Paper 30

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE, INC.,

Petitioner

v.

QUALCOMM INCORPORATED,

Patent Owner

Case IPR2018-01250

U.S. Patent No. 8,447,132

PATENT OWNER'S SUR-REPLY TO PETITIONER'S REPLY

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Cases

PATENT OWNER'S EXHIBITS LIST

Exhibit No.	Description
2001	1250 Expert Declaration of Dr. John Villasenor
2002	Curriculum Vitae of Dr. John Villasenor
2003	omitted
2004	Transcript of March 28, 2019 Deposition of Alan Bovik, Ph.D.
2005	omitted
2006	Transcript of August 28, 2019 Deposition of Alan Bovik, Ph.D.

I. PETITIONER'S CONSTRUCTION OF "GAIN" IS OVERLY BROAD

The '132 Patent uses "gain" to refer to "an attribute that relates to brightening or darkening a region of an image." POR, 8 (citing APPLE-1001, 2:14-17, 5:15-24, 5:54-60; EX2001), ¶107). As confirmed by Dr. Bovik, a gain can result in either an upward or downward adjustment, "an amplification or attenuation." EX2006, 70:18-22. Petitioner responds that a POSITA would not interpret the '132 Patent's use of "gain" in this way, because the '132 Patent discloses adjustment of various image parameters (e.g., chromaticity). PR, 2-3 (citing APPLE-1001, 3:59-64; APPLE-1022, ¶8). But the '132 Patent states that "the content-based technique introduced here is ***not necessarily limited*** to determining a ***gain adjustment*** or to DRC" and "***other types of corrections or adjustments can be made*** based on image content as described herein, such as contrast enhancement, color manipulation, sharpness adjustment, noise reduction, skin smoothing, etc." APPLE-1001, 3:59-64 (emphasis added). This disclosure directly undermines Petitioner's contention that "gain" can refer to other types of correction, however, because those "***other*** types of corrections or adjustment" are ***other than*** gain.

Petitioner then points to the '132 Patent's disclosure regarding "[m]ultiplying each color component of the input image by one or more pixel dependent **gain *or attenuation factors***, using a nonlinear mapping function that may either **lighten shadow regions or darken highlights *or change the chromaticity of pixels*** in either

of these regions, generates the output image." PR, 2 (emphasis added). The very next sentence in the specification makes clear that chromaticity is ***distinct*** from gain: "Altering input image pixel chromaticity (color balance) can be done separately, or in combination with, overall pixel gain adjustment to further enhance the appearance of image details in regions of the image close to positive (the highlight regions) or negative (the shadow regions) saturation." APPLE-1001, 3:54-58.

Petitioner also argues that "it is possible to perform the different corrections identified in the '132 patent . . . using the structure of FIG. 2B, which includes a gain lookup table, or by determining a digital gain from a gain lookup table that outputs a gain map." *See* PR, 2-3; APPLE-1021, 122:7-127:10. This is irrelevant. Even accepted *arguendo*, this does not indicate that the ***other*** (non-gain) operations described in the '132 Patent fall within the term "gain." PR, 2-3; APPLE-1021, 122:7-127:10.

Petitioner's expansive interpretation of "gain" is unreasonably broad, and unsupported by either of the '132 Patent and Dr. Villasenor's statements. To the contrary, the broadest *reasonable* interpretation of "gain," consistent with a POSITA's understanding of the term is "an attribute that relates to brightening or darkening a region of an image." POR, 8 (citing APPLE-1001, 2:14-17, 5:15-24, 5:54-60; EX2001, ¶107).

II. ALL CHALLENGED CLAIMS ARE NOVEL OVER NEEDHAM

A. Petitioner's "Matched" Argument is a Red Herring

Petitioner avoids matching its response to PO's argument by myopically focusing on just one aspect of Needham. As PO explained, Needham describes an image correction framework with multiple, distinct approaches to correcting images (POR, 11-13), and "[w]hen Needham matches a correction to an object in an image, Needham does not also apply a different amount of *that same* correction to a second portion of the image." POR, 18-23. Specifically, Needham does not disclose a single image-correction approach that performs ***all of***: "determining a correction to apply . . . [that] is matched to the predetermined type" of physical object, "applying a first amount of the [matched] correction to the first portion" of the image, and "applying a second amount of the [matched] correction to a second portion." APPLE-1001, Cl. 1. Petitioner's Reply suffers from the same defects as its original Petition—*i.e.*, Petitioner improperly cherry picks elements of Needham's distinct processes and attempts to present them as a single approach, without articulating any rationale for combining these distinct approaches.

