

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LENOVO (UNITED STATES) INC. and
MOTOROLA MOBILITY LLC,
Petitioners,

v.

THETA IP, LLC,
Patent Owner.

Case IPR2023-00697
U.S. Patent No. 10,129,825

**THETA IP, LLC'S
PATENT OWNER SUR-REPLY**

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Patent Owner’s Exhibit List	
EX2001	Declaration of Corey Johanningmeier in Support of Motion for <i>Pro Hac Vice</i> Admission
EX2002	“Yannis Tsividis, Path-Breaking Researcher and Educator,” IEEE Solid State Circuits Magazine, Fall 2014
EX2003	Y. Tsividis <i>et al.</i> , “Internally Varying Analog Circuits Minimize Power Dissipation,” IEEE Circuits & Devices Magazine, Jan. 2003
EX2004	Y. Tsividis, “Signal-to-Noise Ratio, Dynamic Range, and Power Dissipation,” IEEE Solid State Circuits Magazine, Fall 2018
EX2015	Declaration of Professor Lawrence Larson, Ph.D. under 37 C.F.R. § 1.68 in support of Patent Owner’s Preliminary Response in IPR2023-00694, -00697, and -00698.
EX2006	<i>Curriculum Vitae</i> of Professor Larson
EX2007	U.S. Patent No. 5,001,776 (<i>Clark</i>)
EX2008	Scheduling Order, <i>Theta IP, LLC v. Motorola Mobility LLC, et al.</i> , No. 1:22-cv-03441 (N.D. Ill. July 6, 2023), ECF No. 60
EX2009	Excerpts of Rudolf F. Graf, <i>Modern Dictionary of Electronics</i> , Seventh Edition, 1999
EX2010	Excerpts of Phillip A. Laplante, <i>Electrical Engineering Dictionary</i> , 2000
EX2011	Excerpts of Mahmood Nahvi, Ph.D. & Joseph A. Edminister, <i>Schaum’s Outline of Theory and Problems of Electric Circuits</i> (4th ed. 2003)
EX2012	Prosecution History of U.S. Patent No. 7,010,330 B1 – Filed by Petitioners in IPR2023-00694 as EX1003
EX2013	Memorandum and Order on Claim Construction dated June 6, 2017 from <i>Theta IP, LLC v. Samsung Electronics Co. Ltd., et al.</i> , 2:16-cv-527 (E.D. Tx.) – Filed by Petitioners in IPR2023-00694 as EX1010

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EX2014	Claim Construction Order dated January 7, 2021, from <i>Theta IP, LLC v. Samsung Electronics Co. Ltd., et al.</i> , 6:20-cv-00160-ADA (W.D. Tx.) – Filed by Petitioners in IPR2023-00694 as EX1009
EX2015	Declaration of Professor Lawrence Larson, Ph.D. in support of Patent Owner's Preliminary Response in IPR2023-00697 and -00698
EX2016	Deposition Transcript of R. Jacob Baker, P.E., Ph.D
EX2017	Exhibit 5 from the Deposition of R. Jacob Baker, P.E., Ph.D – Lax Machina export of “31 PTAB trials”
EX2018	Exhibit 6 from the Deposition of R. Jacob Baker, P.E., Ph.D – Lex Machina export of “12 PTAB trials”
EX2019	Exhibit 7 from the Deposition of R. Jacob Baker, P.E., Ph.D – Baker, CMOS, Circuit Design, Layout, and Simulation (3rd Ed.)
EX2020	Wikipedia, “Envelope detector,” <i>available at</i> https://en.wikipedia.org/w/index.php?title=Envelope_detector
EX2021	[RESERVED]

I. Introduction

As shown in Response and below, Lenovo's Grounds—both relying on alleged anticipation by *Rauhala* for all elements disputed here—fail to show disclosure of elements of each challenged claim.

For every challenged claim, *Rauhala*'s detector does not detect an interferer signal strength of a received wireless signal, when it is re-tuned to detect total received signal strength of a different wireless signal. And for challenged claim 8, *Rauhala*'s DC bias current resistors do not cause an impedance to change, are not in the signal path (as the Board agreed), and do not thereby cause a bias current to be decreased.

Nearly all of Lenovo's Reply brief is made up of impermissible new argument—including completely new theories for the impedance and signal path elements of the claims. This flies in the face of regulation and precedent requiring Petitioners to state the basis of their challenges in their Petitions with specificity. 37 CFR §42.23(b).

Lenovo's new arguments and theories are no better than the original Petition arguments already rebutted in the Response and rejected by the Board. *See* IPR2023-00694, Paper 14, Decision Denying Rehearing (P.T.A.B. Feb. 7, 2024), 11, 14-15 (“Petitioner does not identify any arguments ... that were overlooked or misapprehended. Petitioner's new argument ... is not persuasive

that rehearing should be granted.”). *Rauhala* does not anticipate any of the challenged claims, under Lenovo’s old arguments, or its new arguments—to the extent that Lenovo’s new theories are considered despite being improperly first presented in Reply.

