

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

APPLE INC.,  
Petitioner,

v.

QUALCOMM INCORPORATED,  
Patent Owner

---

Case IPR2018-01250  
Patent 8,447,132

---

**PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE**

## TABLE OF CONTENTS

I.	CLAIM CONSTRUCTION .....	1
II.	NEEDHAM ANTICIPATES CLAIMS 1 AND 5-7.....	3
	A. Needham discloses that the correction is matched to the predetermined type (claim 1).....	3
	B. Needham discloses applying the matched correction to two portions of the image in different amounts (claim 1). ....	8
	C. Needham discloses determining different amounts of gain for different portions (claim 7).....	11
III.	NEEDHAM IN VIEW OF NONAKA RENDERS CLAIMS 1 AND 5-7 OBVIOUS .....	11
	A. Nonaka discloses that the correction is matched to the predetermined type (claim 1).....	12
	B. A POSITA would have found it obvious to combine Needham with Nonaka. ....	14
IV.	NEEDHAM (ALONE OR IN VIEW OF NONAKA) AND DVIR RENDER CLAIM 8 OBVIOUS .....	16
	A. Dvir discloses determining a gain amount “to maintain local contrast of the first portion of the digital image data.” .....	16
	B. A POSITA would have found it obvious to combine Needham (alone or in view of Nonaka) with Dvir. ....	19
V.	NEEDHAM (ALONE OR IN VIEW OF NONAKA) AND GALLAGHER RENDER CLAIM 13 OBVIOUS .....	21
	A. Gallagher discloses “applying the determined amount of gain to apply to the first portion of the digital image data comprises obtaining the amount of gain to apply to the first portion of the digital image data from the gain map.”...21	
	B. A POSITA would have found it obvious to combine Needham (alone or in view of Nonaka) with Gallagher. ....	22

VI. CONCLUSION .....24

## EXHIBITS

APPLE-1001	U.S. Patent No. 8,447,132 to Galil (“the ’132 patent”)
APPLE-1002	Prosecution History of the ’132 Patent
APPLE-1003	Declaration of Alan C. Bovik, Ph.D., P.E.
APPLE-1004	U.S. Publication No. 2002/0181801 to Needham et al. (“Needham”)
APPLE-1005	U.S. Publication No. 2008/0007634 to Nonaka et al. (“Nonaka”)
APPLE-1006	U.S. Patent 6,891,977 to Gallagher (“Gallagher”)
APPLE-1007	U.S. Publication No. 2008/0291287 to Dvir (“Dvir”)
APPLE-1008	Reserved
APPLE-1009	Reserved
APPLE-1010	Reserved
APPLE-1011	Patent Owner’s Infringement Contentions for <i>Qualcomm Inc. v. Apple Inc.</i> , Case No. 3:17-cv-02402-WQH-MDD (S.D. Cal.)
APPLE-1012	Reserved
APPLE-1013	Reserved
APPLE-1014	Reserved
APPLE-1015	Reserved
APPLE-1016	Reserved

APPLE-1017	Reserved
APPLE-1018	Declaration of Michael A. Amon
APPLE-1019	Declaration of Noah C. Graubart
APPLE-1020	Reserved
APPLE-1021	Transcript of Deposition of Dr. John Villasenor
APPLE-1022	Second Declaration of Alan C. Bovik, Ph.D., P.E.
APPLE-1023	Reserved
APPLE-1024	Reserved
APPLE-1025	U.S. Provisional Application No. 60/285,063 (“the ’132 provisional”)

Qualcomm presents a number of arguments in its Patent Owner's Response (POR) in an attempt to overcome the substantial evidence of the unpatentability of the challenged claims, but Qualcomm's positions fail. As explained in the Petition and further clarified below, the prior art references anticipate and/or render obvious the challenged claims.

## **I. CLAIM CONSTRUCTION**

The Board indicated that no express constructions were required. Institution Decision (ID), 4. Despite this, and in an apparent attempt to manufacture patentability of some dependent claims, Qualcomm now urges the Board to adopt unduly narrow constructions of the terms "gain" and "gain map."

Qualcomm proposes that the term "gain," used alone and in the phrase "gain map," should mean "an attribute that relates to brightening or darkening a region of an image." POR, 8. However, the Board need not construe this term for purposes of comparing the claims to the prior art references. As detailed below, Apple notes that no construction is necessary based on the straightforward teachings of the cited references.

