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Paper 87
Entered: April 17, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MAXLINEAR, INC.,
Petitioner,

v.

CRESTA TECHNOLOGY CORP. and CF CRESPE LLC,
Patent Owner.

Case IPR2015-00592
Patent 7,075,585 B2

Before PHILLIP J. KAUFFMAN, GREGG I. ANDERSON, and PATRICK M. BOUCHER, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

MaxLinear, Inc. ("Petitioner") filed a Petition (Paper 2, "Pet.") to institute an *inter partes* review of claims 1–21 of U.S. Patent No. 7,075,585 B2 (Ex. 1001, "the '585 patent"). The Board instituted review, conducted a trial, and issued a Final Written Decision. Papers 9, 72. At the time of institution, the '585 patent was owned by Cresta Technology Corporation, but was assigned to CF CRESPE LLC during the trial (collectively, "Patent Owner"). Paper 61. The Federal Circuit vacated the Final Written Decision and remanded to the Board to consider the collateral-estoppel impact of a prior Board decision, affirmed by the Federal Circuit, that certain of the challenged claims are unpatentable. *MaxLinear, Inc. v. CF CRESPE LLC*, 880 F.3d 1373 (Fed. Cir. 2018) (Ex. 3001).

We have jurisdiction under 35 U.S.C. § 6(c). This Decision is a Final Written Decision under 35 U.S.C. § 318(a) that substitutes for the vacated Decision.

II. BACKGROUND

A. Procedural Background

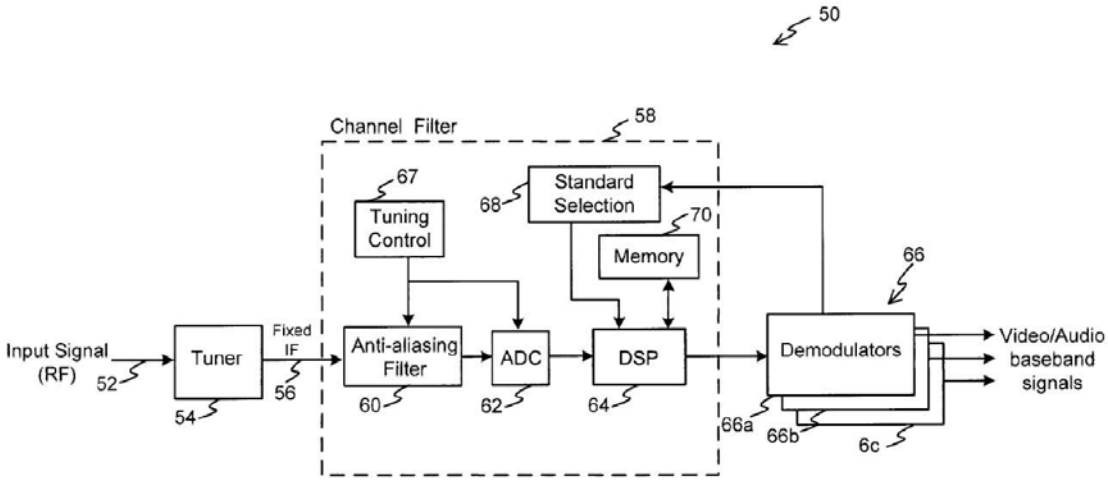
During the trial, Patent Owner timely filed a Patent Owner Response (Paper 19, "PO Resp."), and Petitioner timely filed a Reply to the Patent Owner Response (Paper 31, "Reply"). Patent Owner also filed a Motion to Exclude, which Petitioner opposed, and to which Patent Owner replied.

Papers 36, 52, 62. An oral hearing was held on June 3, 2016.[1] Paper 71 ("Tr.").

After remand, the parties filed briefs proposing procedures to be followed on remand. Papers 79, 80. In addition, pursuant to our authorization, Petitioner filed a Motion for Leave to File Exhibits 1213–17 as Supplemental Information, which Patent Owner opposes. Papers 83, 86.

B. The '585 Patent

The '585 patent "relates to a broadband television signal receiver for receiving multi-standard analog television signals, digital television signals and data channels." Ex. 1101, 1:16–19. Figure 2 of the '585 patent is reproduced below.



[1] The hearing was consolidated with the hearing for IPR2015-00594, and a single transcript was produced.

Figure 2 provides a block diagram of television receiver 50 that receives input radio frequency (RF) signals at input terminal 52. *Id.* at 1:52–3:44–48. Tuner 54 converts an input RF signal to an intermediate-frequency signal that is filtered and processed by anti-aliasing filter 60. *Id.* at 3:48–51, 4:3–7. The center frequency of anti-aliasing filter 60 is selected based on the intermediate frequency of the intermediate signal. *Id.* at 4:31–33. After filtering, the intermediate signal is sampled and digitized by analog-digital converter 62. *Id.* at 4:17–20. The resulting digital representation is processed by digital signal processor 64 "according to the television standard to which the input RF signal is encoded." *Id.* at 4:41–54. Specifically, the digital signal processor applies a filter function that depends on a manually or automatically established state of a standard selection circuit used to select among "the several analog television standards and the several digital television standards." *Id.* at 4:55–64; 5:7–22. A bank of demodulators generates appropriate video and audio baseband signals from the digitally processed signals. *Id.* at 5:42–44.

C. Illustrative Claim

Claim 17 of the '585 patent is illustrative of the claims at issue:

> 17. A method for receiving input RF signal[s] comprising:
>
> receiving said input RF signals encoding information in one of a plurality of formats;
>
> converting said input RF signals to intermediate signals having an intermediate frequency;

applying a first filter function to said intermediate signals, said first filter function being an anti-aliasing filter and having a center frequency;

digitizing said filtered intermediate signals at a sampling frequency;

processing said digitized signals in accordance with said format of said input RF signals and generating digital output signals indicative of information encoded in said input RF signals; and

demodulating using a plurality of demodulators said processed digitized signals to generate baseband signals corresponding to said format of said input RF signals.

Ex. 1001, 8:17–34.

D. References Relied Upon

Petitioner relies on the following references.

Van De Plassche	US 6,653,502 B1	Nov. 4, 2003	Ex. 1104
Ishikawa	US 5,418,815	May 23, 1995	Ex. 1105
Malkemes	WO 01/020792	Mar. 22, 2001	Ex. 1106
Balaban	US 6,369,857	Apr. 9, 2002	Ex. 1107
Greenberg	US 5,278,872	Jan. 11, 1994	Ex. 1110

Yannis P. Tsividis, *Integrated Continuous-Time Filter Design—An Overview*, IEEE J. Sol. St. Circuits, **29**, 166 (Mar. 1994) (Ex. 1108) ("Tsividis").

