

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 IPR2023-00698
U.S. Patent No. 10,524,202

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

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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
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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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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”
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EX2020	Wikipedia, “Envelope detector,” <i>available at</i> https://en.wikipedia.org/w/index.php?title=Envelope_detector
EX2021	Wikipedia, “Signal-to-interference-plus-noise ratio,” <i>available at</i> https://en.wikipedia.org/w/index.php?title=Signal-to-interference-plus-noise_ratio

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 multiple 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.

For every challenged claim, *Rauhala*'s black box and mention of "SNR" fails to disclose the required comparing of "desired" and "interferer" components of a signal—including because the alleged neighbor channel signal strength is neither the "interferer" component of the received signal nor disclosed to be part of any performed comparison.

And for challenged claims, 7, 8, and 19, *Rauhala*'s DC bias current resistors do not cause an impedance to change, and are not in the signal path—as the Board already agreed and then confirmed.

Lenovo failed to meet its burden of proof and *Rauhala* does not anticipate any of the challenged claims.

II. Claim Construction

A. “changing” or adjusting “an impedance”

Lenovo offers no Reply to the fact that it, and its Declarant, admitted in the Petition 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, 29-31; Petition, 41; EX1002, ¶134; IPR2023-00697, EX1002, ¶149.

As Theta demonstrated, this is completely consistent with how Professor Tsividis uses “impedance,” in the ’202 Patent, doing so only when referring to varying signals; in contrast, when referring to DC bias currents, the term “resistance” is used instead. Response, 29-35; EX2015, ¶¶52-58. Lenovo’s Reply does not address the ’202 Patent’s actual use of the term “impedance” 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 to its Declarant’s testimony 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 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 and general definition offered at EX1002, ¶134 and IPR2023-00697, 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, and is resolved by looking to the intrinsic evidence. *Phillips*, 415 F.3d at 1321-22. And again, the evidence of Professor Tsvidis’ teaching via the intrinsic evidence—with examples showing the patents’ use of “impedance” only in reference to alternating or varying signal currents—is left undisputed. Response, 31-35; EX2015, ¶¶52-58.

The ’202 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, 29-35; EX2015, ¶¶52-58. This is how the

concept is taught in introductory EE courses, textbooks, and most importantly here, in the '202 Patent. *Id.*

The bias current carrying resistors identified by Lenovo in *Rauhala* fail to disclose the elements of claims 7, 8, and 19 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, 58-63)—and also because they are not in the AC varying signal path (Response, 54-57). 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, 25-26; 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 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. Lenovo's arguments are also wrong for the previously unaddressed reason concerning the '202 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 ’202 Patent.

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 each challenged claim. Response, 6. But Lenovo’s Petition and Reply arguments fail to establish the required explicit (or inherent) disclosure of multiple elements. The gaps in Lenovo’s required proof are fatal, and the challenged claims should be upheld. *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016).

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

The challenged claims each require “***receiving a signal comprising a desired signal and an interferer signal,***” as well as “a circuit for determining a signal strength of the interferer signal” and “determining a signal strength of the desired signal.” See, e.g., EX1001, 14:3-6 (claim 7), 14:39-42 (claim 11), 15:16-19 (claim 13), 17:25-28 (claim 19). Simply from reading the claim language, the desired signal and the interferer signal are ***parts of the same received wireless signal***—in other words, they are received together. Response, 37. This is also explained in the specification. *Id.*, 5:22-32 (“When a receiver is actively receiving

