

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. 10,218,995

Filing Date: April 21, 2015

Issue Date: February 26, 2019

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,
MOVING PICTURE REENCODING PROGRAM

PATENT OWNER'S PRELIMINARY RESPONSE

Case No. IPR2025-00984

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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 May 12, 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. 10,218,995 (APPLE-1001, the “’995 Patent”), challenging Claims 2-4 and 11 (the “Challenged Claims”). The Petition asserts that the Challenged Claims are rendered obvious over (i) 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”), Martins et al., *A Unified Approach to Restoration, Deinterlacing and Resolution Enhancement in Decoding MPEG-2 Video*, IEEE Transactions on Circuits & Systems for Video Tech., Vol. 12, No. 9, September 2002 (“APPLE-1007” or “Martins”), and U.S. Patent Application Publication No. 2008/0137753 (“APPLE-1008” or “He”); and (ii) Phek in view of Segall, Martins, and U.S. Patent Application Publication No. 2001/0043751 (“APPLE-1046” or “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, Martins, and He discloses at least “a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution

enlarger to work on the sequence of super-resolution enlarged decoded pictures to implement a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with a standard resolution,” “a second decoder configured to acquire the second sequence of encoded bits obtained with a standard resolution at the demultiplexer as a set of decoding targets, the sequence of decoded pictures created with the standard resolution at the first decoder as a set of first reference pictures, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter as a set of second reference pictures,” “select one of the set of first reference pictures and the set of second reference pictures based on reference picture selection information to implement a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution based on the set of decoding targets and the set of selected reference pictures,” “a second resolution converter configured to acquire the sequence of decoded pictures with the standard resolution from the first decoder to work on the sequence of decoded pictures to implement an interpolation of pixels with the second enlargement to create a sequence of enlarged decoded pictures with a high resolution as a second resolution higher than the standard resolution,” and “wherein the set of decoding targets, the set of first reference pictures, and the set of second reference

pictures have the same value in spatial resolution.”

First, the Petition is deficient because the Challenged Claims require the input data to the super-resolution enlarger to be a standard resolution, which is the same resolution that the first resolution converter needs to downscale to. However, Petitioner’s proposed combination of references (relying primarily on Martins) discloses a downsampled resolution merely to the output format. That the output device/format happens to be SDTV does not have any bearing on the recited “standard resolution.” Therefore, Petitioner’s reliance on the system of Martins where the amount of decimation in the downscaling is based on the resolution of the desired *output* format (*i.e.*, HDTV or SDTV) renders the Petition deficient.

Second, the Petition is deficient because He’s deblocking control flags are not the claimed “reference picture selection information,” 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’s “predetermined selection factors” are not 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 both the claimed “set of first reference pictures” and “set of second 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.

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

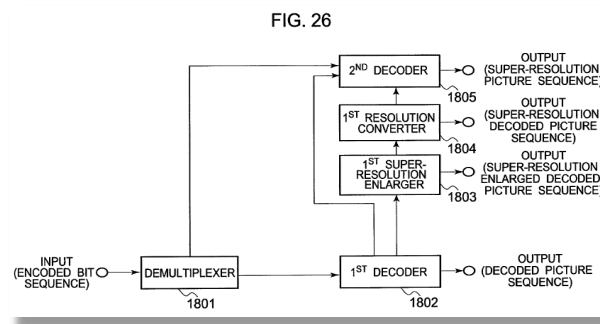
The Board should exercise its discretion to deny the Petition under 35 U.S.C. § 314(a) for at least the following reasons: (i) a parallel District Court Litigation (defined below) exists between the same parties or real-parties-in-interest; (ii) the District Court Litigation involves the same subject patent (the ’995 Patent) with substantially the same claims; (iii) the District Court’s trial will be *over nine months before* the projected statutory deadline; (iv) the parties have heavily invested in the District Court Litigation and a trial date is set for April 20, 2026; and (v) there is no

stay of the parallel District Court Litigation.

II. THE '995 PATENT

The '995 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.” '995 Patent, 1:23-31. The '995 Patent uses layered coding to increase coding efficiency and allow for the creation of high-resolution images. *Id.*, 1:23-31. The '995 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.*, 1:35-53, 2:21-36. Known techniques using motion prediction to improve resolution upscaling were insufficient because they reduced encoding efficiencies and resulted in degraded image quality. *Id.*

The '995 Patent describes a system that maintains coding efficiency and image quality by disclosing a decoder (“2nd Decoder”) which receives three inputs, as shown in FIG. 26.