E. Grounds of Unpatentability

The Petition challenges claims 1–21 of the '585 patent on the following grounds. Pet. 7.

References	Basis	Claim(s) Challenged
Van De Plassche and Ishikawa	§ 103(a)	1, 2, 4, 5, 10, and 12–20
Van De Plassche, Ishikawa, and Malkemes	§ 103(a)	3
Van De Plassche, Ishikawa, and Balaban	§ 103(a)	6, 7, 9, and 21
Van De Plassche, Ishikawa, and Tsividis	§ 103(a)	8
Van De Plassche, Ishikawa, and Greenberg	§ 103(a)	11

Upon determining that the Petition did not demonstrate a reasonable likelihood of prevailing on the challenges to claims 5 and 10–15, we instituted review with respect to the remaining challenges, i.e., with respect to claims 1–4, 6–9, and 16–21. Paper 9. While this remand was pending, the Supreme Court held that a final written decision under 35 U.S.C. § 318(a) must decide the patentability of all claims challenged in a petition for *inter partes* review. *SAS Institute, Inc. v. Iancu,* 138 S. Ct. 1348 (2018). Accordingly, we address the patentability all challenged claims, i.e., claims 1–21, herein. Although Petitioner notified the Board of *SAS Institute* and contended that any final written determination should address claims 5 and 10–15, Paper 81, neither party requested briefing to address any further specific impact of *SAS Institute* on this proceeding.

F. Related Proceedings

Patent Owner has asserted the '585 patent against Petitioner in the following actions: *Cresta Tech. Corp. v. MaxLinear, Inc.*, 1:14-cv-00079-RGA (D. Del.); and *Certain Television Sets, Television Receivers, Television Tuners, and Components Thereof*, Investigation No. 337-TA-910 (USITC) ("the ITC proceeding"). Pet. 1.

Petitions for *inter partes* review of the '585 patent were also filed in the following proceedings.

1. IPR2014-00728: We determined that claims 1–3, 5, 10, and 16–19 are unpatentable over art that differs from the art at direct issue in this proceeding. *Silicon Labs., Inc. v. Cresta Tech. Corp.*, Case IPR2014-00728, slip op. (PTAB Oct. 21, 2015) (Paper 53) (copy at Ex. 1204). The Federal Circuit affirmed. *CF CRESPE LLC v. Silicon Laboratories*, 670 F. App'x 707 (Fed. Cir. 2016) (per curiam).

2. IPR2015-00591: We denied institution of a trial. *MaxLinear, Inc., v. Cresta Tech. Corp.*, Case IPR2015-00591 (PTAB June 15, 2015) (Paper 9).

3. IPR2015-00615: We determined that claims 11–15 and 20 are unpatentable over art that differs from the art at direct issue in this proceeding. *Silicon Labs., Inc. v. Cresta Tech. Corp. and CF CRESPE LLC*, Case IPR2015-00615, slip op. (PTAB Aug. 11, 2016) (Paper 64). The Federal Circuit affirmed. *CF CRESPE LLC v. Silicon Labs. Inc.*, 705 F. App'x 1000 (Fed. Cir. 2017) (per curiam).

Petitions for *inter partes* review of related patents, U.S. Patent Nos. 7,251,466 B2 ("the '466 patent") and 7,265,792 B2 ("the '792 patent"), were also filed in the following proceedings.

1. IPR2014-00881: We determined that claims 1, 2, 5, 8, 12, 13, 20, 21, 25, 26, 31, 32, 35, and 36 of the '466 patent are unpatentable over art that differs from the art at direct issue in this proceeding. *Silicon Labs., Inc. v. Cresta Tech. Corp.*, Case IPR2014-00881, slip op. (PTAB Oct. 21, 2015) (Paper 47).

2. IPR2014-00809: We determined that claims 1–17 of the '792 patent are unpatentable over art that differs from the art at direct issue in this proceeding. *Silicon Labs., Inc. v. Cresta Tech. Corp.*, Case IPR2014-00809, slip op. (PTAB Oct. 21, 2015) (Paper 56).

3. IPR2015-00593: We denied institution of a trial involving the '792 patent. *MaxLinear, Inc. v. Cresta Tech. Corp.*, Case IPR2015-00593, slip op. (PTAB Aug. 14, 2015) (Paper 9).

4. IPR2015-00594: We determined that claims 1–17 and 24–29 of the '792 patent are unpatentable over art that differs from the art at direct issue in this proceeding. *MaxLinear, Inc. v. Cresta Tech. Corp.*, IPR2015-00594, slip op. (PTAB Aug. 15, 2016) (Paper 90).

5. IPR2015-00626: We determined that claims 18, 19, and 24–29 of the '792 patent are unpatentable over art that differs from the art at direct issue in this proceeding. *Silicon Labs., Inc. v. Cresta Tech. Corp. and CF*

CRESPE LLC, Case IPR2015-00626, slip op. (PTAB Aug. 11, 2016) (Paper 65).

G. Prosecution History

The application that matured into the '585 patent was filed on September 6, 2002, claiming the benefit of the filing date of a provisional application filed on September 17, 2001. Ex. 1001 at [22], [60]. In the first Office Action, the independent claims were rejected by the Examiner as anticipated by Van De Plassche, and the dependent claims were rejected as anticipated by Van De Plassche or as obvious over Van De Plassche in combination with other art. Ex. 1112, 55–57. Original claims 3, 4, and 9 were identified as "appear[ing] allowable over the prior art." *Id.* at 58.

In response to the Office Action, the applicant submitted an amendment that incorporated the "plurality of demodulators" limitation of original claim 3 into each of independent claims 1 and 18 (which ultimately issued as claims 1 and 17). *Id.* at 43–50. Specifically, independent claim 1 was amended to add the following:

> a plurality of demodulators, each coupled to receive output signals from said signal processor, each of said demodulators for demodulating said digital output signals according to one of said formats of said input RF signal, each of said demodulators generating video and audio baseband signals corresponding to said format of said input RF signal;

and independent claim 18 (issued claim 17) was amended to add the following:

> demodulating said processing digitized signals to generate baseband signals corresponding to said format of said input RF signal.

Id. at 45, 47. In accompanying remarks, the applicant explained that "claim 1 has been amend[ed] to include the limitation in allowable claim 3. . . . Furthermore, in the present amendment, claim 18 [(issued claim 17)] has been amend[ed] to include the limitation in claim 23 which is allowable for the same reasons claim 3 is allowable." *Id.* at 50.