Qualcomm provides no explanation for why the meaning of "gain" would not have been understood by a POSITA. And, Qualcomm provides insufficient explanation for why a POSITA would have understood "gain" as being limited to "an attribute that relates to brightening or darkening a region of an image."

Contrary to Qualcomm’s position, Qualcomm’s construction is not “the broadest reasonable interpretation” because the construction improperly imports limitations. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). A POSITA would not understand the ’132 patent’s use of “gain” as limited to only “brightening or darkening a region of an image.” APPLE-1022, ¶7.

For example, the ’132 patent discloses 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; APPLE-1022, ¶8. The ’132 patent describes one example where “[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.” APPLE-1001, 3:49-53 (emphasis added), *see also* 4:4-25; APPLE-1022, ¶9. Dr. Villasenor acknowledged that the ’132 patent identifies different types of correction. APPLE-1021, 52:9-53:5, 115:10-116:6. Dr. Villasenor also stated that it is possible to perform the different corrections identified in the ’132 patent (e.g., smoothing, contrast enhancement, and color manipulation) 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. APPLE-1021, 122:7-127:10.

Accordingly, Qualcomm’s proposed construction of “gain” is not the broadest reasonable interpretation as understood by a POSITA after reading the entire patent. Qualcomm’s proposed construction should not be adopted, and the terms “gain” and “gain map” should be given their ordinary meanings under the broadest reasonable interpretation. APPLE-1022, ¶10.

## **II. NEEDHAM ANTICIPATES CLAIMS 1 AND 5-7**

### **A. Needham discloses that the correction is matched to the predetermined type (claim 1).**

Qualcomm contends that “Needham fails to disclose that a correction is determined that is matched to the ‘predetermined type’ of physical object detected on the image as required by Claim 1.” POR, 14 (emphasis in original). Qualcomm relies on Dr. Villasenor’s conclusory and unsupported opinion that “‘matched’ in this context means a particular type of correction is predetermined or assigned to a particular image feature.” EX-2001, ¶51. Here, Qualcomm takes a very narrow view of the term “matched” and attempts to rewrite the claim language to require that “the determined correction is predetermined or assigned to the predetermined type.” The ’132 patent provides no disclosure of such a requirement. APPLE-1022, ¶11.



As an initial matter, the term “matched” and the phrase “a particular type of correction is predetermined or assigned to a particular image feature” appear nowhere in the ’132 patent’s specification, as Dr. Villasenor admitted. APPLE-1021, 45:20-47:18; APPLE-1022, ¶12. Nevertheless, Qualcomm contends that the ’132 patent requires that the “correction is matched to the particular image feature type in a predetermined manner” (POR, 14) because the ’132 Patent describes “examples of the different correction amounts as including different gain curves, such as shown in figure 7, that map input pixel intensities to output pixel intensities” and “that a lookup table provides gain values for use with a particular detected object type, and additional lookup tables can provide gain values for other object types.” POR, 10 (emphasis added) (citing APPLE-1001, 3:12-27, 5:52-60, 5:65-67, 6:22-25). However, the portions of the ’132 patent that Qualcomm relies on do not support Qualcomm’s contention that a particular type of correction is predetermined for the particular image feature type, but rather only that the correction amount or the gain values are predetermined for different object types and other image content. APPLE-1022, ¶12.

Qualcomm asserts that Needham demonstrates lack of matching because “Needham discloses multiple objects of the same type receiving different corrections.” POR, 12 (citing APPLE-1004, [0032] (“The operational parameter(s) may also specify that different occurrences of the same image feature type (e.g.,

different human faces) in an image receive a differing correction operation.”)).

But Qualcomm mischaracterizes Needham and ignores disclosure surrounding the quoted sentence, which states:

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. ... 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]. Needham’s example teaches multiple objects of the same predetermined type (e.g., human faces) receiving the same type of correction (dynamic range) in different amounts specified by operational parameters (intensity of the dynamic range correction). APPLE-1022, ¶13.