II. Claim Construction

A. “changing” or adjusting “an impedance”

The ’825 Patent, both in the specification’s teachings and in express claim language, use the term “impedance” according to its well-understood meaning, referring to an alternating/varying current parameter. When referring to DC bias currents, the ’825 Patent consistently uses “resistance” to do so. Lenovo understood this, having said exactly so in its Petition and *Original* Expert Declaration. But on Reply—having been shown the fallacies in the Petition’s arguments—Lenovo now seeks a different construction that is unsupported by the intrinsic record. As discussed below, Lenovo’s attempt to generate a dispute about dictionary definitions, or the applicability of a well-understood formula, to make up for shortcomings of its Petition art and arguments should be rejected—as inconsistent with admissions in the Petition, incorrect, and divorced from the intrinsic record.

Lenovo offers no Reply to the fact that its Petition, and Declarant, admitted that the definition of impedance “well known in the field” was “[t]he total

opposition (i.e., resistance and reactance) a circuit offers to the flow of ***alternating current*** at a given frequency.” Response, 26-28; Petition, 53; EX1002 (Baker Opening Decl.), ¶149:

An “impedance” is an extremely well-known concept in the field of electric circuits. It generally means a “[t]otal opposition that a circuit offers to the flow of ***alternating current or any other varying current*** ... [comprising] a combination of resistance, R, and reactance, X” ...

As Theta demonstrated, this is completely consistent with how Professor Tsividis uses “impedance,” in the ’825 Patent, doing so only when referring to varying signals; in contrast, Professor Tsividis uses “resistance” when referring to DC bias currents. Response, 26-32; EX2015, ¶¶52-58. Lenovo’s Reply does not address the ’825 Patent’s use of the term at all—despite the primacy of the claims and specification in any claim construction analysis. *Id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005).

Lenovo also has no Reply for the fact that its Declarant testified that he would always call a resistor alone a resistor—testimony seemingly inconsistent with Lenovo’s identification of DC bias resistors in *Rauhala* as the alleged changed impedance. EX2016, 75:4-78:7. Those resistors aren’t alleged to have an imaginary part. *Id.*, 78:1-7 (“The only way I would refer to it as complex

impedance is if it had both the real and the—or at least the imaginary part due to the reactance of a capacitor or an inductor.”).

Instead, Lenovo has had Dr. Baker change his testimony to match the attorney argument given in Reply at 3-4. EX1019, ¶¶8-10. Now, instead of the combined general definition offered at EX1002, ¶149, Lenovo/Dr. Baker wish to parse individual definitions in the Graf dictionary separately, ignoring one that mentions “alternating current” for other definitions that neither mention nor exclude it. EX1029, ¶8. This *changed* argument could and should have been included in the Petition and is improper on Reply. 37 C.F.R. §42.104(b)(3).

But more to the point, Lenovo at best conjures a disagreement between experts over dictionary definitions—which have the *least* authority among various sources used in claim construction. Conflicts such as this one over what dictionary definition is to apply must yield to intrinsic evidence such as the claims and specification. *Phillips*, 415 F.3d at 1321-22. And again, the evidence of Professor Tsvividis’ teaching via the intrinsic evidence—with examples showing the patents’ use of “impedance” only in reference to alternating or varying signal currents (and consistent use of a different term, “resistance” for direct current bias currents)—is left undisputed. Response, 28-31; EX2015, ¶¶52-58.

Lenovo’s discussion of the undisputed equation for impedance, and what happens if one or more of the terms are zero, is a complete red herring. Reply, 4;

EX1019, ¶10. Professor Larson included the equation in his declaration, and no one disputes the mathematical concept that the formula reduces to resistance R if the reactance terms are zero. EX2015, ¶54. But the distinction between use of the terms “resistance,” or “impedance,” by a POSITA and by the ’825 Patent is instead a distinction between the component carrying constant (DC) current or varying (AC) current.

Again, the ’825 Patent uses “impedance” consistent with its ordinary definition as an alternating or varying current parameter, and uses “resistance” when referring to constant bias currents. Response, 26-32; EX2015, ¶¶52-58. This is how the concept is taught in introductory EE courses, textbooks, and most importantly here, in the ’825 Patent. *Id.*

The bias current carrying resistors identified by Lenovo in *Rauhala* fail to disclose the elements of claim 8 both because the resistors carrying a DC bias current don’t carry AC current—and so aren’t what the patent refers to as an impedance (Response, 45-51)—and also because they are not in the AC varying signal path (Response, 51-54). The Board did not decide the first point, but agreed with Theta on the second point in its institution decisions here and in other proceedings, and in denying Lenovo’s rehearing request in its non-instituted IPR. Paper 10, 33-36; IPR2023-00694, Paper 14, 14-15 (P.T.A.B. Feb. 7, 2024):

On the other hand, for those claims that, like the claims before us here, require changing an *impedance* of circuits in the signal path (see claim 8 in IPR2023-00697 and claims 7 and 19 in IPR2023-00698), we concluded, as here and in our Decision, that Petitioner’s challenge based on Rauhala fails to meet the test for institution.