B. Needham Does Not Disclose an Image Correction Process that: (1) Detects a Predetermined Object Type in An Image, (2) Determines, Based on the Detection of the Predetermined Object Type, a Correction Matched to the Predetermined Object Type, *and* (3) Applies that Correction in a First Amount to the Predetermined Object Type and in a Second Amount to Another Portion of the Image

1. Petitioner's interpretation of "matched" is overbroad and conflicts with the BRI of the term

Petitioner again divorces individual elements from the claimed method and cobbles together those elements from distinct processes within Needham. For example, Petitioner tries to stretch "matched" to capture any correction applied to an object of a predetermined type, but neglects both the '132 Patent's use and POSITA's understanding of the term. A POSITA would understand "matched" in the context of the claims and specification of the '132 Patent to mean that a correction is "predetermined or assigned to" an object type. The plain language of the claims and the specification require that determined corrections be matched to predetermined object types. *See* APPLE-1001, 3:12-27, 5:52-60, 5:65-67, 6:22-25, Cl. 1; EX2001, ¶51.

For example, claim 1 clearly requires that the determination that a first portion represents a physical object of a predetermined type occurs ***before*** determining a correction to apply, and that determining a correction to apply is based on the determination that the first portion represents the object of the predetermined type. APPLE-1001, Cl. 1. And claim 1 ***additionally*** requires that "the determined

correction is matched to the predetermined type." *Id.* Petitioner's interpretation of "matched" would effectively eliminate the plain meaning of the claim structure and language, namely that the correction must be predetermined or assigned to a particular object type, and that "matched" requires more than mere happenstance application of a correction to a particular object type (*e.g.*, when a correction is applied to an entire image regardless of the presence/absence of the object type). *See* PR 3-4; APPLE-1001, 3:12-27, 5:52-60, 5:65-67, 6:22-25; EX2001, ¶51.

Contrary to Petitioner's assertion, this is supported by the '132 Patent's exemplary gain curves and gain tables for object types mapping input pixel intensities to output pixel intensities, because those curves/tables provide examples of matching. APPLE-1001, 3:12-27, 5:52-60, 6:22-25, FIG. 7. The '132 Patent describes that, in addition to two gain lookup tables 207-1 and 207-2, one for detected objects and others for use with all other pixels, "additional lookup tables could be provided, for example, if more than one type of object is to be detected and treated differently from the image." APPLE-1001, 6:22-25. Thus, an object type may have a predetermined or associated gain table—i.e., the gain table is matched to the predetermined object type. Likewise, FIG. 7 shows a curved line that "represents an example the effect of selectively modifying the gain G(s) to increase the intensity of darker portions of an image" as an example implementation of a gain lookup table 207 as described above. APPLE-1001, 5:52-60. The curved line

represents a correction that can be applied to all objects of a specific object type, i.e., a correction that is "matched" to a predetermined object type. APPLE-1001, 5:52-60.

As a further example of matching, the '132 Patent describes that "a single gain lookup table contains one or more values to be used for specified image content (e.g., faces) and separate values to be used for other image content, and the DRC unit selects the appropriate value for a given input pixel from the lookup table according to whether that pixel is part of a specified type of object" and that, in another embodiment, "a particular gain lookup table is provided for specific image content (e.g., faces) and a separate gain look up table is provided for all other content." APPLE-1001, 3:12-27. A set of gain values or specific gain table for specific image content, such as a set of gain values or specific gain table applied to all faces, is a correction that is applied to faces because they are faces, i.e., a correction that is matched to faces. *See* EX2001, ¶51.