Qualcomm further contends that Needham discloses no matching because Needham’s “corrections would be applied regardless of whether any particular object type or even whether any object was detected as confirmed by Petitioner’s expert Dr. Bovik.” POR, 12, *see also* 15-16. However, Needham’s disclosure is similar to the ’132 patent and its provisional in that the corrections would be applied regardless of whether any particular object type or even whether any object

was detected. *See e.g.*, APPLE-1001, 4:64-5:5, 6:36-41, FIG. 6 (select “normal gain value[s]” for pixels not representing face at 603 and select “alternate gain value[s]” for pixels representing face at 605); APPLE-1025, 8 (describing correction for “normal image data (non-face)” and “specific image content (i.e. face)”); APPLE-1022, ¶¶14-16. Nowhere does the ’132 patent or provisional describe applying no correction or not correcting the image if no predetermined object is found in the image. *Id.* Like Needham, in the ’132 patent and its provisional, correction is applied regardless, just in an amount specified by the “normal gain value[s]” for “normal image data.” *Id.*

The Petition cited multiple portions of Needham which, when read as a whole—as they should be—support Needham’s disclosure of “matching.” Petition, 12-14 (citing APPLE-1004, [0019]-[0020], [0024], [0026]-[0027], [0029]-[0032], [0035], FIGS. 2, 6, 7). For example, paragraph [0020] discloses “[o]ne or more types of correction operations may also be defined for each image feature” and “different types of correction operations may be applied to different image features.” Here, Needham discloses a type of correction being “defined” for, i.e., “matched” to, an image feature, e.g., a human face image feature. Paragraph [0020] also discloses an example where “maximizing the intensity *dynamic range* (i.e., enhance the contrast) may be performed on a *human face image feature* and a *different correction operation* that increases the brightness

may be applied to the image feature that represents *the sky*.” In this example, different types of corrections are applied to different types of image features—the operation of maximizing dynamic range is applied to human faces and the operation of increasing brightness is applied to the sky—which indicates that the different corrections are matched to the different image features. APPLE-1022, ¶17. In addition, paragraph [0032] discloses “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, which also establishes that dynamic range correction is matched to human faces. APPLE-1022, ¶¶13, 17. Neither Qualcomm nor Dr. Villasenor address these disclosures of Needham.

More generally, paragraph [0026] discloses “[*b*]ased on the feature description 260, the feature-based correction unit 270 performs one or more *specified* correction operations,” paragraph [0030] discloses “a feature description 260 includes a feature type 610” and “[feature] descriptions may be *used to determine* where and how to apply one or more *specified* correction operations,” and paragraph [0031] discloses that the correction operation defines the type of correction (e.g., brightness or contrast enhancement) to be performed. *See also* APPLE-1004, FIGS. 2, 6-7. Needham [0026] and [0030]-[0031], in conjunction with Needham [0020] and [0032], specify that a feature type, e.g., human faces, is

matched to a specified correction operation, e.g., dynamic range correction.

In addition, paragraph [0035] discloses “[f]or each detected image feature, the corresponding correction parameters are *retrieved*” and “[t]he correction operation(s) is then performed 870 on each image feature.” Paragraph [0019] discloses that “[c]orrection operations may also be *defined* on individual image features” such as “detected human faces.” Paragraph [0029] discloses “[t]he correction is *made in accordance with* the *specified* correction parameters and the *detected* image features.” Thus, Needham discloses that a correction operation and/or a correction parameter is “defined,” “specified,” “based on,” “in accordance with,” and “retrieved” for, as well as “corresponding” to, an image feature and an image feature type, which is sufficient to satisfy the claimed “match[ing].”

APPLE-1022, ¶17.

**B. Needham discloses applying the matched correction to two portions of the image in different amounts (claim 1).**

As discussed above, Needham, particularly paragraphs [0020] and [0032], establishes that dynamic range correction is “defined” for, i.e., “matched” to, human faces. Needham [0022] further discloses that “the intensity dynamic range used for correcting human faces in an image *may be larger (corresponding to higher contrast) than that* used for correcting buildings in an image.” Qualcomm asserts that Needham [0022] does not “explicitly define that the same operation is

performed in two different amounts on two different portions.” POR, 21.

Qualcomm relies on Dr. Villasenor’s statements that “Needham’s disclosure that ‘the intensity dynamic range used for correcting human faces in an image may be larger (corresponding to higher contrast) than that used for correcting buildings in an image’ is ambiguous in light of the Needham disclosure in the very same sentence describing ‘maximizing intensity dynamic range.’” EX-2001, ¶45.

As Dr. Villasenor explained “[m]aximizing’ the intensity dynamic range means using the full range of intensity values.” EX-2001, ¶44. Dr. Villasenor also explained ways of adjusting dynamic range, which include extending one end of the dynamic range (e.g., increasing the brightest value). APPLE-1021, 200:22-202:2.