As further detailed in Response and below, nothing Lenovo offers in Reply corrects the deficiencies in its showing concerning the signal path elements, and the Board should not reverse its preliminary (and rehearing) rejection of Lenovo’s arguments. But Lenovo’s arguments are also wrong for the previously unaddressed reason concerning the ’825 Patent’s use of “impedance,” and can and should be rejected based on their failure to show changing of an impedance as that term is properly understood in the context of Professor Tsividis’ teachings in, and claims of, the ’825 Patent.

B. “determining” elements

This term does not need to be construed here. Theta did not propose, and is not proposing, a construction. Response, 32-33. Nor is there a dispute about the number of circuits. Theta never argued that the claims are limited to a particular number of circuits. *Id.* And Theta’s use of “one received spectrum” interchangeably with “receiving a wireless signal” is not a proposal for construction—but simply a choice of different words for the same concept. See Reply, 5.

The dispute here is about application of the plain claim language to *Rauhala*, and specifically whether a reference that admittedly says nothing about how its detector operates (other than that it needs re-tuning to detect on neighbor channels) can ***anticipate*** the claim language. The Petition does not argue obviousness of this element, and Lenovo’s Reply argument defeats itself—by admitting that *Rauhala* “does not give any details about the internal functioning of the detector,” and relying on what a POSITA would recognize as contingently possible. Reply 8-9. There is no explicit or inherent anticipatory disclosure alleged.

Because the dispute concerns non-anticipation of the claim language as written, rather than the Board’s preliminary comments on construction, Theta will address it as such below. *See also* Response, 35-45.

III. Petitioners failed their burden to prove that the challenged claims are disclosed by *Rauhala*

Rauhala is relied on only as an alleged ***anticipatory*** reference for independent claims 1, 3, and 8. Response, 4. But Lenovo’s arguments in its Petition and in Reply fail to establish the required explicit (or inherent) disclosure of multiple elements. Lenovo failed its burden to show invalidity. The gaps in Lenovo’s required proof are fatal to the Petition; the challenged claims should be upheld. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016)

(“the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable”).

A. Petitioners failed to show that *Rauhala* discloses “a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal” according to the challenged claims

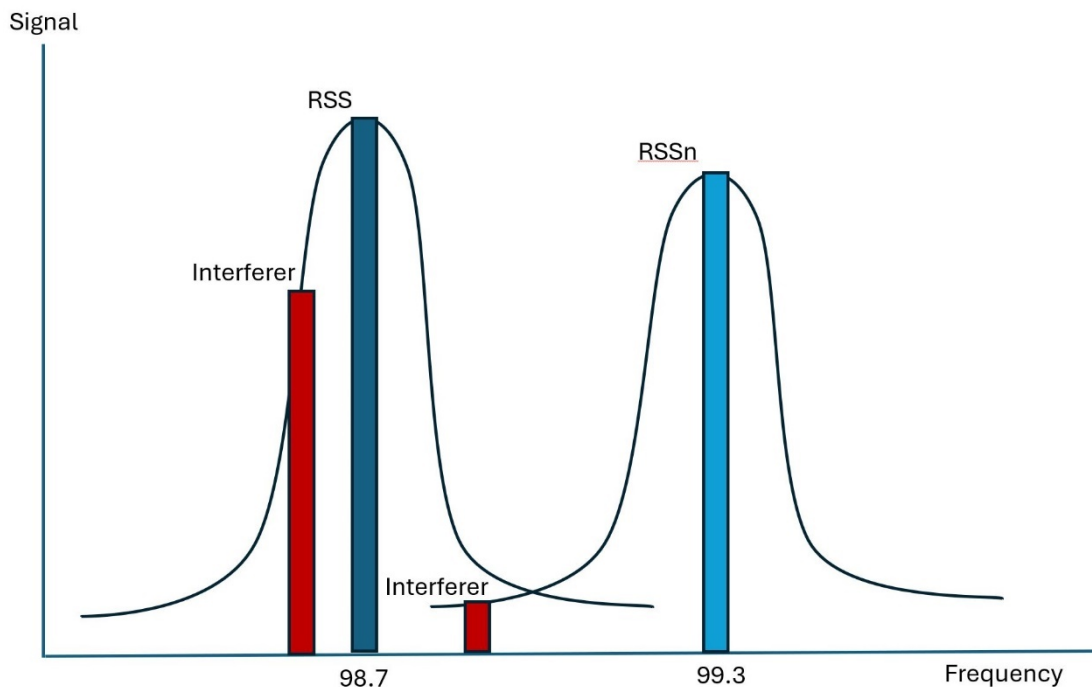
The challenged claims each require “*receiving a wireless signal having a desired signal and an interferer signal*,” as well as “a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal.” *See, e.g.*, EX1001, 12:65-13:7 (claim 1), 13:43-52 (claim 3), 16:15-24 (claim 8). Simply from reading the claim language, it is clear that the desired signal and the interferer signal are *parts of the same received wireless signal*—in other words, they are received together. Response, 35. This is also explained in the specification. *Id.*, 5:20-30 (“When a receiver is actively receiving a desired signal each block in the signal path has at its input the desired signal as well as noise and possibly interfering signals.”). *Rauhala* does not disclose (and the Petition does not show) this limitation; it discloses a different approach involving the measurement of different wireless signals. Lenovo’s attempted resort to claim construction cannot overcome this fundamental difference, nor do its other arguments in Reply, which depart from what Lenovo said in its Petition.