Id., FIG. 26. It receives (1) the coded extension layer sequence from the

demultiplexer, (2) the decoded base layer sequence at standard resolution, and (3) the decoded base layer sequence created by super-resolution enlarging (i.e., upscaling resolution and increasing the width/height) and then converting to standard resolution. *Id.* Either one of the two standard resolution decoded sequences, whether base layer or upsampled base layer, are used as sets of reference pictures by the second decoder to decode the coded extension layer sequence it received in order to create a sequence of super-resolution pictures decoded using standard resolution reference pictures. *Id.*, Claim 2, FIG. 26. As with the first resolution converter, the output sequence of the second decoder can also be put through a second resolution converter to obtain a second resolution higher than the standard resolution. *Id.*

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

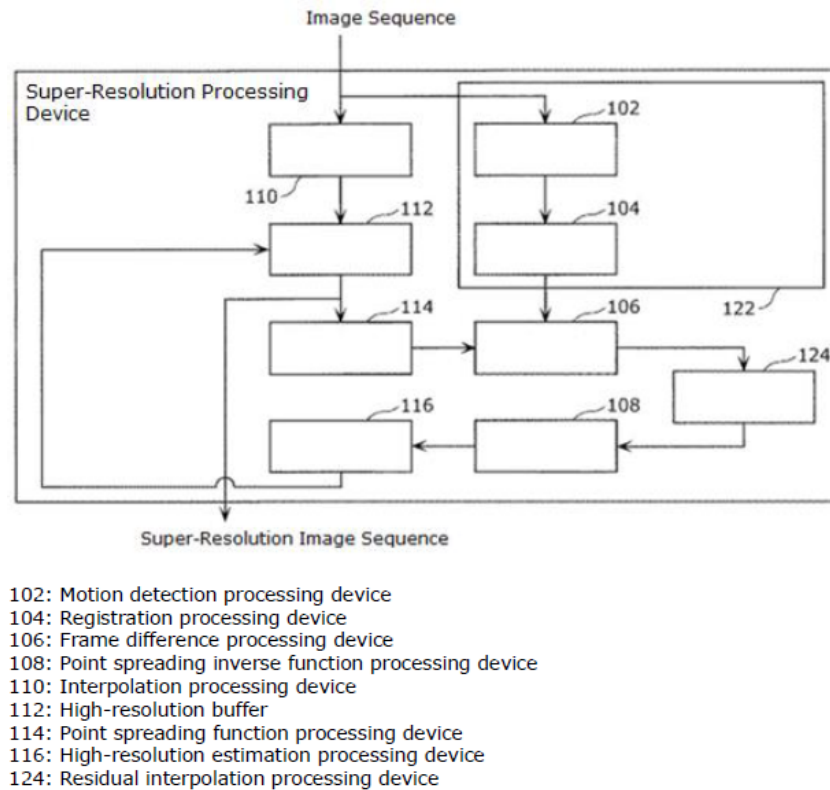
is not set properly, the blurring will be excessive or insufficient.

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:



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.

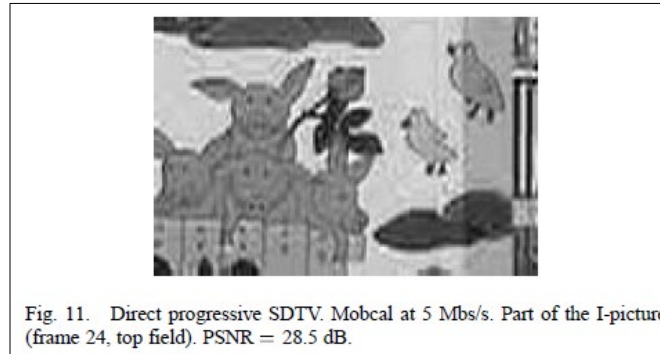
Segall also discloses a multilayer system that utilizes image pyramids. *Id.*, 3-4, 13 (“At the high level, the design is conceptually an image pyramid”). Segall

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.*

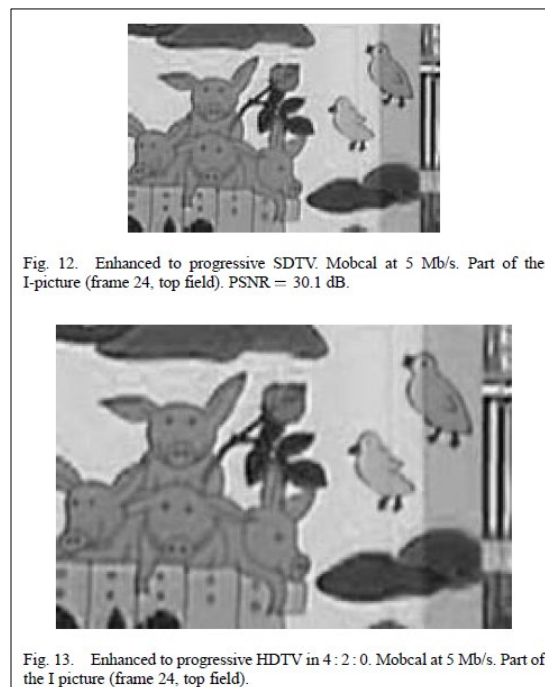
C. Martins

Martins is directed to addressing special problems associated with improving the quality and spatial resolution of video through super resolution. APPLE-1007, Abstract. Specifically, Martins proposes an algorithm which converts resolutions using upsampling and then decimation based on the supported output format (i.e., SDTV or HDTV). *Id.*, Abstract (“The algorithm is based on motion-compensated spatial upsampling from multiple images and *decimation to the desired format.*”) (emphasis added), 2 (“The algorithm has two steps. In the first step, a superresolution version (default is quadruple resolution) of each directly decoded picture is constructed. In the second step, the superresolution picture is *decimated to the desired format.*”) (emphasis added and footnote omitted).

