

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,

Petitioner

v.

INTERDIGITAL, INC.,

Patent Owner

Case: IPR2024-01441

U.S. Patent No. 9,674,556

PATENT OWNER'S PRELIMINARY RESPONSE

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LIST OF EXHIBITS

EXHIBIT NO.	SHORT NAME	DESCRIPTION
Exhibit 2001	Richardson	Declaration of Dr. Iain Richardson
Exhibit 2002	Richardson CV	Curriculum Vitae of Dr. Iain Richardson
Exhibit 2003	IDG PH Brief	Public Version of Complainants' Initial ITC Post-Hearing Brief

I. Introduction

Patent Owner InterDigital, Inc. (“InterDigital”) submits this Preliminary Response to Petitioner Intel Corporation’s (“Petitioner”) and Real Parties in Interest¹ Lenovo Group Limited’s and Lenovo (United States) Inc.’s Petition for IPR challenging Claims 1-8 of U.S. Patent No. 9,674,556 (“the ’556 Patent”). 37 C.F.R. §42.207(a). The ’556 Patent is directed to an improved method and apparatus for decoding an image region that uses two in-loop filters in succession, a deblocking filter and an adaptive sparse de-noising filter, to reduce a first and a second type of coding artifact.

Petitioner’s primary prior art references (Lee, Chiang, VC1) do not disclose an adaptive sparse de-noising filter—required by every Challenged Claim. In fact, Petitioner “concedes” these references do not teach the claimed adaptive “sparse de-noising filter” under the construction Petitioner asserts is correct. Petition, 71 n.7. Petitioner’s attempt to remedy this by proposing to add an adaptive sparse de-noising filter is belied by Petitioner’s own references showing no motivation to do so.

Further, Petitioner’s Grounds 1A and 1B presents the same art and arguments previously presented to the Office while Grounds 2 and 3 present cumulative art and

¹Since the Petition’s filing, co-pending actions between InterDigital and Lenovo before the ITC and in EDNC were dismissed.

arguments. Specifically, Lee and the alleged Applicant Admitted Prior Art, “AAPA,” (the Guleryuz filter), relied upon for Grounds 1A, 1B, and 3 were cited, discussed, and overcome during prosecution. Petitioners’ remaining primary references, Chiang and VC1, are merely cumulative of Lee. Accordingly, the Petition is precisely the type of Petition the Board regularly exercises its discretion to deny under §325(d).

All Grounds asserted are deficient with respect to at least one limitation of each independent claim, which carries through to all dependent claims. Petitioner fails to meet its burden to show a reasonable likelihood of unpatentability of any Challenged Claim and the Board should deny institution under 37 C.F.R. §42.108(c).

II. Patent Overview

A. ’556 Patent

The ’556 Patent describes a method and apparatus for decoding an image region using at least two in-loop filters in succession to reduce a first and second type of coding artifact. In block-based video coding frameworks, visual distortions or artifacts may result from video compression’s lossy nature. The ’556 Patent uses a succession of filters on coded frames to help reduce the amount of coding artifacts. The invention uses filters placed in the coding loop (in-loop) where filtered frames are used as referenced frames for motion compensation of other coded frames.

The ’556 Patent explains, “[t]he present principles differ from the prior art in the use of a series of refinement steps (succession of filters) . . . each oriented to

correct at least one part of the coding artifacts.” ’556 Patent, 14:19-39. The claimed invention results in enhanced decoded video quality because different types of artifacts and quantization errors are handled by different filters successively applied in-loop. *Id.*, 10:42-59. With these “present principles” the inventors determined, unexpectedly, “[t]he signal after deblocking filter is a better match to the independent and identically distributed (i.i.d.) noise presumption” which led to this “superior performance in removing video compression artifacts, both in practice and theory” because “[t]he adaptive sparse de-noising filtering is directed to recovering the original signal from an independent and identically distributed (i.i.d.) noisy environment.” *Id.*, 14:19-39. The ’556 Patent explains that the prior art taught away from successive filtering with a sparse-denoising filter, recognizing drawbacks of the single general-purpose filter disclosed in the Guleryuz reference that is discussed in the patent’s background (which Petitioner asserts as Applicant Admitted Prior Art or “AAPA”). *Id.*, 2:4-21, 48-53. The ’556 Patent explains it was not previously known that successively performing deblocking filtering in a first pass with an adaptive sparse de-noising filter for performing a second pass would achieve “superior performance” than either use of a deblocking filter or a general-purpose filter. *Id.*, 14:24-36; EX2001 (“Richardson”), ¶116.

B. Prosecution History

U.S. Application No. 12/312,386, which issued as U.S. Patent No. 9,277,243, is the parent application to the '556 Patent, with which it shares a common specification. During the '386 application's prosecution, the Examiner issued a rejection over U.S. Patent No. 6,665,346 to Lee, a cumulative reference to the asserted Lee publication (which Petitioner admits, *see* Petition, 69-70). *See infra*, §VI.A. The Examiner mapped Lee's deringing filter to the claimed "sparse de-noising filter" *just as Petitioner's Ground 1A does*. EX1005, 258. After the Applicant pointed out that "Lee's deringing filtering" implementation did not qualify as a sparse filter (EX1005, 287), the Examiner concluded: "Lee discloses an adaptive deringing filter (de-noising filter) . . . but **does not disclose that the de-noising filter is a sparse filter.**" EX1005, 303-306.

After recognizing Lee alone did not disclose the claim, the Examiner asserted it would be obvious to replace Lee's deringing filter with the prior art filter from the '386 Application's specification background, *just as Petitioner's Ground 1B does*. EX1005, 304. Notably, the '386 Application's (and '556 Patent's) provisional application, which contains substantially the same disclosure regarding the prior art filter, explicitly indicates that the filter being described at those passages is a filter proposed by Onur G. Guleryuz in "A Nonlinear Loop Filter for Quantization Noise

Removal in Hybrid Video Compression” (*i.e.*, the Guleryuz reference relied upon by Petitioner). EX1005, 137.

The Examiner’s reasoning precisely mirrored Petitioner’s: replacing Lee’s deringing filter with Guleryuz’s would allegedly offer “higher distortion reduction in terms of objective measures.” *Id.*, 304 (citing the specification’s background section). The Applicant’s response pointed out that the Examiner took these statements out of context and overlooked the inventors’ findings, which specifically identified the flaws in the Guleryuz filter and “point[ed] out why [a POSITA] would not consider using sparsity-based denoising as proposed by the combination asserted in the rejections.” EX1005, 320-321 (citing ’556 Patent, 2:25-42). After the Applicant amended the claims to recite an “adaptive sparse de-noising filter” (EX1005, 342-344)—which was discussed during a February 6, 2015, Examiner interview (EX1005, 333)—the Examiner issued a notice of allowance. EX1005, 363-377.

III. Level of Skill

Petitioner and its expert apply different levels of skill. *Compare* Reader, ¶¶93 *with* Petition, 12. InterDigital applies Dr. Reader’s proposed level, which reflects that a POSITA would have approximately three years of work experience, for which advanced graduate studies could substitute. Richardson, ¶¶19-21.

IV. **“Sparse De-noising Filter” Claim Construction**

Petitioner tells the Board it “need not explicitly construe any terms.” Petition, 13-14. But Petitioner then construes the “sparse de-noising filter” term required by every Challenged Claim. Petitioner’s claim construction approach provides several reasons the Board should deny institution.

Petitioner identifies four different constructions: (1) “a filter which exploits a sparse image model using an over complete set of linear transforms and hard thresholding, which is not a deringing filter”; (2) “sparse de-noising filter for performing a second pass to reduce noise; which is not a deringing filter”; (3) “a filter that reduces noise based on a sparse representation of the signal”; and (4) what it refers to as “PO’s proposed ITC construction.” Despite the fact that “PO’s proposed ITC construction” contains the exact same language as Construction (3), Petitioner intentionally misinterprets the construction as “a filter that reduces noise based on a sparse signal” to justify two Grounds. Petition, 17; Richardson, ¶¶41-51.

A. **Plain and Ordinary Meaning of “Sparse De-noising Filter”**

The plain and ordinary meaning of “sparse de-noising filter” is “a filter that reduces noise based on a sparse representation of the signal.”² ’556 Patent, 2:37-47

²Petitioner does not quarrel with this, noting, “ITC Staff’s proposed construction, [“a filter that reduces noise based on a sparse representation of the signal”], . . . is

(explaining the relevance of the signal’s “sparse representation at the filtering stage”); 10:62-64, 11:16-24 (embodiment architecture would create sparse representation); 13:24-65 (two embodiment algorithms would create sparse representations); 14:19-21 (the adaptive sparse de-noising filter is directed to recovering the original signal from noise); Fig. 5, Claims 1, 5 (decod[ing] an image region); *see also* Richardson, ¶43; Reader, ¶65, ¶105. A POSITA would have understood this construction applies even if the signal input into the “sparse de-noising filter” happens to be already sparse. Richardson, ¶44.

B. “Sparse De-noising Filter” Constructions Applied by Petitioner

As noted above, Petitioner identifies four constructions for this term. Grounds 1B and 3 allege obviousness irrespective of which construction the Board adopts. However, for Grounds 1A and 2, Petitioner acknowledges that institution *requires* that the Board adopts the construction Petitioner explicitly asserts is “incorrect.” Petition, 20, 43. Grounds 1A and 2 should therefore be rejected because Petitioner (a) relies on a construction it explicitly states is incorrect, and (b) contorts that construction in a manner inconsistent with the plain and ordinary meaning of “sparse denoising filter.” To aid the Board with Petitioner’s many proposed constructions

actually consistent with” the construction Petitioner says “should be adopted.” Petition, 16-17.

and grounds, each applied construction for each Ground is summarized below, with the plain and ordinary meaning highlighted in green:

	Ground 1A	Ground 1B	Ground 2	Ground 3
(1) “a filter which exploits a sparse image model using an over complete set of linear transforms and hard thresh-holding, which is not a deringing filter”	Not applied by Petitioner	Institution should be denied irrespective of the claim construction applied	Not applied by Petitioner	Institution should be denied irrespective of the claim construction applied
(2) “sparse de-noising filter for performing a second pass to reduce noise; which is not a deringing filter”	Not applied by Petitioner		Not applied by Petitioner	
(3) “a filter that reduces noise based on a sparse representation of the signal”	Not applied by Petitioner		Not applied by Petitioner	
(4) “a filter that reduces noise based on a sparse signal”	“Incorrect” construction does not support institution		“Incorrect” construction does not support institution	

Ultimately, the Board need not construe the claims to deny institution of Grounds 1B and 3 and should take Petitioner at its word and decline to adopt an “incorrect construction” for Grounds 1A and 2. Regardless, none of Petitioner’s Grounds can succeed when the proper meaning of “sparse de-noising filter” is applied.

C. Petitioner’s Failure to Conduct a *Phillips* Analysis

Petitioner’s claim construction exercise should be rejected in its entirety because it never conducts a *Phillips* analysis and therefore fails to meet its burden. *See, e.g.*, 37 C.F.R. §§42.100(b), 42.104(b)(3)-(4). “[T]he petitioner . . . bears the

burden of proof in IPRs.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). This burden requires a showing of “[h]ow the challenged claim is to be construed” and “[h]ow the construed claim is unpatentable.” 37 C.F.R. §42.104(b)(3)-(4); *Samsung Electronics America, Inc. v. Cobblestone Wireless, LLC*, IPR2024-00319, Paper 16, 20 (P.T.A.B. June 24, 2024) (denying institution where Petitioner “failed to set forth a sufficient basis to support the claim construction it relies on”).

Instead of reading the claims in light of the intrinsic record to properly construe the terms—as *Phillips* requires—Petitioner simply declares certain proposed ITC constructions “consistent with . . . the disclosure of the ’556 Patent” and “the plain English understanding.” Petition, 16-18. This analysis is backwards. *See Trustees of Columbia Univ. v. Symantec Corp.*, 811 F.3d 1359, 1363, 1366 (Fed. Cir. 2016) (“*Phillips* rejected an approach ‘in which the specification should be consulted only after a determination is made . . . as to the ordinary meaning or meanings of the claim term in dispute.’”) (citations omitted). The Federal Circuit has made clear, understanding the “concrete substance” of words’ usage in the intrinsic record “is necessary because, ‘[i]n reviewing the intrinsic record to construe the claims, we strive to capture the scope of the actual invention’” to help guard against “allow[ing] the claim language to become divorced from what the specification

conveys is the invention.” *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 801, 809 (Fed. Cir. 2021) (citations omitted). Petitioner impermissibly starts from constructions proposed before the ITC and works backwards. *See id.*, at 811 (vacating construction lacking “substance-focused analysis . . . of what the intrinsic evidence shows”).