In the second Office Action, the Examiner rejected claim 18 (issued claim 17) because it did not mirror the "plurality of demodulators" language added to claim 1. *Id.* at 36–37. The applicant responded by expressly reciting a "plurality of demodulators":

> demodulating using a plurality of demodulators said processed ~~processing~~ digitized signals to generate baseband signals corresponding to said format of said input RF ~~signal~~ signals.

Id. at 28.

After this further amendment, the Examiner allowed all claims.

II. PRELIMINARY MATTERS

A. Person of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art "would have held at least a Masters of Science or higher degree in electrical engineering, as well as about four years of substantial experience designing or doing research in the area of wireless communication receivers and

integrated circuit realization of Radio Frequency, known as RF, wireless communication receivers." Pet. 18 (citing Ex. 1113 ¶ 42). Patent Owner counters that Petitioner's definition is incomplete, in that a person of ordinary skill would need "at least two years of professional experience in implementing radio-frequency circuits for television applications." PO Resp. 4–5 (citing Ex. 2013 ¶ 19). Although Patent Owner cites the testimony of its expert, Ion E. Opris, Ph.D., in support of this assertion, it does so incompletely. Dr. Opris testifies that a person of ordinary skill in the art would need "at least two years of professional experience in implementing radio-frequency circuits for television applications *or similar circuits*." Ex. 2013 ¶ 19 (emphasis added); *see* Ex. 1203, 55:23–56:4.

Experience is but one of several factors that may be considered when determining the level of ordinary skill in the art. *See, e.g.*, *In re GPAC*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (identifying factors as including the "type of problems encountered in the art," "prior art solutions to those problems," "rapidity with which innovations are made," "sophistication of the technology," and "educational level of active workers in the field"). "In a given case, every factor may not be present, and one or more factors may predominate." *Id.* Patent Owner's distinction relates to a portion of one factor (education) in a determination that involves several factors.

The significance of the level of ordinary skill in the art is the role it plays in an obviousness analysis. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966); *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir.

2001) ("[T]he level of skill in the art is a prism or lens through which a judge, jury, or the Board views the prior art and the claimed invention"); *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991) ("The importance of resolving the level of ordinary skill in the art lies in the necessity of maintaining objectivity in the obviousness inquiry"). Patent Owner does not explain persuasively how the alleged omission by Petitioner impacts the obviousness analysis.

We conclude that Petitioner's proposed definition, which is consistent with the level of skill generally reflected by the prior art of record, reflects an appropriate skill level. *See Okajima*, 261 F.3d at 1355.

B. Patent Owner's Motion to Exclude Evidence

Patent Owner moves to exclude the declaration testimony of Petitioner's expert, Dr. Hossein Hashemi, as unreliable under Federal Rules of Evidence 702 and 703, and under the reasoning of *Daubert v. Merrell Dow Pharm., Inc.*, 509 U.S. 579, 593 (1993) ("The initial question of whether expert testimony is sufficiently reliable is to be determined by the court, as part of its gatekeeper function"). Paper 36 ("Mot."), 1–3.

During his deposition, Dr. Hashemi testified that he was "assisting" in the related ITC proceeding, and that one of the television manufacturers he represented in the ITC proceeding "might have been Samsung." Ex. 2006, 14:10–20, 20:8–18. Patent Owner showed Dr. Hashemi a copy of Exhibit 2008, which appears to be a presentation dated April 15, 2011, by Behnam

Analui, "Co-founder & CEO" of Abtum, Inc.[2] *Id.* at 142, 17–25. Dr. Hashemi co-founded Abtum, Inc. "with [his] friend," and is among a "handful" of individuals who own shares in the company. *Id.* at 143:4–19.

Page 13 of Exhibit 2008 provides a list under the heading, "Abtum's customers," among which "Samsung" is included. Dr. Hashemi testified that the listed entities are not "Abtum's current customers"—that Abtum, Inc., in fact, "has no customers at all"—but that "[t]hese are all potentials." *Id.* at 144:4–17. Dr. Hashemi thereafter refused to answer questions "about Abtum's current business practices," including the specific question, "Will you tell me if Samsung, for example, is a customer that Abtum is seeking to

[2] We overrule Petitioner's objections to Exhibit 2008, made during the deposition, "to the foundation to this document in that it has not been authenticated as a business record," because "[i]ts provenance is uncertain," and to its "relevance." Ex. 2006, 145:17–25, 147:15–21. We also overrule Petitioner's objection that the questions posed to Dr. Hashemi are "beyond the scope of his direct." *Id.* at 151:4–5. Exhibit 2008 is not relied on by Patent Owner for what it discloses, but rather as a vehicle for raising questions about Dr. Hashemi's potential undisclosed bias. Although Dr. Hashemi questioned the ability of Patent Owner to find the document on the Internet, indicating his "concern . . . that this may not be available on the Internet today [and may] no longer be publicly available," he did not question the authenticity of the document, and there is no indication that Patent Owner engaged in any impropriety in finding the document. *See id.* at 147:14–18. On cross-examination, Patent Owner may legitimately explore potential biases of the witness that affect credibility. *See* Fed. R. Evid. 608(b), 611 ("Cross-examination should not go beyond the subject matter of the direct examination *and matters affecting the witness's credibility*" (emphasis added)).

acquire business from?" *Id.* at 149:2–7, 152:21–24. At no time during the deposition did Petitioner's counsel instruct Dr. Hashemi not to answer the questions posed to him. *See id.* at 153:23–24 ("I have not instructed him not to answer").

Subsequent to the deposition, Dr. Hashemi submitted a "Deposition Errata Sheet" in which he attempted to excise (small) portions of his testimony. Ex. 2010. Specifically, Dr. Hashemi attempted to "remove 'might have been Samsung'" from his sworn testimony regarding the entities he represented in the ITC proceeding because "I checked and found that I did not represent Samsung." *Id.* at 1. He also attempted to qualify a number of answers to questions posed with respect to "Vizio and Samsung"—he answered "Yes" to those questions during his sworn testimony, and attempted to change those answers with the Deposition Errata Sheet to "Yes to Visio [*sic*]. No to Samsung." *Id.* We agree with Patent Owner that such alterations are improper. Petitioner contends that it "was both his right under Fed. R. Civ. P. 30(e)(1) ('if there are changes in form or substance . . .') and arguably his obligation under Fed. R. Civ. P. 26(e)(2)" to make those alterations. Paper 52 ("Opp."), 2. We disagree.