Figs. 11 and 12 of Martins confirm that decimation occurs to obtain the resolution supported by the desired format on the output device. For example, “Fig. 11 depicts the result of using simple upsampling of a directly decoded sequence.”



Id., 8-9, Fig. 11. For Martins’ Fig. 12 and Fig. 13, the level of decimation or downsampling is also dependent only upon the desired output format (*e.g.*, SDTV or HDTV) rather than the resolution of the pictures that were the input for super-resolution:



Id., Figs. 12 and 13.

The section of Martins referring to “IV. Decimation” also confirms that a resolution conversion caused by decimation is based on the desired output format of HDTV or SDTV by adjusting pixel parameters:

The last case in (17), where there is no MC superresolution (p_{mc}) pixel at the output sample position (m_0, n_0) , may occur in *conversion to HDTV* and in chrominance upsampling. *Restoring SDTV* there will always be the directly decoded pixel at (m_0, n_0) ensuring a defined pixel in p_{mc} at (m_0, n_0) .

Id., 6 (emphasis added).

D. 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:

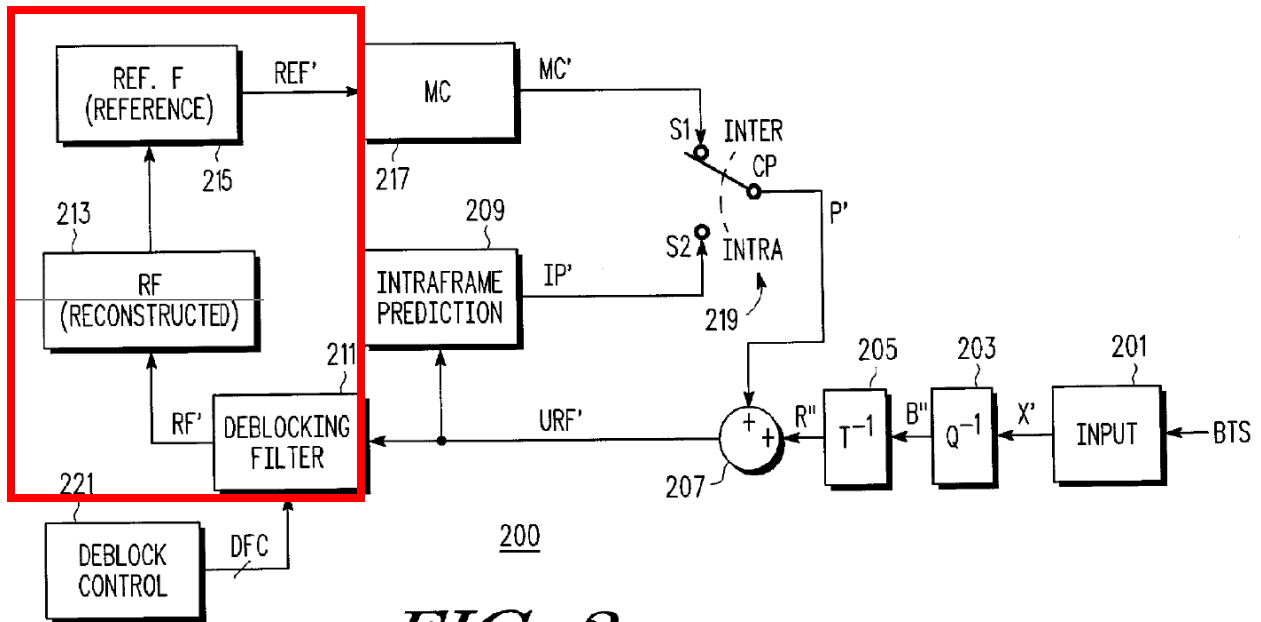


FIG. 2

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' :