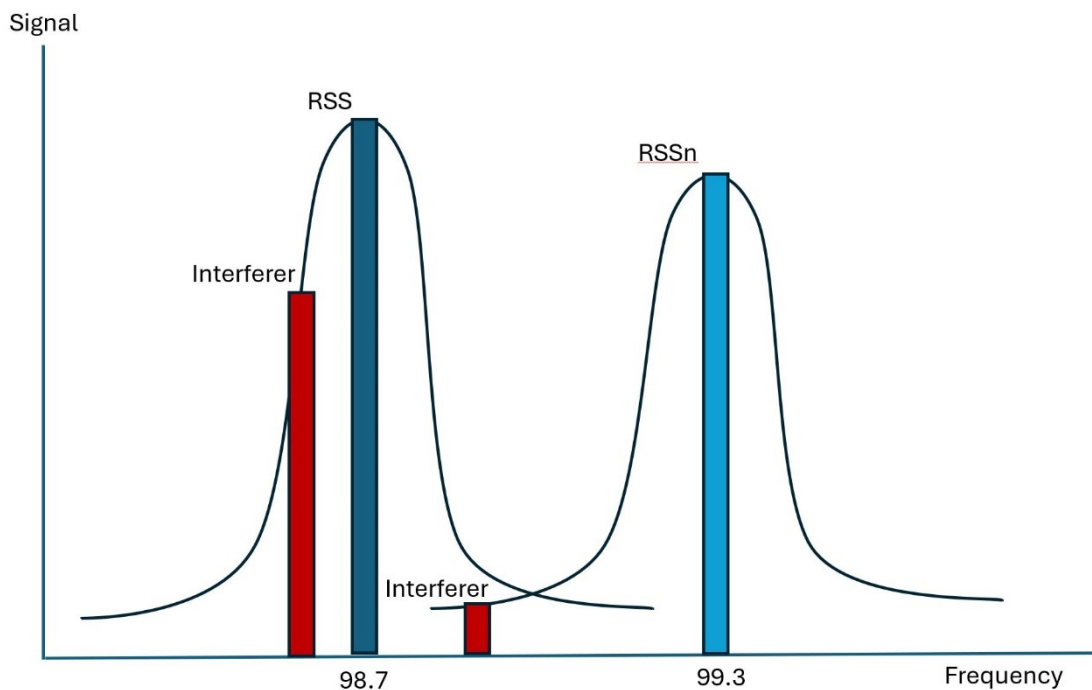
a desired signal each block in the signal path has at its input the desired signal as well as noise and possibly interfering signals.”). *Rauhala* does not disclose this limitation; it discloses a different approach involving the measurement of different wireless signals. This fundamental difference is not overcome by Lenovo’s attempted resort to claim construction or its new arguments on Reply.

Lenovo’s expert agreed that 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”).

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, 38-41, 43; 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, 37-39; 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, 21 (“**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 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 7-9. 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 the interferer signal strength” and “determining the desired signal strength,” within a single received wireless “signal” as claimed in the ’202 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, 21 (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 Reply excerpts from a discussion in *Rauhala*, asserting that that the thresholds triggering control signals in “control unit 42” can meet two conditions “at the same time.” Reply, 8 (citing EX1004, [0017]). But this does not require that the **determination** of RSS and RSS_n 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.

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, 37-43; 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.

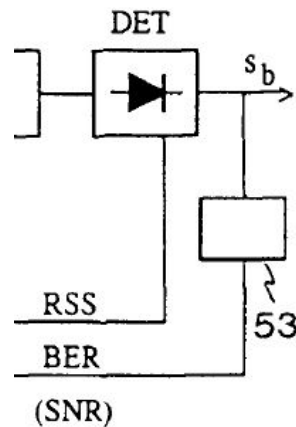
B. Petitioners failed to show that *Rauhala* discloses “comparing the strength of the desired signal relative to the strength of the interferer signal” according to the challenged claims

Every challenged claim requires “comparing the strength of the desired signal relative to the strength of the interferer signal.” Response, 47. The desired signal strength and the interferer signal strength are those components of the received “wireless signal” determined in the claims’ immediately preceding limitations. *See, e.g.,* EX1001, 14:3-8 (claim 7); *see also* Reply 11 (acknowledging that what must be compared is “the strength of the desired signal relative to the strength of the interferer signal.”

Rauhala fails to disclose (expressly or inherently) this recited comparison—for many reasons Theta explained in detail, and that Lenovo either ignores or mischaracterizes in Reply. Response, 48-54; Reply, 9-12.

For example, Lenovo has no Reply to the fact that the things it alleges to be the compared signal strengths (RSS and RSS_n), **are not even inputs** to the block

of *Rauhala* alleged to calculate the SNR (black box “53”). Response, 48-49 (citing EX1004, Fig. 5):