First, we do not construe reference in Fed. R. Civ. P. 30(e)(1) to "changes in . . . substance" to provide an unfettered "right" to alter sworn testimony. Although the alterations attempted by Dr. Hashemi are significantly less extensive than those attempted in *Greenway v.*

International Paper, Co., 144 F.R.D. 322 (W.D. La. 1992), the court's broader reasoning in that case is sound:

> The purpose of Rule 30(e) is obvious. Should the reporter make a substantive error, i.e., he reported "yes" but I said "no," or a formal error, i.e., he reported the name to be "Lawrence Smith" but the proper name is "Laurence Smith," then corrections by the deponent would be in order. The Rule cannot be interpreted to allow one to alter what was said under oath. If that were the case, one could merely answer the questions with no thought at all then return home and plan artful responses. Depositions differ from interrogatories in that regard. A deposition is not a take home examination.

Greenway at 325. There is no indication that the alterations Dr. Hashemi wishes to make to his deposition testimony are a result of reporter errors. Second, Petitioner did not seek to file supplemental evidence to clarify Dr. Hashemi's sworn statements pursuant to 37 C.F.R. § 42.64(b)(2), such as in the form of a sworn declaration. *See generally Atlanta Gas Light Co. v. Bennett Regulator Guards, Inc.*, Case IPR2013-00453, slip op. at 8 n.5 (PTAB Jan. 6, 2015) (Paper 88) (noting that the Board has not adopted the Federal Rules of Civil Procedure). Accordingly, we do not give weight to Dr. Hashemi's attempt to recant his sworn testimony through a "Deposition Errata Sheet." His recantation was not made under oath and was not subject to cross-examination by Patent Owner.

An adverse inference may be drawn from a witness's refusal to answer questions at a deposition—in civil cases, this is true even when the refusal is grounded in an exercise of the Constitutional Fifth Amendment

right against self-incrimination. *See, e.g., Baxter v. Palmigiano*, 425 U.S. 308, 317–18 (1976). Patent Owner further directs our attention to *Bowling v. Hasbro, Inc.*, 2008 WL 717741 (D.R.I. Mar. 17, 2008), as an example in which a court excluded an expert's report after finding it "marred by obvious bias." Mot. 2 (quoting *Bowling* at *6). Patent Owner reasons:

> Here, Hashemi was paid by several parties, including potential customers of his separate commercial business, to specifically opine that the challenged claims are "unpatentable." He willingly obliged, and provided a declaration with "an obvious bias in favor" of the patent challengers, rather than fairly and independently addressing the claims. This biased declaration should be excluded as unreliable under [Fed. R. Evid.] 702/703 and *Daubert*.

Id. at 2–3.

Importantly, we find that Patent Owner did not exhaust avenues available to it in attempting to secure answers to its questions from Dr. Hashemi. The line of questioning involving Exhibit 2008 occurred late in the day, "well after the close of business on the east coast," and an attempt by the parties to telephone the Board during the deposition was unsuccessful. *See* Opp. 3; Ex. 2006, 154:24–155:4. The parties discussed contacting the Board the following day, and continuing the deposition the day after that, when Petitioner would make Dr. Hashemi available for further cross-examination after receiving guidance from the Board. Ex. 2006, 155:5–157:13. Rather than proceed in this fashion, Patent Owner decided to abandon the line of questioning and passed the witness for redirect: "I think

after we talked about it a bit, I think *we will withdraw our questions on this document* and just move on to redirect." *Id.* at 157: 22–25 (emphasis added).

Dr. Hashemi could have answered the questions and sought a protective order that would insulate his answers from the public record, providing the Board with the information needed to perform a focused evaluation of the credibility and reliability of specific statements in his testimony. But a significant measure of responsibility for whether Dr. Hashemi's testimony is tainted with bias lies with Patent Owner for declining to pursue the issue to a point of greater clarification. Indeed, we are limited in how strongly we can fault Petitioner for failing to submit a clarifying declaration from Dr. Hashemi, in light of Patent Owner's decision to "withdraw" the questions at issue. Because the evidence is insufficiently developed, we are similarly limited in the degree to which we can draw adverse inferences from Dr. Hashemi's refusal to answer questions, and unable to conclude, by a preponderance of the evidence, that Dr. Hashemi's testimony is tainted by an undisclosed bias.

Accordingly, we deny Patent Owner's Motion to Exclude.

C. Petitioner's Motion to File Supplemental Information

Pursuant to our authorization, Petitioner filed a Motion for Leave to File Exhibits 1213–17 as Supplemental Information, which Patent Owner opposes. Papers 83, 86. The Motion asserts that such information is

"relevant to the issues in the case, specifically the lack of nexus between any purported secondary consideration, including surprising or unexpected results." Paper 83, 1. We do not reach Patent Owner's arguments regarding secondary considerations because we conclude that Petitioner's case-in-chief is insufficient. Accordingly, we dismiss the Motion as moot.

III. ANALYSIS

A. Claim Construction

In an *inter partes* review proceeding based on a petition filed prior to November 13, 2018, the Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b) (2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Under the broadest reasonable interpretation standard, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

1. Uncontested Interpretations

Patent Owner "applies the claim constructions provided by the Board in the Institution Decision." PO Resp. 6. Because Patent Owner does not contest these interpretations and because we see no reason to depart from

them, we repeat our conclusion, but not our analysis from the Institution Decision. In the interest of consistency, we also identify applicable portions from the Final Written Decision of related IPR2014-00728 (Ex. 1204).

a. "input RF signals"

We construe "input RF signals," recited in independent claims 1 and 17, as signals that are input having a frequency between 10 kHz and 100 GHz. Dec. 6; Ex. 1204, 6–8.

b. "said input RF signals encoding information in one of a plurality of formats"

We construe this phrase, recited in independent claims 1 and 17, as requiring that each received input RF signal encode information in exactly one format. Dec. 7; Ex. 1204, 8–9.

c. "processing said digital representation of said intermediate signals in accordance with said format" and "processing said digitized signals in accordance with said format"

We construe these phrases, recited respectively in independent claims 1 and 17, as requiring processing in accordance with the exactly one format in which each received input RF signal is encoded. Dec. 8; Ex. 1204, 9.

d. "video and audio baseband signals" and "baseband signals"

We construe "baseband signal" as a signal without transmission modulation. Dec. 8; Ex. 1204, 11. Each "video and audio baseband signal" may correspond to a single signal that encodes both video and audio information without transmission modulation. Dec. 9; Ex. 1204, 12.

2. Contested Interpretations

The parties disagree on the appropriate construction of "signal processor," which is recited in independent claim 1, and "select signal," which is recited in claim 19. *See* PO Resp. 7–12. Because our Decision does not turn on the construction of these terms, we decline to resolve the disagreement as to their interpretation.