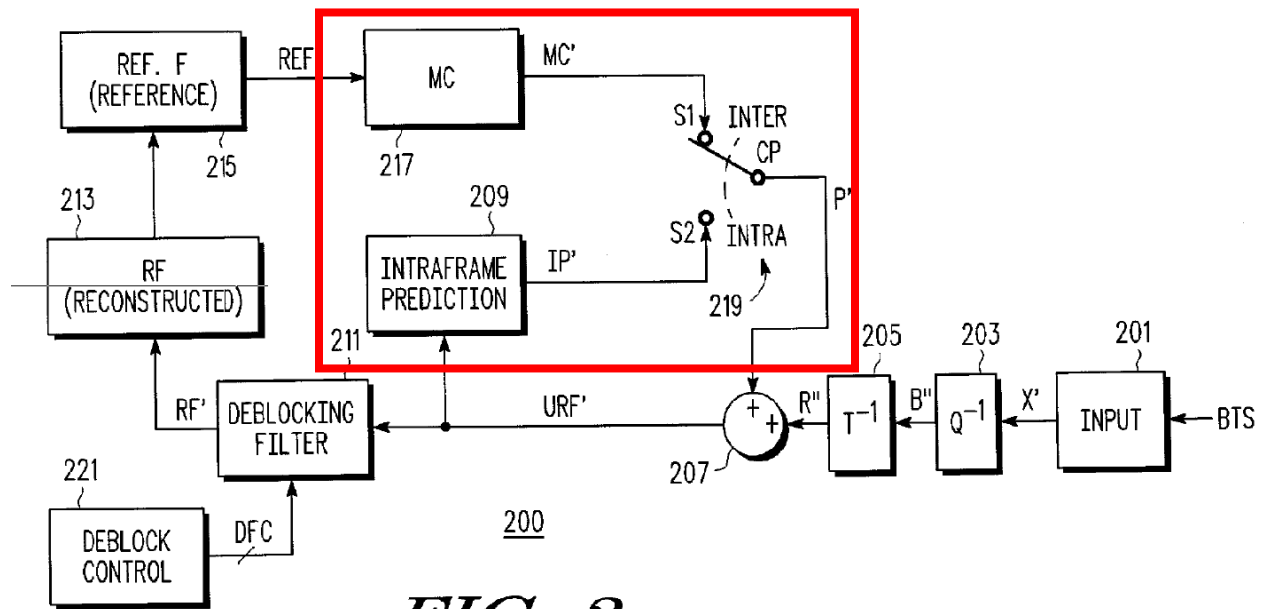


FIG. 2

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.*

E. 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”	’995 Patent, Claims 1-4, 8-11	“the spatial resolution of a picture input into an encoding system as an encoding target”
“decoding with an extension of the standard resolution”	’995 Patent, Claims 2-4, 11	“decoding with an enhancement layer based on standard resolution reference picture(s)”
“super-resolution enlarged decoded pictures”	’995 Patent, Claims 2-4, 11	“higher than standard resolution enlarged decoded pictures”

Ex. 2004, at 2. 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 “how 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: “at least 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 5 (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. Claim 2 Is Not Obvious Over Phek in View of Segall, Martins, and He

- 1. The Petition Does Not Show Any Combination of Phek, Segall, Martins, He, and Takahashi Discloses “a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to work on the sequence of super-resolution enlarged decoded pictures to implement a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with a standard resolution,” as Required by Claim Element [2.4]**

Claim 2 of the ’995 Patent requires “a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to work on the sequence of super-resolution enlarged decoded pictures to implement a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with a standard resolution.”

As noted above, Petitioner failed to propose a construction for “standard resolution,” despite agreeing to construe this term as “the spatial resolution of a picture input into an encoding system as an encoding target” in the District Court

Litigation. *See supra* Section IV.

The Petition is deficient because it does not show that the Phek-Segall-Martins-He or Phek-Segall-Martins-Takahashi combinations disclose the recited “process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with a ***standard resolution***.” Claim 2 of the ’995 Patent requires the input data to be a standard resolution, whereas the proposed combination discloses a downsampled resolution to the output format. That the output device/format happens to be SDTV does not have any bearing on the recited “standard resolution.”

The claim language of the ’995 Patent describes that the recited standard resolution of this “first resolution converter” claim limitation is the resolution of “the first sequence of encoded bits” at the “first decoder” claim limitation. ’995 Patent, Claim 2 (“a first decoder configured to acquire ***the first sequence of encoded bits obtained with a standard resolution*** at the demultiplexer to implement thereon a process for a ***prescribed first decoding*** to create ***a sequence of decoded pictures with a standard resolution***.”) (emphasis added).

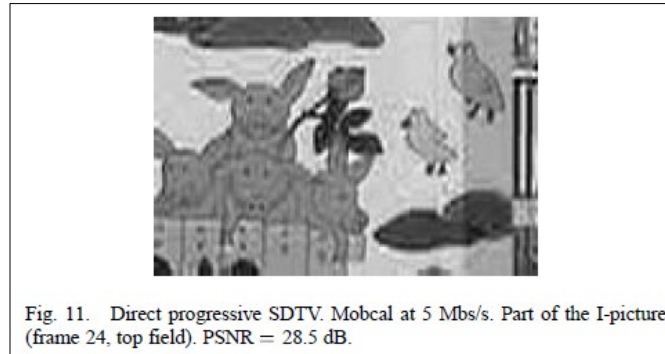
On the contrary, the Petition acknowledges that the decimation or downsampling of Martins (which is the only reference of its alleged combination relied upon for this claim limitation) is untethered to any “prescribed first decoding to create a sequence of decoded pictures with a standard resolution.” In particular,

Petitioner admits that the “resolution converter” of Martins converts resolutions based only *on the supported output format* (i.e., SDTV or HDTV). Pet. at 50-51; *see also* APPLE-1007, Abstract (“The algorithm is based on motion-compensated spatial upsampling from multiple images and *decimation to the desired format.*”) (emphasis added), 2 (“The algorithm has two steps. In the first step, a superresolution version (default is quadruple resolution) of each directly decoded picture is constructed. In the second step, the superresolution picture is *decimated to the desired format.*”) (emphasis added and footnote omitted).