In light of Dr. Villasenor’s explanations, Needham [0022] is not ambiguous and discloses to a POSITA applying a correction of “maximizing intensity dynamic range” using a “larger” intensity dynamic range for human faces “(corresponding to higher contrast)” **and** applying the same correction of “maximizing intensity dynamic range” using a smaller intensity dynamic range (corresponding to lower contrast) for buildings in the same image. APPLE-1022, ¶¶18-20. The “larger” intensity dynamic range used for human faces would correspond to a larger increase in the brightest value of the dynamic range, resulting in higher contrast for faces. *Id.* The smaller intensity dynamic range

used for buildings in the same image would correspond to a smaller increase in the brightest value of the dynamic range, resulting in smaller contrast for buildings.

*Id.* The correction would then maximize, i.e., use the full range of intensity values, within the larger intensity dynamic range determined for human faces when correcting human faces and maximize within the smaller intensity dynamic range determined for buildings when correcting buildings in the same image, i.e., apply two different amounts of the same type of correction, anticipating the claims of the '132 patent. *Id.* Indeed, this is similar to the '132 patent's disclosure regarding the histograms 802A, 802B, and 802C in FIGS. 8A-8C. APPLE-1001, 9:54-10:28 (shift in "peak of histogram" "reflects the more optimal brightness level of face area"), FIGS. 8A-8C.

Regardless of whether Needham's "weight" corresponds to an "amount of correction" (which it does, as established in the Petition at 13-16), Needham [0022] provides a clear and concrete example of "applying a first amount of the correction to the first portion of the digital image data" and "applying a second amount of the correction to a second portion of the digital image data," as discussed above and in the Petition. Thus, Qualcomm's arguments regarding claim 1's patentability over Needham fail.

**C. Needham discloses determining different amounts of gain for different portions (claim 7).**

As discussed above, Needham, particularly paragraphs [0020] and [0032], establishes that dynamic range correction is “defined” for, i.e., “matched” to, human faces. Needham [0022] further discloses applying a larger intensity dynamic range for human faces when correcting human faces, and applying a smaller intensity dynamic range for buildings when correcting buildings in the same image. Dr. Villasenor confirmed that dynamic range correction involves changing the intensity of one or more pixel values. APPLE-1021, 135:3-137:14 (“any operation involves changing intensities” and “any manipulation of images could involve some change to the pixel values”). Dr. Villasenor also explained ways of adjusting dynamic range, which include adjusting the brightest value (an attribute related to brightening) and/or the darkest value (an attribute related to darkening) of the image portion to be corrected. APPLE-1021, 200:22-202:2. Even under Qualcomm’s proposed construction of “gain” and in light of Dr. Villasenor’s explanations, it is clear that Needham determines different amounts of gain for dynamic range correction of the face portion and the building portion of the image. APPLE-1022, ¶21. Thus, Qualcomm’s arguments regarding claim 7’s patentability over Needham fail.

**III. NEEDHAM IN VIEW OF NONAKA RENDERS CLAIMS 1 AND 5-7 OBVIOUS**



**A. Nonaka discloses that the correction is matched to the predetermined type (claim 1).**

Qualcomm contends that Nonaka's optimization processing is not matched to the object type "face" because "Nonaka describes that the correction (applied by 'optimization processing section 5b') is still applied when a face is not detected." POR, 26-27. In doing so, Qualcomm misinterprets Nonaka and mischaracterizes Dr. Bovik's testimony.

Nonaka describes three different optimization processing options including "optimization processing for the face display in the step S17" and "the emphasis processing for the face detection in the step S15." APPLE-1005, [0070], FIG. 8; APPLE-1022, ¶23. Nonaka [0058], relied on by Apple (Petition, 14), discloses not performing the "optimization processing" of step S17 when no face is detected. APPLE-1022, ¶24. FIG. 8 shows that when "NO" is the answer to "FACE DETECTED?" at step S11 and "NO" is the answer to "FACE DETECTABLE?" at step S16, Nonaka does not perform step S17. APPLE-1005, [0067], [0069] ("when the face cannot be detected (step S16 NO), the processing returns to the step S2"), FIG. 8. On the other hand, Nonaka [0042], relied on by Qualcomm (POR, 26), describes performing the "emphasis processing" of step S15 because the "face detecting section 11 cannot detect the face" in step S11. APPLE-1005, [0063], [0067]-[0068], FIG. 8; APPLE-1022, ¶25. This "emphasis processing" of

step S15 *is a different correction* than the “optimization processing” of step S17.