B. Patentability

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art;

(3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Arguments for patentability not raised in the Patent Owner response are waived. Paper 10, 3 ("The patent owner is cautioned that any arguments for patentability not raised in the response will be deemed waived").

1. Claims 1–3, 5, and 10–20

As noted above, claims 1–3, 5, and 10–20 have been held unpatentable by the Board in other *inter partes* review proceedings involving a different petitioner and different prior art, and the Federal Circuit has affirmed those holdings. *CF CRESPE LLC*, 670 F. App'x 707; *CF CRESPE*, 705 F. App'x 1000. "Both parties agree that those prior decisions, having been affirmed by [the Federal Circuit], are binding in this proceeding, as a matter of collateral estoppel." *MaxLinear*, 880 F.3d at 1376. The Federal Circuit's decision holding these claims unpatentable is also binding in this proceeding regardless of collateral estoppel: these claims have already been finally adjudicated as unpatentable.

Accordingly, we summarily hold that claims 1–3, 5, and 10–20 are unpatentable.

2. Claims 4, 6–9, and 21

a. Van De Plassche

Van De Plassche "relates to the reception of signals which are transmitted in accordance with different standards." Ex. 1104, 1:6–7. Figure 5 of Van De Plassche is reproduced below.

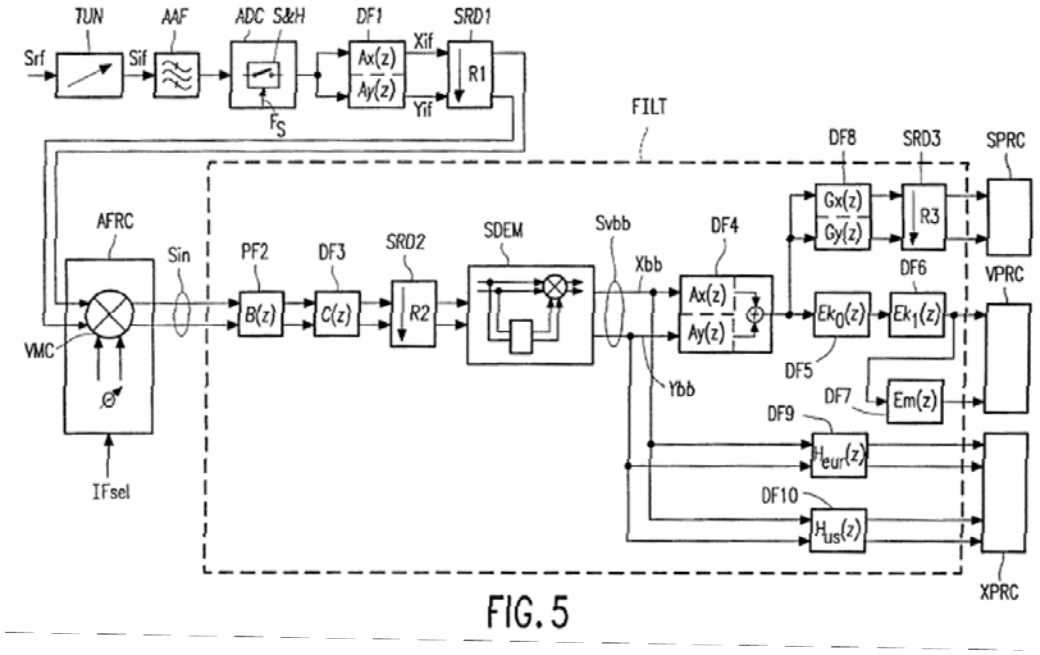


FIG. 5

Figure 5 illustrates an example of a television receiver that includes tuner TUN, anti-aliasing filter AAF, and analog-to-digital converter ADC. *Id.* at 5:1–8. Petitioner draws a correspondence between these disclosed elements and the "tuner," "anti-aliasing filter," and "analog-to-digital converter" recited in independent claim 1. Pet. 27–28, 30–31. Petitioner supports its position with testimony by Dr. Hashemi. Ex. 1113 ¶ 73.

With respect to tuner TUN, Van De Plassche discloses conversion of "reception signal Srf to an intermediate-frequency signal Sif." Ex. 1104,

3:2–3. Petitioner draws a correspondence between the respective signals and the "input RF signals" and "intermediate signals having an intermediate frequency" recited in claim 1, further observing that the information in the input RF signals "is encoded in one of a plurality of formats, including analog and digital television formats." Pet. 30 (citing Ex. 1113 ¶ 78). Petitioner further contends that, in Van De Plassche, anti-aliasing filter AAF, analog-to-digital converter ADC, and a signal processor are comprised by a channel filter identified in Petitioner's annotated version of Figure 5. *Id.* at 28, 30–31 (citing, *inter alia*, Ex. 1113 ¶¶ 73–85).

In Van De Plassche, filter arrangement FIL includes synchronous demodulator SDEM. Ex. 1104, 5:10–12. Petitioner contends that synchronous demodulator SDEM, which it characterizes as a "combined demodulator," "performs all functionality required for analog television demodulation and digital television demodulation." Pet. 31. But Petitioner does not advance a contention that synchronous demodulator SDEM teaches or suggests "a plurality of demodulators" as recited in independent claim 1.

b. Ishikawa

Ishikawa "relates generally to a receiver adaptively operable for multiple signal transmission systems, and more particularly to such a receiver adapted for receiving video signals or audio signals." Ex. 1105, 1:6–9. Figure 14 of Ishikawa is reproduced below.