Petitioner’s conclusory analysis also fails to satisfy the Board’s guidelines, which make clear that Petitioner “*bears the burden of providing sufficient support* for any construction advanced” through “point[ing] out the specific portions of the specification, prosecution history, and relevant extrinsic evidence that [Petitioner] want[s] considered, and explain[ing] the relevancy of any such evidence to the arguments.” Consolidated Trial Practice Guide, 46 (emphasis added). Petitioner fails to do so, and the Board should deny institution for this reason alone. *See Globus Medical, Inc. v. Moskowitz Family LLC*, IPR2020-01306, Paper 7, 17-18 (P.T.A.B. Jan. 8, 2021) (refusing Petitioner’s construction when Petitioner “fail[ed] to provide any supporting evidence.”).

D. Petitioner Explicitly Disagrees with the Sole Construction it Applies in Grounds 1A and 2

Ground 1A and 2 should also be denied because Petitioner *expressly disagrees* with the sole proffered construction. The Board’s decision in *Hologic, Inc. v. Enzo Life Sciences, Inc.*, IPR2018-00019, Paper 21 (P.T.A.B. Nov. 28, 2018) made clear that a “Petitioner does not satisfy Rule 42.104(b)(3) when, in a proceeding applying

the *Phillips* claim-construction standard, it ‘expressly disagree[s] with its proffered constructions.’” *Id.*, 6 (citation omitted). Numerous Board decisions have followed *Hologic’s* reasoning. *See, e.g., T-Mobile, Inc. v. Cobblestone Wireless LLC.*, IPR2024-00136, Paper 18, 23 (P.T.A.B. June 5, 2024) (denying institution where Petitioner based case on construction “expressly criticize[d] as being inconsistent with the plain and ordinary meaning . . .”); *Samsung Elecs. of Am., Inc. v. Uniloc 2017 LLC*, IPR2020-00046, Paper 6, 10 (P.T.A.B. Apr. 1, 2020) (denying institution based on “Petitioner’s invitation to adopt allegedly incorrect claim constructions”); *Netflix, Inc. v. GoTV Streaming, LLC*, IPR2023-00757, Paper 18, 9 (P.T.A.B. Dec. 21, 2023).

These decisions show *expressly disagreeing* with constructions advanced in the Petition contravenes Office policy. Yet Petitioner does so anyways. Specifically, Petitioner characterizes Construction (1) in the above chart as “correct” and tells the Board it “should be adopted” while characterizing Construction (4) as “incorrect” and “unsupported by the evidence.” Petition, 14-18; Reader, ¶¶132, 136. Grounds 1A and 2 then proceed to rely *entirely* on this “incorrect” construction. Petition, 25, 46-47.

As the Board’s caselaw, Office policy, and common sense makes clear, a Petitioner cannot demonstrate a reasonable likelihood of prevailing based upon

constructions it expressly disagrees with. The Office declared, in the preamble of the rulemaking associated with the switch from a BRI standard to a *Phillips*-style claim construction standard, its official “agree[ment]” with “[s]everal comments [which] acknowledged that harmonizing the claim construction standards would prevent parties from taking inconsistent positions” 83 Fed. Reg. 51,340, 51350 (Oct. 11, 2018); *id.* (““With a uniform application of the Phillips standard, *patent challengers . . . will instead be required to choose a single claim construction that best captures the true meaning of the patent claim*”).

Despite this, Petitioner actually “concedes” Ground 1A does not render the claims obvious under any proposed construction except one Petitioner explicitly states is incorrect. Petition, 25, 71 n.7. The same is true for Ground 2. Petition, 46-47. Accordingly, the Board should exercise discretion to deny institution of Grounds 1A and 2.

E. Petitioner’s Misinterpretation of InterDigital’s ITC Construction of “sparse denoising filter” is Contrary to the Plain and Ordinary Meaning

Assuming, *arguendo*, petitioners could advance grounds exclusively relying on constructions they deem “incorrect,” Petitioner’s approach still must be rejected because Grounds 1A and 2 rely upon a fabricated “interpretation” that is contrary to the plain and ordinary meaning of “sparse denoising filter.”

Specifically, Petitioner rewrites InterDigital’s ITC construction to arrive at Construction (4) in an attempt to show that the Challenged Claims are obvious. Petitioner’s allegations are premised on asserting “there is a dispute whether [InterDigital’s ITC] construction encompasses that the signal itself is sparse . . . or whether just the representation of the signal is sparse.” Petition, 15.³ Ultimately, Petitioner uses this allegation to eliminate the “*sparse representation of the signal*” requirement from the construction (Reader, ¶132), because Lee and Chiang do not disclose it. Said differently, Petitioner rewrites InterDigital’s proposed ITC construction to broadly encompass *any filter* that acts on “a sparse signal.” See Petition, 25; Richardson, ¶42. This rewritten Construction (4) is inconsistent with the plain and ordinary meaning. See *supra*, §§IV.A, E.

Contrary to Petitioner’s allegations, this position is fully consistent with InterDigital’s infringement case before the ITC. EX1024, 9-10, 18-21. At trial, InterDigital showed “evidence demonstrat[ing] that [the accused filter] is a filter that reduces noise based on a sparse representation of the signal.” EX2003, 95-97 (the accused filter “transforms the data, or signal, into a difference domain, which is a

³Petitioner supports its misinterpretation of InterDigital’s construction with citation to *ITC Staff*’s brief, not InterDigital’s. Petition, 15 (citing EX1025, n.10).

sparse representation”). This is what Petitioner gets wrong when it takes a single statement from InterDigital’s infringement contentions out of context: the accused filter “adapts to the sparse nature of underlying video signals” by reducing noise based on a sparse representation of that signal. *Id.*, 95-101. Chiang and Lee do no such thing, nor does Petitioner even argue that they do.

As mentioned, the “sparse de-noising filter” term’s plain and ordinary meaning is “a filter that reduces noise based on a sparse representation of the signal.” ’556 Patent, 2:37-47; 10:62-64, 11:16-24; 13:24-65; 14:19-21; Fig. 5; *see also* Richardson, ¶43. A key distinction between this meaning and Petitioner’s interpretation is that “a filter that reduces noise based on a sparse representation of the signal” is not satisfied by any filter merely because a sparse signal is input; instead, it is a filter that reduces noise based on a sparse representation of an input signal being decoded, regardless of whether that signal was already sparse. *Id.*, ¶45.

InterDigital’s expert, Dr. Richardson provides an analogy that helps explain why this is and why Petitioner’s misinterpretation is erroneous. Dr. Richardson proposes an exercise: separating skyscrapers from other buildings in Manhattan. In this analogy, “*the signal*” comprises all the buildings in Manhattan, skyscrapers and non-skyscrapers, which can be shown from a bird’s eye view (left) as well as from a skyline perspective (right):



Find the Skyscrapers



Id., ¶48. Dr. Richardson explains the skyscrapers are items of interest (*i.e.*, the original signal before corruption by noise), and all other buildings are noise in the signal; the task is to filter other buildings (reduce the noise) while leaving skyscrapers. *Id.*, ¶49. Separating skyscrapers from buildings in the bird's eye image on the left is difficult; on the right, it is much easier. This is because the change in perspective allows the skyscrapers to stand out from the many other buildings. *Id.* In this way, the skyline perspective can be considered a sparse representation of the signal.

Dr. Richardson's explanation demonstrates that a sparse representation is a perspective of the input signal in which certain components of the signal can be more easily discriminated to separate the original signal (before being corrupted by noise) from the noise and that this sparse representation must still represent the input data.

Id. Petitioner’s expert, Dr. Reader even describes sparse filtering technology similarly. Reader, ¶65; Richardson, ¶¶50-51. Returning to Dr. Richardson’s analogy, the skyline perspective is a sparse representation because items of interest (skyscrapers) stand out from other buildings. But, critically, the other buildings in Manhattan are still present (“we have not leveled any buildings in Manhattan”), albeit represented in a different domain or perspective. *Id.* The sparse de-noising filter bases noise reduction on this sparse representation of the signal (the skyline view). *Id.* One example of how a filter might operate in this analogy would be to remove all buildings below a certain height. *Id.*

Turning back to Petitioner’s fabricated Construction (4), a sparse de-noising filter can operate on any suitable signal, whether sparse or non-sparse. *Id.*, ¶51. What distinguishes a sparse de-noising filter from a non-sparse filter is its ability to take the original signal, consider a different, sparse representation that still represents the original data, and then reduce noise based on this sparse representation of the signal. *Id.* For instance, a different cityscape with only a handful of skyscrapers but no other buildings could be considered a naturally sparse signal. *Id.* A filter designed to reduce noise by changing perspectives to the skyline view to differentiate the skyscrapers from the other buildings would operate in the same way whether the input signal was such a naturally sparse signal with just a few buildings, or a non-

sparse signal comprised of all buildings in Manhattan. *Id.* Ultimately, whether a filter is a “sparse de-noising filter” is independent of the type of signal that it operates on.

Accordingly, the Board should also deny institution as to Grounds 1A and 2 because the sole construction Petitioner uses to support these Grounds runs contrary to the plain and ordinary meaning of “sparse denoising filter” as that term is used in the ’556 Patent.

F. Petitioner’s Remaining Claim Construction Arguments

Finally, Grounds 1B and 3 fail for numerous reasons *unrelated* to the “sparse de-noising filter” term’s construction as explained below. *See infra*, §§V.B, D. The Board can deny institution of those Grounds without construing “sparse de-noising filter.” *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019). Petitioner also argues an alleged disclaimer occurred during prosecution of the ’556 Patent’s parent application; however, none of the Petition’s Grounds demonstrate a reasonable likelihood of obviousness irrespective of the alleged disclaimer, and therefore the Board need not reach the issue to deny institution.

V. Argument

A common theme arises across Petitioner’s cited prior art: none teach using an adaptive sparse de-noising filter in-loop in succession with a deblocking filter as all Challenged Claims require. In fact, Petitioner only asserts a single reference that it alleges discloses a sparse de-noising filter under a “correct” construction:

Guleryuz, a reference cited by the inventors in distinguishing their invention over the prior art. This is because, contrary to the Challenged Claims' requirements, Guleryuz teaches away from the '556 Patent's solution by disclosing a single filtering solution *without successive filtering* and emphasizing that its single filter is intended to *replace traditional filtering solutions*.

Petitioner never rebuts Guleryuz's clear teaching away despite the fact that the '556 Patent's specification and the prosecution history both articulate it. *See* §II.B (describing Guleryuz in the prosecution history and specification). Indeed, the Examiner allowed the claims after the applicant emphasized Guleryuz's teaching away. '556 Patent, 2:1-22; EX1005, 304, 321, 359, 493. Petitioner waived its opportunity to address the reasons Guleryuz's filter would not be used in succession with a separate deblocking filter because it did not analyze the issue in the Petition's Grounds,⁴ despite its prominence in the intrinsic record. *See, e.g.,* Petition, 34-40,

⁴In its omnibus §325(d) discussion, Petitioner states, “[a]s explained in this petition . . . Applicant’s argument that the AAPA taught away from the use of a sparse denoising filter . . . should [not] have overcome the Examiner’s rejection based on the Lee-AAPA combination.” Petition, 71 (citing §VII.B in its entirety). But the cited

55-64; *Yita LLC v. MacNeil IP LLC*, 69 F. 4th 1356, 1365-66 (Fed. Cir. 2023) (“[A]n ‘IPR petitioner may not raise in reply an entirely new rationale’... not ‘raised in its petition’ or ‘responsive to arguments raised in the patent owner’s response brief.’”) (citations omitted).