APPLE-1005, [0064] (“optimization processing of correcting the brightness of the part and emphasizing the contrast (step S17)”), [0068] (“emphasizing correction processing (amplifying correction, contrast emphasis or the like) for the face detection (step S15)”); APPLE-1022, ¶26. In short, Nonaka’s system does not perform the “optimization processing” of step S17 when no face is detected.

APPLE-1005, [0058], [0067], [0069], FIG. 8.

Qualcomm does not rely on any of Dr. Villasenor’s opinions in support of its contentions, but instead relies on Dr. Bovik’s testimony. POR, 26-27. Regarding Dr. Bovik’s testimony in EX-2004 at 152:22-153:1, Dr. Bovik was merely confirming what is stated in Nonaka [0042], *not* that the “optimization processing” of step S17 is performed regardless of whether a face is detected. APPLE-1022, ¶27. Additionally, Qualcomm’s reliance on Dr. Bovik’s testimony in EX-2004 at 156:3-5 is misplaced. Dr. Bovik’s testimony actually supports Apple’s position that the “emphasis processing” of step S15 is a different correction than the “optimization processing” of step S17. EX-2004, 154:4-156:5; APPLE-1022, ¶27. Because the “optimization processing” of step S17 is performed when a face is detected and not performed when no face is detected, the “optimization processing” of step S17 is matched to faces (a predetermined type of object). APPLE-1022, ¶26.

**B. A POSITA would have found it obvious to combine Needham with Nonaka.**

Qualcomm asserts that “Needham’s algorithm already maximizes dynamic range” and thus there is “no anticipated benefit to dynamic range achieved by modifying Needham with Nonaka.” POR, 28-29, 36-37. Qualcomm does not address the Petition’s stated improvements and benefits of processing image data at high speed and improving visibility while a user is shooting an image, in addition to improving visibility of a person in a backlit scene. Petition, 8-10. The desirability of such improvements and benefits, as taught in Nonaka, would have motivated a POSITA to combine Nonaka’s and Needham’s teachings. APPLE-1022, ¶28.

Qualcomm further argues, in essence, Nonaka’s architecture is incompatible with Needham’s in an attempt to defeat the teachings of Nonaka through physical combinability and bodily incorporation of those teachings into Needham. POR, 29-33. Qualcomm’s arguments are misplaced as they do not focus sufficiently on the teachings of Needham and Nonaka, which both operate on digital image data. APPLE-1021, 133:14-135:2, 155:2-20; APPLE-1022, ¶29. “The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference” but rather “what the combined teachings of the references would have suggested to those of ordinary

skill in the art.” *MCM Portfolio LLC v. Hewlett-Packard Co.*, 812 F.3d 1284, 1294 (Fed. Cir. 2015) (quoting *In re Keller*, 642 F.2d 413, 425 (CCPA 1981)); *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (en banc) (noting that the criterion for obviousness is not whether the references can be combined physically, but whether the claimed invention is rendered obvious by the teachings of the prior art as a whole). Apple did not propose to combine “the corrections and architectures of these two different dynamic range correction systems” (POR, 33), but rather relied on Nonaka’s teaching of not performing optimization processing when no face is detected in digital image data, using gain as a correction parameter for dynamic range correction of digital image data, and applying different amounts of gain to different portions of digital image data in a single image. Petition, 14-17.

Qualcomm’s argument regarding expectation of success is also wrong. POR, 32-35. Nonaka [0042], which Qualcomm argues describes “pre-brightening” (POR, 33 (citing APPLE-1005, [0042])), in actuality describes performing the “emphasis processing” of step S15 because the “face detecting section 11 cannot detect the face” in step S11, as discussed above. APPLE-1005, [0042], [0063], [0067], FIG. 8; APPLE-1022, ¶¶25, 30. Contrary to Qualcomm’s allegations, which mistakenly look to Dr. Bovik’s testimony for additional support (POR, 34-35), Nonaka ***does not require*** “pre-brightening” (i.e., “emphasis processing” of step S15) prior to “full correction” (i.e., “optimization processing” of step S17)

when a face is detected in the pre-processed image data (“FACE DETECTED?” is “YES” in step S11). APPLE-1005, [0064], FIG. 8; APPLE-1022, ¶¶30-32.

Nonaka’s gains are applicable to the processing path where no “emphasis processing” (step S17) is performed where the face is detected at step S11.