Lenovo's expert agreed that in order for an interferer signal to interfere, it must be received along with the desired signal. EX2017, 64:10-22, 65:7-17; *see also* EX1019, ¶¶48-49 (arguing that measurements of different channel signal strengths at different times would be "meaningless" and "unpredictable"). This is a matter of fact, not a claim construction issue.

In Reply, Lenovo does not dispute that when *Rauhala*'s receiver is re-tuned to receive a neighboring channel, its detector measures the total "signal strength on the ... neighboring channel," denoted " RSS_n ." Reply, 8. But Lenovo never acknowledges the distinction made by Theta and Professor Larson, that the total signal strength on a neighboring channel RSS_n of *Rauhala* is **not** the "interferer signal" component of the **original** received "wireless signal having a desired signal and an interferer signal." *Id.*; Response, 36-38, 40; EX2015, ¶¶70, 72.

Professor Larson provided a simple analogy using conventional FM radio that illustrates this distinction. If one tunes to station 98.7 on the radio, one can hear a desired signal, for example, music, and sometimes one can also hear interference, for example, static. One could even measure the strength of both these signal components—within the wireless signal received while tuned to station 98.7. But if instead, one then tunes to station 99.3, one hears **a different signal**, with a different signal strength and different interference component. Determining the total signal strength while tuned to station 99.3 is not determining

the strength of the interferer signal component of the total signal that was received while tuned to station 98.7. *Id.* A demonstrative picture illustrating this analogy in less words is given below, showing RSS and two interferer components for the wireless signal around one radio station tuning, and RSS_n for an imagined neighboring station tuning:



RSS_n is not an interferer signal component of the signal received when tuned to 98.7, as Professor Larson explained. EX2015, ¶¶70, 72. No interferer signal component of that received wireless signal is *ever* determined by *Rauhala's* detector. *Id.*

Theta provided careful and well-supported explanation of what *Rauhala* actually discloses—a single detector that can detect a threshold for a received

signal strength RSS on one channel or another. Response, 35-37; EX1004, [0014] (“[d]etector DET provides information about the signal strength (RSS) **on the channel to which the receiver is tuned**”), [0017] (“Signal a from the receiver’s tuner control indicates the channel”). What Lenovo said prior to its Reply brief was consistent with this understanding. See, e.g., Petition, 23 (“a ‘detector DET’ configured to provide ‘an indication about **either** the receive channel signal strength RSS **or** ... RSS_n [that] stands for the signal strength of the neighboring channel.”); EX1002, ¶83 (same, because copied verbatim).

In Reply, Lenovo/Dr. Baker now change their position and argue that *Rauhala* does not “necessarily” “only provide one signal strength indication at any given time.” Reply, 7. But this is just wrong, *Rauhala discloses only that*. Separate indications at separate times is the plain English meaning of the words “either [RSS] ... or [RSS_n]” and the teaching that the “[d]etector DET provides information about the signal strength (RSS) on the channel to which the receiver is tuned.” EX1004, [0014], [0017]. *Rauhala* discloses a single detector that it describes as detecting a signal strength on “either” one channel, “or” another at one time. *Id.*; EX2015, ¶¶69-72. What is disclosed in, and hence what could be **anticipated** by, *Rauhala*, is at most these separate detections of separate total channel signal strengths.

Lenovo is not aided in its anticipation argument by ambiguity about what might be in the “DET” box of *Rauhala*. In fact, its argument that a POSITA would simply know, because Professor Larson’s explanation of what is disclosed would be “impractical,” proves that Lenovo has failed show explicit (or inherent) disclosure for anticipation. Reply 8-9. Either Professor Larson’s assumptions are correct, and *Rauhala* does not disclose simultaneous determinations, or other assumptions are possible, and *Rauhala* doesn’t disclose simultaneous determinations explicitly or inherently. *Id.*

There is no requirement that *Rauhala* disclose a good solution, and Lenovo cannot prove anticipation by arguing that the separate channel detections (*i.e.*, what was actually disclosed by *Rauhala*) wouldn’t work as well as what Lenovo wishes that *Rauhala* disclosed. *Id.*, 9; EX1019, ¶¶48-49. It is indeed true that “determining a signal strength of the interferer signal and ... determining a signal strength of the desired signal,” within a single received “wireless signal” as claimed in the ’825 Patent, is a better invention than *Rauhala*’s “a ‘detector DET’ configured to provide ‘an indication about **either** the receive channel signal strength RSS **or** ... RSS_n [that] stands for the signal strength of the neighboring channel.” Petition, 23 (quoting *Rauhala*). On this the experts agree. EX2015, ¶70; EX1019, ¶48. It does not follow that *Rauhala* must then **anticipate** the better

solution of the claims because a POSITA might understand that *Rauhala*'s teaching was impractical. Reply, 9.