The remainder of Petitioner’s prior art—Lee, Chiang, Lin, and VC1—each teach non-sparse filtering. Petitioner admits as much, only alleging that Lee and Chiang disclose a “sparse de-noising filter” under a construction Petitioner expressly disagrees with. The sole proposed construction that Petitioner deems “incorrect,” yet nevertheless applies for Lee and Chiang, is premised on a mischaracterization of InterDigital’s infringement contentions before the ITC, is contrary to the plain and ordinary meaning of the term “sparse denoising filter,” and used to obfuscate the fact that Lee and Chiang do not teach sparse filters at all. Regardless of the construction applied, however, none of Petitioner’s Grounds demonstrate a reasonable likelihood that at least one Challenged Claim is obvious. As discussed below, Petitioner’s suggestion throughout to simply add filters into different references’ coding loops fails to consider the differences between in-loop and out-of-loop filter

Grounds in the Petition lack analysis of Guleryuz’s teaching away, or the prosecution history’s discussion thereof.

implementations. *See infra*, §§V.B.4, D.4. In fact, Guleryuz himself—author of the reference relied on heavily by Petitioner—explained he was unable to successfully implement his own proposed filter within the decoding loop. Richardson, ¶85.

Petitioner’s obfuscation does not end there. In Ground 1B, Petitioner asserts that the ’556 Patent’s disclosure addressing the Guleryuz reference should be considered AAPA but goes to great lengths to characterize the AAPA as *different* from Guleryuz as asserted in Ground 3. Not so. The passage from the ’556 Patent (2:1-21) that Petitioner alleges is AAPA of a sparse de-noising filter describes the filter of Guleryuz. This is made clear by the fact that the ’556 Patent’s provisional application contains the same disclosure that Petitioner points to as “AAPA” and explicitly states that this disclosure refers to Guleryuz. *See* EX1005, 137 (’556 Patent provisional application citing to the Guleryuz reference, submitted here as EX1010); *see also* §II.B. Petitioner is therefore incorrect when it lists “Lee, *Guleryuz, and the AAPA*” as separate references and argues Guleryuz was “never applied by the Examiner.” Petition, 70-71.

Petitioner’s positions blatantly attempt to avoid denial under §325(d). Petitioner’s Grounds simply recycle art and, even when identifying different art, Petitioner relies on the same arguments as those considered and rejected by the Examiner. Recognizing the weakness of its redundant challenges, Petitioner argues

the Office did not consider claim constructions from the ITC action while contradicting itself, explaining that “the Board need not explicitly construe any terms.” Petition, 14. None of the ITC claim constructions undercut the Examiner’s reasoning and the Board should exercise discretion to deny institution. *See infra*, §VI.

A. Ground 1A: No Obviousness Based on Lee Alone

Ground 1A does not support institution because Petitioner does not show a reasonable likelihood that the Challenged Claims are obvious over Lee alone. Lee, squarely before the Examiner during prosecution, was deemed to not render the invention obvious. *See supra*, §II.B. Petitioner’s recycled Lee-based Ground should compel the Board to exercise its discretion not to institute.

Ground 1A’s merits fare no better at least because Petitioner fails to show that Lee has an adaptive sparse denoising filter as required by each Challenged Claim. Instead, Petitioner only applies an “incorrect” Construction (4), with which it expressly disagrees, while “conced[ing] that the Challenged Claims are not unpatentable as obvious over Lee alone” under any construction it deems “correct.” Petition, 16-18, 71 n.7. Further, the single construction that is applied by Petitioner for the “sparse denoising filter” term is inconsistent with the plain and ordinary

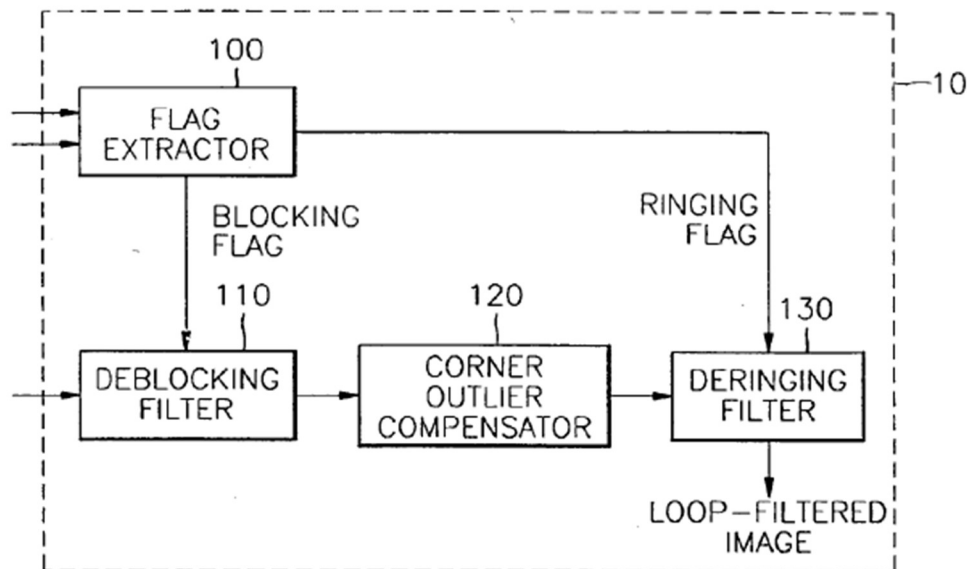
meaning of the term. *See* §§IV.A, E. Applying the correct construction, Petitioner fails to show that Lee obviates the Challenged Claims.

1. Lee

Lee's filtering method aims to reduce quantization effects generated when encoding or decoding image data. Lee, Abstract, ¶9. Lee's stated goal: low complexity and reduced computation. *Id.* ¶¶8, 51, 73, 100, 105, 110, 113, 119.

As shown in Figure 1, Lee includes a “deblocking filter” followed by a “corner outlier compensator” and a “deringing filter.” *Id.*, Fig. 1, ¶¶31, 44, 49, 100-103; Richardson, ¶93.

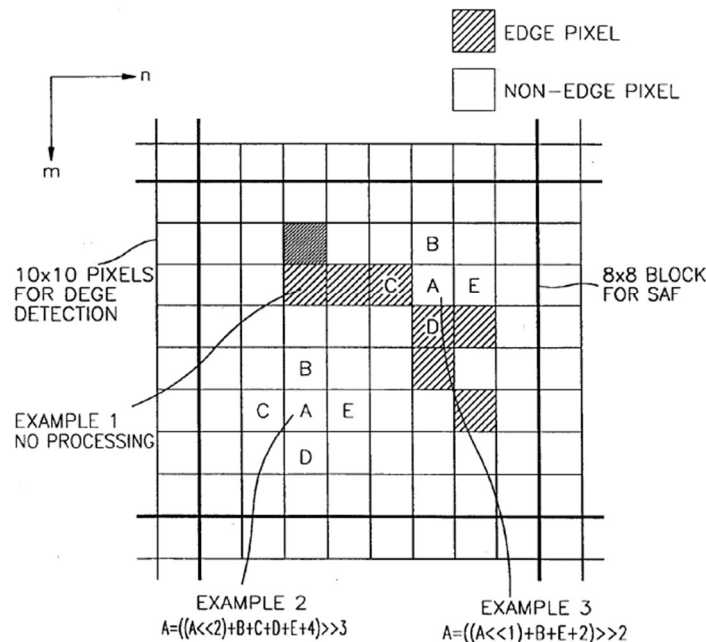
FIG. 1



Lee applies the corner outlier compensator after the deblocking filter. Lee, Fig. 1. The corner outlier compensator detects the corner outlier of the image data passed through the deblocking filter, and then the deringing filter is used “to deringing-filter the corner outlier compensated data.” *Id.*, ¶¶48, 31, 100.

Lee explains “[s]imple edge detection is performed before [deringing] filtering” to replace the image pixel values with new data in an “edge map”: a “one” value for edge pixels or “zero” value for non-edge pixels. Lee, ¶¶105, 111. Accordingly, the image data is lost in forming the edge map; the image pixel values cannot be recovered from the edge map:

FIG. 7B



After edge detection, Lee performs deringing filtering using “a simple convolution operation.” *Id.*, ¶113. Lee’s filtering scheme’s simple linear convolution operations “are defined in consideration of computational complexity” to be “performed by simple shift and addition operations.” *Id.*, ¶113. Lee’s simple design works “without multiplication and division, thereby reducing the complexity of hardware.” Lee, ¶119.

2. *Petitioner Does Not Satisfy its Burden to Show Obviousness Over Lee Alone*

Petitioner fails to meet its burden to demonstrate Lee alone renders the claims obvious because it expressly disagrees with the sole “adaptive sparse de-noising filter” construction applied and does not demonstrate Lee discloses such a filter.

Petitioner concedes Lee alone does not render the claims obvious under any construction it deems correct. Petition, 71 n.7. The Board’s analysis should stop there. *See* 37 C.F.R. §42.104(b)(3); Consolidated Trial Practice Guide, 46. Petitioner applies a single construction based on an interpretation it describes as “incorrect.” Petition, 16, 25. Petitioner does not support this interpretation as required under the Board’s rules; rather, its expert opines that he “see[s] no support . . . in the intrinsic record” for Construction (4). Reader, ¶132. Accordingly, Petitioner cannot show a reasonable likelihood it will prevail on Ground 1A; the Board should exercise discretion to deny institution. *See supra*, §IV.D.

Even if the Board considers Lee alone, Petitioner fails to meet its burden to show the claimed “sparse de-noising filter” because it never alleges Lee discloses “a filter that reduces noise based on a sparse representation of the signal.” In fact, Petitioner agrees Lee does not disclose such a filter. *See* Petition, 71 n.7.

Petitioner identifies an allegedly “sparse signal” in Lee but crucially stops short of alleging that Lee reduces noise based on *sparse representation of the signal* that is being decoded. Petition, 26-28, 71 n.7. As Dr. Richardson explains, a sparse filter can operate on any suitable signal, including signals that happen to be sparse (e.g. mostly blank screen) or non-sparse (typical video image). Whether operating on a sparse signal or not, a sparse de-noising filter is distinguished from other filters by its ability to take the input signal, consider a different, sparse, representation that still represents the original data, and then reduce noise based on this sparse representation of the signal. Richardson, ¶¶44-51.

Petitioner’s allegation that Lee’s edge map can be considered a “sparse representation of a signal” fails to show the allegedly sparse representation is a representation of the input signal being decoded, *i.e.*, “the signal,” which in Lee is image pixel data. Petition, 25. In Lee’s edge map, the image pixel data of the signal being decoded has been irreversibly deleted, replaced with a set of binary “1” or “0” values. Richardson, ¶65. Petitioner admits this. Petition, 26 (“The resulting edge map

is made up of entirely ones and zeroes”). As. Dr. Richardson explains, Lee’s “one” or “zero” values do not reflect image pixel data values and therefore do not represent video image data. Richardson, ¶65. Dr. Richardson further explains that a sparse representation of the signal is a perspective of the input signal in which certain components of the signal can be more easily discriminated, but, importantly, this sparse representation must still represent the original input data. *Id.*, ¶66. This is clearly not the case in Lee’s edge map, which irreversibly deletes pixel data. *Id.* Therefore, the edge map does not contain information regarding noise, nor information one could use to distinguish the original signal from noise. Petition, 26-27; *cf.* ’556 Patent, 14:19-21. Put another way, the edge map does not represent the signal being decoded, which is why even Petitioner only ever alleges it is a representation of “a signal,” not “the signal.” Petition, 25, 28.

Only by reading the requirement to show a “sparse representation of the signal” out of the claim⁵ can Petitioner attempt to map Lee to the claims, but as

⁵Petitioner tries to sidestep this limitation by comparing Lee’s “behavior” to a single statement taken out of context from InterDigital’s ITC infringement contentions. Petition, 25. But the cited passage simply identified the *result* of the accused filter, not a *definition* of an “adaptive sparse de-noising filter.” EX1024, 9-10. InterDigital

explained above, this does not disclose a sparse de-noising filter. *See supra*, §IV.E. Instead, just as the Examiner determined, Lee “does not disclose that the de-noising filter is a sparse filter.” EX1005, 304; *see, e.g., Shire, LLC v. Amneal Pharms., LLC*, 802 F.3d 1301, 1307 (Fed. Cir. 2015) (when prior art was considered during prosecution, the patent challenger “ha[s] the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job.”).

Petitioner does not allege a POSITA would change Lee’s non-sparse filter into an “adaptive sparse de-noising filter.” The Board cannot supply the missing argument. *Merck Sharp & Dohme Corp. v. Genentech, Inc.*, PGR2021-00036, Paper 10, 20-21 (P.T.A.B. July 24, 2021); *see also In re Magnum Oil Tools Int’l*, 829 F.3d 1364, 1381 (Fed. Cir. 2016).

