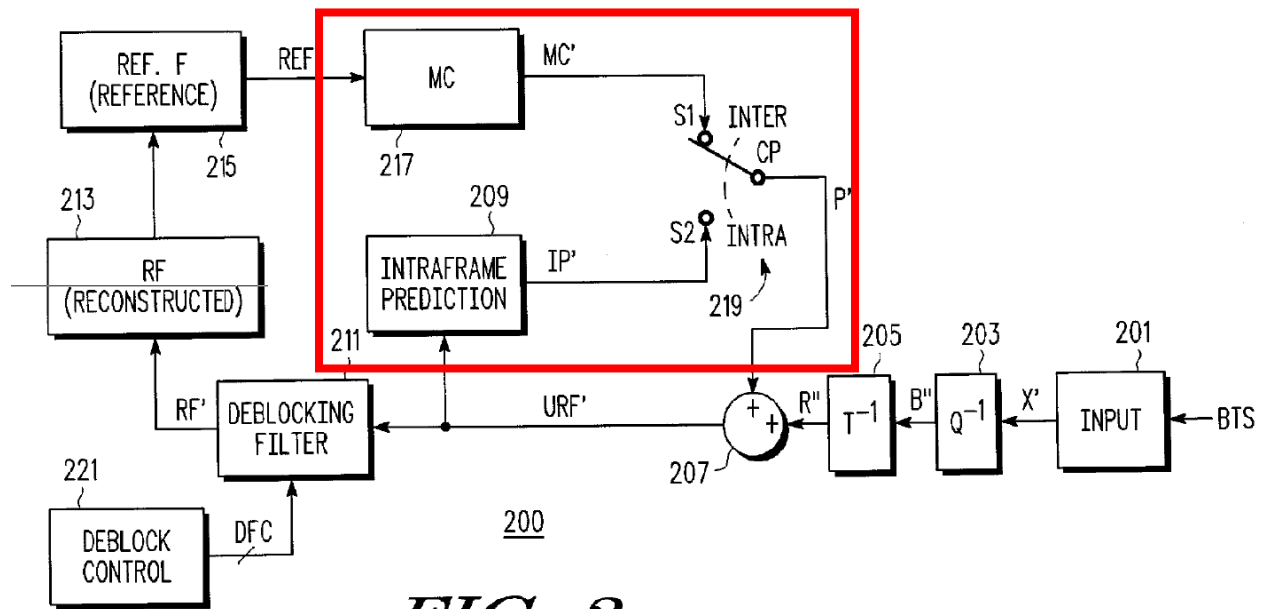


FIG. 2

Id., FIG. 2 (annotated), [0033] (“The intraframe prediction circuit 209 provides intraframe prediction information IP’ to the input terminal S2 of the switch 219. The switch 219 selects between the motion compensated prediction information MC’ and the intraframe prediction information IP’ and provides the selected prediction information P’. The input bitstream BTS provides mode information for controlling the switch 219 for selecting between interframe and intraframe prediction information as known to those of ordinary skill in the art.”). Therefore, the only selection described in the FIG. 2 decoder of He, outside of the selection to apply a deblocking filter to reconstructed frames, is between interframe prediction information (i.e., motion compensated prediction information) and intraframe prediction information. *Id.*

D. Takahashi

Takahashi “relates to a hierarchical image processing apparatus, a hierarchical image processing method, and a data storage medium, and more particularly, to a reduction of the amount of operational processing in a processing for compressively coding digital image signals having different resolutions and in a processing for multiplexing streams obtained by compressively coding image signals having different resolutions and storing or transmitting the multiplexed streams” and “relates to a data storage medium for storing the multiplexed stream obtained by multiplexing the streams, and a data storage medium for storing a program which realizes, by software, the compressive coding or multiplexing that can reduce the amount of operational processing.” Ex. 1046, [0001]-[0002].

Takahashi discloses “a selection switch 19*b* for selecting either the high-resolution predicted data Pg1 or the resolution converted signal CITg2, depending the coding mode.” *Id.*, [0176].