Thus, the '132 Patent describes a process in which a set of gain values are in a gain lookup table are predetermined or assigned to a predetermined object type. *See* APPLE-1001, 3:12-22; EX2001, ¶51. Petitioner suggests that this portion of the '132 Patent discloses that "the correction ***amount*** or the gain values are predetermined for different object types and other image content." Reply, 4 (emphasis added). However, as explained above, gain lookup tables and/or sets of

gain values are predetermined or assigned to specific object types. APPLE-1001, 3:12-22, 6:22-25. That amounts of correction may also be predetermined does nothing to undermine or expand the basic requirement of the claims that the correction is matched to the predetermined object type.

For at least these reasons, a POSITA would have understood the broadest *reasonable* interpretation of "matched" to be that "a particular type of correction is predetermined or assigned to a particular image feature," i.e., that a correction is applied to an image feature because of a type of the image feature, under the broadest reasonable interpretation. *See* EX2001, ¶51.

2. Needham does not disclose a correction that is "matched" to a predetermined object type and applied in different amounts to objects of that type and another image portion

Petitioner generically points to a laundry list of Needham paragraphs as allegedly disclosing "matching," and implores the Board to read those paragraphs "as a whole" without explaining why all of those paragraphs describe a unitary image-correction process. Reply, 6 (citing Petition, 12-14; APPLE-1004, [0019]-[0020], [0024], [0026]-[0027], [0029]-[0032], [0035], FIGS. 2, 6, 7). Only a few of these paragraphs are addressed with any particularity, and each fails to disclose what is claimed.

Petitioner first points to Needham's paragraph [0020] as allegedly disclosing matching, but expressly concedes "***different types of corrections*** are applied to

different types of image features (face and sky)." Reply, 6-7 (emphasis added). Thus, Needham's paragraph [0020] does not disclose applying the determined and matched correction in a first amount to the predetermined object type and in a second amount to another portion of the image.

Petitioner then points to Needham's paragraph [0032] as disclosing that "'different occurrences of a same image feature type (e.g., different human faces) in an image receive a differing correction operation' such as different amounts of 'dynamic range' correction." Reply, 7. However, rather than suggesting that a correction is matched to a predetermined object type, paragraph [0032] instead explains that for a correction of "enhanc[ing] the contrast 740 of an ***image feature***," operational parameters can include different dynamic ranges that may be used for objects of the ***same type***:

> For each defined correction operation, one or more operational parameters 720 may be specified. For example, ***to perform the correction operation of enhancing the brightness 730*** of an image feature, an intensity upper bound 750 may be specified as an operational parameter so that the brightest intensity in the corrected image feature will not exceed the defined upper bound. Such upper bound may be specified, for example, as a function of statistical properties of one or more image features in the input image 110. As another example, ***to enhance the contrast 740*** of an image feature, an intensity dynamic range 760 may be specified as an operational

> parameter so that the contrast in the detected image feature will be scaled to the specified dynamic range. Similarly, the specified dynamic range 760 may be defined as a function of statistical properties of one or more image features detected from the input image 110. The operational parameter(s) may also specify that different occurrences of a same image feature type (e.g., different human faces) in an image receive a ***differing correction operation***. For example, the intensity dynamic range used for correcting a particular human face may be determined according to the size of the face detected. The larger the face (e.g., closer to the camera), the larger the dynamic range that may be used (so that the face can be seen more clearly).

APPLE-1004, [0032] (emphasis added). For Petitioner's argument here, the fly in the ointment is that the correction—enhancing the contrast 740—is not applied in a first amount to the predetermined object type (faces) and in a second amount to another portion of the image. Indeed, when a correction of "enhancing the contrast 740" is applied only to faces (*see* APPLE-1004, [0031] (operation mode 705 = individual features)), Needham's paragraph [0032] does ***not*** disclose that "enhancing the contrast 740" is applied in a different amount to another portion of the image. APPLE-1001, Cl. 1. Likewise, when a correction of "enhancing the contrast 740" is applied to the entire image (*see* APPLE-1004, [0031] (operation mode 705=entire image)), Needham's paragraph [0032] does ***not*** disclose that

"enhancing the contrast 740" is selected based on the detection of the predetermined object type (face/s). APPLE-1001, Cl. 1.[1]

Petitioner then cobbles together selected sentences of Needham's paragraphs [0026], [0030], and [0031], "in conjunction with Needham [0020] and [0032]" (addressed above), to assert that these paragraphs "specify that a feature type, e.g., human faces, is matched to a specific correction operation, e.g., dynamic range correction." Reply, 7-8. Yet again, Petitioner's conclusion—flawed though it is by the unexplained mixing and matching of distinct alternatives within Needham—*still* does not explain where Needham discloses a single image correction process that: (1) detects a predetermined object type in an image, (2) determines, based on the detection of the predetermined object type, a correction that is matched to the predetermined object type, and (3) applies that correction in a first amount to the predetermined object type and in a second amount to another portion of the image.