APPLE-1022, ¶30. Contrary to Qualcomm’s allegations (POR, 33), Nonaka does not require the gains to be dependent on “pre-brightening.” *Id.* Thus, Nonaka’s gains are useable values in Needham’s system, with the weights controlling the gains as taught by Needham and Nonaka. Petition, 16-17 (“Needham’s teachings of applying weights to control correction parameters” and Nonaka’s teachings of “using gain as a correction parameter”); POR, 32 (contrary to Qualcomm’s argument that the “Petition does not describe how the weights of Needham ... would be modified in view of the gain values of Nonaka to arrive at gain values that would enhance the image.”); APPLE-1022, ¶30. Qualcomm’s arguments regarding Nonaka are simply wrong.

#### **IV. NEEDHAM (ALONE OR IN VIEW OF NONAKA) AND DVIR RENDER CLAIM 8 OBVIOUS**

##### **A. Dvir discloses determining a gain amount “to maintain local contrast of the first portion of the digital image data.”**

As discussed above, Qualcomm incorrectly alleges that Needham does not disclose determining gains. POR, 40-41. Qualcomm alleges that Dvir likewise does not disclose determining gains. POR, 41. Qualcomm ignores that the

Petition cites Dvir [0006], which discloses using “a cascade of nonlinear edge preserving filters, and pixel point operations, to calculate pixel gain ... that can be employed to make image detail more visible.” Petition, 23-27; APPLE-1007, [0006]; APPLE-1003, ¶64; APPLE-1022, ¶33. The Petition also cites Dvir [0012], [0014], [0016], [0018], [0019], and [0025], which all describe determining a gain amount. Petition, 23-27; APPLE-1003, ¶¶64-68; APPLE-1022, ¶33.

Qualcomm, relying on Dr. Villasenor’s conclusory opinions in his declaration, contends that “to ‘maintain’ local contrast requires specific consideration of the contrast before the processing as well as affirmative steps to ensure a similar output contrast—something that is not discussed in Dvir.” POR, 41 (citing EX-2001, ¶96). During his deposition, Dr. Villasenor confirmed that his statement is supported by the ’132 patent at 3:28-32 and 9:28-53, which according to Dr. Villasenor discuss maintaining local contrast and relate to considering local contrast before the processing steps. APPLE-1021, 93:13-98:16. As pointed out in the Petition (Petition, 23) and worth reemphasizing here, the ’132 patent at 3:28-32 and 9:28-53 are substantially the same as Dvir [0012] and [0033]-[0036], respectively. *Compare* APPLE-1001, 3:28-32, 9:28-53 *with* APPLE-1007, [0012], [0033]-[0036]. Thus, contrary to Qualcomm’s and Dr. Villasenor’s contentions, Dvir [0012] and [0033]-[0036] discuss maintaining local contrast and relate to considering local contrast before the processing steps. APPLE-1022, ¶34.

These portions of the '132 patent and Dvir describe a “general embodiment of FIGS. 3 and 4,” which is an embodiment of block 205 shown in FIGS. 2A-D of the '132 patent and in FIG. 2 of Dvir. APPLE-1001, 5:31-51, 9:23-24, FIGS. 2-4; APPLE-1007, [0017]-[0018], [0033], FIGS. 2-4. As established in the Petition (Petition, 23-24), the '132 patent's FIG. 2B shows a DRC unit 117 that includes the same blocks 205 and 207 and in exactly the same configuration as the DRC unit 117 shown in FIG. 2 of Dvir. *Compare* APPLE-1001, FIG. 2B with APPLE-1007, FIG. 2; APPLE-1022, ¶35. Dr. Villasenor agreed that, in the '132 patent's FIG. 2B, box 205 provides information to the gain look-up table 207, which the gain look-up table 207 uses to produce a gain that is applied on pixels in the digital image to change the pixel values, which can result in a change in pixel values in a first portion of the digital image. APPLE-1021, 112:23-115:8; APPLE-1001, 6:45-8:8. Because Dvir's FIG. 2 is exactly the same as the '132 patent's FIG. 2B with respect to blocks 205 and 207, Dvir discloses determining a gain amount “to maintain local contrast of the first portion of the digital image data” in the same manner as the '132 patent. APPLE-1022, ¶35; *compare* APPLE-1001, 6:45-8:15,

FIG. 2B *with* APPLE-1007, [0019]-[0025], FIG. 2.<sup>1</sup>

**B. A POSITA would have found it obvious to combine Needham (alone or in view of Nonaka) with Dvir.**

Qualcomm contends that the purported “reengineering necessary,” “add[ed] complexity,” “trade-offs,” and “degradation to the image” would have led a POSITA away from combining Dvir’s teachings with Needham. POR, 42-43. The only evidence Qualcomm provides in support of this argument is Dr. Villasenor’s unsupported and conclusory statements in his declaration. EX-2001, ¶¶85-100. Qualcomm does not point to any teachings of the references to establish “clear discouragement” of the combination, as required for teaching away. *In re Ethicon, Inc.*, 844 F.3d 1344, 1351 (Fed. Cir. 2017); APPLE-1022, ¶36.