IV. CLAIM CONSTRUCTION

Petitioner’s assertion that “no formal [claim] constructions are presently necessary” in this proceeding (Pet. at 3-4) contradicts its positions in *Advanced Coding Techs. LLC v. Apple, Inc.*, Case No. 2:24-cv-00572-JRG (E.D. Tex.) (the “District Court Litigation”). In the District Court Litigation, both parties agreed to the following constructions:

Claim Term	Claims	Proposed Construction
“standard resolution”	’448 Patent, Claims 1-3	“the spatial resolution of a picture input into an encoding system as an encoding target”
“super-resolution enlarged decoded pictures”	’448 Patent, Claims 1-3	“higher than standard resolution enlarged decoded pictures”
“A moving picture encoding system that makes an encoding of a sequence of moving pictures with a resolution higher than a standard resolution using moving pictures contents which include a sequence of moving pictures with the standard resolution and do not include a sequence of moving pictures with a resolution higher than the standard resolution, the moving picture encoding system comprising”	’448 Patent, Claims 1-3	Preamble is limiting.

Ex. 2004, at 2-3. The Petition does not assume that the plain and ordinary meaning of these terms is as limited as the parties’ agreed-upon constructions, and the Petition’s analysis of the claim limitations containing these terms against the cited references does not indicate that those references disclose the aforementioned claim terms under Petitioner’s proposed constructions in the District Court Litigation.

If Petitioner believed that any claim terms required construction, it had a duty to identify “[h]ow the challenged claim is to be construed” in its Petition. 37 C.F.R.

§ 42.104(3); *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide, November 2019, at 48 (“The Board, in its claim construction determinations, will consider statements regarding claim construction made by patent owners and by a petitioner filed in other proceedings, if the statements are timely made of record.”) (citations omitted). Instead, Petitioner chose to apply the plain and ordinary meaning in this proceeding, while agreeing to narrower constructions in the District Court Litigation. Therefore, the parties’ agreed-upon constructions in the District Court Litigation should be applied in this proceeding. Notably, Petitioner was aware of these agreed-upon constructions from a previous district court litigation. *See* Dkts. 87, 155, *Advanced Coding Techs. LLC v. LG Elecs Inc.*, 2:22-cv-00501-JRG (E.D. Tex.) (Lead Case); *Advanced Coding Techs. LLC v. Samsung Elecs. Co.*, 2:22-cv-00499-JRG (E.D. Tex) (Member Case).

For the purposes of this Preliminary Response, Patent Owner notes that since both Patent Owner and Petitioner agreed to the constructions of the above terms in the District Court Litigation, it is highly likely that the District Court will enter the agreed constructions. Patent Trial and Appeal Board Consolidated Trial Practice Guide, at 47 (citations omitted) (“Parties should submit a prior claim construction determination by a federal court or the ITC in an AIA proceeding as soon as that determination becomes available. Preferably, the prior claim construction determination should be submitted with the petition, preliminary response, or

response, along with explanations. Submission of a prior claim construction determination is mandatory under 37 C.F.R. § 42.51(b), if it is ‘relevant information that is inconsistent with a position advanced by the party during the proceeding.’”).

V. LEVEL OF ORDINARY SKILL IN THE ART

For the purposes of this Preliminary Response only, Patent Owner utilizes Petitioner’s proposed level of skill in the art: “a bachelor’s degree in computer science, electrical engineering, computer engineering, or a related field, with 2-3 years of experience in digital video processing, or a related field. Additional graduate education could substitute for professional experience, and *vice versa*.” Pet. at 4 (citations omitted).

VI. PETITIONER HAS NOT DEMONSTRATED A REASONABLE LIKELIHOOD OF SUCCESS FOR THE GROUNDS ADVANCED IN THE PETITION, AND THE PETITION SHOULD BE DENIED

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) so-called secondary considerations where in evidence. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966); *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537

(Fed. Cir. 1983).

The Board has held that a failure to identify the differences between the claimed subject matter and the prior art is fatal to an obviousness challenge. *See, Apple, Inc. v. Contentguard Holdings, Inc.*, IPR2015-00355, Decision Denying Institution of *Inter Partes* Review, Paper 9 at 9-10 (P.T.A.B. June 26, 2015) (denying institution for failure to identify the differences between the claimed subject matter and the prior art).