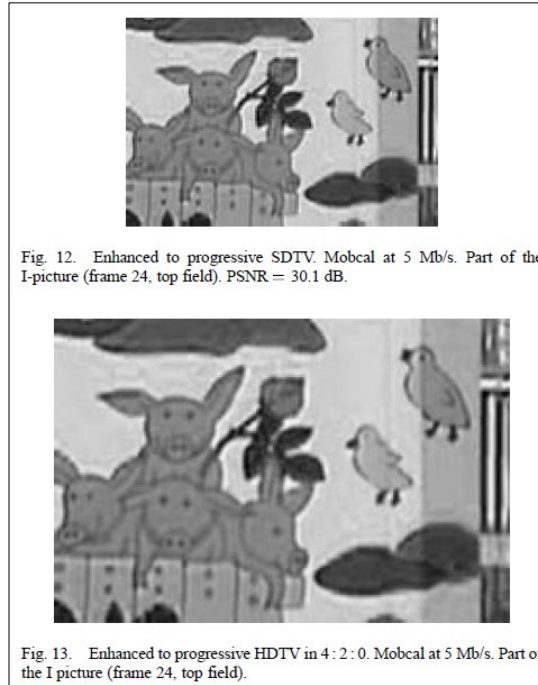
The “desired format” to be output or “supported *output* format” is clearly not “the spatial resolution of a picture *input* into an encoding system *as an encoding target*” under the proper construction of “standard resolution.” Because Petitioner fails to address the proper construction of standard resolution, it also fails to address the proper construction of “super-resolution enlarged decoded pictures” (i.e., “higher than standard resolution enlarged decoded pictures”) and is deficient for that additional reason.

Petitioner’s own cites to Figs. 11 and 12 of Martins confirm that there is no “resolution conversion” based on the “standard resolution” (i.e., the same resolution as the input of the first super-resolution enlarger). Pet. at 61-62. Instead, Martins clearly states that “Fig. 11 depicts the result of using simple upsampling of a directly decoded sequence.” APPLE-1007 at 8-9. In order to obtain the resolution of the

SDTV in Fig. 11, the resolution of the input must have been *lower* if only upsampling was used.



Id., Fig. 11. For Fig. 12 and Fig. 13 (ignored by Petitioner), where presumably Martins' technique of upsampling and downsampling was used to obtain SDTV and HDTV respectively, Martins does not mention what the input resolution to the upsampling was during the technique because it does not matter for comparative purposes to Fig. 11. *See id.*, 8-9. The level of decimation or downsampling in Martins is dependent only upon the desired output format (*e.g.*, SDTV or HDTV) as compared to the super-resolution rather than the resolution of the pictures that were the input for super-resolution:



Id., Figs. 12 and 13.

The section of Martins referring to “IV. Decimation” also confirms that a resolution conversion caused by decimation is based on the desired output format of HDTV or SDTV by adjusting pixel parameters:

The last case in (17), where there is no MC superresolution (p_{mc}) pixel at the output sample position (m_0, n_0) , may occur in **conversion to HDTV** and in chrominance upsampling. **Restoring SDTV** there will always be the directly decoded pixel at (m_0, n_0) ensuring a defined pixel in p_{mc} at (m_0, n_0) .

Id., 6 (emphasis added).

Without a prescribed first decoding in the first instance to create a sequence of decoded standard resolution pictures, there can be no basis for a prescribed resolution conversion of upscaled pictures to downscaled pictures with the **same**

standard resolution recited in the “first decoding” claim limitation (*i.e.*, a prescribed resolution conversion can only occur with a prescribed input with standard resolution subject to the first decoding). Therefore, Petitioner’s reliance on the system of Martins where the amount of decimation in the downscaling is based on the resolution of the desired **output** format (*i.e.*, SDTV) renders the Petition deficient with respect to this claim limitation.

Because of this deficiency, institution should be denied.

2. The Petition Does Not Show that Any Combination of Phek, Segall, Martins, He, and Takahashi Discloses “a second decoder configured to acquire the second sequence of encoded bits obtained with a standard resolution at the demultiplexer as a set of decoding targets, the sequence of decoded pictures created with the standard resolution at the first decoder as a set of first reference pictures, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter as a set of second reference pictures,” as Required by Claim Element [2.5.i]

Claim 2 of the ’995 Patent requires “a second decoder configured to acquire the second sequence of encoded bits obtained with a standard resolution at the demultiplexer as a set of decoding targets, the sequence of decoded pictures created with the standard resolution at the first decoder as a set of first reference pictures, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter as a set of second reference pictures.”