B. Ground 1B: No Obviousness Based on Lee and AAPA

Petitioner has not established that Ground 1B presents a reasonable likelihood of obviousness because it fails to show motivation to modify Lee with the alleged AAPA it references, which is simply the Guleryuz filter that teaches away from the _____ demonstrated infringement by showing the accused filter reduces noise based on a sparse representation of the signal, which Petitioner fails to do with Lee here. *See Richardson*, ¶¶61-68; EX2003, 95-97.

'556 Patent's invention. *See* §II.B. Ground 1B is premised on ignoring the teachings of the references utilized and using a hindsight-fueled approach. As a result, Petitioner fails to show Lee modified by the alleged AAPA teaches or suggests using at least two filters in succession where the filter for performing a second pass is an adaptive sparse de-noising filter. Ground 1B therefore fails.

1. *Lee*

Lee's description is incorporated by reference. *See supra*, §V.A.1.

2. *De-noising Filter, aka Guleryuz*

Petitioner relies on alleged AAPA in Ground 1B to try to remedy the claimed sparse filter's absence in Lee. Petition, 34-43. Petitioner identifies passages pertaining to Guleryuz (namely, at 2:1-22), which is also asserted in Ground 3, as AAPA.⁶ EX1005, 137 ("a denoising type nonlinear in-loop filter has been proposed by Onur G. Guleryuz"). Petitioner's deliberate effort to portray these teachings as different from Guleryuz and mask the reality that Guleryuz's teachings were expressly before the Office during prosecution undercuts its credibility. *See supra*, §II.B; *infra*, §VI.A.

⁶Guleryuz's teachings would have been understood by the POSITA as of the '556 Patent's filing and would have informed the POSITA's reasons (or not) to combine references as discussed herein.

A POSITA would have understood the Guleryuz filter that the AAPA addresses is antithetical to Lee's stated goal of reduced complexity. Richardson, ¶87. Indeed, it teaches that sparse denoising techniques to denoise decompressed video frames are complex and difficult. Guleryuz, 1-2; '556 Patent, 2:16-21, 30-34. A POSITA would have understood that Guleryuz discloses a single filter, which teaches away from using multiple, separate, filters in succession (or multiple filters in the first instance). Guleryuz, 1-3, Fig. 1; '556 Patent, 2:5-7; Richardson, ¶80. In fact, Guleryuz specifically teaches away from using a deblocking filter, which it deems "traditional systems," and instructs its single filter should "replace traditional systems." Guleryuz, 1- 2. In short, the '556 Patent mentions Guleryuz for the purpose of pointing out why a POSITA would *not* consider using an adaptive sparse de-noising filter as proposed in Petitioner's combination. Richardson, ¶86; EX1005, 321.

A POSITA would have understood the AAPA (Guleryuz) filter is contrasted with existing, traditional, deblocking filters (*e.g.* the MPEG-4 or VC1 deblocking filter), in which the "primary utilized model is an image having smoothly varying pixel values, and the designed filters typically consist of a bank of low-pass filters." Guleryuz, 1; Richardson, ¶¶78, 111. Such deblocking filters have three problems: (1) a smooth image model is not always applicable and images may not be handled

correctly by the filter; (2) “it is very beneficial to have a single filtering solution that is applicable in the general case;” and (3) that such filters had limited improvements in rate “and their visual quality, especially around edges and other singularities is poor.” Guleryuz, 1; ’556 Patent, 2:27-31, 2:34-37, 2:41-42. From this, a POSITA would understand Guleryuz addressed these problems with a *single* filtering solution capable of handling all types of quantization noise. Richardson, ¶¶79-80.

Guleryuz does not mention using its filter with other filters. Instead, Guleryuz undermines separate deblocking filters, concluding their “inclusion in modern codecs is not always a clear-cut decision from a performance v. complexity standpoint.” Guleryuz, 1. Thus, Guleryuz teaches that the disclosed filter is intended to “replace traditional systems with significant improvements in both objective and subjective quality metrics.” *Id.*, 1-2. Guleryuz’s single general-purpose filter teaches away from using multiple filters in succession. Richardson, ¶80; ’556 Patent, 2:5-7.

Guleryuz explains that trying to carry over the seemingly “simple recipe” of sparse denoising “to quantization noise reduction from decompressed video frames presents many significant issues.” Guleryuz, 2. Guleryuz notes three significant problems associated with trying to carry over these established techniques to noise removal in decompressed video frames: (1) reliance on i.i.d. noise models, which Guleryuz cautions against for denoising decompressed video frames; (2) “repeatedly

filter[ing] the information” because “[h]igh performance video codecs utilize a multitude of frame types” not amenable to established denoising and artifact removal approaches; and (3) “accomplishing the denoising rule solely” in the sparse domain, as done in established techniques, may overlook lucrative information in previously decompressed frames. *Id.*, 2; Richardson, ¶81.

Thus, in all three problems identified above, Guleryuz notes ***complexity and difficulty*** in attempting to denoise decompressed video frames with established sparse de-noising techniques and cautions against overfiltering. Guleryuz, 1-2; ’556 Patent, 2:34-42. In fact, Guleryuz’s single filter was so powerful, simulations were run with many parameters turned off or simplified as special measures taken “to curb processing complexity,” and only applied the filter out-of-loop. Guleryuz, 4; Richardson, ¶¶82, 85. Even then, Guleryuz’s filter accounted for twenty percent of the computational complexity of the ***entire decoder***. *Id.*; Richardson, ¶82. Petitioner never acknowledges this critical aspect of Guleryuz.

Guleryuz “makes special allotment to these issues” and “ensure[s] overfiltering is kept to a minimum.” Guleryuz, 2. The solution is “a robust, high performance filter that can ***replace traditional systems***.” *Id.* Deblocking filters, such as in MPEG-4 and VC1, are explicitly disclosed as traditional systems. *Id.*, 1. At

bottom, Guleryuz teaches use of a single computationally complex filter and away from using multiple filters, like a deblocking filter, in succession. *Id.*

Petitioner mischaracterizes other passages as AAPA, but these passages reflect findings identified by the '556 Patent inventors. '556 Patent, 2:31-47, 14:22-30; Richardson, ¶¶76-77. These passages describe the inventor's findings on the Guleryuz filter and MPEG-4 deblocking filter and the inventors' description of problems posed by their use in decoding compressed video frames. Richardson, ¶76; *see also* EX1005, 304 (Examiner identifying lines 3-5, 17-20 as AAPA, correlating to the '556 Patent, 2:22-25, 2:43-46), 320 (applicant explaining that the Examiner had mistakenly relied, just like Petitioner here, on the inventor's findings "pointing out an important problem that teaches away"). Petitioner's attempt to reclassify the inventor's disclosure of the identified problem and the patent's solution as AAPA undermines the entire Petition. *See, e.g.*, Petition, 35-36 (citing '556 Patent, 2:31-47, 14:22-30); *BMW of North America, LLC v. Carrum Techs., LLC*, IPR2019-00902, Paper 10, 12-13 (P.T.A.B. Oct. 18, 2019) ("there is insufficient evidence to demonstrate that the problems identified in the... patent are applicant admitted prior art"). The '556 Patent inventors were the first to recognize the problem and identify the solution disclosed and claimed. Richardson, ¶77; *Ex Parte Burdgick*, Appeal 2009-4835, 2009 Pat. App. LEXIS 8258 at *5 (B.P.A.I. Nov. 19, 2009) ("Appellants'

statement, although found in [the Background] section, is not an ‘admission’ but rather a statement regarding *the need* . . . [d]efining a need suggests something that does not yet exist.”).

The ’556 Patent inventors identified a need, a motivation to solve it, and drawbacks of other attempts to use sparse de-noising filters in video compression. ’556 Patent, 2:31-47, 14:22-30; Richardson, ¶77. Petitioner’s reliance on these teachings is impermissible hindsight—particularly given the lack of other evidence to support Petitioner’s allegation that these teachings were known. The Board has recognized, “[t]o the extent that Petitioner is relying on alleged AAPA to provide reasoning in support of the proposed combination, we note that identification of a problem ‘is not an admission that this problem was known or appreciated by others.’” *BMW of North America, LLC v. Carrum Techs., LLC*, IPR2019-00928, Paper 10, 13-14 (P.T.A.B. Nov. 5, 2019).

3. MPEG-4 Deblocking Filter

Petitioner mischaracterizes more passages as AAPA. Petition, 35-36. The final two sentences of Petitioner’s section on the MPEG-4 deblocking filter cite to the detailed description at 14:22-30. These passages are not AAPA; rather, they describe the invention’s unexpected results and advantages over the prior art. ’556 Patent, 14:24-30 (“The present principles *differ from the prior art* in the use of a series of

refinement steps (succession of filters) after for example, the MPEG-4 AVC Standard deblocking filter . . . the signal after deblocking filter is a better match to the [i.i.d.] noise presumption.”). Richardson, ¶¶71-72. Petitioner’s alleged motivation to combine based on these passages blatantly uses the patent as a roadmap informed by hindsight. *See InTouch Techs., Inc. v. VGo Communs., Inc.*, 751 F.3d 1327, 1351-1352 (Fed. Cir. 2014) (holding an expert’s “reli[ance] on [the patent] itself as her roadmap for putting” references together failed to show motivation to combine due to risk of hindsight bias).

Petitioner ignores that Guleryuz admonishes “traditional filtering system[s],” like the MPEG-4 deblocking filter recited in the ’556 Patent’s background section, which Guleryuz’s filter “replaces.” Guleryuz, 1-2; Richardson, ¶¶79-80. This oversight is fatal to Ground 1B as a POSITA would have heeded Guleryuz’s instruction, replacing both Lee’s filters, including the relied-upon MPEG-4 deblocking filter.

4. *Petitioner Fails to Show it Would Have Been Obvious to Use an Adaptive Sparse De-noising Filter in Lee*

Petitioner fails to show its proposed modification of Lee with the AAPA renders obvious the “adaptive sparse de-noising filter” limitation. Lee does not disclose the claimed sparse filter (*see supra*, §V.A.2). Thus, Petitioner must show a reasonable likelihood that a POSITA would modify Lee to include such a filter.

Petitioner cannot do that. Petitioner has therefore not shown a reasonable likelihood that Ground 1B renders the Challenged Claims obvious.

The Examiner expressly considered this combination during prosecution—Lee modified to include the AAPA’s (Guleryuz’s) filter—but allowed the claims. *See supra*, §§II.B, V.B.2. None of the four proposed “sparse de-noising filter” constructions warrant a different result. In fact, Petitioner does not even articulate in Ground 1B whether and how the AAPA (Guleryuz) discloses a filter that reduces noise based on a sparse representation of the signal (Construction (3)). *See* Petition, 37; Reader, ¶188; *supra*, §§IV.A-B. Ground 1B should be denied on this basis alone. *Niantic, Inc. v. Barbaro Techs., LLC*, IPR2019-00669, Paper 8, 14-20 (P.T.A.B. Aug. 16, 2019) (denying institution and noting lack of analysis regarding why proposed construction was taught); *HTC Corp. v. Salazar*, IPR2018-00273, Paper 14, 4 (P.T.A.B. Feb. 25, 2019) (same).

Regardless of construction, Petitioner’s alleged reasons to combine are unsupported and driven by hindsight. A POSITA would have understood the AAPA strongly teaches away from the claimed invention (’556 Patent, 2:2-62; Guleryuz, 1-2; Richardson, ¶72) and Petitioner’s modification would have rendered Lee inoperable for its intended purpose of low complexity. Richardson, ¶86; *see Depuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009).

Lee aims to avoid, and disparages, methods requiring “complicated computations,” and further, to implement its process in hardware and software “easily.” Lee, ¶¶4-8, 119; Richardson, ¶86. Lee’s method is simple enough to “be performed . . . without multiplication and division” to “reduce the complexity of hardware.” Lee, ¶119; Richardson, ¶86. Indeed, “in consideration of computational complexity,” Lee’s deringing filter employs “simple shift and addition operations” as demonstrated in Table 1. Lee, ¶113; Richardson, ¶86. ***Petitioner never evaluates this fundamental teaching of Lee.*** This is critical: the AAPA’s (Guleryuz’s) filter is computationally complex and unsuitable for Lee. Richardson, ¶86. Petitioner fails to consider this consequence or even the teachings that instruct it. *In re Fritch*, 972 F.2d 1260, 1265 n. 12 (Fed. Cir. 1992) (holding no incentive existed to modify a prior art reference whose purpose would be impeded by the modification).