[1] Petitioner's contention that "[n]either Qualcomm nor Dr. Villasenor address these disclosures of Needham" is disingenuous given the parallel to Needham's paragraph [0022], which was directly addressed by Dr. Bovik and cited in the POR and Dr. Villasenor's declaration. POR, 12 (citing EX2004, 112:3-16); EX2001, ¶51 (same).

3. Petitioner unsuccessfully attempts to assemble claim 1 from portions of Needham's distinct image correction approaches, without articulating any basis or rationale for doing so

Petitioner continues to ignore the fact Needham describes an image correction framework with multiple, distinct approaches to correcting images. POR, 11-13. That is evident, for example, at Reply pages 8-10, where Petitioner turns its back on Needham disclosure relied on for matching (Needham, [0020], [0026], and [0030]-[0032]). Petitioner instead relies ***exclusively*** on a single paragraph as teaching the application of a matched correction in different amounts to an object type *and* another part of the image. Reply, 10-12. Petitioner's argument boils down to: (a) some paragraphs teach matching dynamic range adjustment to particular objects, and (b) paragraph [0022] adjusts dynamic range of different objects differently, so Needham "as a whole" teaches all elements of claim 1. Petitioner's argument is flawed because Needham ***never*** discloses that its paragraph [0022] is used as part of the same image correction process as its paragraph [0020]. To the contrary, Needham's paragraphs [0020] and [0022] describe alternative approaches to image correction. POR, 11-13 (citing APPLE-1004, [0016]-[0022], [0027], [0032]); EX2001, ¶33.

Petitioner's lack of articulated rationale to combine paragraphs [0020] and [0022] is alone fatal to its argument.

Additionally, Petitioner's own expert agreed that the dynamic range changes in paragraph [0022] are ***neither*** determined based on the presence of the predetermined object type (faces), ***nor*** matched to that predetermined object type. EX2004, 112:3-16. In particular, Dr. Bovik conceded in his first deposition that the changes of Needham's paragraph [0022] would be applied regardless of whether any object (e.g., a face or building) was detected:

> Q. In paragraph 22, Needham doesn't say that it's applying an intensity dynamic range correction to the face and the building because there's a face in the image; does it?
>
> A. I don't think that Needham is saying that the example that begins with "for instance" in paragraph 22 requires that the input image have faces in it. They may or may not.
>
> Q. And in paragraph 22, Needham doesn't say that it's applying an intensity dynamic range correction to the face and the building because there's a building in the image; does it?
>
> A. I think the algorithm would be applied whether or not there's a building in the image.

EX2004, 112:3-16. Thus, Dr. Bovik conceded that Petitioner's current argument (and sole argument re-urged in its Reply on this point) is incorrect.

That Dr. Bovik now attempts to walk back that admission does not undermine its force. *See, e.g.*, APPLE-1022, ¶14 ("As an initial matter, Qualcomm mischaracterizes my testimony as I did not admit that Needham does not disclose

this element of claim 1."). Dr. Bovik makes no attempt to explain how that testimony is mischaracterized (it is not), and does not offer an explanation or analysis of why Needham's paragraph [0022] does in fact disclose what he admitted it does not. Instead, Dr. Bovik first attempts to obscure his admission by redirecting the Board's attention to the disclosure of the '132 Patent. APPLE-1002, ¶¶14-16 (none of which address Needham). Dr. Bovik next attempts to blur the clear lines of claim 1 by addressing the same laundry list of purported "matching" paragraphs addressed above, again without actually tying them to Needham's paragraph [0022], on which Petitioner relies as the penultimate disclosure of the application of a matched correction in different amounts to an object type *and* another part of the image.