As noted in Section VI.A.1 above, the Petition does not show that any combination of Phek, Segall, Martins, He, and Takahashi discloses “a first resolution converter configured to acquire the sequence of super-resolution enlarged decoded pictures created at the first super-resolution enlarger to work on the sequence of super-resolution enlarged decoded pictures to implement *a process for a prescribed resolution conversion to create a sequence of super-resolution decoded pictures with a standard resolution.*” Therefore, the Petition also cannot show that the combination discloses “a second decoder configured to acquire the second sequence of encoded bits obtained with a standard resolution at the demultiplexer as a set of decoding targets, the sequence of decoded pictures created with the standard resolution at the first decoder as a set of first reference pictures, and *the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter as a set of second reference pictures.*”

Because of this deficiency, institution should be denied.

3. The Petition Does Not Show that Any Combination of Phek, Segall, Martins, He, and Takahashi Discloses “select one of the set of first reference pictures and the set of second reference pictures based on reference picture selection information to implement a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution based on the set of decoding targets and the set of selected reference pictures,” as Required by Claim Element [2.5.ii]

Claim 2 of the '995 Patent requires a decoder configured to “select one of the set of first reference pictures and the set of second reference pictures based on reference picture selection information to implement a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution based on the set of decoding targets and the set of selected reference pictures.” The Petition fails to show that the prior art teaches this claim limitation for two reasons.

First, as noted in Section VI.A.2 above, the Petition is deficient because it does not show that any combination of Phek, Segall, Martins, He, and Takahashi discloses “a second decoder configured to acquire the second sequence of encoded bits obtained with a standard resolution at the demultiplexer as a set of decoding targets, the sequence of decoded pictures created with the standard resolution at the

first decoder as a set of first reference pictures, and the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter as *a set of second reference pictures*.” Therefore, the Petition is also deficient because it does not show that any combination of Phek, Segall, Martins, He, and Takahashi discloses “select one of the set of first reference pictures and *the set of second reference pictures* based on reference picture selection information to implement a combination of processes for a prescribed prediction and a prescribed second decoding being a decoding with an extension of the standard resolution, to create a sequence of super-resolution pictures decoded with the standard resolution based on the set of decoding targets and the set of selected reference pictures.”

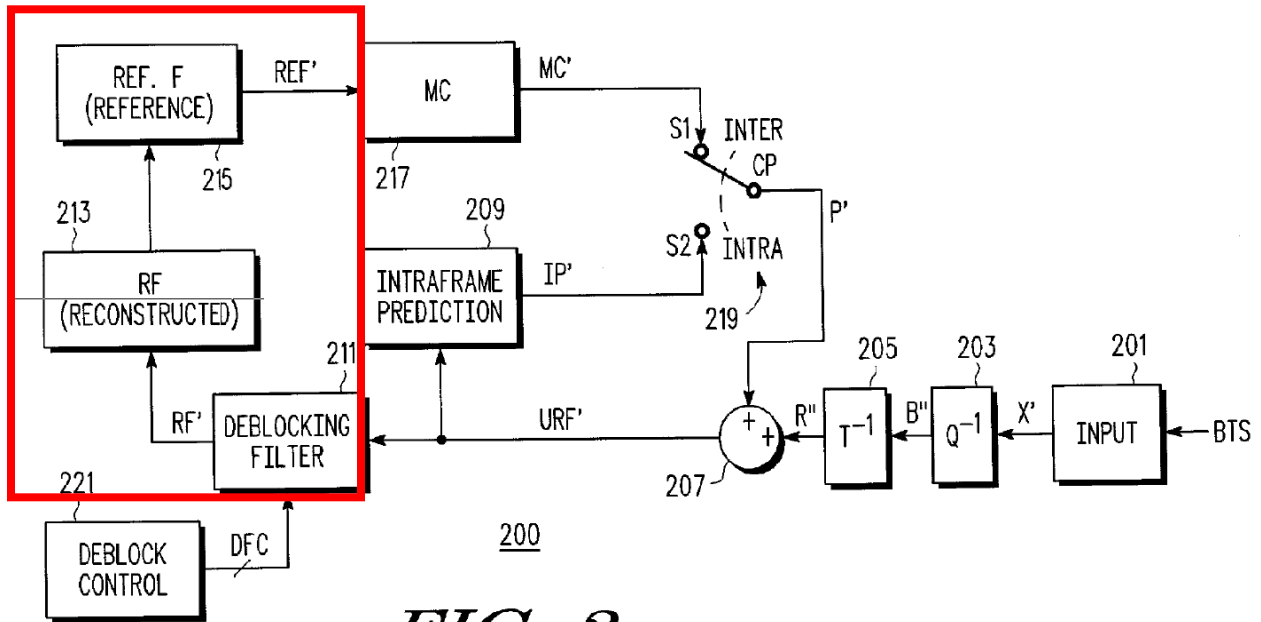
Second, as noted above, Petitioner failed to propose and apply a construction for “decoding with an extension of the standard resolution,” despite agreeing to construe this term as “decoding with an enhancement layer based on standard resolution reference picture(s)” in the District Court Litigation. *See supra* Section IV.