Lenovo also has no Reply to Professor Larson’s testimony, and its own expert’s concession, that SNR can be derived from a bit or block error rate (*e.g.*, BER), a method that does not involve considering the strength of any signal components at all. Response, 50-51; EX2015, ¶¶76-78. While RSS and RSS_n do not even go into the block of *Rauhala* that Lenovo alleged to calculate the SNR (black box “53” above), signal s_b does. And the BER—a measure of errors on signal s_b —is an output of the block. A POSITA trying to guess what *Rauhala*’s “unit 53” is doing would naturally conclude it calculates BER from the received signal input s_b , and alternatively derives “(SNR)” from the measured bit error rate. *Id.* Again, deriving SNR from the measured bit error rate does not involve

considering the strength of any signal components. *Id.*¹

Lenovo argued anticipation, and simply concluding that one of several options might be done by a black box is **not** anticipation by the reference of a missing limitation. “A claim is anticipated if each and every element as set forth in the claim is found, either expressly or inherently, in a single prior art reference.” *Arbutus Biopharma Corporation v. ModernaTX, Inc.*, 65 F.4th 656, 662 (Fed. Cir. 2023); MPEP §2131.² Inherent disclosure requires something be “necessarily present”—not that it could be one of several undisclosed possible

¹ Lenovo does not say otherwise, opting instead to disparage Professor Larson’s and Theta’s points as “quibbling” or “irrelevant.” Reply 10-11. Not so.

² Lenovo invites error to the extent it suggests a Federal Circuit panel majority’s “reasonably understand or infer from ... teaching” language softens the requirement that every limitation be “disclosed in that single reference.” Reply, 12. It does not. *See, e.g., Genentech, Inc. v Hospira, Inc.*, 946 F.3d 1333, 1347 (Fed. Cir. 2020) (Newman, J., dissenting); *VirnetX Inc. v. Apple Inc.*, 2023 WL 6933812, *4 (Fed. Cir. Oct. 20, 2023) (“The core inquiry is whether a person of ordinary skill in the art would understand the reference to disclose the limitation in question, rather than merely ‘envisage’ a limitation that is in fact missing from the reference.”).

approaches. *Id.*

The cited Signal to Noise Ratio “SNR” cannot anticipate comparison according to the claims because the claimed step of “comparing the strength of the desired signal relative to the strength of the interferer signal” was not performed in creating it. Reply 11.

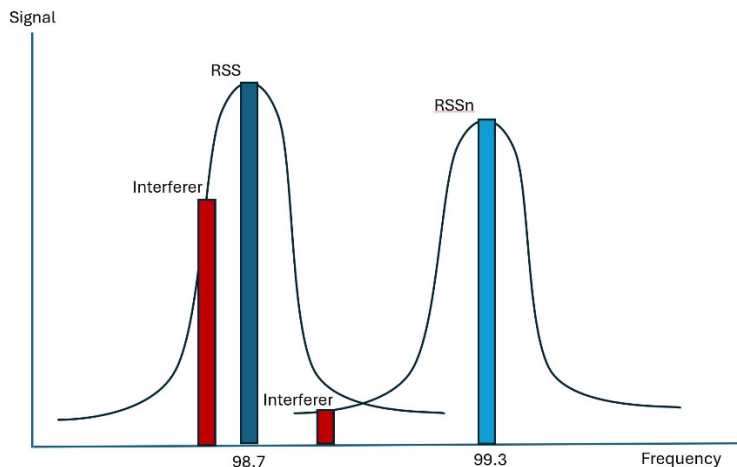
A bit error rate calculated from the received signal and used to derive the SNR does not disclose performance of the claimed step.

And strength of “a signal on a neighboring channel” (*id.*) is not the noise in SNR, nor strength of “the interferer signal” component of the received “wireless signal”; the claimed step is not disclosed. Response, 51-54. Neighboring channel signal strength RSS_n is not “the interferer signal” component of the received “wireless signal,” and so the claimed “comparing ... to the strength of the interferer signal” is not disclosed. *Id.*

Lenovo’s only Reply to this argument is to say, “yes, it is.” Reply, 11 (“the interferer signal (... a signal on a neighboring channel)”). Dr. Baker’s Reply opines without support that: “A POSITA would have readily understood that SNR” would “qualify and/or quantify” relative strengths of a desired signal and “signal on a neighboring channel.” EX1019, ¶62. He and Lenovo omit that a few paragraphs earlier, he opined that such a comparison would be impractical and “meaningless.” EX1019, ¶48 (“the comparison ... would be meaningless”).

Lenovo's and Dr. Baker's conclusory Reply argument lacks credibility.

As Professor Larson explained, including in the context of the “determining” elements, the total signal strength of a neighboring channel (RSS_n) is simply not the same as the strength of the interferer signal **component** of the original received wireless signal. See Section III.A above; see also Response 48-50; EX2015, ¶¶70 (“The total signal power in a band around a neighboring channel when tuned to that channel is not a direct measurement of interference received when the receiver is tuned to a first channel.”), 72, 73-79.