The gap in Petitioner's and Dr. Bovik's attempt to tie paragraph [0022] to paragraph [0020] (and other purported "matching" paragraphs) is consistent with and highlighted by Dr. Bovik's earlier admission—*i.e.*, that the corrections of Needham's paragraph [0022] are not selected based on a determination that a predetermined object type (face) is in the image.

4. Even if Needham's distinct approaches were combined, Needham still *would not anticipate*

Even if its multiple approaches were combined, the disclosures of Needham are, *at best*, ambiguous. POR, 11-13 (citing EX2001, ¶¶42-45). "Anticipation requires that a single reference 'describe the claimed invention with sufficient

precision and detail to establish that the subject matter existed in the prior art.' For this reason, it has long been understood that ambiguous references do not, as a matter of law, anticipate a claim." *Wasica Finance GmbH v. Continental Automotive Systems, Inc.*, 853 F.3d 1272, 1284 (Fed. Cir. 2017). Petitioner's purported combination thus fails to disclose applying the determined and matched correction in a first amount to the predetermined object type and in a second amount to a second portion of the image. Petitioner's response to Needham's ambiguities is a statement from Dr. Bovik that, although agreeing with Dr. Villasenor's premise that "maximizing intensity dynamic range means using the full range of intensity values" (APPLE-1022, ¶19), Dr. Bovik disagrees that it causes ambiguity. *Id*. But Dr. Bovik points to nothing in Needham to support his different conclusion, and instead simply explains what he thinks Needham *could* have said to anticipate the challenged claims. Dr. Bovik cannot rewrite Needham to suit Petitioner's ends. 2018 Trial Practice Guide Update, 4-5 (citing *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987)) ("a petitioner asserting anticipation cannot rely on its expert to supply disclosure of a claim element that is not expressly or inherently present in the reference").

C. Needham Does Not Disclose Determining Different Amounts of Gain for Different Portions of An Image As Recited in Claim 7

None of Petitioner's Reply arguments for claim 7 remedy the shortcomings in its theories for independent claim 1. Reply, 11. Petitioner again relies solely on Needham's paragraph [0022] for applying a correction in a first amount to a predetermined object type (face) and in a second amount to a portion that is not a face (building). Reply, 11. But Needham's paragraph [0022] falls short for the reasons explained above, and Dr. Villasenor's discussion of possible brightness adjustments in dynamic range operations (APPLE-1021, 200:22-202:2) does not bridge the gap. Petitioner takes certain of Dr. Villasenor's statements out of context to argue that dynamic range correction necessarily involves changing the intensity of one or more pixel values. Reply, 11. Even setting aside the ambiguity in Needham's paragraph [0022] (EX2001, ¶¶42-46) to accept Petitioner's presentation *arguendo*, however, fails to establish that Needham discloses determining a different amount of gain for a second portion that does not represent the physical object type. For example, the amount of gain applied to two objects, even to reach two different dynamic intensity ranges, depends on the starting dynamic ranges of the respective objects (*id.*, ¶45), which is not given in Needham. *See* APPLE-1004, [0022], [0032] (explaining that a dynamic range may be assigned as an operational parameter to apply to a specific object).

III. ALL CLAIMS ARE PATENTABLE OVER NEEDHAM-NONAKA

A. Nonaka's Optimization Processing and Emphasis Processing Do Not Determine Correction Based on Detection of, and Are Not Matched to, Predetermined Object Type

Nonaka does not cure the foregoing deficiencies of Needham.

At the outset, Petitioner attempts to obscure the teachings of Nonaka by contending that Nonaka's FIG. 8 is necessarily tied to Petitioner's earlier assertions, and that FIG. 8 limits the broader and unequivocal statements relied upon in the POR. *See* Reply, 12-13; *compare* POR, 24-25, 29-32. But Petitioner's attempt improperly proffers a new theory of mapping Nonaka to claim 1. In particular, Petitioner's previous mapping relied solely on paragraphs [0048]-[0050] of Nonaka as allegedly mapping to claim element [1c]. *See* Petition, 15-16. Petitioner's new attempt to rely on Nonaka's FIG. 8 and paragraphs [0058], [0063]-[0064], [0067]-[0070] is untimely and should be rejected. The need to reject this new theory is not merely formal; if credited, PO would be prejudiced by the inability to adequately address this new theory, which has only been introduced after PO's last opportunity to introduce new documentary evidence or analysis from PO's own expert.