The AAPA teaches away from the ’556 Patent’s claimed invention and precludes Petitioner’s alleged reason to combine it with Lee. Richardson, ¶¶72-83; ’556 Patent, 2:25-31, 34-42. But Petitioner does not analyze the many problems that a POSITA would have understood from the AAPA as discussed above. *Supra*, §V.B.2; Guleryuz, 1-2; Richardson, ¶81. Petitioner instead offers generalized statements that fail to account for the art’s teachings or come straight from the

inventors. *ActiveVideo Networks, Inc. v. Verizon Communs., Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012).

For its alleged motivation, Petitioner states (1) sparse filters are designed for i.i.d. noise and therefore (2) a POSITA would have recognized noise remaining after Lee's deblocking filter would more closely match i.i.d. noise. Petition, 36-37. Petitioner wrongly relies on hindsight.

Petitioner's first argument ignores that a POSITA would have understood the AAPA filter, Guleryuz, teaches away from reliance on the i.i.d. noise model. Guleryuz, 2 ("One must be . . . especially cautious against using methods that are too dependent on the i.i.d. noise model"). As Dr. Richardson explains, Guleryuz instructs a single filter that applies a model "unlike the additive i.i.d. noise case." Richardson, ¶72; Guleryuz, 2. Accordingly, in contrast to the '556 Patent's claimed invention, a POSITA would have understood Guleryuz to instruct to use a single filtering solution and reduce reliance on i.i.d. noise models.

Petitioner's second argument is flawed because it depends on the '556 Patent inventors' findings. Petition, 36; Reader, ¶187 (citing '556 Patent, 14:28-30); Richardson, ¶¶71-73. Petitioner and its expert do not cite any other evidence to support the assertion that it was known that the signal after a deblocking filter was a better match for the i.i.d noise model, just the '556 Patent's detailed description. *See*

InTouch Techs., 751 F.3d at 1351-1352 (Fed. Cir. 2014); *see also supra*, §V.B.3. Petitioner identifies no indication in the prior art that a POSITA would have recognized this benefit, a failing all the more glaring given Petitioner overlooks the AAPA's (Guleryuz's) teaching to pursue a different path. Richardson, ¶72. Thus, Petitioner's argument that applying Lee's deblocking filter first would solve the "drawback" of reliance on i.i.d. noise models is hindsight.

Petitioner also argues the AAPA filter offers an "advantage" in the form of higher distortion reduction in terms of objective measures.⁷ Petition, 37. Petitioner ignores that Guleryuz reports this result from the single filter designed to replace deblocking filters and "address all types of quantization noise." Guleryuz, 1-2; '556 Patent, 2:13-14. But Petitioner does not propose a single filtering solution and fails to show this alleged advantage would exist when Lee's deblocking filter is applied

⁷Dr. Reader opines, "a distinction is made between the *subjective* quality of the reproduced video data . . . and the *objective* quality" where "loop filters for video coding have focused on *subjective* video quality." Reader, ¶50. Dr. Reader does not substantiate his conclusion that offering higher objective quality would have motivated a POSITA to add Guleryuz as an in-loop filter, even after his own statement that loop filters focus on subjective quality.

separately. Richardson, ¶83; *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1385-86 (Fed. Cir. 2001) (“[s]uch conflicting teachings can not reasonably be viewed as suggesting [the two reference’s] combination”). Petitioner also ignores that the AAPA’s (Guleryuz’s) complex filter would not be a simple substitution to replace part of Lee’s process: the performance “advantage” Petitioner relies upon required computationally demanding complexity incompatible with Lee. Richardson, ¶86.

Next, Petitioner alleges motivation to modify Lee with the AAPA because after Lee’s deblocking filter the “resulting image . . . would lack at least the ‘false blocky edges.’” Petition, 38. But as Petitioner admits, the AAPA (Guleryuz) filter is designed to reduce blocking artifacts too. Petition, 61; ’556 Patent, 2:13-14. Petitioner never explains why a POSITA would be motivated to add a deblocking filter (Guleryuz) after Lee’s deblocking filter. Richardson, ¶88. Petitioner never even considers the redundancy. Accordingly, Petitioner’s explanation that the AAPA filter and Lee’s deblocking filter would have worked “synergistically with each other” is conclusory and lacks context. Petition, 38; Richardson, ¶83. Furthermore, Petitioner again relies on the findings of the inventors (*i.e.*, non-AAPA) to allege it was known that “false blocky edges” are troublesome for the AAPA filter. Petition, 38 (citing ’556 Patent, 2:25-37); Richardson, ¶74. *See InTouch Techs.*, 751 F.3d at 1351-1352.

Last, Petitioner abandons its proposed combination (replacing Lee’s deringing filter) and alleges the AAPA (Guleryuz) *could* be used *in addition to* Lee’s deringing filter. Petition, 38-39. Petitioner all but admits its proposed combination is a throw of the metaphorical dart. *See Leo Pharm. Prods. v. Rea*, 726 F.3d 1346, 1356 (Fed. Cir. 2013) (distinguishing KSR’s “identified, predictable solutions” from “‘merely throwing metaphorical darts at a board’ in hopes of arriving at a successful result.”) (citation omitted). But Petitioner never evaluates why a POSITA would allegedly be motivated to modify Lee such that it performed deblocking, corner outlier compensation, deringing, followed then by Guleryuz’s filter (which itself reduces blocking and ringing artifacts)—all within the coding loop. A POSITA would not. Richardson, ¶88. Petitioner’s suggestion that a POSITA “could” do this fails to show what a POSITA “would” do. *Personal Web Tech. v. Apple*, 848 F.3d 987, 993-94 (Fed. Cir. 2017); *see Impact Selector Int’l v. Petromac IP Ltd.*, IPR2019-01660, Paper 12, 30 (P.T.A.B. Apr. 17, 2020) (finding modification that “could” be made insufficient to show motivation).

Petitioner’s suggestion to apply so many filters in Lee’s coding loop emphasizes its failure to acknowledge the drawbacks of adding computational complexity into the coding loop. *Cf.* Petition, 63 (admitting that even having to code one additional filter flag would come “at the expense of slightly reduced

compression”); Richardson, ¶¶89. Dr. Richardson, however, details the many challenges and potential drawbacks a POSITA would face in implementing in-loop filters, which Dr. Reader fails to do. Richardson, ¶¶56-57, 83-89. Likewise, Dr. Richardson highlights how a post-filter or out-of-loop filter will not necessarily have a positive effect on compression if redesigned to operate in-loop. *Id.*, ¶89. Moreover, Guleryuz himself was unable to successfully implement his own proposed filter within the decoding loop, further suggesting it would not have been obvious or straightforward for a POSITA to do so. *Id.*, ¶85.

Further, to the extent any reason to combine the AAPA with Lee existed (there is none), the POSITA would have replaced **both** of Lee’s filters with the disclosed single-filtering solution. Richardson, ¶94; Guleryuz, 1-2. Petitioner fails to address that a POSITA would have recognized many potential solutions to the problem the ’556 Patent solves (to develop a filtering system which addressed more than just the blocking artifact (*see* ’556 Patent, 1:58-61, 4:58-61)), not a finite number of identified, predictable solutions. Richardson, ¶93. The AAPA (Guleryuz) reinforces the ’556 Patent’s unexpected results: “[t]he succession of filters has shown its superior performance in removing video compression artifacts” and the deblocking filter presents a signal that better matches i.i.d. noise models. ’556 Patent, 14:19-36.

Petitioner’s remaining boilerplate arguments concerning alleged “known technique[s]” to yield “predictable results” or “improve similar devices” all fail because they do not consider the above teachings of the prior art. For instance, Petitioner fails to demonstrate it was a “known technique” to successively filter in-loop with an adaptive sparse de-noising filter because Petitioner only cites to the AAPA (Guleryuz) for this filter but ignores that Guleryuz teaches to use a “single filtering solution.” Guleryuz, 1-2. Petitioner identifies no reference teaching a sparse filter used with another filter. Likewise, Petitioner’s “predictable results” and “simple substitution” allegations ignore that Lee would be rendered inoperable by adding the AAPA’s (Guleryuz’s) complex filter. Petition, 39. Last, Petitioner argues its (various) proposed combinations would allow “a POSITA . . . to individually tune and optimize filters to reduce artifacts.” Petition, 39. But a POSITA would have been able to separately tune and optimize either Lee or the AAPA (Guleryuz), without requiring combination, and therefore this argument does not substantiate Petitioner’s proposed combination. Petitioner altogether fails to show its Ground 1B arguments present a reasonable likelihood the Challenged Claims are obvious.

C. Ground 2: No Obviousness Over Chiang and Lin

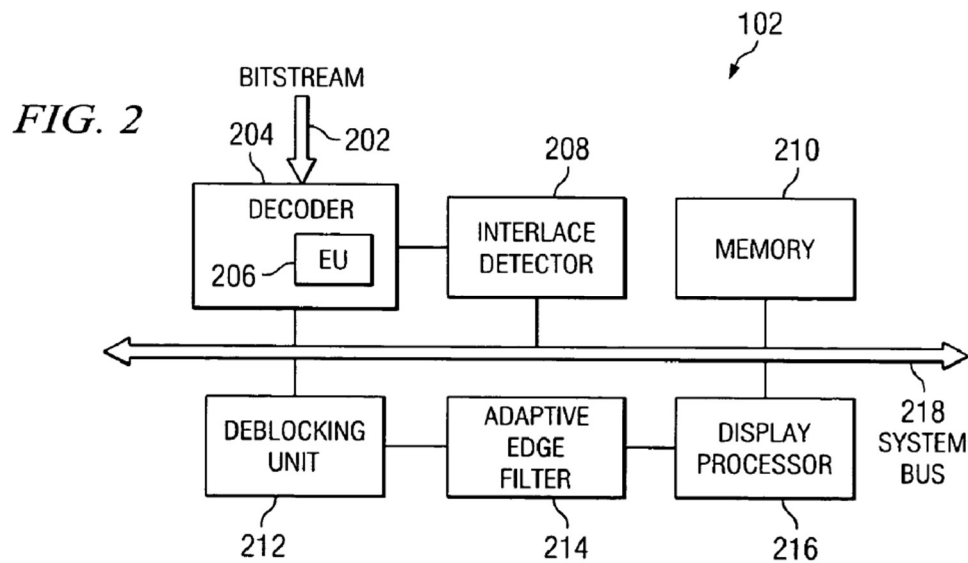
As with Ground 1A, Petitioner fails to show a reasonable likelihood it will prevail because it does not demonstrate that Chiang or Lin teach or disclose “a sparse

denoising filter” as required by all Challenged Claims. Like Ground 1A, Ground 2 relies on a construction that does not comport with the plain and ordinary meaning of “sparse denoising filter” and which Petitioner explicitly states is “incorrect.” *See supra*, §IV.D. Petitioner also fails to meet its burden as to “performing in-loop filtering . . . using at least two filters” with the deblocking filter performing a first pass, required by all Challenged Claims. Petitioner does not apply Lin to remedy Chiang’s failures to teach the claims. Institution should thus be denied.

1. *Chiang (US 2006/0110062 A1)*

Chiang discloses several embodiments of a decoder which receives encoded image information and applies an edge adaptive filtering system. Chiang, ¶¶1, 5-9. Chiang’s disclosure focuses on an image decoder that receives encoded information from a DVD player. Chiang, ¶¶27, 32; Fig. 1. Chiang’s “auto-regressive edge adaptive filtering system” is used out-of-loop to “at least partially reduce ringing artifacts in the image.” Chiang, ¶ 29. Chiang states the decoder “may also use a deblocking filtering system,” also out-of-loop, that “at least partially reduce[s] blocking artifacts in the image.” *Id.* As Petitioner admits, “much of Chiang’s subsequent explanation regarding application of its filters focuses on an embodiment in which the filters are applied *outside* of the decoding loop.” Petition, 46.

Chiang’s Figure 2 exemplifies this out-of-loop embodiment:



Chiang, Fig. 2.

In other embodiments, Chiang contemplates that one filter or the other may be applied in the coding loop. Richardson, ¶95; Chiang, ¶¶34, 40-41.

2. *Lin (US 2003/0152146 A1)*

Petitioner relies on Lin only for its disclosure of enabling and disabling filters. Petition, 49-51. Lin is directed to a deblocking filter applied to reference frames in a motion compensation loop. Lin, ¶¶117-118.