Petitioners' *Rauhala* arguments are facially deficient, as there is simply no teaching in *Rauhala* that a POSITA would understand to disclose the claimed “comparing” of the “desired signal” and “interferer signal” components determined from the received wireless signal. Lenovo has not met its burden and its Grounds, each of which rely only on alleged anticipation by *Rauhala* of the “comparing” elements, must fail.

C. Petitioners failed to show that *Rauhala* discloses varying “an impedance” according to challenged claims 7, 8, and 19

For all the reasons given in Theta’s Response (at 29-35, 58-63) 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 ’202 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, 20-22), notably ***completely ignores and never mentions*** the ’202 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 ’202 Patent discloses and claims “bias current” adjustment and “impedance scaling” as distinct controls. *Id.*, 31-33. Lenovo’s interpretation of changing bias current resistors as changing an impedance collapses the distinction between varying “a bias current and an impedance,” in claims that recite both—improperly vitiating an element. *See, e.g.*, EX1001, 13:58-14:14 (claim 7), 14:15-20 (claim 8).

For all these reasons, the alleged impedance that Lenovo pointed to in the Petition—“Changing the foregoing resistances [R2 and/or R3]”—is not an impedance per the claims of the '202 Patent. Petition, 40-41.

1. Lenovo’s new argument must be rejected

In Reply, Lenovo has 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, 22-25. 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, 41. 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 the varying an

impedance according to the claims. *See, e.g.*, EX1001, 14:15-20 (claim 8) (“dynamically increasing the impedance”). 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 ’202 Patent describes three types of dynamic adjustment—bias current control, impedance variation, and gain control. Response, 7-9; EX2015, ¶¶43-45:

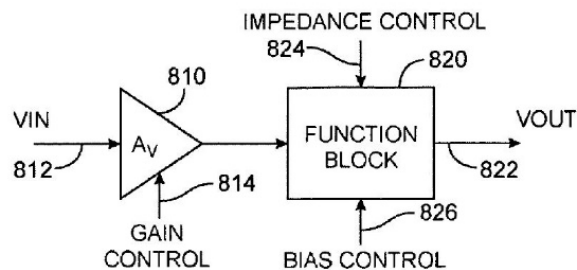
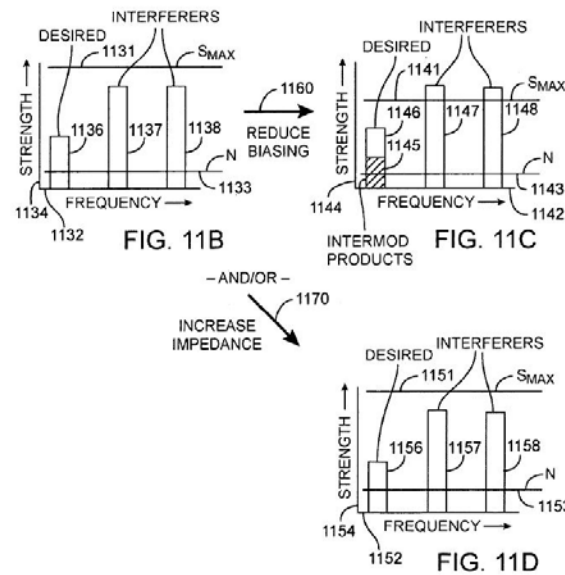


FIG. 8A

See also Petition, 6-9. As shown, these three adjustments are taught, and claimed, as separate controls. *See, e.g.*, EX1001, Abstract (“bias current reduction, impedance scaling, and gain changes”), 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 '202 Patent is a different control than impedance scaling—even though impedance scaling affects the bias current, and vice versa. *See, e.g.,* EX1001, 1:64-2:2 (“bias currents are reduced ..., impedances are scaled ***thus reducing*** required drive and other bias currents”), 3:29-32, 6:22-25. 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 '202 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, 1:64-2:2. 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 '202 Patent carefully distinguishes between dynamic impedance controls and bias current controls. *See e.g., id.,* 8:22-24, 8:41-50, 11:41-45 (“under the control of variable gains, impedances, biasing, or combination thereof”). Claims 7 and 19—unlike claim 11 which only lists bias changes—treats bias changes and impedance changes as separate, direct adjustments. *Id.,* 14:9-14 (“an impedance, a bias or a gain”). When the claims instead refer to an indirect effect such as reducing power consumption, they instead use the language “thereby.” *Id.*

Lenovo's new Reply argument vitiates the separate 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 '202 patent, and should be rejected on its lack of merit—if not for the unfairness and procedural violation of being stated nowhere in the Petition.