Second, Petitioner's arguments miss the point. As explained in the POR, Nonaka's dual-path processing requires both paths to function, such that a POSITA would not merely pluck a piece of the second path as Petitioner asserts. POR, 24-25, 29-32.

Nonaka's FIG. 8 relates to the *first, image capture processing path*, and shows multiple instances in which correction can be applied, including optimization processing (S17) and emphasis processing (S15). PR, 12; APPLE-1005, [0070] (image subjected to step S17 processing displayed to camera user), FIGs. 8-9. However, none of those instances apply correction due to an image portion having been matched to an object type. Rather, the same corrections are applied regardless of whether a specific type of object is detected. APPLE-1005, [0042], [0064], [0067]-[0069]. Dr. Bovik confirmed that corrections performed at S15 and S17 "may be the same … type of correction." EX2006, 100:25-101:2. Corrections applied regardless of whether an object of a specific type is detected are not "matched" to the object type, and Nonaka does not describe "matching" of a correction to a predetermined object type. POR, 26-27.

Nonaka's application of corrections at various locations within FIG. 8 also does not disclose matching as recited in the claims of the '132 Patent. Both step S15 (performed on an image when faces are not detected) and step S17 (applied to detected faces) may include contrast emphasis operations. APPLE-1005, [0064], [0068]. And, even in step S17 of FIG. 8, Nonaka "subjects the face part ***and the person*** to the optimization processing of correcting the brightness of the part and emphasizing the contrast (step S17)." APPLE-1005, [0064] (emphasis added). Petitioner's Reply does not explain why a correction applied to both is matched to

the face, and does not assert that this optimization processing is applied in a different amount to a second portion of the image. Thus, the corrections of Nonaka, such as contrast processing, may be performed regardless of whether or not a face is detected. APPLE-1005, [0058], [0064], [0067]-[0069], FIG. 8. There is nothing in Nonaka's disclosure to teach or suggest that corrections are applied to an object based on the object being of a predetermined object type.

B. Petitioner's Generic Reasons For Combining Needham and Nonaka Fail to Demonstrate Any Advantages to the Combination

The few generic, hindsight benefits alleged by Petitioner, such as processing image data at high speed, improving visibility while a user is shooting an image, and improving visibility of a person in a backlit scene, were rebutted in the POR, and each remains insufficient to properly establish obviousness. Reply, 14; POR, 29-32; EX2001, ¶¶65-66. Petitioner has failed to show any benefits with respect to high speed image data processing provided by a combination of Needham and Nonaka. *See* POR, 29-30; EX2001, ¶¶65-66; EX2004, 135:23-25; APPLE-1005, [0008]. The dual-path nature of Nonaka and the intensity dynamic range maximization provided by Needham, would preclude a combination of the two from providing any benefits related to enhanced visibility while shooting and improvements to visibility of a person in a backlit scene. *See* POR, 29-30; EX2001, ¶¶65-66, 74-77; EX2004, 135:23-25; APPLE-1005, [0008].

Patent Owner's criticism of the combination of Needham and Nonaka focused on design incentives and a lack of expectation of success that would lead a POSITA away from combining the two references. *See* Reply, 14-16; POR, 30-35. A finding of obviousness under Section 103 "requires consideration of whether, in light of factors such as 'design incentives and other market forces,' the hypothetical skilled artisan would recognize the potential benefits and pursue the variation." *Belden v. Berk-Tek LLC*, 805 F.3d 1064, 1075 (Fed. Cir. 2016) (citing *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007)). There is no motivation to combine two references when there is no factual basis for finding that the proposed combination "would have had a reasonable expectation of success." *See Dome Patent L.P. v. Lee*, 799 F.3d 1732, 1380 (Fed. Cir. 2015).