In arriving at an obviousness determination, the Board must sufficiently explain and support the conclusions that the prior art references disclose all the elements recited in the Challenged Claims and a relevant, skilled artisan not only could have made, but would have been motivated to combine all the prior art references in the way the patent claims and reasonably expected success. *Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017). That is, even if all the claim elements are found across a number of references, an obviousness determination must consider whether a person of ordinary skill in the art would have the motivation to combine those references. *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1368 (Fed. Cir. 2016); *Los Angeles Biomedical Rsch. Inst. at Harbor-UCLA Med. Ctr. v. Eli Lilly & Co.*, 849 F.3d 1049, 1067 (Fed. Cir. 2017) (vacating and remanding an obviousness determination, in part, because the Board did not make factual finding as to whether there was an apparent reason

to combine all three prior art references to achieve the claimed invention and whether a person of skill in the art would have had a reasonable expectation of success from such a combination). This combinability determination, as supported by an articulated motivation to combine, requires a plausible rationale as to why those prior art references would have worked together. *Broadcom Corp. v. Emulex Corp.*, 732 F.3d 1325, 1335 (Fed. Cir. 2013). Absent some articulated rationale, a “common sense” finding is no different than the conclusory statement “would have been obvious.” *In re Van Os*, 844 F.3d 1359, 1361 (Fed. Cir. 2017). Of additional importance, “knowledge of a problem and motivation to solve it are entirely different from motivation to combine particular references” *Innogenetics, N.V. v. Abbott Lab’ys.*, 512 F.3d 1363, 1373 (Fed. Cir. 2008).

A. The Challenged Claims Are Not Obvious Over Any Combination of Phek, Segall, He, and Takahashi

1. The Petition Does Not Show Any Combination of Phek, Segall, He, and Takahashi Discloses “*A moving picture encoding system that makes an encoding of a sequence of moving pictures with a resolution higher than a standard resolution using moving pictures contents which include a sequence of moving pictures with the standard resolution and do not include a sequence of moving pictures with a resolution higher than the standard resolution, the moving picture encoding system,*” as Required by Claim Elements [1.P], [2.P], and [3.P]

The Challenged Claims of the ’448 Patent require “A moving picture encoding system that makes an encoding of a sequence of moving pictures with a

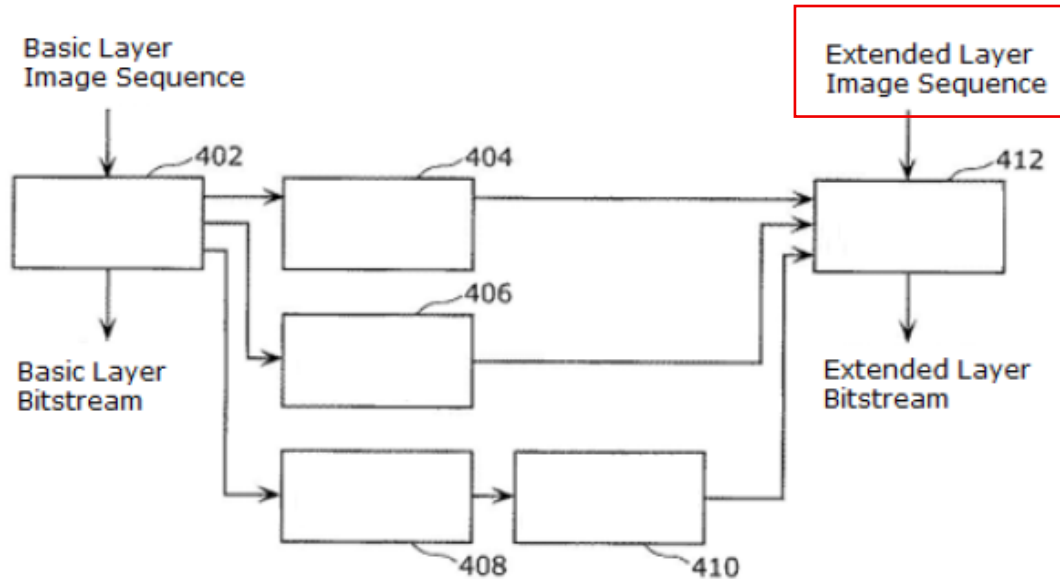
resolution higher than a standard resolution using moving pictures contents which include a sequence of moving pictures with the standard resolution and do not include a sequence of moving pictures with a resolution higher than the standard resolution, the moving picture encoding system.”

As noted above, Petitioner failed to propose a construction for this preamble despite agreeing to construe the preamble as limiting in the District Court Litigation. *See supra* Section IV.