Third, the Petition is deficient because He’s deblocking control flags are not the claimed “reference picture selection information,” as the Petition incorrectly alleges. Pet. at 71. In fact, He’s deblocking control flags are irrelevant to reference pictures. As the Petition notes, “[b]ased on the value of the deblocking control flag, the deblock control circuit 221 issues control signals to a deblocking filter 131 to

selectively enable/disable the use of a deblock filter on reconstructed (decoded) frames.” Pet. at 73 (citing APPLE-1008, [0006]-[0008]¹). 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, 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.*

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 73-74. He’s FIG. 2 and its supporting disclosure, which are relied upon by Petitioner (Pet. at 71-73), show only one creation of reference frames from filtered reconstructed frames:

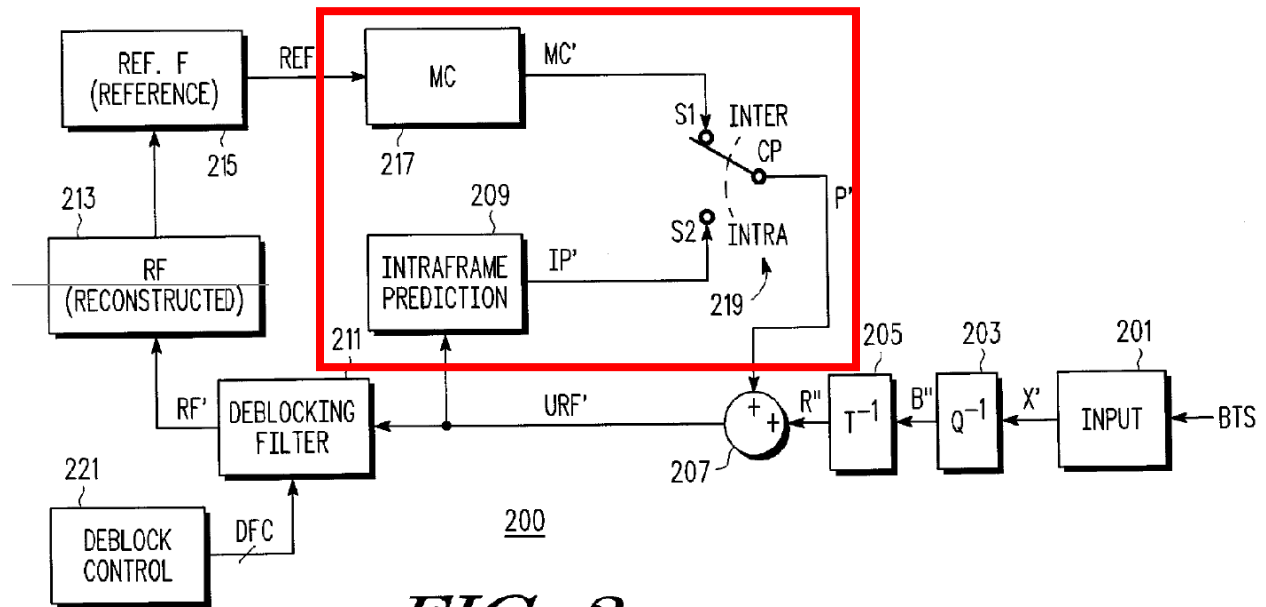
¹ Patent Owner notes that APPLE-1008, [0006]-[0008] does not correspond to a disclosure of He’s deblock control circuit 221 or deblocking filter 131.



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.

The Petition is completely incorrect when it states that “[w]hen the deblock filter is disabled, the original (unfiltered or non-enhanced) reconstructed frame is used as the reference picture for prediction of a subsequent frame.” Pet. at 73. 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 "select[ing] one of the set of first reference pictures and the set of second reference pictures." '995 Patent, Claim 1.

Fourth, the Petition is deficient because Takahashi's "predetermined selection factors" are not the claimed "reference picture selection information," as the Petition incorrectly alleges. Pet. at 97. Instead, Petitioner alleges that such factors operate a switch "selectively enabl[ing]/disabl[ing] SR-D processing of base layer frames." *Id.* at 96.² However, even under Petitioner's allegations, enabling or disabling one kind of processing means that only one kind of processing can take place at one time. Takahashi confirms that "a selection switch **19 b** [is] for selecting either the high-resolution predicted data Pg**1** or the resolution converted signal CITg**2**, depending the coding mode." APPLE-1046, [0176]. 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 two different sets requires two different processes that are both enabled.