What Petitioner attempts to characterize as arguments against physical combination are instead design incentives that would lead a POSITA away from combining Needham and Nonaka and reasons why a POSITA would not have had a reasonable expectation of success in combining Needham and Nonaka. POR, 30-35. For example, Petitioner's contention that Nonaka does not perform optimization processing when no face is detected (Reply, 15), in addition to being a mischaracterization of Nonaka as outlined in Section III(A) *supra*, does nothing to remedy the fact that differences between the two architectures of Needham and Nonaka would render the systems incompatible, leading a POSITA away from

combining the two references due to a lack of an expectation of success. *See* POR, 32-35 (citing EX2001, ¶¶66-76). Further, the pre-brightening performed in Nonaka would skew pixel values due to the fact that pixels are brightened prior to later correction operations which Petitioner purports to combine with the disclosure of Needham. *See* EX2001, ¶¶74-75. Contrary to Petitioner's assertions (Reply, 15-16), pre-brightening as performed at step S15 of FIG. 8 of Nonaka, is performed even when faces are not detected, and step S17 of FIG. 8 is dependent on such pre-brightening. *See* APPLE-1005, [0064], [0067], [0070], FIG. 8. The skewed pixel values resulting from the pre-brightening could introduce errors into the combined system, and a POSITA would not have had an expectation of success in combining elements from Needham and Nonaka due to the presence of such errors. *See* EX2001, ¶¶74-75. Such uncertainties would have led a POSITA away from combining Needham and Nonaka. EX2001, ¶¶74-76. In fact, Nonaka teaches away from the suggested combination, as Nonaka states that application of face emphasizing contrast operations, such as those described with respect to pre-brightening and optimization processing of steps S15 and S17, in the context of photographing "is not necessary" and should be avoided because "[t]he background needs to be rather balanced" during photographing to prevent capture of "an unnatural image." APPLE-1005, [0078].

Nor has Petitioner shown that the combination of Needham's dynamic range correction techniques with Nonaka's dynamic range correction techniques would allow for processing image data at high speed, improving visibility while a user is shooting an image, improving visibility of a person in a backlit scene, or any other benefits, but instead merely asserts that it is so. Reply, 14. In light of Needham's disclosure of a dynamic range maximization operation, the addition of the multi-path approach of Nonaka would not provide any of the alleged benefits, design incentives would lead a POSITA away from combining Needham and Nonaka, and a POSITA would not expect success from any such combination. APPLE-1004, [0022]; EX2001, ¶¶65-76.

IV. ALL CLAIMS ARE PATENTABLE OVER NEEDHAM-DVIR

A. Dvir Does Not Disclose that Local Contrast is Considered to Determine Pixel Gain

Dvir's generic disclosure of pixel gain calculation fails to render claim 8 obvious because Dvir does not disclose "determining the amount of gain to apply . . . so as to maintain local contrast." Reply, 16-18. While Dvir discusses local contrast and gain calculation separately, Dvir does not disclose a link between the two. *See* Petition, 26-27; EX2001, ¶¶95-96. Petitioner suggests that similarities between FIG. 2 of Dvir and FIG. 2B of the '132 Patent somehow suggest that Dvir discloses "determining the amount of gain to apply . . . so as to maintain local contrast," but neither FIG. 2 nor the remaining disclosure of Dvir discloses such a

determination. In essence, Dvir does not disclose specific consideration of local contrast before gain determination, as well as affirmative steps to ensure a similar output local contrast. *See* EX2001, ¶96.

Furthermore, Petitioner errs when claiming that the '132 Patent at 3:28-32 and 9:28-53 is "substantially the same" as Dvir at [0012] and [0033]-[0036]. PR, 17. The '132 Patent states that "a cascade of non-linear edge preserving filters, and nonlinear pixel point operations" is employed "in order to make object edge detail more visible, i.e., to improve local contrast." APPLE-1001, 3:28-32. Dvir, on the other hand, discloses that "a cascade of nonlinear edge preserving filters, and non-linear pixel point operations" are employed "to make image detail more visible." APPLE-1007, [0012]. This distinction is important as the relevant portion of claim 8 recites "determining the amount of gain to apply . . . so as to maintain local contrast." Dvir discloses making image detail generally more visible, while the '132 Patent discusses making object edge detail more visible to improve local contrast. Furthermore, the '132 Patent at 9:28-53 discusses use of predetermined object types, in addition to the spatial measurements disclosed in Dvir at [0033]-[0036]. Thus, Petitioner is incorrect that the cited portions of the '132 Patent are substantially the same as the cited portions of Dvir and is incorrect that Dvir includes all the teachings of local contrast that the '132 Patent contains.