The Petition only relies on Phek to disclose the recited “moving picture encoding system that makes an encoding of a sequence of moving pictures with a resolution higher than a standard resolution using moving pictures contents which include a sequence of moving pictures with the standard resolution and ***do not include a sequence of moving pictures with a resolution higher than the standard resolution, the moving picture encoding system.***” *See* Pet. at 45-48. However, as the Petition admits, Phek can only disclose that “[t]he base layer video stream would thus include pictures only at a standard resolution for coding at the standard resolution and the enhanced layer video stream would thus include pictures only at a resolution higher than the standard resolution for coding at the higher resolution.” *Id.* at 47. However, this ignores the claim language that describes encoding a sequence of moving pictures with a resolution higher than a standard resolution without using an input sequence of moving pictures resolution higher than the

standard resolution. Phek’s own Figures 4A and 4B, cited by Petitioner, demonstrate that Phek requires a separate “extended layer image sequence” in order to develop a higher than standard resolution encoded sequence (i.e., *does* include “a sequence of moving pictures with a resolution higher than the standard resolution” for “encoding of a sequence of moving pictures with a resolution higher than a standard resolution”):

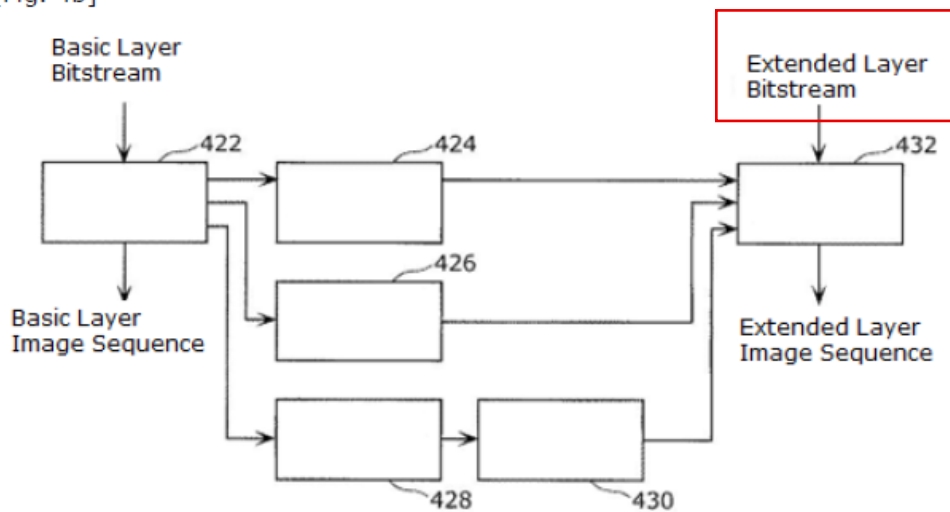
[Fig. 4a]



402: Basic layer encoding processing device
404: Interlayer residual prediction processing device
406: Interlayer motion data prediction processing device
408: Interlayer intra-prediction processing device
410: Super-resolution processing device
412: Enhanced layer encoding processing device

APPLE-1005, Fig. 4a (annotated).

[Fig. 4b]



422: Basic layer decoding processing device
 424: Interlayer residual prediction processing device
 426: Interlayer motion data prediction processing device
 428: Interlayer intra-prediction processing device
 430: Super-resolution processing device
 432: Enhanced layer decoding processing device

Id., Fig. 4b (annotated).

To the extent that Phek discloses a “super-resolution processing device 410,” such a device only describes taking the output of an “interlayer intra-prediction processing device 408 [that] uses an intra image of the basic layer or a reconstructed image of the basic layer as an additional reference image for encoding the image of the enhanced layer” as the input of super-resolution processing device 410 in order “to improve these additional references images.” *Id.*, [0014]. Notably, no encoding has taken place. Therefore, such a device does not “make an **encoding** of a sequence of moving pictures with a resolution higher than a standard resolution.” Phek’s encoding only takes place at “basic layer encoding processing device 402” and

“enhanced layer encoding processing device 412.” *Id.* In sum, the output of Phek’s basic layer encoding processing device yields encoded standard resolution images that are not used in the “super-resolution processing device” (i.e., no **encoding** of a sequence of moving pictures with a resolution higher than a standard resolution) and Phek’s enhanced layer encoding processing device requires an extended layer bitstream (i.e., **does** include “a sequence of moving pictures with a resolution higher than the standard resolution”), both in contravention of the claimed limitations.