As stated by the Federal Circuit, “[a] given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine.” *Allied Erecting & Dismantling Co. v. Genesis*

---

<sup>1</sup> No other portions of the ’132 patent specification discuss “local contrast,” much less “maintaining local contrast.” APPLE-1022, ¶34. As such, to the extent that the ’132’s patent’s specification meets Section 112’s requirements regarding maintaining local contrast, so does Dvir, which includes all the same teachings of maintaining local contrast.



*Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016) (affirming PTAB’s determination of obviousness although the “suggested modification to Caterpillar would entail design and structural changes”); *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006). As discussed above, the test for obviousness is “what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *MCM*, 812 F.3d at 1294; *In re Etter*, 756 F.2d at 859. And, as the Supreme Court has stated, a POSITA “is also a person of ordinary creativity, not an automaton” “and in many cases ... will be able to fit the teachings of multiple patents together like pieces of a puzzle.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

Here, Dvir does not lack definiteness or certainty about the result of using a cascade of nonlinear edge preserving filters for dynamic range correction and gives more than mere general guidance. *See Medichem*, F.3d 1157 at 1167; *see generally* APPLE-1007; APPLE-1003, ¶¶64-68; APPLE-1022, ¶36. A POSITA would indeed have recognized that Dvir’s teachings of dynamic range correction using a cascade of nonlinear edge preserving filters could have been combined with Needham’s dynamic range correction to determine gain amounts, with Needham’s weights controlling, in one way or another (e.g., before, during, or after Dvir’s filtering), the gain amounts to apply to different portions of the image based on object type in an image. Petition, 15-16, 24-27; APPLE-1022, ¶37. Indeed, Dr.

Villasenor testified that it could be possible to apply the '132 patent's FIG. 2B structure, which includes Dvir's filters as block 205, to correct for contrast enhancement (which Needham discloses corresponds to dynamic range correction). APPLE-1021, 122:7-125:1; *compare* APPLE-1001, 6:45-8:15, FIG. 2B *with* APPLE-1007, [0019]-[0025], FIG. 2; APPLE-1004, [0022]. Thus, Qualcomm's arguments regarding Dvir are wrong.

**V. NEEDHAM (ALONE OR IN VIEW OF NONAKA) AND GALLAGHER RENDER CLAIM 13 OBVIOUS**

**A. Gallagher discloses “applying the determined amount of gain to apply to the first portion of the digital image data comprises obtaining the amount of gain to apply to the first portion of the digital image data from the gain map.”**

Qualcomm argues that “Gallagher discloses a ‘gain map’ ‘used to determine the level of sharpening to apply on a pixel-by-pixel basis,’” and “[b]ecause Gallagher’s gain map is not used for controlling the brightening or darkening of a region of an image,” Gallagher does not disclose or suggest the use of a gain map in claim 13. POR, 46. Under any interpretation of “gain map,” Qualcomm’s arguments are misplaced and do not focus sufficiently on the teachings of Needham and Gallagher, which both teach adjusting pixel intensity values of digital image data. APPLE-1021, 129:10-130:17 (confirming that sharpness adjustment would include adjusting pixel intensity values), 135:3-137:14 (confirming that Needham describes enhancing the brightness and/or contrast,

which would involve changing the intensity of one or more pixel values), 136:23-137:14 (“any operation involves changing intensities” and “any manipulation of images could involve some change to the pixel values”); APPLE-1022, ¶38.

As stated above, “[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference” but rather “what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *MCM*, 812 F.3d at 1294; *In re Etter*, 756 F.2d at 859. Apple did not propose to modify Needham with Gallagher’s gain map for determining the level of sharpening, but rather relied on Gallagher for its 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. Petition, 29, 32; APPLE-1022, ¶39. As stated in the Petition, a POSITA would have been led by Gallagher to modify Needham and/or the Needham-Nonaka combination to generate a gain map for dynamic range correction, and using the gain map to correct the image, as suggested by Gallagher. Petition, 29-31; APPLE-1003, ¶¶80-83; APPLE-1022, ¶39.