3. *Petitioner Misapplies Chiang's Out-of-Loop Embodiment*

Petitioner does not demonstrate that Chiang teaches an in-loop deblocking filter for performing a first pass in succession with an adaptive sparse de-noising filter performing a second pass. Petitioner admits it relies on Chiang's embodiment where the filters are "applied outside of the decoding loop." Petition, 46. Petitioner

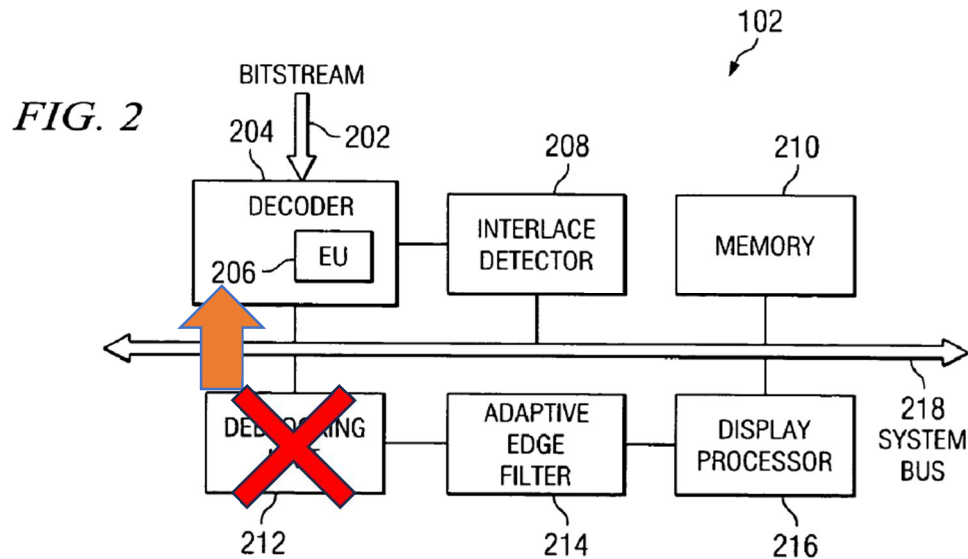
argues Chiang's auto-regressive edge adaptive filtering 214 is the claimed "adaptive sparse de-noising filter" and that deblocking filter 212 is the deblocking filter, even though filters 212 and 214 are both out-of-loop filters. *Id.* There is no dispute this out-of-loop embodiment fails to disclose "performing in-loop filtering." Petition, 46.

Petitioner hypothesizes a POSITA would "apply[] the same order of filters in loop" because Chiang's teachings "equally apply to an in-loop implementation." Petition, 44-46. In support, Petitioner states Chiang's edge filter can be applied after motion compensation (Petition, 46). But a POSITA would have understood Chiang to teach applying the edge filter first after motion compensation in this embodiment, rather than for performing a second pass as the claims require. Richardson, ¶98. Petitioner does not identify a single embodiment in Chiang that performs filtering with an in-loop deblocking filter followed by an in-loop adaptive sparse de-noising filter in succession. Petition 44-46; Richardson, ¶¶96-102.

Instead, Chiang proposes another embodiment where the edge filter remains out-of-loop but is used "after in-loop filtering of decoded images." Chiang, ¶34; Richardson, ¶98. In this embodiment, "the deblocking unit 212 may be omitted from the image decoder" when performing in-loop deblocking. Chiang, ¶40; Richardson, ¶101. Thus, Chiang does not teach use of an in-loop deblocking filter with a second in-loop filter performing a second pass. Instead, Chang "omit[s]" the deblocking unit

212 while leaving the edge filter 214 out of the decoding loop as annotated below.

Richardson, ¶101.



Chiang’s statement that the edge filter “may be used at any suitable point” applies to the embodiment where one of the filters is applied out-of-loop. Richardson, ¶100; Chiang ¶34; Petitioner, 45-46. Chiang does not disclose both filters applied in-loop in the same order as Chiang’s Figure 2. Richardson, ¶100. Other than the assumption that the order shown in Figure 2 “equally appl[ies],” Petitioner never explains how Chiang’s alternative embodiment with edge filtering “after motion compensation” teaches a deblocking filter that performs a “first pass.” Petition, 45-46.

Petitioner is limited to the sole theory raised in its Petition: that Chiang’s out of loop teachings “equally apply to an in-loop implementation.” Petition, 46; *see*

Cisco Systems, Inc. v. C-Cation Techs., LLC, IPR2014-00454, Paper 12, 9-10 (P.T.A.B. August 29, 2014) (Informative). This does not demonstrate obviousness because Chiang teaches to apply to only one of its filters in-loop not both. Richardson, ¶102. Moreover, Chiang’s teachings to apply one filter in-loop without adding multiple in-loop filters aligns with the knowledge of the POSITA. Richardson, ¶103.

Though not addressed, Dr. Reader asserts it would have been within a POSITA’s skill to “reconfigure the filtering process” because “Chiang’s image decoder is tailorable to its use.” Reader, ¶225. Dr. Reader provides only a generalized “motivation,” to “increase the predictability of buffering images” by “tuning the filtering process to a particular device.” *Id.*; Richardson, ¶¶103-104. A POSITA would not be motivated to add multiple filters into the coding loop when Chiang itself does not contemplate using both filters in-loop and a POSITA understood the added complexity and reduced flexibility from additional in-loop filters. Richardson, ¶103. Dr. Reader also fails to explain the connection between the alleged motivation (increasing the predictability of buffering images) and modifying Chiang’s Figure 2 to “an in-loop implementation.” Reader, ¶225; Richardson, ¶103. Dr. Richardson explains that a POSITA would not have been motivated to implement multiple filters in-loop, or apply out-of-loop filters in the coding loop, because doing so would

require additional complexity while reducing flexibility. Undue experimentation would also be required to determine if doing so resulted in any appreciable compression gain. Richardson, ¶¶83, 103-104. Dr. Reader does not address these considerations.

Petitioner does not rely upon Lin for this limitation. Petition, 44-46. However, Lin undercuts Petitioner’s general view that out-of-loop filter teachings apply equally to in-loop implementations. Richardson, ¶90; Lin, ¶117.

4. *Petitioner Does Not Demonstrate Chiang’s Edge Filter Teaches the Claimed Adaptive Sparse De-noising Filter*

Petitioner alleges only that “Chiang’s adaptive edge filter *is* an adaptive ‘sparse de-noising filter’ under PO’s proposed ITC construction.” Petition, 47; Richardson, ¶106. This Ground should be denied because Petitioner only advances Construction (4), with which it expressly disagrees. *See supra*, §IV.D. Petitioner admits that Chiang does not disclose a sparse filter under any “correct” construction. Petition, 46-47. Petitioner fails to compare the prior art to the construed term. *See* 37 C.F.R. §42.104(b); *Niantic, Inc. v. Barbaro Techs., LLC*, IPR2019-00669, Paper 8, 14-20 (P.T.A.B. Aug. 16, 2019).

Instead of arguing how *the construed claim* is unpatentable (37 C.F.R. §42.104(b)(4)), Petitioner identifies the *effect* of the accused filter from the now-dismissed ITC action (preventing excessive blurring when applied across an edge)

and surmises that any filter which prevents blurring when applied across an edge is the claimed sparse filter. Petition, 47; Richardson, ¶107. Petitioner jumps to the conclusion that, because Chiang’s filter allegedly has a similar effect, “Chiang’s adaptive edge filter ***must also be*** a ‘sparse de-noising filter.’” Petition, 47; Reader, ¶229. This flawed “analysis” is severely lacking.

First, Petitioner does not explain how comparing the effect of one filter to another (here, the accused filter to Chiang’s edge filter) demonstrates the Chiang filter is an adaptive sparse de-noising filter. It does not. *See Zenith Elecs. Corp. v. PDI Commun. Sys.*, 522 F.3d 1348, 1363 (Fed. Cir. 2008) (“[M]ere proof that the prior art is identical, in all material respects, to an allegedly infringing product cannot constitute clear and convincing evidence of invalidity.”).

Second, the basis of Petitioner’s argument is that Chiang’s system “uses the distance between a pixel of interest and an edge to identify a filter weight” to “reduce or remove ringing artifacts near edges and in flat regions of decoded images.” Petition, 47 (citing Chiang, ¶¶31, 41); Richardson, ¶108. But the plain and ordinary meaning, Construction (3), is “a filter that reduces noise based on a sparse representation of the signal.” Petition, 14-15. Petitioner and its expert never address whether (and how) Chiang discloses a sparse representation of the signal or how that filter reduces noise based on this sparse representation. Richardson, ¶108. Petitioner

does not even analyze its misinterpreted Construction (4) requiring only “a sparse signal.” *See supra*, §IV.B.

“It is of the utmost importance that petitioners ... adhere to the requirement that the initial petition identify with particularity the evidence that supports the grounds to challenge each claim.” *Intelligent Bio-Systems, Inc. v. Illumina Cambridge, Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016). Petitioner fails this requirement in not explaining how Chiang satisfies this limitation as construed. Ground 2 should be denied. *See VusionGroup SA v. Hanshow Tech. Co.*, IPR2024-01045, Paper 8, 14 (P.T.A.B. Jan. 14, 2025) (denying institution when Petitioner did “not explain adequately how [a] combination... satisfies” a limitation); *Sercomm Corp. v. Atlas Global Techs., LLC*, IPR2022-01520, Paper 25, 30 (P.T.A.B. April 11, 2023) (same).

D. Ground 3: No Obviousness Over VC1 and Guleryuz

Petitioner does not show a reasonable likelihood of obviousness in Ground 3 because VC1 alone does not teach the claims (as Petitioner admits), and Petitioner fails to demonstrate a motivation to combine VC1 with Guleryuz in the first instance, let alone as proposed in the Petition. Instead, Petitioner again relies on hindsight, ignoring the teachings of its own references, and using the patent’s teachings as a

roadmap to attempt to obviate the claims and add a sparse denoising filter to VC1 in the exact combination and manner as claimed. Such analysis is improper.

Petitioner misleads the Board by failing to acknowledge the Guleryuz reference *is* the AAPA applied in Ground 1B. *See infra*, §V.B.2; Richardson, ¶72. The Examiner allowed the patent to issue over Guleryuz’s teachings which were applied in an *identical* manner to that proposed by Petitioner here. *See infra*, §VI.A. Accordingly, the Board should exercise discretion to deny institution.

1. VC-1 Compressed Video Bitstream Format and Decoding Process (“VC1”)

The VC1 reference describes the VC1 format and decoding process used in the VC1 video decoder. VC1, iii. VC1’s decoding process is shown below.