Because of this deficiency, institution should be denied.

2. The Petition Does Not Show that Any Combination of Phek, Segall, He, and Takahashi Discloses “a *third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution,*” as Required by Claim Elements [1.4] and [2.3]

Claims 1 and 2 of the ’448 Patent require “a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution.”

The Petition is deficient because it incorrectly relies on Segall for the concept of multiple enhancement layers (Pet. at 57-59) to obtain the recited “a resolution

higher than the standard resolution.” As Segall explains, “[t]he enhancement layer encoder takes a *higher resolution sequence as input*” and “higher resolution video data is often referred to as the *enhancement layer*.” APPLE-1006, 2 (first emphasis added), Fig. 1. But the plain language of this claim limitation precludes the concept of Segall’s multiple enhancement layers because the claimed “third resolution converter” does not process a different higher resolution sequence or even different pictures, than what has already been independently processed by the claimed “second super-resolution enlarger.” See ’448 Patent, Claim 1 (“a third resolution converter configured to *acquire the set of decoded pictures from the first encoder*”; “a second super-resolution enlarger configured to *acquire the set of decoded pictures from the first encoder*”) (emphasis added).

Even if the Petition were correct that the claimed “third resolution converter” operated as an “enhancement layer,” Segall expressly discloses that its multilayer system utilizes image pyramids. APPLE-1006, 3-4, 13 (“At the high level, the design is conceptually an image pyramid”). Segall explains that “[i]mage pyramids describe a relationship between lower resolution and higher resolution versions of an image” where “the sequence of pictures at the lowest of these resolutions is coded in a manner such that it can be decoded independently” and “[e]ach higher resolution video sequence is coded relative to a decoded lower resolution sequence.” *Id.* at 3. Therefore, Segall’s addition of a second enhancement layer as part of Petitioner’s

combinations is part of an image pyramid that depends upon the first enhancement layer, which in turn depends upon a base layer, which is the only layer that “can be decoded independently.” *Id.* This dependent decoding of enhancement layers contradicts the language of this claim limitation in which the recited “third resolution converter” “create[s] a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution” using only one independent input layer that is the claimed “set of decoded pictures from the first encoder.” In view of independent processing built into the language of this claim limitation, the claimed third resolution converter cannot be disclosed by Segall’s multilayer scheme in combination with Phek, He, or Takahashi.

Because of this deficiency, institution should be denied.

3. The Petition Does Not Show that Any Combination of Phek, Segall, He, and Takahashi Discloses “*a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits, wherein a spatial resolution of the set of super-resolution enlarged pictures, that of the set of super-resolution enlarged decoded pictures, and that of the set of resolution converted enlarged decoded pictures are made equal,*” as Required by Claim Elements [1.5], [1.6], [2.4], and [2.5]

Claims 1 and 2 of the '448 Patent require “a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits, wherein a spatial resolution of the set of super-resolution enlarged pictures, that of the set of super-resolution enlarged decoded pictures, and that of the set of resolution converted enlarged decoded pictures are made equal.”

As noted in Section VI.A.2 above, the Petition does not show that any

combination of Phek, Segall, He, and Takahashi discloses “a third resolution converter configured to acquire the set of decoded pictures from the first encoder to implement thereon a process for a third resolution conversion to create *a set of resolution converted enlarged decoded pictures with a resolution higher than the standard resolution.*” Therefore, the Petition does not show that any combination of Phek, Segall, He, and Takahashi discloses “a third encoder configured to have the set of super-resolution enlarged pictures from the first super-resolution enlarger as a set of encoding target pictures, employing the set of super-resolution enlarged decoded pictures from the second super-resolution enlarger and *the set of resolution converted enlarged decoded pictures from the third resolution converter as sets of reference pictures*, to implement thereon a third combination of processes for a prediction and an encoding to create a third sequence of encoded bits, wherein a spatial resolution of the set of super-resolution enlarged pictures, that of the set of super-resolution enlarged decoded pictures, and that of *the set of resolution converted enlarged decoded pictures* are made equal.”

Because of this deficiency, institution should be denied.