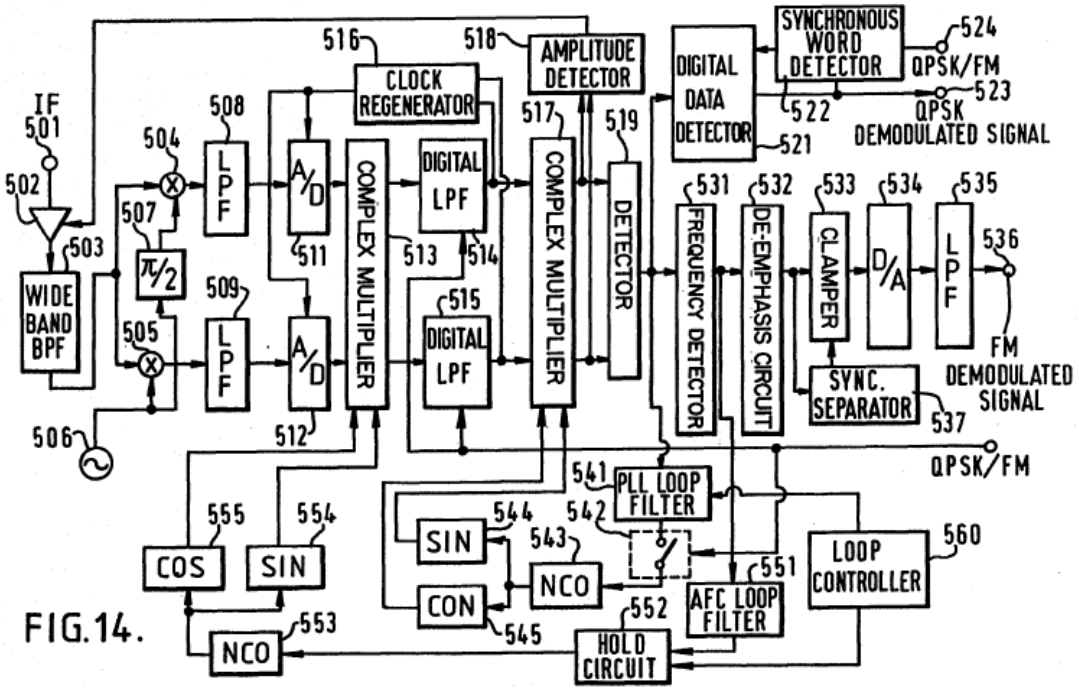


FIG.14.

Figure 14 is a block diagram of a receiver disclosed by Ishikawa. *Id.* at 16:50–51.

With an annotated version of Figure 14, Petitioner identifies a channel filter in Ishikawa's receiver that includes a signal processor, wide-band BPF 503 (presumably a bandpass filter), and A/D converter 511. Pet. 29. Petitioner further identifies through its annotation a "Demodulator (Digital Format)" that includes digital data detector 521 and synchronous word detector 522, and a "Demodulator (Analog Format)" that includes frequency detector 531, de-emphasis circuit 532, clamper 533, D/A converter 534, low-pass filter 535, and sync separator 537. *Id.* (citing Ex. 1113 ¶ 75). Petitioner thereby identifies a "plurality of demodulators." We note that Ishikawa discloses that the output of terminal 524 is "an identification flag showing

that the FM signal is being received" (Ex. 1105, 18:18–25), with demodulated data from the QPSK modulated signal output through terminal 523 (*id.* at 18:7–9).

3. Combination of Van De Plassche and Ishikawa

In addressing claim 4, Petitioner contends that one of skill in the art would have combined the teachings of Van De Plassche and Ishikawa. Pet. 27–32, 38. In addressing claims 6, 7, 9, and 21, Petitioner contends that one of skill in the art would have effected a further combination of Van De Plassche and Ishikawa with Balaban. *Id.* at 47–50. And in addressing claim 8, Petitioner contends that one of skill in the art would have combined the teachings of Van De Plassche and Ishikawa with Tsividis. *Id.* at 51–54. Because we find that Petitioner has not sufficiently shown that one of skill in the art would combine the teachings of Van De Plassche and Iskikawa, we do not address the further combination with Balaban or Tsividis.

With the correspondences identified above, Petitioner contends that Van De Plassche's synchronous demodulator "performs all functionality required for analog television demodulation and digital television demodulation." *Id.* at 31. Petitioner cites Ishikawa's disclosure of a plurality of demodulators as "an alternative structure for the functionality that already exists" in Van De Plassche, emphasizing that it does not cite Ishikawa "to replace the functionality" of Van De Plassche's synchronous demodulator. *Id.* As such, Petitioner contends that the combination of Van

De Plassche and Ishikawa neither changes the principle of operation of Van De Plassche nor renders Van De Plassche inoperable for its intended purpose. *See id.* at 32.

A significant portion of Petitioner's argument regarding the combination of Van De Plassche with Ishikawa is based on an alternative embodiment of Van De Plassche that is not shown explicitly in any drawing, but is described in the Specification's text as disclosing the possibility of reversing the order of filtering and demodulation shown in Figure 5. *See, e.g.*, Pet. 27–28. Van De Plassche discloses:

> With reference to FIG. 5, it should also be noted that any of the digital filters DF4-DF10 behind the synchronous demodulator SDEM may be replaced by a digital filter in front of the synchronous demodulator SDEM. If all the digital filters DF4-DF10 were replaced in this manner, the filter arrangement FIL would not comprise a synchronous demodulator.

Ex. 1104, 9:3–9. Petitioner also relies on this alternative embodiment in addressing a number of Patent Owner's responses. *See* Reply 8–16.

The parties agree that RF processing is an unpredictable art. *See* PO Resp. 34–35 (citing Ex. 2006, 123:19–125:15); Tr. 51:17–21, 79:22–80:12. This impacts our evaluation of whether Petitioner has established, by a preponderance of the evidence, that one of ordinary skill in the art, as we have defined such a person above, would have combined the teachings of Van De Plassche and Ishikawa in the manner proposed. Petitioner's expert, Dr. Hashemi, testified in his Declaration that "[t]he field to which the ['']585 patent is directed is the field of integrated circuits and Radio Frequency

communication receivers" and that "[t]his is a very demanding field with little margin for error that requires a high level of skill to practice." Ex. 1113 ¶ 42. Dr. Hashemi elaborated at his deposition:

> Q. I will ask you about -- if you will flip to Paragraph 42 of your declaration, there is a sentence towards the beginning of the paragraph:
>
> "This is a very demanding field with little margin for error that requires a high level of skill to practice."
>
> What do you mean when you say that there is "little margin for error"?
>
> A. It means that a simple error can stop an entire scheme from working.
>
> Q. So what would be an example of a simple error that would stop the scheme from working?
>
> A. The field of wireless communication is extremely complex. Any little piece has to be properly designed in tandem with the rest of the system. I will give you an example of something that you heard when I think Apple iPhone 4 came out. Soon people started complaining that there is not a good reception. And they found that the problem was that the that [*sic*] antenna was used in certain phone configurations, when you hold it in different positions in your hand, would not receive the signal appropriately, and the entire system would fail.
>
> So you are talking about a very complex system, and one piece of it that is just the antenna was not designed so that it could work in every single condition. So that little error led into iPhone 4 not working properly. That's an example.
>
> Q. So that little error was the signal output from the antenna; right?

A. Was not strong enough.

Q. So there was a minor variation in the signal output, and it caused the whole system to not function properly?

A. Correct.

Q. Is it fair to say that it's difficult to determine whether or not a minor signal will cause the system to operate fine or cause the whole system to fail?

A. It's not easy.

Q. So it's difficult to predict when that would happen?

A. It's difficult.

Ex. 2006, 123:19–125:15.