Lenovo's Reply excerpts from a discussion in *Rauhala*, asserting that the thresholds triggering control signals in "control unit 42" can meet two conditions "at the same time." Reply, 8-9 (citing EX1004, [0017]). But this does not require that the **determination** of RSS and RSS_n to have happened simultaneously—indeed the same paragraph begins by teaching that they **did not**. EX1004, [0017] ("A control unit 42 receives from detector DET an indication about **either** the receive channel signal strength RSS **or** the strength of [RSS_n]"). All that logically would be required is that the control unit store the result of one threshold crossing test until the other is also available. Again, ambiguity and the need for guessing and inference here points away from anticipatory disclosure.

And again, as Theta pointed out in Response and above, re-tuning and determining the total signal strength of a neighboring channel is not the same as determining the interferer component of the wireless signal received whilst tuned to a first channel. Response, 35-40; EX2015, ¶¶69-72.

There is simply no teaching or suggestion in *Rauhala* of the elements requiring "receiving a wireless signal having a desired signal and an interferer signal," and then "determining a signal strength of the interferer signal and ... determining a signal strength of the desired signal" within that received wireless

signal. These elements are included directly or by dependency in every challenged claim. Petitioners' Grounds, each of which cite to and rely only on *Rauhala* for alleged anticipatory disclosure of these elements, must fail. *See, e.g., In re Smith Int'l, Inc.*, 871 F.3d 1375, 1381 (Fed. Cir. 2017) (all claim elements must be shown). *Rauhala* does not disclose every element and cannot anticipate, and all challenged claims should be upheld.

B. Petitioners failed to show that *Rauhala* discloses varying “an impedance” according to challenged claim 8

For all of the reasons given in Theta's Response (at 26-32, 45-51) and in Section II.A above, the DC bias current resistors identified by Lenovo in *Rauhala* are not “an impedance” as disclosed and claimed in the '825 Patent—because impedance is used and understood therein to refer to a parameter of alternating current signal-carrying components, which those resistors undisputedly are not. *See also* EX2015, ¶¶52-58, 64-68.

Lenovo's new discussion of its contrary interpretation of “impedance” in Reply (at 3-5, 10-11), notably ***completely ignores and never mentions*** the '825 Patent. *See also* EX1019, ¶¶7-12. Lenovo gives no rebuttal to the fact that Professor Tsividis uses “impedance” when referring to AC signal currents, and “resistance” when referring to DC bias currents. Response, 28-29. And critically, Lenovo has no rebuttal for the fact that the '825 Patent discloses and claims “bias

current” adjustment and “impedance scaling” as distinct controls. *Id.*, 29-30. Lenovo’s interpretation of changing bias current resistors as changing an impedance collapses the distinction between varying “a bias current and an impedance,” in a claim that requires both—improperly vitiating an element. EX1001, 16:10-48 (claim 8).

For all these reasons, the alleged impedance that Lenovo pointed to in the Petition—“R2 and/or R3 constituting the impedance”—is not an impedance per the claims of the ’825 Patent. Petition, 45-46, 49.

1. Lenovo’s new argument must be rejected

In Reply, Lenovo launched an *entirely new argument*, alleging for the first time that “output impedances of the transistors” elsewhere in the circuit are now the alleged changed impedance—not “R2 and/or R3” as in the Petition. Reply, 12-15. This is both wrong, and improper.

This argument could have, and should have, been raised in the Petition—which used the “well known” definition of impedance as “total opposition (i.e., resistance and reactance) a circuit offers to the flow of alternating current at a given frequency.” Petition, 53. Lenovo cannot claim surprise that impedance could be interpreted per the very definition Lenovo advanced, nor are its new theories “responsive” to any “new construction.” *Cf.* Reply, 4-5.

Lenovo's new argument is improperly presented for the first time in Reply testimony. 37 CFR § 42.23(b); Consolidated Trial Practice Guide (2019), 74 ("a reply or sur-reply that raises a new issue or belatedly presents evidence may not be considered"). Lenovo may not use Reply to add in new evidence that could have been included in its Petition, and all such evidence should be excluded. *See, e.g., Id.; Toshiba Corp. v. Optical Devices, LLC*, IPR2014-01447, Paper 34, pp. 44–47 (P.T.A.B. Mar. 9, 2016) ("[Section 42.23(b)], however, does not authorize or otherwise provide a means for supplementing the evidence of record."); *Toyota Motor Corp. v. Am. Vehicular Scis. LLC*, IPR2013-00424, Paper 50, p. 21 (P.T.A.B. Jan. 12, 2015) ("[Petitioner] cannot rely belatedly on this evidence in its Reply ... to make up for the deficiencies in its Petition.").

The rules concerning sur-reply prevent Theta from putting on rebuttal testimony here. 37 CFR §42.23(b) ("sur-reply ... may not be accompanied by new evidence other than ... the cross-examination of any reply witness"). Lenovo's late presentation of this argument on Reply thus raises fundamental fairness and due process concerns. *See, e.g., Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1080 (Fed. Cir. 2015) ("A patent owner ...is undoubtedly entitled to notice of and a fair opportunity to meet the grounds of rejection"); *see also Dell v. Accelaron*, 818 F.3d 1293, 1301 (Fed. Cir. 2016) (reversing Board for relying on "a factual assertion introduced into the proceeding only at oral argument, after

[Patent Owner] could meaningfully respond”). The Board should not consider Lenovo’s improper new and changed argument, or the Reply declaration introducing it. EX1019, ¶¶14-17.