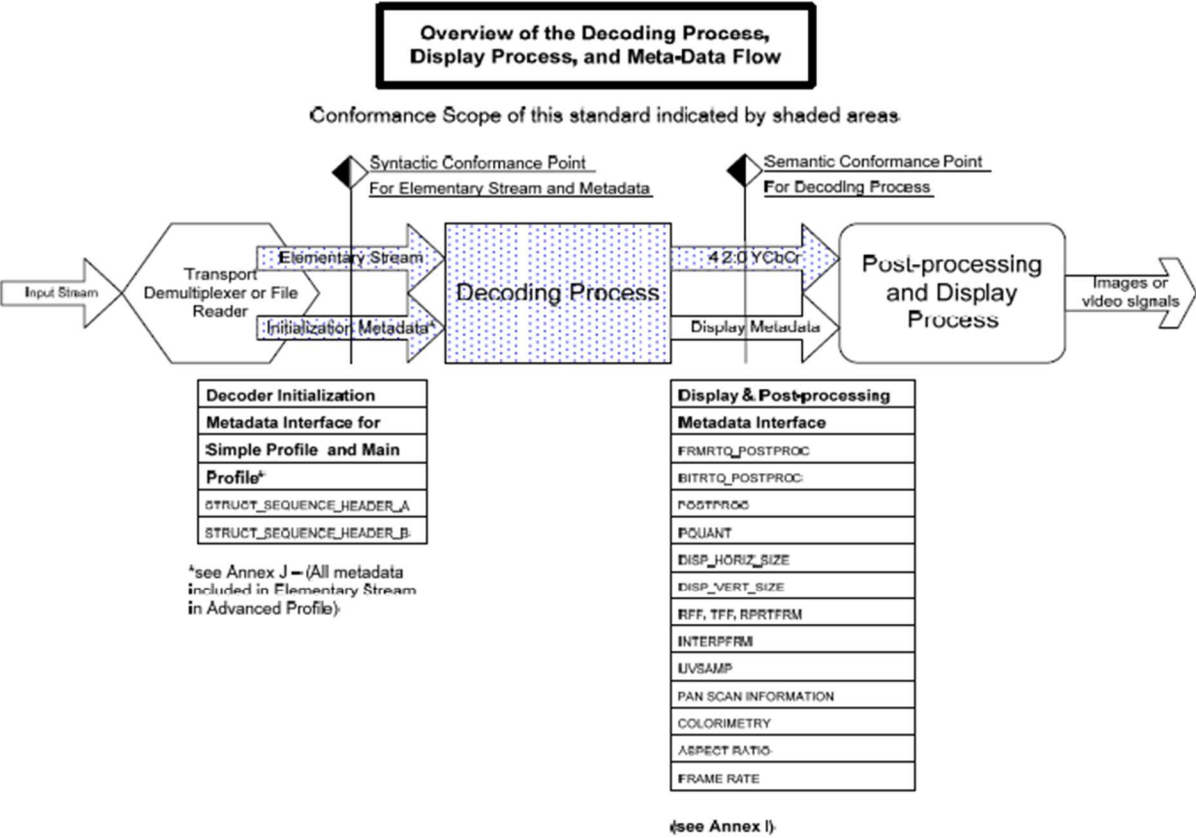


Figure 5: Overview of the Decoding Process and Meta-Data

VC1, Figure 5. VC1 teaches implementation specific post-processing steps for out-of-loop coding noise reduction, namely, “de-blocking and/or de-ringing” applied after decoding. VC1, 452. The VC1 decoder estimates the computational complexity of these operations which “may be used by the decoder to decide whether to disable or enable deblocking and de-ringing operations.” VC1, 459.

2. *Guleryuz*

Guleryuz’s description is incorporated by reference. *See supra*, §V.B.2.

3. *Petitioner’s Ground 3 Does Not Address the “in succession” Limitation*

Petitioner *never* analyzes the “in succession” limitation in this Ground. Petition, 60-62. Petitioner argues Guleryuz’s filter would be applied “after” VC1’s deblocking filter, but this argument fails to comply with the Board’s rules requiring “particularity” because Petitioner never maps it to the limitation “using at least two filters in succession.” *Intelligent Bio-Systems*, 821 F.3d at 1369. Accordingly, institution of Ground 3 is unwarranted because Petitioner failed to address a limitation required by every Challenged Claim.

4. *Petitioner Fails to Show Motivation to Modify VC1 with Guleryuz as Proposed*

Petitioner relies on VC1’s “in-loop deblock filter[]” as the claimed first filter but recognizes VC1 lacks the claimed filter for performing a second pass. Petition, 57-58. Petitioner admits the purpose of VC1’s in-loop filter is to address blocking artifacts, but then argues VC1 “is silent regarding other coding artifacts.” *Id.*, 58; Richardson, ¶110. That is incorrect; VC1 teaches applying an out-of-loop filter to address other coding artifacts, like ringing artifacts. Accordingly, a POSITA would not have been motivated to look to additional in-loop filters. VC1, 452; Richardson, ¶110.

Petitioner nevertheless argues a POSITA “looking to apply the teachings of [VC1]” would seek to add a second in-loop filter. Richardson, ¶110. But Petitioner

fails to show Guleryuz's filter would be combined with VC1. Even if combined, Guleryuz instructs **replacing** VC1's traditional deblocking filter. *Id.*, ¶¶110-111. Neither reference supports using two in-loop filters. *Id.*

Petitioner offers three flawed justifications for its proposed combination: (1) "shortcomings" of VC1's deblocking filter that another in-loop filter might address; (2) Guleryuz's filter would allegedly address these "shortcomings;" and (3) a POSITA would apply, or it would be obvious to try, Guleryuz's filter **after** VC1's in-loop deblocking filter.

i. Petitioner's Flawed Motivation to Add Another In-Loop Filter

Petitioner's first argument fails because it is driven by hindsight and does not account for the art's teachings. Petitioner argues a POSITA would have used "a second in-loop filter," alleged to be "a common technique to improve the quality of decoded images," because in-loop deblocking filters have "shortcomings in that they do not address other types of coding artifacts very well." Petition, 58; Richardson, ¶112. VC1, however, addresses those other types of coding artifacts with **out-of-loop** filters to achieve "coding noise reduction" and "improve[d] perceptual quality." VC1, 452; Richardson, ¶112. VC1 therefore resolves the "shortcomings" identified by Petitioner, and provides the stated benefit, using out-of-loop "deblocking and de-ringing . . . operations." VC1, 18 (teaching out of loop filters "to mitigate the effect

of compression artifacts, and improve perceptual quality of video.”); Richardson, ¶112.

VC1 also warns of potential “perceptual degradation” in certain instances, indicating a POSITA would have been cautious to add filters into VC1’s loop that could not be disabled by the decoder. VC1, 452; Richardson, ¶¶56-57, 83-89, 112. Indeed, a POSITA would have understood VC1’s out-of-loop filters promote decoder flexibility, such as in consideration of computation complexity, unlike in-loop filters that need to match what was applied by the encoder. Richardson, ¶¶56-57, 83-89, 113; VC1, 459. Petitioner never considers this teaching away.

Petitioner cites VC1’s “overlap smoothing” as reason to use two in-loop filters addressing different coding artifacts but ignores this processing step addresses the same type of artifacts as the deblocking filter (blocking artifacts), not others. Richardson, ¶114; VC1, 175 (“blocking artifacts can be minimized” by overlap smoothing). Petitioner does not acknowledge this teaching either. VC1’s overlap smoothing does not support applying different in-loop filters to address different types of coding artifacts.

Petitioner proposes that notwithstanding VC1’s instruction to use filters for other coding artifacts out-of-loop, additional in-loop filters would be used to provide “higher quality reference frames.” Petition, 58, n.6. But VC1’s designers limited in-

loop filtering to only those that address blocking artifacts despite understanding the “benefit” of in-loop filters. Richardson, ¶115. A POSITA would have understood that VC1 implemented its coding noise reduction filters out-of-loop because VC1, like Lee, is sensitive to computational complexity demanded by post processing for coding noise reduction. VC1, 459-460; Reader, ¶292 (admitting “‘processing speed and memory’ are taken into consideration by” VC1).

VC1’s out-of-loop filters afford the decoder flexibility based on the “computational complexity of deblocking and de-ringing operations.” VC1, 452-459. Despite this teaching, Petitioner does not evaluate the computational complexity required by adding Guleryuz’s complex filter as another in-loop filter. Richardson, ¶117; *see supra*, §V.B.2; *see also* Petition, 63 (acknowledging adding in-loop processes may come at “the expense of slightly reduced compression”). A POSITA would not have been motivated to add Guleryuz’s filter within VC1’s coding loop. Richardson, ¶116.

ii. Guleryuz Would Not be Combined with VC1

Petitioner next proposes *Guleryuz’s* filter be used in addition to VC1’s deblocking filter. Petitioner fails to properly consider its cited references. Guleryuz’s computationally complex single filter “*replaces*” deblocking filters. Guleryuz, 1-2, Fig. 1; *See* Richardson, ¶¶80-85, 109-117; *see also supra*, §V.B.2. The reasons a

POSITA would not combine Guleryuz with VC1 are consistent with those discussed above. *See* §V.B.4. Guleryuz’s teachings—particularly to replace the WMV9 deblocking filter used in VC1 (Richardson, 112 (explaining Guleryuz’s “traditional” reference describes the deblocking system used in VC1))—are never addressed by Petitioner. This oversight is fatal.

Dr. Reader also cites Guleryuz to allege that benefits of in-loop filters were “well understood in the art” but mischaracterizes the cited Guleryuz passage. Reader, ¶269. Guleryuz explains that the experimental results reported “do not utilize the proposed framework fully” because steps were taken to curb computational complexity. Guleryuz, 4. Guleryuz’s simulation was also run out-of-loop, undercutting Petitioner’s motivation to apply Guleryuz within VC1’s coding loop. Guleryuz, 3-4; Richardson, ¶82. Dr. Reader also cites Lee and Chiang as examples where a second in-loop filter “was a common technique to improve the quality of decoded images.” *Id.*, ¶112 (citing Reader, ¶269). But neither reference employs an adaptive sparse de-noising filter and thus cannot support the assertion that it was “a common technique” to add one in-loop for performing a second pass. *See supra*, §§V.A.2, B.4, C.4.

Petitioner admits Guleryuz’s filter reduces “both blocking artifacts and artifacts around sharp edges.” Petition, 57. But Petitioner focuses only on the second,

ignoring Guleryuz’s blocking artifact reduction. Petitioner never considers its own admission when arguing a POSITA would use Guleryuz in VC1, despite VC1 already reducing blocking artifacts. Richardson, ¶¶88, 110.

Petitioner simply concludes applying Guleryuz’s filter would be combining known elements to yield predictable results. Petition, 58-59. But the Federal Circuit rejects cursory motivations that do not account for the references’ teachings. *See Medtronic, Inc. v. Teleflex Life Scis. Ltd.*, 2024 U.S. App. LEXIS 6703 at *24-25 (Fed. Cir. March 21, 2024) (non-precedential) (rejecting motivation to combine “when [one reference] suggests drawbacks” with using the teachings of the second); *Intuitive Surgical, Inc. v. Ethicon LLC*, 2022 U.S. App. LEXIS 3810 at *8, 12 (Fed. Cir. Feb. 11, 2022) (non-precedential) (rejecting motivation to combine where petitioner did not explain how one reference would work with another).

iii. Guleryuz’s Filter Would Not be Added “After” VC1’s Deblocking Filter

Petitioner alleges Guleryuz’s filter would be used *after* VC1’s in-loop deblocking filter because “after removal or reduction of block artifacts, the remaining quantization noise is a much closer match to i.i.d. noise, *as the ’556 patent admits was known.*” Reader, ¶270. But the patent does not admit this, and Petitioner fails to show this teaching was known.

The '556 Patent does not admit it was known that deblocking filters present quantization noise that more closely matches i.i.d. noise models; rather, the detailed description discloses the invention's unexpected "superior performance" because:

[t]he present principles *differ from the prior art* in the use of a series of refinement step (succession of filters) . . . [t]he signal after deblocking filter is a better match to the independent and identically distributed (i.i.d.) noise presumption.

'556 Patent, 14:18-36; Richardson, ¶116; *see supra*, §V.B.3.

Petitioner relies on the '556 Patent as a roadmap when it uses the patent's teachings of an unexpected benefit to allege motivation to apply Guleryuz's filter after VC1's deblocking filter. Richardson, ¶116. Without any other evidence to support its position, Petitioner fails to show Ground 3 should be instituted.

Petitioner fails to account for Guleryuz's teaching away, despite admitting, "Guleryuz notes the fact that quantization noise is not i.i.d. noise presents an obstacle to applying its denoising filter." Petition, 59. Guleryuz also discloses "it is very beneficial to have a single filtering solution that is applicable in the general case" and proposes a filter designed to minimize reliance on i.i.d noise models. Guleryuz, 1-2; Richardson, ¶¶72, 80. The discussion above regarding Guleryuz's teaching away from the claimed invention applies here. *See supra*, §§V.B.2, 4.

Petitioner last argues it would be “obvious to try” Guleryuz’s filter after VC1’s deblocking filter, alleging that “it is one of two options (deblock filter first or denoising filter first).” Petition, 59-60. That is not the proper analysis. Petitioner must evaluate whether modifying VC1 *with Guleryuz’s filter in the proposed way* would have been obvious to try. *Spectralytics, Inc. v. Cordis Corp.*, 649 F.3d 1336, 1343 n.2 (Fed. Cir. 2011) (rejecting obvious to try argument where the prior art could be combined a “finite number of” ways because one of the ways was not predictable); *Leo Pharm. Prods. v. Rea*, 726 F.3d 1346, 1356-7 (Fed. Cir. 2013) (rejecting obvious to try argument where “breadth of these choices and the numerous combinations” was more akin to “‘merely throwing metaphorical darts at a board’ in hopes of arriving at a successful result.”).