**B. A POSITA would have found it obvious to combine Needham (alone or in view of Nonaka) with Gallagher.**

Qualcomm contends that “the goals of Gallagher are sharpening an image rather than feature-based enhancement of dynamic range contrast as in Needham”

and “[t]here is no incentive to adapt a technique used for sharpening an entire image for use in enhancing dynamic range contrast of portions of an image.” POR, 47. Qualcomm concludes that these “design considerations” would have led a POSITA away from combining Gallagher with Needham and/or Needham-Nonaka. *Id.* The only evidence Qualcomm provides in support of this argument is Dr. Villasenor’s unsupported and conclusory statements in his declaration. EX-2001, ¶¶101-104. Again, Qualcomm does not point to any teachings of the references to establish “clear discouragement” of the combination, as required for teaching away. *In re Ethicon*, 844 F.3d at 1351.

As repeatedly discussed above, “[t]he test for obviousness is ...” “what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *MCM*, 812 F.3d at 1294; *In re Etter*, 756 F.2d at 859. And, in view of the Supreme Court’s guidance, referenced above (at 18), a POSITA would have known how to fit Gallagher’s teachings with Needham and/or Needham-Nonaka. *See KSR*, 550 U.S. at 421.

Gallagher does not lack definiteness or certainty about the result of using a gain map to correct an image and gives more than mere general guidance as described in the Petition. *See Medichem*, F.3d 1157 at 1167; *see generally* APPLE-1006; APPLE-1003, ¶¶75-79; APPLE-1022, ¶40. A POSITA would have recognized that Gallagher’s teachings 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 could have been combined with Needham's dynamic range correction to generate a gain map for dynamic range correction and use the gain map to correct the image. Petition, 27-33; APPLE-1022, ¶40. Thus, Qualcomm's arguments regarding Gallagher fail.

## **VI. CONCLUSION**

All Challenged Claims are unpatentable.

Respectfully submitted,

Date: August 8, 2019

/Timothy W. Riffe/

W. Karl Renner, Reg. No. 41,265  
Timothy W. Riffe, Reg. No. 43,891  
Thomas A. Rozylowicz, Reg. No. 50,620  
Kim Leung, Reg. No. 64,399  
Fish & Richardson P.C.  
3200 RBC Plaza  
60 South Sixth Street  
Minneapolis, MN 55402  
T: 202-783-5070  
F: 877-769-7945

Attorneys for Petitioner

**CERTIFICATION UNDER 37 CFR § 42.24(d)**

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply to Patent Owner's Response totals 5,118, which is less than the 5,600 allowed under 37 CFR § 42.24.

Respectfully submitted,

Date: August 8, 2019

/Timothy W. Riffe/

W. Karl Renner, Reg. No. 41,265  
Timothy W. Riffe, Reg. No. 43,891  
Thomas A. Rozylowicz, Reg. No. 50,620  
Kim Leung, Reg. No. 64,399  
Fish & Richardson P.C.  
3200 RBC Plaza  
60 South Sixth Street  
Minneapolis, MN 55402  
T: 202-783-5070  
F: 877-769-7945

Attorneys for Petitioner

### **CERTIFICATE OF SERVICE**

Pursuant to 37 CFR §§ 42.6(e)(1) and 42.6(e)(4)(iii), the undersigned certifies that on August 8, 2019, a complete and entire copy of this Petitioner's Reply to Patent Owner's Response and Accompanying Exhibits were provided via email to the Patent Owner by serving the email correspondence addresses of record as follows:

Eagle Robinson  
R. Ross Viguet  
Darren Smith  
Norton Rose Fulbright US LLP  
98 San Jacinto Blvd., Suite 1100  
Austin, TX 78701

Email: [eagle.robinson@nortonrosefulbright.com](mailto:eagle.robinson@nortonrosefulbright.com)  
[ross.viguet@nortonrosefulbright.com](mailto:ross.viguet@nortonrosefulbright.com)  
[darren.smith@nortonrosefulbright.com](mailto:darren.smith@nortonrosefulbright.com)

/Diana Bradley/  
Diana Bradley  
Fish & Richardson P.C.  
60 South Sixth Street, Suite 3200  
Minneapolis, MN 55402  
(858) 678-5667