B. Petitioner Fails to Rebut the Disincentives a POSITA Would Have Encountered in Any Attempt to Combine Needham and Dvir

Petitioner's primary response to the reasons against the combination of Needham and Dvir is that the POR "does not point to any teachings of the references to establish 'clear discouragement' of the combination." PR, 19. Yet, in addition to Dr. Villasenor's testimony referencing numerous portions of Dvir, paragraph [0006] of Dvir applies filters to surrounding neighborhoods of pixels, *without considering object detection*. POR, 43; EX2001, ¶¶84-101. For example, the reengineering necessary to modify the edge-preserving filters that work on a neighborhood of pixels around a certain pixel as in Dvir to instead work on detected objects, and the uncertainty of such a modification would have clearly discouraged a POSITA from the combination. *See* POR 41-43; EX2001, ¶¶84-101.

V. ALL CLAIMS ARE PATENTABLE OVER NEEDHAM-GALLAGHER

A. Gallagher's Gain Map for Sharpening Cannot Be Combined with the Needham to Suggest "Obtaining the Amount of Gain to Apply to the First Portion of the Digital Image Data from the Gain Map"

Gallagher's gain map is for applying pixel by pixel sharpening. APPLE-1006, Title, 2:21-40, 6:25-27, 6:30-31, 8:22-29; EX2001, ¶36. Gallagher's disclosure of a sharpening gain map does not include a "general teaching of generating a gain map that indicates an amount of correction to be applied to image pixels and using the gain map to correct the image," as suggested by Petitioner. Sharpening values, as disclosed in Gallagher's gain map, and amounts of gain, as recited in the '132

Patent's claims are different because the amounts of gain of the '132 Patent's gain map are related to brightening or darkening of a region of an image, while the sharpening values of Gallagher are "used to determine the level of sharpening to apply on a pixel-by-pixel basis." POR, 46; APPLE-1006, 6:26-31; EX2001, ¶¶108-110; *see* Section I(B) *supra*. The differences between Gallagher's gain map and the claimed gain map mean the combination would ***not*** include or suggest a gain map to adjust brightening of the image. Reply, 22. *See* APPLE-1006, Title, 2:21-40, 6:25-27, 6:30-31, 8:22-29; EX2001, ¶36. Neither Gallagher nor Needham discloses the gain map of claim 13, and a POSITA would not combine them to achieve one.

B. A POSITA Would Not Have Combined Needham and Gallagher

Petitioner mistakenly contends that Dr. Villasenor provides the only support for the lack of motivation to combine. Reply, 22-23. Dr. Villasenor cites portions of Gallagher demonstrating design incentives leading a POSITA away from combining Needham and Gallagher. EX2001, ¶108. Further, contrary to Petitioner's assertions, Gallagher describes a *specific* gain map for a specific *use* (pixel sharpening), not a gain map useful for multiple functions. Reply, 23-24; *see* APPLE-1006, Title, 2:21-40, 6:25-27, 6:30-31, 8:22-29. Attempting to modify the sharpening gain matrix of Gallagher to operate on the intensity dynamic range of Needham would involve substantial uncertainty. *See* EX2001, ¶¶101-103, 108.

Therefore, a POSITA would not have been motivated to combine Needham with Gallagher based on this uncertainty and the design disincentives. *Id.*

VI. CONCLUSION

For the foregoing reasons, the Petition should be denied.

Dated: September 11, 2019

Respectfully submitted,

/Eagle H. Robinson/
Eagle H. Robinson (Reg. No. 61,361)

Lead Counsel for Patent Owner

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24(a)(i), the undersigned certifies that this Paper—exclusive of the table of contents, table of authorities, certificate of service, and this certificate of word count—includes 5,591 words. The undersigned has relied upon the word count feature provided by Microsoft Word.

/Eagle H. Robinson/
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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on September 11, 2019, complete copies of PATENT OWNER'S SUR-REPLY TO PETITIONER'S REPLY and Exhibit 2006 were served on Lead and Back-up Counsel for Petitioner via email (by consent) to:

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