4. The Petition Does Not Show that Any Combination of Phek, Segall, He, and Takahashi Discloses “*wherein the third encoder controls a selection of a set of reference pictures and creates a set of data on the selection of the set of reference pictures to identify a selected set of reference pictures during the process for prediction of the third combination,*” as Required by Claim Elements [1.7], [2.6], [3.6]

The Challenged Claims requires “the third encoder [configured to] control[] a selection of a set of reference pictures and creates a set of data on the selection of the set of reference pictures to identify a selected set of reference pictures during the process for prediction of the third combination.” The Petition fails to show that the prior art teaches this claim limitation for two reasons.

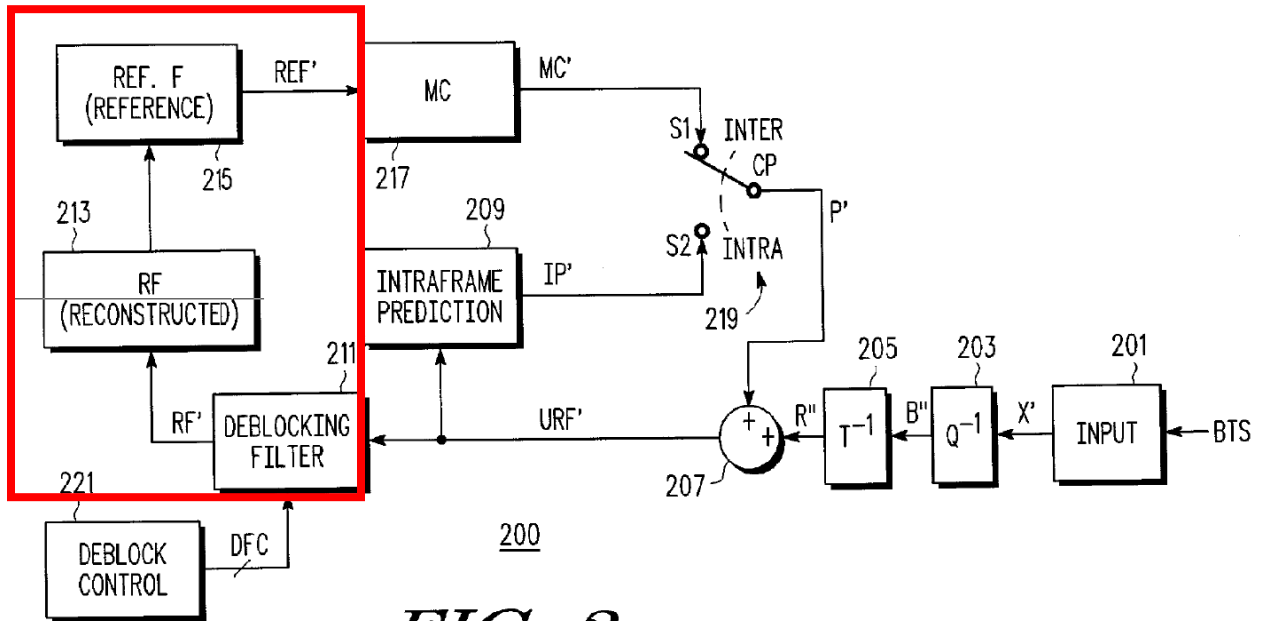
First, the Petition is deficient due to its reliance on Phek and Segall to disclose this limitation while contradicting other claim limitations. For example, (i) Petitioner admits that “Phek further teaches that ‘the intra image of the basic layer or a reconstructed image of the basic layer is used as an *additional* reference image for encoding the image of the enhanced layer’” (Pet. at 65) (emphasis added); and (ii) Petitioner admits that “Segall teaches that ‘inter-layer prediction can be used to provide additional coding choices,’ including selecting between upsampled base layer references and enhanced-layer predictions” (*Id.* at 67). In both Phek and Segall, any purported choice between reference pictures is between pictures of different resolutions (i.e., base layer versus enhanced layer) rather than the same resolution, which is required by the Challenged Claims (“a spatial resolution of the set of super-

resolution enlarged pictures, that of the set of super-resolution enlarged decoded pictures, and that of the set of resolution converted enlarged decoded pictures *are made equal*").