But the new argument is also fatally flawed and must be rejected on its merits, because the incidental changes that occur elsewhere in the circuit, by operation of Ohm’s law when a bias current is changed, are not varying an impedance according to claim 8. *See, e.g.*, EX1001, 16:10-48 (claim 8) (“causing ... an impedance to vary in one or more of the plurality of circuits in the receiver signal path” and “causing: ... an impedance of the one or more of the plurality of circuits in the receiver signal path ... to be increased”). Lenovo’s new interpretation completely vitiates these elements, asserting that they are satisfied by the incidental, Ohm’s law results of changing a separate bias current control.

As detailed in Theta’s Response and agreed by Lenovo, the ’825 Patent describes three types of dynamic adjustment—bias current control, impedance variation, and gain control. Response, 5-7; EX2015, ¶¶43-45:

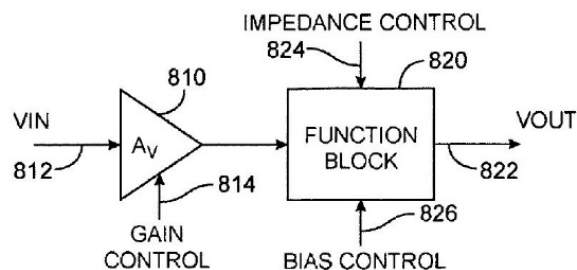
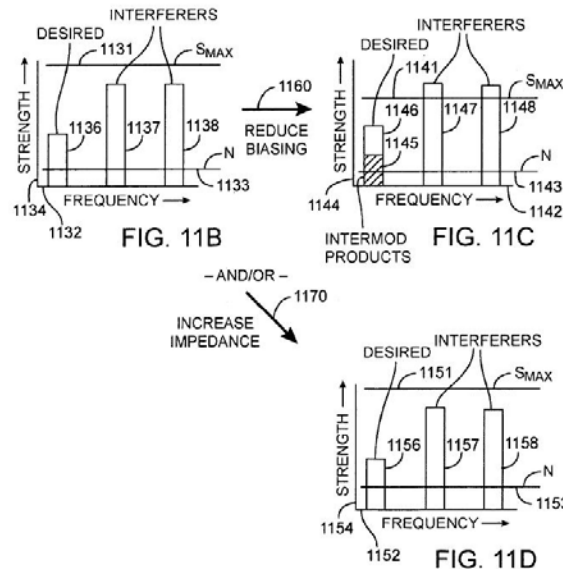


FIG. 8A

See also Petition, 6-9. As shown, these three adjustments are taught, and claimed, as separate controls. See, e.g., EX1001, Abstract (“the dynamic variations may include setting any of the gain, bias current, or impedance parameters”), Fig. 11 (“reduce biasing” “and/or” “increase impedance”):



If a bias current change that indirectly resulted in a changed component output impedance elsewhere in the circuit were enough to meet the claim elements, the additional impedance variation elements of claim 8 would be vitiated and make no sense. It was known and undisputed that a new setting of a bias or supply current will affect the overall circuit—and that the component parameters may change throughout. This is because of one of the most basic principles of electrical circuits, Ohm’s law, where Resistance R is the Voltage V divided by the Current I . See https://en.wikipedia.org/wiki/Ohm%27s_law (“ $V = IR$ ” or “ $R = V/I$ ”); EX1018, 85:19-86:14; EX1019, ¶16 (“ $r_o = V_A/I_C$ ”).

These parameters are proportional to each other and changing one of the Ohm's law parameters affects the others. Changing a current through a transistor changes its output impedance—this is no admission or secret, as seen from Lenovo's citation to textbooks. But there is and was an understood difference between 1) directly changing the value of a resistor or capacitor component or a current source, and 2) the indirect, down-circuit effects that such a change has via operation of Ohm's law. If direct adjustment is treated as indistinguishable from indirect effects, it becomes impossible to effectively teach about or explain electric circuits. Professor Tsividis taught, and claimed, three separate controls for voltage (gain), (bias) current, and impedance—and a POSITA would not be confused by the background knowledge that these parameters are related such that changing one affects the value of others.

Bias current reducing in the '825 Patent is a different control than impedance scaling—even though impedance scaling affects the bias current, and vice versa. *See, e.g.*, EX1001, 1:62-67 (“bias currents are reduced ..., impedances are scaled **thus reducing** required drive and other bias currents”), 3:28-31, 6:20-23. A POSITA would differentiate between impedance varying—by directly changing the impedance of a signal path component such as an attenuator circuit—and transistor output impedances that may change as an indirect result of changing a bias current. The alternative would be to believe, as Lenovo now

suggests, that one of the most respected Professors in the field of transistor-based RF circuits somehow wrote a patent that is rendered unintelligible and invalid by operation of Ohm's law.

Such an absurd result is easily rejected. Professor Tsividis in the '825 Patent says changing a current when he means changing a current and says changing an impedance when he means changing an impedance. That changing one can indirectly cause the other to change is uncontroversial and assumed. *See, e.g.*, EX1001, 1:62-67. It is also very much not the point of teaching each of the three variables in Ohm's law—voltage (gain), impedance, and (bias) current—as separate dynamic controls in a circuit.