Patent Owner's expert, Dr. Opris, takes a similar view:[3]

The field of RF television design is an unpredictable art, and a [person of ordinary skill in the art] would not make such a modification [reversing the order of filtering and demodulation

[3] We have considered Petitioner's contention that "Dr. Opris' testimony deserves little weight" because he "was shielded from damaging information," "did not review the file wrapper," "did not analyze the differences between the art and the invention," "is a 'close acquaintance'" of one of Patent Owner's representatives, and "his testimony was evasive, non-responsive, and punctuated by rote objections of counsel over 700 times." Reply 24. On the specific point of the unpredictability of the art, in which Dr. Opris agrees in substance with Dr. Hashemi, we see no compelling reason not to credit the opinion of Dr. Opris fully.

> shown in Figure 5 of Van De Plassche] without detailed consideration of all of the signal and interconnects. A [person of ordinary skill in the art] doing so would have no reasonable expectation of success because of the unpredictability.

Ex. 2013 ¶ 74. Dr. Opris was also questioned extensively during his deposition regarding the impact of the unpredictability of the art on combining the teachings of Van De Plassche with the demodulators disclosed by Ishikawa. *See* Ex. 1203, 137:20–139:20 ("These are complicated systems and you cannot simply put together demodulator and decoders and make a system that you have a reasonable expectation of success."), 208:24–8 ("This is a very unpredictable art. You cannot simply put a system designed for something with another demodulator for something else and expect reasonable success."), 208:17–214:23 ("[I]t's not that simple to just pick a modulator and put it -- combine it with another apparatus designed for something else.") ("[T]hese are very theoretical questions. In order to provide you with an accurate answer, I would have to look at that particular system.").

The framework for an obviousness analysis established by the Supreme Court in *KSR* "presumes that the record before the time of invention would supply some reasons for narrowing the prior art universe to a 'finite number of identified predictable solutions.'" *Eisai Co. Ltd. v. Dr. Reddy's Laboratories, Ltd.*, 533 F.3d 1353, 1359 (Fed. Cir. 2008). "To the extent an art is unpredictable, . . . *KSR*'s focus on these 'identified, predictable solutions' may present a difficult hurdle because potential

solutions are less likely to be genuinely predictable." *Id.* Neither Petitioner nor Dr. Hashemi provides sufficient analysis to address the unpredictability of the art in reasoning that one of skill in the art would effect the combination of teachings proposed. Indeed, when responding to Patent Owner's argument, Petitioner evades the unpredictability of the art by focusing instead on the difficulty of physically combining prior art:

> Nothing in the [Patent Owner Response] or attached evidence refutes that Ishikawa teaches the claimed "plurality of demodulators." Instead, [Patent Owner] asserts that the art is difficult and unpredictable. Alleged *difficulty in physically combining prior art* does not prevent the claimed inventions from being rendered obvious by the teachings of the prior art as a whole. *See, e.g., In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) ("Etter's assertions that Azure cannot be incorporated in Ambrosio are basically irrelevant, the criterion being not whether the references could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole.").

Reply 10–11 (emphasis added). This is not an instance in which Patent Owner attempts to avoid obviousness "simply by a showing of some degree of unpredictability in the art" because Petitioner has not otherwise sufficiently established a reasonable probability of success. *See Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007).

At the oral hearing, Petitioner was asked to address the unpredictability of the art:

JUDGE BOUCHER: Can you address the patent owner's contention that the experts agree that the field of RF television design is an unpredictable art?

MR. SCHODDE: Absolutely. It is a very unpredictable art because it's a very difficult art. The level of skill in television design is extraordinarily high. The level of disclosure in the patent is very low. We were accused of presenting cartoons to you. Our cartoons are more detailed than anything in the patent. Ishikawa is vastly more informative and VDP [Van De Plassche] are both vastly more informative of the digital multistandard television receiver than anything in the patent. The level of skill is high. I would submit to you that you're got to measure the '585 patent against the level of skill of other artisans who preceded them which may be substantially higher than what these people demonstrated.

JUDGE BOUCHER: Normally the electrical arts are considered to be predictable arts. Not unpredictable arts. If this is, in fact, an unpredictable art, doesn't that make your obviousness argument combining the references more difficult to sustain?

MR. SCHODDE: Not at all. I would propose this to you. When Dr. Hashemi was talking about unpredictability, the examples that were being used with the antenna, for example, relate to the tuner. The high-frequency RF piece of the art, that's the part of the art that their patent just doesn't even begin to try to dive into. It says just use the prior art well known heterodyne tuner from a hundred years ago, Armstrong, and leaves it at this that. It's the high-frequency nature of RF that leads to the unpredictability because the high frequency generates stray currents and voltages all over your circuit board. That's why you down convert.

At the back end, by the time you get to the demodulator, which is where the combination is, Ishikawa with [Van De Plassche], that is fairly predictable. And how do you know it's

> predictable? Well, our expert said it was predictable. Everyone knows how to do that. You know the modulation scheme. You know the demodulator. You just connect it together. That's where the patent just assumes that you can plug and play the demodulator in to get whatever you need.

Tr. 79:22–81:3.

We acknowledge the plausibility of Petitioner's position, expressed at the oral hearing, that the unpredictability is limited to the high-frequency aspects of the art. But Petitioner provides insufficient evidence of this qualification in its briefing for us to accord it weight. *See Office Patent Trial Practice Guide*, 77 Fed. Reg. 48,756, 48,768 (Aug. 14, 2012) ("No new evidence or arguments may be presented at the oral argument"); *Level 3 Communications, LLC v. AIP Acquisition LLC*, Case IPR2013-00296, slip op. at 9–10 (PTAB Oct. 8, 2014) (Paper 42). In addition, Petitioner's argument that a distinction can be discerned between the predictability of the art at high versus lower frequencies on the basis of Dr. Hashemi's testimony is circular because it is precisely that testimony that Patent Owner challenges.

In reaching our decision, we are also influenced by the fact that a very similar combination of art was squarely before the Examiner during prosecution. That is, the Examiner expressly considered Van De Plassche, issuing rejections over Van De Plassche during prosecution, and the '585 patent itself discloses a plurality of demodulators as "(Prior Art)" in

Figure 1.[4] Petitioner's expert, Dr. Hashemi, even highlights the fact that the Examiner did not reject the claims over the combination of Van De Plassche and that admitted prior art:

> What is notable from this prosecution is the rejection that the Examiner did not make. The Examiner recognized that VDP anticipated the applicant's original idea of a multi-standard broadband television receiver that processes and demodulates [intermediate frequency] signals in the digital domain instead of the analog domain, but considered the notion of separate demodulators for each of those standards to be novel. However, the inventors themselves admitted that the prior art used separate demodulators for different standards, as shown in Fig. 1 of the '585 patent (above). Even if this was novel, which it was not, one skilled in the art would have found this element to be obvious in view of the prior art.