The appropriate analysis is missing from the Petition. For example, Guleryuz’s filter could be solely applied in the VC1 system, it could be applied out-of-loop before, after, or instead of either or both of the post processing filters in VC1, it could be applied before or simultaneous to the in-loop deblocking filter, and so on. Richardson, ¶117. Indeed, VC1 “contemplates a post-processing deringing filter to remove ringing artifacts.” Reader, ¶¶269-270; *Id.* Petitioner never evaluates why a POSITA would not follow this teaching to employ additional filters—especially the complex Guleryuz filter—out of the coding loop. Richardson, ¶117. In sum, there

are many possible configurations—all ignored by Petitioner. *Id.*; *Ortho-McNeil Pharm., Inc v. Mylan Labs., Inc.*, 520 F.3d 1358, 1364 (Fed. Cir. 2008) (holding obviousness not shown in part because an expert “discounted the number and complexity of the alternatives...”). Petitioner fails to show it would have been obvious to try Guleryuz’s filter as an additional in-loop filter after VC1’s in-loop deblocking filter. *See Grunenthal GmbH v. Alkem Labs. Ltd.*, 919 F.3d 1333, 1345 (Fed. Cir. 2019) (holding the district court did not err in finding something not obvious to try when dealing with “a huge number of possible choices.”).

VI. The Board Should Exercise its Discretion to Deny Institution

Petitioner’s prior art references are identical and cumulative to the references the ’556 Patent overcame during prosecution. Indeed, Petitioner’s arguments apply the allegedly “new” art in the same way as the Examiner applied during prosecution. A strong presumption, therefore, exists that the Patent Office considered and approved the Challenged Claims over the art and arguments raised in the Petition, and in the absence of some showing of error in that process—which Petitioner has not shown—institution should be denied.

Petitioner acknowledges the Board’s two-part framework for evaluating discretionary denials under §325(d): (1) whether the same or substantially the same art or arguments were presented to the PTO during the original prosecution; and (2)

whether the Petitioner has demonstrated that the PTO erred in a manner material to the patentability of Challenged Claims. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH*, IPR2019-01469, Paper 8, 10 (P.T.A.B. Feb. 13, 2020) (“*Advanced Bionics*”) (precedential). Once the Board determines that part one of the framework is satisfied, it then considers whether Petitioner can show “material” error. *Advanced Bionics*, IPR2019-01469, Paper 8, 8-10.

Here, Petitioner asserts identical and cumulative art and arguments to those presented during prosecution. Petitioner’s Grounds 1A and 1B recycle the exact challenges the Examiner raised during prosecution before finding the claims patentable. EX1005, 303-306. Petitioner’s Grounds 2 and 3 assert substantially similar and cumulative art as that considered during the ’556 Patent’s prosecution. Part one of the *Advanced Bionics* framework is met and Petitioner fails to show material error under step two.

A. Petitioner Presents the Same or Substantially the Same Art

1. *Grounds 1A and 1B*

Grounds 1A and 1B rely on art considered and overcome in prosecution. Petition, 69-70 (Petitioner admits that “Examiner applied Lee and the AAPA during prosecution). Worse, Petitioner applies this art in the same way as the Examiner, first alleging Lee alone supports obviousness and then, because Lee does not disclose the claimed sparse filter, alleging obviousness based on Lee in combination with the

AAPA. *See generally* Petition, §§V.A, V.B. The Examiner did the same—issuing rejections first over Lee alone and next the combination of Lee and the AAPA—premised on the same arguments as Petitioner. *See, e.g.*, EX1005, 258, 287, 303-306, 321, 359, 493; Petition, 9 n.4. Thus, Petitioner’s Grounds 1A and 1B art, and teachings, were discussed at length in the prosecution history. Petition, 20-43. Petitioner cannot meaningfully deny this.

2. Grounds 2 and 3

Petitioner relies on Chiang as its primary reference for Ground 2, and VC1 combined with Guleryuz in Ground 3. Petitioner never articulates how Chiang, VC1, and Guleryuz are not cumulative of art before the Office. Petition 71-72. Importantly, Petitioner uses these references to make the same arguments as the Examiner during prosecution, confirming they are cumulative and part one of *Advanced Bionics* applies. *See Samsung Electronics America, Inc. v. Uniloc 2017 LLC*, IPR2018-01756, Paper 7, 27 (P.T.A.B. Mar. 11, 2019) (finding references cumulative because “Petitioner relies on [the new] disclosure in the same way” as another challenge applied a reference).

The AAPA considered by the Examiner during prosecution is the Guleryuz filter asserted by Petitioner now and should therefore be found to be an identical reference under *Advanced Bionics*. *See* §§II.B; V.B.2. At minimum, it is cumulative,

something readily apparent based on Petitioner’s arguments in Grounds 1B and 3 where the teachings of the alleged AAPA and of Guleryuz are applied in the same way. *Siemens Mobility, Inc. v. Metrom Rail*, IPR2024-00947, Paper 12, 16-17 (P.T.A.B. Nov. 19, 2024) (finding references substantially similar under §325(d) because Petitioner’s arguments used them in the same way).

Part one of *Advanced Bionics* is also met for Chiang and VC1, which are cumulative of the Lee reference cited and considered during prosecution. *See supra*, §II.B. Petitioner’s flawed attempt to distinguish these references relies almost exclusively on the fact that Chiang and VC1 are not cited on the face of the ’556 Patent. But that fact is misleading because Petitioner relies on these references for teachings that are no different than those considered by the Examiner. *See, e.g., Glaxosmithkline Consumer Healthcare Holdings (US) v. Cipla Ltd.*, IPR2020-00370, Paper 7, 9-12 (P.T.A.B. July 31, 2020) (finding grounds raised “substantially the same prior art” because the new reference did not differ in any material way from art considered during prosecution).

i. Chiang is Cumulative to Lee

Chiang discloses an out-of-loop deblocking filter and deringing filter. Chiang, Fig. 2; *supra*, §V.C.1. Petitioner alleges a POSITA would modify this to employ an “in-loop implementation,” which (although wrong) simply means it would then be

cumulative to Lee’s in-loop deblocking filter and deringing filter. *Compare* Petition, 23-24 *with id.*, 45-46. Moreover, Petitioner concedes that neither reference discloses an “adaptive sparse de-noising filter,” under any “correct” construction. *See supra*, §§V.A.2, V.C.4; Petition 45-46, 71 n.7. Chiang and Lee would also be cumulative even applying the Construction (4) that Petitioner admits is “incorrect,” as Petitioner’s allegation that the Lee and Chiang deringing filters disclose the “adaptive sparse de-noising filter” apply the same flawed reasoning. *Id.* Chiang is therefore cumulative of the considered art and the Board should exercise discretion to deny Ground 2.

ii. VC1 is Also Cumulative to Lee and H.264

Part one of *Advanced Bionics* is met because VC1 is cumulative of Lee and H.264. VC1 applies an in-loop deblocking filter but its “de-blocking and/or deringing” filters for coding noise reduction are applied out-of-loop. VC1, 452. Petitioner focuses on the in-loop filter and argues that because VC1 allegedly has multiple filters in the coding loop, a POSITA would add Guleryuz’s filter as a second pass with deblocking performed first. Petition, 57-58. This is the same logic in Petitioner’s Ground 1B and applied by the Examiner (that Lee discloses multiple in-loop filters and the AAPA (Guleryuz) would be added as a second pass). *See supra*, §VI.A. Petitioner applies the art in a cumulative way, confirming their cumulative

nature. VC1's in-loop deblocking filter is also cumulative with H.264, which is cited on the face of the patent and discloses such a filter. '556 Patent, (56) Other Publications.

Petitioner's VC1 and Guleryuz challenge is cumulative, if not identical, to Petitioner's obviousness arguments for Lee and the AAPA. The Board need only look at Petitioner's indistinguishable arguments for confirmation. *General Electric Co. v. United Techs. Corp.*, IPR2018-01172, Paper 7, 15-19 (P.T.A.B. Nov. 29, 2018) (denying institution where "Petitioner's obviousness argument is substantively the same as the Examiner's rejection"). Part one of *Advanced Bionics* is therefore satisfied for Grounds 2 and 3. *See NXP USA, Inc. v. Impinj, Inc.*, IPR2020-00519, Paper 7, 8 (P.T.A.B. Aug. 17, 2020) (denying institution where the Board found substantially cumulative prior art previously presented to the Office); *Uniloc 2017 LLC*, IPR2018-01756, Paper 7 at 27.

B. No Material Error

Given Petitioner's identical or cumulative art, the Board should exercise discretion to deny institution because Petitioner has not shown the Office committed a material error. *Advanced Bionics*, Paper 6, 8. In fact, Petitioner never argues the Office erred with respect to Grounds 2 and 3, which therefore cannot survive part two of *Advanced Bionics*.

Petitioner fails to show that Grounds 1A and 1B demonstrate the PTO committed material error. The Examiner looked at Lee and the AAPA that Petitioner applies here and allowed the claims. Petitioner’s alleged “error” relates to claim construction; but Petitioner admits this argument is based on an “incorrect” construction, without argument that any “correct” construction demonstrates a material error. Petition, 70-71. Petitioner’s “conce[ssion]” that Lee alone does not disclose the claim should govern institution. *Id.*, 71 n.7. Put another way, under “correct” interpretations, Petitioner admits the Examiner got it right. And, as explained above in Ground 1A, Lee does not disclose a sparse de-noising filter even under Petitioner’s misinterpreted Construction (4). *See supra*, §V.A. Petitioner’s arguments about “adaptive” are of no moment, as the Examiner correctly recognized Lee “does not disclose that the de-noising filter is a sparse filter.” EX1005, 304. The Examiner did not commit material error in allowing the claims over Lee.

Petitioner also fails to show the Examiner committed material error in allowing the claims over Lee modified by the AAPA, Petitioner’s Ground 1B challenge. *See supra*, §V.B.4. After the Applicant explained the AAPA teaches away from the claimed invention, the Examiner correctly allowed the claims. Petitioner alleges the Examiner erred allowing the claims by pointing to its merits argument and concluding that the AAPA’s teaching away should not have overcome the

rejection. Petition, 71. But Petitioner never analyzed the teaching away in Ground 1B of its Petition and its expert does not explain why there would be a motivation to combine in the face of it. *See supra*, §V.B.4.

In contrast, Dr. Richardson explains why a POSITA would not combine the references given the strong teaching in the Guleryuz reference that the '556 Patent's AAPA addresses. *Id.*; Richardson, ¶¶70-94. Petitioner does not show material error because it does not establish that a POSITA would have looked to modify Lee's simple process to add such a complex filter to "address all types of quantization noise," including deblocking, along with another filter that already performs deblocking. *Id.* Moreover, even if Petitioner showed some disagreement, "it cannot be said that the Office erred in a manner material to patentability" where "reasonable minds can disagree regarding the purported treatment of the art or arguments." *Advanced Bionics* IPR2019-01469, Paper 8, 8-10. Accordingly, the Board should exercise discretion to deny institution of Grounds 1A and 1B. *General Electric*, IPR2018-01172, Paper 7, at 15-19.

Petitioner's last argument is that the Examiner did not consider the combination of Guleryuz and VC1. Petition, 72. This conclusory statement, which does not even allege that there was an error, cannot satisfy Petitioner's burden to establish material error. *Autel Intelligent Tech. Corp., Ltd. v. Orange Elec. Co., Ltd.*,

IPR2021-01545, Paper 8, 27 (P.T.A.B. April 8, 2022) (denying institution under §325(d) because “Petitioner’s conclusory argument ... also fails to demonstrate that the Office erred.”); *Panduit Corp. v. Corning Optical Commc’ns LLC*, IPR2021-01562, Paper 20, 17 (P.T.A.B. April 6, 2022) (denying institution under §325(d) because of “conclusory and non-persuasive” argument that Examiner erred). Accordingly, the Board should defer to the previous Office evaluations and exercise discretion to deny institution under §325(d).

VII. Conclusion

For the foregoing reasons, the Board should not institute IPR of the Petition.

Respectfully submitted,

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CERTIFICATION UNDER 37 C.F.R. §42.24

Under the provisions of 37 CFR §42.24, the undersigned hereby certifies that the word count for the foregoing Patent Owner Preliminary Response totals 13,980 words (Sections I-VII), which is less than the 14,000 allowed under 37 CFR §42.24(a)(1)(i), (b)(1).

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.8 and 42.6(e), the undersigned hereby certifies that the foregoing Patent Owner's Preliminary Response was served electronically in its entirety on January 30, 2025 on the following:

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