Professor Tsividis' teaching in the '825 Patent carefully distinguishes between dynamic impedance controls and bias current controls. *See e.g., id.*, 8:20-22, 8:39-48, 11:38-42 (“under the control of variable gains, impedances, biasing, or combination thereof”). Claim 8, unlike claim 3, has elements requiring both bias current changes and impedance changes. *Id.*, 16:10-48. Claim 8 also makes clear by its own language that “causing” the bias current change in element (i) and “causing” the impedance change in element (ii) are separate, direct changes. *Id.* When claim 8 instead refers to an indirect effect, it instead uses the language “thereby causing.” *Id.* (“causing” ... “an impedance ... to be increased, thereby causing a drive current ... to be decreased.”).

Lenovo's new Reply argument completely vitiates the impedance variation elements by alleging that they can be met by the indirect, Ohm's law effects of changing a bias current. That is wrong, contrary to the teachings of the '825 patent, and this argument should be rejected on its lack of merit—if not for the unfairness and procedural violation of being stated nowhere in the Petition and only brought on Reply.

In sum, Petitioners' *Rauhala* arguments are facially deficient, as there is simply no teaching in *Rauhala* of the claimed changing of "an impedance." Lenovo has not met its burden and its Grounds, each of which rely only on alleged anticipation by *Rauhala* for the elements of challenged claim 8, must fail.

C. Petitioners failed to show that *Rauhala* discloses varying an impedance "in the receiver signal path" according to challenged claim 8

In its Institution Decision, the Board found that Lenovo had no reasonable likelihood of success in showing the "receiver signal path" elements anticipated by *Rauhala*. Paper 10, 35-36; Response 51-54. In the related proceeding concerning the parent '330 Patent, where all challenged claims had this element, the Board's same finding resulted in denial of institution. IPR2023-00694, Paper 10, 19-20. Lenovo asked for rehearing, and the Board again rejected Lenovo's arguments concerning "signal path," clarifying along the way that there was no reasonable likelihood of success found on the preliminary record here for claim 8

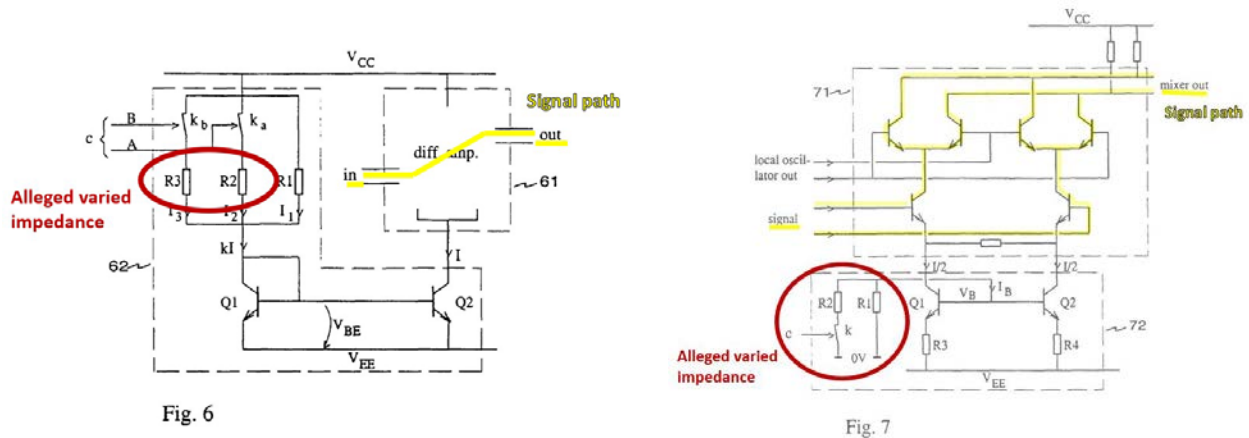
as well. *Id.*, Paper 14, 14-15.

In Reply, Lenovo offers nine pages of new argument—all of which has been raised in its prior rehearing request and rejected by the Board, or should have been raised in the Petition and should be rejected now.

Lenovo’s main new argument (Reply 15-23) is just its rejected argument from the ’330 Patent rehearing request—transposed from Figure 7 of *Rauhala* to Figure 6 in a transparent effort to dodge the Board’s prior rejection of the theory. *Compare* IPR2023-00694, Paper 11, 3 (“the Entirety of FIG. 7 is a Mixer within the Signal Path”), 4 (“control circuit 72 must be part of the mixer itself”), 4 (“control signals ... annotated in green, and *Rauhala*’s mixers annotated in red”) *with* Reply, 18 (“The entirety of the circuitry shown in *Rauhala*’s FIG. 6 is an ... amplifier ... which is in the signal path”); 19 (“control circuit 62 must be part of the amplifier itself”), 19 (“control signals ... annotated in green, and *Rauhala*’s amplifiers annotated in blue”).