In sum, Petitioners' *Rauhala* arguments are facially deficient; there is 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* of the "impedance" elements of the challenged claims, must fail.

D. Petitioners failed to show that *Rauhala* discloses varying an impedance "in the receiver signal path" according to challenged claims 7, 8, and 19

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, 25-26; Response 54-57. 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 claims 7 and 19 as well. *Id.*, Paper 14, 14-15.

In Reply, Lenovo offers eight 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 12-19) 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”); 16 (“control circuit 62 must be part of the amplifier itself”), 16 (“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, 55-56:

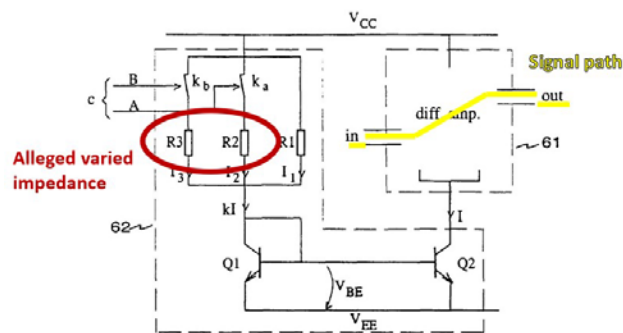


Fig. 6

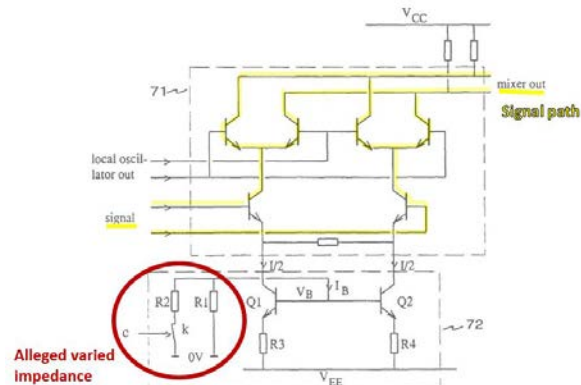


Fig. 7

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, 54-57.

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, 12-13, 17-19. 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.C.1 above) under the heading of “signal path.” Reply 20. 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 '202 Patent.

Again, Petitioners' *Rauhala* arguments show 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 claims, must fail.

E. Petitioners cannot argue waiver to excuse their failure to argue that *Rauhala* disclosed the “bias” elements of claims 7 and 19

Lenovo's Petition arguments for the elements of claims 7 and 19 (which alternatively require “dynamically adjusting a ... bias”) never even use the word “bias.” Petition, 37-41 (element 7.11), 71 (element 19.10). Lenovo's Petition alleged disclosure only of the impedance variation aspect of these elements. *Id.*,

40-41 (“changes the impedance”).

As Theta pointed out in Response, Lenovo had the burden to identify specific proof of disclosure of each and every challenged claim element in the Petition. Response, 5. When Lenovo failed to make an argument, Theta had nothing to rebut. *Id.*

Lenovo’s waiver argument in Reply (page 25-26) is exactly backwards—it is Lenovo that failed its burden to show disclosure of dynamically adjusting a bias in *Rauhala*. Any attempt to do so for the first time on Reply is improper and should be rejected. *See, e.g.*, 37 CFR §42.23(b); Consolidated Trial Practice Guide (2019), 74.

F. Dependent claim 8 must also be upheld

In Reply, Lenovo alleges incorrectly that the dependent challenged claims rise or fall only with their corresponding independent claims. Reply, 26. But as shown above, Lenovo has the burden of proof, and Theta is not required to make any argument to uphold its dependent claims if Lenovo fails to meet its burden on the elements therein. Response, 5.

And as shown above, with respect to dependent claim 8 in particular, Theta ***did argue*** that the “dynamically increasing the impedance ... in the signal path” element of claim 8 is not disclosed by *Rauhala*. Response, 1, 24, 28, 54, 57, 58, 62 (“claim 8”). Claim 8 requires an impedance adjustment, and not in the

alternative. EX1001, 14:15-20. Lenovo has failed its burden of proof for all the reasons given in Response and in subsections C. and D. above—and claim 8 should be upheld on that basis as well.

IV. Conclusion

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 5,594 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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