Second, the Petition is deficient because He's "control flags and other signaling" do not "control[] a selection of a set of reference pictures" as the Petition incorrectly alleges. Pet. at 38-39, 65-67. As the Petition notes, "He describes techniques for selectively enabling/disabling reference picture *filters* in a scalable coding system," and specifically "whether enhanced (filtered) reference pictures are to be used for the prediction of a current frame." Pet. at 65-66 (citing APPLE-1008, [0028], [0034], [0037]) (emphasis added). He describes that "[t]he deblocking filter enhances the decoded picture quality and increases the encoding efficiency by removing the block effects in the boundary of each 4x4, 8x8, and/or 16x16 block." APPLE-1008, [0006]. Therefore, He's deblocking control flag merely selects between whether to use a deblock filter to remove block effects on the block boundaries of reconstructed frames or not. *Id.*

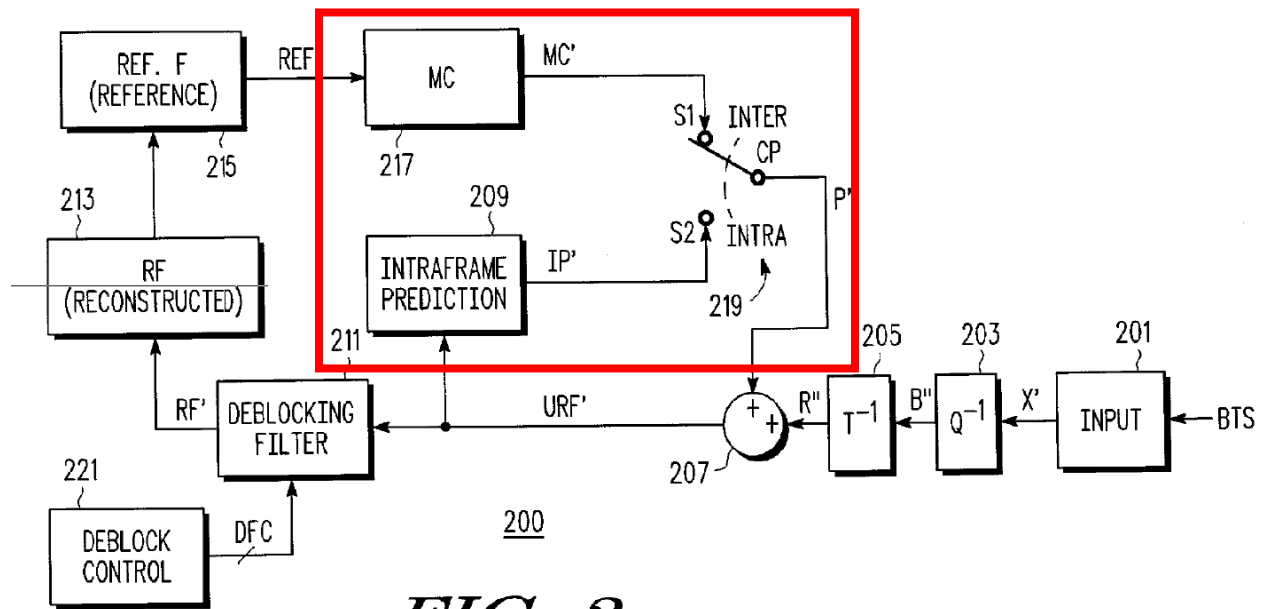
Petitioner makes an unsupported illogical leap to conclude that the selection made by He's deblock filter (whether to apply a deblocking filter to a reconstructed frame) constitutes a selection between alleged reference frames: a filtered reconstructed frame and an unfiltered reconstructed frame. Pet. at 66-67. He's FIG. 2 and its supporting disclosure show only one creation of reference frames from

filtered reconstructed frames:



APPLE-1008, FIG. 2 (annotated), [0033] (“One or two previously encoded and decoded (and selectively filtered) frames from the RF buffer 213 are provided to a frame storage 215, which provides *reference information REF’ to the input of a motion compensation (MC) circuit 217.*”) (emphasis added). Therefore, the motion compensation circuit 217 of FIG. 2 does not have a selection between different reference picture sets.