The Board already determined and explained why this argument was contrary to the credible evidence, for both “*Rauhala*’s” “Figures 6 and 7.” *See, e.g.*, IPR2023-00694, Paper 14, 8-11 (“We do not agree [with Lenovo] and find Dr. Larson’s testimony credible [and] supported by the record”). As the Board found, “The boxes drawn around those units and their descriptions by *Rauhala* confirm that they are separate.” *Id.* at 10 (*citing* EX1004, [0023], Fig. 7). This is

as true for Figure 6 as for Figure 7. See, e.g., *id.*; EX2015, ¶¶62-63; Response, 52-53:



See also EX1004, [0021] (“In this example the **linear unit 61 is an amplifier** realized by a differential pair. The supply current **control circuit 62** comprises...”), [0023] (“In this case, the **linear unit 71 is an analog multiplier used as a mixer** ... The **control circuit 72** for the supply current I of the analog multiplier 71 comprises...”). Lenovo fails to identify anything about Figure 6 that would change the Board’s rejection citing primarily Figure 7. Theta explained in Response why **both** figures fail to disclose the “signal path” element. Response, 51-54.

To its already raised and rejected argument, Lenovo adds a logical fallacy, suggesting that *Rauhala*’s control circuit 62 must be part of the amplifier 61 because it is necessary for the amplifier to function. Reply, 15, 20-23. Simple

analogies show why this argument must fail. Gasoline, and a gas tank, are not deemed part of the engine of a car, despite being necessary to its operation. A wall switch, and an electrical outlet, are not deemed part of a lamp, even if required for the lamp to function in a room. Similarly, a control circuit providing supply current to an amplifier doesn't become part of an amplifier—or part of the signal path through an amplifier—just because an amplifier needs power to amplify.

Finally, Lenovo repeats its new indirect effects argument (discussed in Section III.B.1 above) under the heading of “signal path.” Reply 16, 23. But as discussed above, any transistor output impedance change that is indirectly caused by changing a bias current cannot be the direct impedance variation taught and claimed as a separate element in the '825 Patent.

Again for this element, Petitioners' *Rauhala* arguments are facially deficient, as there is simply no teaching in *Rauhala* of the claimed changing of an impedance in the “signal path.” Lenovo has not met its burden and its Grounds, each of which rely only on alleged anticipation by *Rauhala* for the elements of challenged claim 8, must fail.

D. Petitioners failed to show that *Rauhala* discloses increasing an impedance to decrease a “drive current” according to claim 8

With respect to the “drive current” element of claim 8, Lenovo’s Reply contains three pages of new claim construction argument, which could have and should have been included in the Petition and is improper on Reply. 37 C.F.R. §42.104(b). Lenovo had access to the prosecution history of the parent ’330 Patent, and the distinction made therein between bias currents and switching or drive currents. Response 55-58. The ’825 Patent clearly explains what a drive current is. *Id.*; EX1001, 5:50-62, Fig. 6.

In the Petition, Lenovo/Dr. Baker argued that “bias current” kI “corresponds to the recited ‘drive current.’” Response, 55. Theta pointed out the prosecution history distinction, and patent disclosure, that Lenovo ignored. *Id.*, 55-58. Professor Larson testified on cross-examination, consistently with the disclosures in the patent, that a drive current is “an AC current supplied by a source to drive a load”—and consistently with the distinction in the prosecution history, that a drive current is typically varying while a bias current is constant. EX1018, 144:18-145:14.

In Reply, Lenovo/Dr. Baker changed from arguing that a bias current “corresponds to” a drive current to arguing that one “becomes” the other when a circuit needs maximum power. Reply, 26. This is nonsense, and completely

without support in the intrinsic evidence or testimony. And Lenovo doesn't bother to explain—because it would be impossible to do so—how a bias current that only “becomes” a drive current under maximum load could result in a drive current being “decreased” as required by claim 8. *Id.*

The Board should disregard Lenovo's shifting, unsupported, and frankly confused argument, and deny the challenge to claim 8 for failing to show disclosure of its “drive current” element, as well as for the reasons given in each of the sections above.

IV. Conclusion

As detailed above, and in Theta's Response, Lenovo failed its burden to show anticipation by *Rauhala* of elements of all challenged claims. The detector of the *Rauhala* reference—which must be re-tuned to detect a second channel's signal strength—cannot anticipate determining a desired signal strength and an interferer signal strength of the original received wireless signal. EX1019, ¶48 (“the comparison ... would be meaningless”). And Lenovo's improper new and shifting arguments about elements of claim 8 relating to changing an “impedance” fail as well—for all of the many reasons discussed above in Sections III.B, C, and D, including those already agreed with by the Board at institution and on consideration of rehearing in Lenovo's IPR on Theta's parent '330 Patent.

For all of these reasons, the challenged claims must be upheld.

Dated: June 11, 2024

Respectfully submitted,

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37 C.F.R. §42.24(d) CERTIFICATION

The undersigned hereby certifies that this submission, excluding the tables of contents, certificate of word count, exhibit list, and certificate of service, contains 5,544 words, as determined using the standard word counting feature of the Microsoft Word program.

Dated: June 11, 2024

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CERTIFICATE OF SERVICE

Petitioners have consented to e-mail service in this proceeding. Pursuant to 37 C.F.R. §42.6, the undersigned certifies that on June 11, 2024, a copy of the foregoing document was served by email upon the following counsel at the below email addresses:

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