Because of this deficiency, institution should be denied.

² Notably, Takahashi never even mentions SR-D. *See generally* APPLE-1046.

4. The Petition Does Not Show that Any Combination of Phek, Segall, Martins, He, and Takahashi Discloses “a second resolution converter configured to acquire the sequence of decoded pictures with the standard resolution from the first decoder to work on the sequence of decoded pictures to implement an interpolation of pixels with the second enlargement to create a sequence of enlarged decoded pictures with a high resolution as a second resolution higher than the standard resolution,” as Required by Claim Element [2.6]

Claim 2 of the '995 Patent requires “a second resolution converter configured to acquire the sequence of decoded pictures with the standard resolution from the first decoder to work on the sequence of decoded pictures to implement an interpolation of pixels with the second enlargement to create a sequence of enlarged decoded pictures with a high resolution as a second resolution higher than the standard resolution.”

The Petition is deficient because Petitioner’s “first mapping of the second resolution converter” (Pet. at 80) and “second mapping of the second resolution converter (Pet. at 82) incorrectly relies on Segall for the concept of multiple enhancement layers (Pet. at 78-79) in its Phek-Segall-Martins-He or Phek-Segall-Martins-Takahashi combinations to obtain the recited “a second 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, Fig. 1. But the plain

language of this claim limitation precludes the concept of Segall's multiple enhancement layers because the claimed "second resolution converter" does not process a different layer of resolution, or even different pictures, than what has already been independently processed by the claimed "first super-resolution enlarger." See '995 Patent, Claim 2 ("a second resolution converter configured to *acquire the sequence of decoded pictures with the standard resolution from the first decoder*"; "a first super-resolution enlarger configured to *acquire the sequence of decoded pictures created with a standard resolution at the first decoder*") (emphasis added).

Even if the Petition were correct that the claimed "second 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 Phek-Segall-Martins-He or Phek-Segall-Martins-Takahashi 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 “second resolution converter” “create[s] a sequence of enlarged decoded pictures with a high resolution as a second resolution higher than the standard resolution” using only one independent input layer that is the claimed “sequence of decoded pictures with the standard resolution from the first decoder.” In view of independent processing built into the language of this claim limitation, the claimed second resolution converter cannot be disclosed by Segall’s multilayer scheme in combination with the proposed systems of Phek-Segall-Martins-He or Phek-Segall-Martins-Takahashi.

Because of this deficiency, institution should be denied.

5. The Petition Does Not Show that Any Combination of Phek, Segall, Martins, He, and Takahashi Discloses “*wherein the set of decoding targets, the set of first reference pictures, and the set of second reference pictures have the same value in spatial resolution,*” as Required by Claim Element [2.7]

Claim 2 of the ’995 Patent requires “wherein the set of decoding targets, the set of first reference pictures, and the set of second reference pictures have the same value in spatial resolution.”

As noted in Section VI.A.2 above, the Petition does not show that the combination of Phek, Segall, Martins, and He discloses “a second decoder

configured to acquire the second sequence of encoded bits obtained with a standard resolution at the demultiplexer as a set of decoding targets, the sequence of decoded pictures created with the standard resolution at the first decoder as a set of first reference pictures, and *the sequence of super-resolution decoded pictures created with the standard resolution at the first resolution converter as a set of second reference pictures.*” Therefore, the Petition does not show that the combination of Phek, Segall, Martins, and He discloses “wherein the set of decoding targets, the set of first reference pictures and *the set of second reference pictures* have the same value in spatial resolution.”

Because of this deficiency, institution should be denied.

B. Claims 3-4 and 11 Are Not Obvious Over Any Combination of Phek, Segall, Martins, He, and Takahashi

Claim 3 recites “[a] moving picture decoding method” that mirrors the claim limitations of Claim 2, which recites “[a] moving picture decoding system.” ’995 Patent, Claims 2, 3. In other words, Claim 3 discloses the method analogue of Claim 2. *Id.* For at least the same reasons as Claim 2, any combination of Phek, Segall, Martins, He, and Takahashi fails to render obvious Claim 3.

Claim 4 recites “[a] recording medium storing a moving picture decoding program comprising a non-transitory computer-readable medium” that mirrors the claim limitations of Claim 2, which recites “[a] moving picture decoding system.”

'995, Claims 2, 4. In other words, Claim 4 discloses the recording medium analogue of Claim 2. *Id.* For at least the same reasons as Claim 2, any combination of Phek, Segall, Martins, He, and Takahashi, fails to render obvious Claim 4.

Claim 11 depends upon Claim 2, and for at least the same reasons as Claim 2, any combination of Phek, Segall, Martins, He, and Takahashi, fails to render obvious Claim 11. '995, Claim 11.

VII. CONCLUSION

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

Respectfully submitted,

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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 6,845 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.

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