Moreover, as shown in FIG. 2 of He and its supporting disclosure, there is no reference picture associated with the unfiltered reconstructed frame because, if selected, the unfiltered reconstructed frame is an *intra*-predicted frame providing intraframe prediction information IP’ (*i.e.*, there is no reference frame when the prediction takes place *within* the same frame):



APPLE-1008, FIG. 2 (annotated), [0033] (“The intraframe prediction circuit 209 provides intraframe prediction information IP' to the input terminal $S2$ of the switch 219. The switch 219 selects between the motion compensated prediction information MC' and the intraframe prediction information IP' and provides the selected prediction information P' . The input bitstream **BTS** provides mode information for controlling the switch 219 for selecting between interframe and intraframe prediction information as known to those of ordinary skill in the art.”). Therefore, the only selection described in the FIG. 2 decoder of He, outside of the unrelated selection to apply a deblocking filter to reconstructed frames, is between interframe prediction information (*i.e.*, motion compensated prediction information) and intraframe prediction information, not between different reference picture sets, as required by this claim limitation’s “control[ing] a selection of a set of reference

pictures.” ’448 Patent, Claim 1.

The Petition is also deficient because it fails to show how Takahashi discloses the claimed “a selection of a set of reference pictures,” as the Petition incorrectly alleges. Pet. at 70-78. Petitioner alleges that Takahashi discloses “selects between resolution-converted data from a lower layer or predicted data from the enhancement layer for use as a reference signal for the prediction of a frame in the enhancement layer based on a coding mode” through a switching mechanism. Pet. at 70, 72, 76. As a preliminary matter, Petitioner admits that “Takahashi describes the switching mechanism in the context of decoding,” not encoding as required by the claim. For this statement, Petitioner relies solely on its expert, who also makes the same statement without any support:

and decoding. APPLE-1046, [0004]. Although Takahashi describes a switching

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mechanism in the context of decoding, a POSITA would have understood that the same switching principles are equally applicable to the encoding process.

Ex. 1003, ¶ 79.

Even under Petitioner’s unsupported assumption, Takahashi’s switching mechanism does not disclose this claim limitation. Takahashi confirms that

“a selection switch 19*b* [is] for selecting *either* the high-resolution predicted data Pg1 or the resolution converted signal CITg2, depending the coding mode.” APPLE-1046, [0176] (emphasis added). Therefore, the Petition fails to show how Takahashi discloses both a set of first reference pictures and the set of second reference pictures, as claimed, because selecting between multiple different sets requires multiple different processes that are both enabled.

Because of this deficiency, institution should be denied.

VII. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board deny institution of the Petition in its entirety.

Respectfully submitted,

Dated: September 24, 2025	By: <u>/Peter Lambrianakos</u> / Peter Lambrianakos (Reg. No. 58,279) Email: plambrianakos@fabricantllp.com Lead Counsel for Patent Owner Vincent J. Rubino, III (Reg. No. 68,594) Email: vrubino@fabricantllp.com Back-Up Counsel for Patent Owner Joseph M. Mercadante (Reg. No. 64,077) Email: jmercadante@fabricantllp.com Back-Up Counsel for Patent Owner FABRICANT LLP 411 Theodore Fremd Avenue Suite 206 South Rye, New York 10580 Tel. 212-257-5797 Fax. 212-257-5796
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CERTIFICATE OF WORD COUNT

The undersigned hereby certifies that the portions of the above-captioned PATENT OWNER'S PRELIMINARY RESPONSE specified in 37 C.F.R. § 42.24 has 5,655 words in compliance with the 14,000 word limit set forth in 37 C.F.R. § 42.24. This word count was prepared using Microsoft Word for Office 365.

Respectfully submitted,

September 24, 2025

By: /Peter Lambrianakos /
Peter Lambrianakos (Reg. No. 58,279)
Lead Counsel for Patent Owner
FABRICANT LLP
411 Theodore Fremd Avenue
Suite 206 South
Rye, New York 10580
Tel. 212-257-5797
Fax. 212-257-5796
Email: plambrianakos@fabricantllp.com

CERTIFICATE OF SERVICE

A copy of the foregoing Patent Owner's Preliminary Response and Exhibits
2001 through 2004 have been served on Petitioner's counsel of record as follows:

W. Karl Renner
Email: IPR50095-0244IP1@fr.com
Nicholas W. Stephens
Jeremy J. Monaldo
FISH & RICHARDSON
60 South Sixth Street, Suite 3200
Minneapolis, Minnesota 55402

Attorneys for Apple Inc.

September 24, 2025

By: /Peter Lambrianakos /
Peter Lambrianakos (Reg. No. 58,279)
Lead Counsel for Patent Owner