Ex. 1113 ¶ 68. We also asked Petitioner about such a potential rejection by the Examiner at the oral hearing:

[4] Notwithstanding the Examiner's consideration of Van De Plassche, we declined in the Institution Decision to deny the Petition under 35 U.S.C. § 325(d). Dec. 18–19. Patent Owner did not seek rehearing of that decision, but in its Response, Patent Owner "disagrees" with that decision and "reserves the right" to raise the issue on appeal to the Federal Circuit. PO Resp. 3–4. Although we do not now revisit that decision, the evidence developed during the trial causes us to reevaluate the Examiner's determination that the issued claims are patentable over Van De Plassche. *See In re: Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1377 (Fed. Cir. 2016) ("the Board has an obligation to assess the question anew after trial based on the totality of the record").

> JUDGE BOUCHER: Wouldn't it have been an easy rejection for the examiner to reject based on [Van De Plassche] plus the prior art admitted by the patent owner in Figure 1?
>
> MR. SCHODDE: I really can't speak to whether it would have been easy for the examiner or not. *Certainly I think it's a potential rejection*, but if we can't institute a petition because of a rejection -- of any possible rejection the examiner might have made that was similar that he didn't make, I'm not sure what scope that leaves for considering anything that might have been overlooked in a case which is only before you because now it's in litigation.
> Tr. 23:20–24:5 (emphasis added).

Our review of the prosecution history raises no concern that the Examiner failed to consider the information presented to the Office at that time fully and carefully, and we agree with the Examiner's reasoning.. Although we do not rest our decision on the Examiner's determination, under the specific facts before us—the unpredictability of the art and the conspicuous similarity of evidence that was before an Examiner who found the claims patentable—that determination reinforces our conclusion.

For these reasons, we conclude that Petitioner does not adequately show that one of skill in the art would have combined the teachings of Van De Plassche and Ishikawa. Accordingly, we conclude that Petitioner does not show, by a preponderance of the evidence, that claims 4, 6–9, and 21 are unpatentable under 35 U.S.C. § 103(a) over the art it relies on.

4. Relationship with Other Inter Partes Review Holdings

"Unlike district court litigation—where parties have greater freedom to revise and develop their arguments over time and in response to newly discovered material—the expedited nature of IPRs bring with it an obligation for petitioners to make their case in their petition to institute." *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016). Accordingly, we have limited our analysis herein to arguments that have support in the Petition.

After this proceeding was remanded by the Federal Circuit, we invited the parties to address a proposed procedure that would include additional briefing regarding the impact of the prior holdings that claims 1–3, 5, and 10–20 are unpatentable, and the parties filed their respective proposals. Papers 78–80. In its proposal, Petitioner suggested that Patent Owner "has waived the right to address the patentability of claims 4, 8, and 9" because "Patent Owner never separately argued for the patentability of these claims." Paper 79, 1; *see MaxLinear*, 880 F.3d at 1378 n.4 ("On remand, the Board may consider whether CRESPE has waived arguments concerning these claims."). But those claims were not challenged in the earlier proceedings that held claims 1–3, 5, and 10–20 unpatentable. Rather, those claims were only challenged in this proceeding with respect to art that was not at issue in the earlier proceedings. In advancing its contention, Petitioner effectively makes the untenable argument that Patent Owner must provide separate

reasons for the patentability of claims 4, 8, and 9, even when we determine that its own case-in-chief for those claims is insufficient.

In addition, Petitioner's proposal requests briefing on the issues of "whether claims 6, 7 and 20 materially alter the [unpatentability] analysis on which the prior [unpatentability] determinations rested." *Id.* We have considered, and deny, that request. The Federal Circuit's remand order noted that the fact that "MaxLinear was not a party to the other IPRs is . . . irrelevant since Cresta, the predecessor in interest to CRESPE, was party to the original determination." *MaxLinear*, 880 F.3d at 1377. But the Federal Circuit's order does not state or suggest that the fact that different prior art was considered in the earlier proceedings is similarly irrelevant. Indeed, we agree with Patent Owner that "[t]he Federal Circuit has not ordered the Board and the parties to start over from scratch, and certainly not with new prior art." Paper 80, 3; *see Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1367 (Fed. Cir. 2015) ("The Board may control its own proceedings, consistent with its governing statutes, regulations, and practice."). Patent Owner is correct that "[a]llowing new prior art to be considered on remand after the Final Decision on the merits would essentially be starting a new IPR proceeding." Paper 80, 9. As Patent Owner asserts, "[t]he parties and the Board would have to argue and consider new grounds, new expert testimony would have to be taken and presented, and a new Final Decision would have to be rendered." *Id.*

The Federal Circuit's instruction is limited: "We remand this case to the Board so that it may consider the patentability of the surviving disputed dependent claims 4, 6-9, and 21." *MaxLinear*, 880 F.3d at 1378. We have complied with this instruction in two ways: first, by applying the Federal Circuit's instruction regarding the collateral-estoppel impact on challenged claims 1–3, 5, and 10–20; and, second, by clarifying that Petitioner's argument regarding the combination of Van De Plassche and Ishikawa compels a conclusion that Petitioner's showing is insufficient with respect to claims 4, 6–9, and 21, independent of any conclusion previously reached with respect to independent claims 1 and 17. While the Federal Circuit includes language in its remand order that might be construed as suggesting applying different prior art in the latter analysis, 880 F.3d at 1377, the scope of this proceeding is limited by the prior art and the arguments in the Petition here. *SAS Institute*, 138 S. Ct. at 1356 ("in an inter partes review the petitioner is master of its complaint"); *see* Paper 80, 8 (Patent Owner addressing potential ambiguity of Federal Circuit's instruction).

III. ORDER

In consideration of the foregoing, it is hereby

ORDERED that, claims 1–3, 5, and 10–20 of U.S. Patent No. 7,075,585 B2 are unpatentable;

FURTHER ORDERED that, based on a preponderance of the evidence, claims 4, 6–9, and 21 of U.S. Patent No. 7,075,585 B2 have not been shown to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude (Paper 36) is *denied*;

FURTHER ORDERED that Petitioner's Motion to File Supplemental Information (Paper 83) is *dismissed*; and

FURTHER ORDERED that, because this is a final written decision, parties to this proceeding seeking judicial review of our decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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