

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 IPR2023-00694
U.S. Patent No. 7,010,330

**PATENT OWNER'S
PRELIMINARY RESPONSE
UNDER 37 C.F.R. §42.107**

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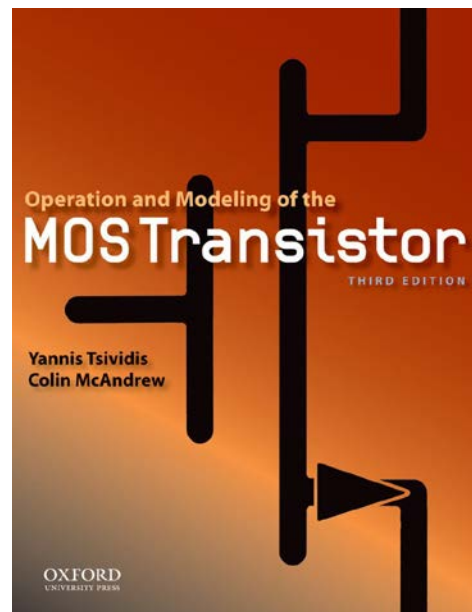
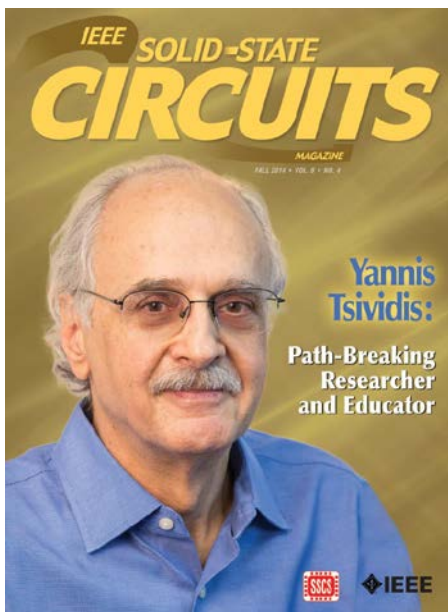
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EX2001	Declaration of Corey Johanningmeier in Support of Motion for <i>Pro Hac Vice</i> Admission
EX2002	"Yannis Tsividis, Path-Breaking Researcher and Educator," IEEE Solid State Circuits Magazine, Fall 2014
EX2003	Y. Tsividis <i>et al.</i> , "Internally 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
EX2005	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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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)

Patent Owner Theta IP, LLC (“Theta”) respectfully submits this Preliminary Response to Lenovo (United States) Inc.’s and Motorola Mobility LLC’s (“Lenovo” or “Petitioners”) above-captioned Petition for *Inter Partes* Review of United States Patent No. 7,010,330 (“the ’330 Patent”).

I. Introduction

The inventor of the ’330 Patent, Yannis Tsividis, is the Edwin Howard Armstrong Professor of Electrical Engineering at Columbia University in New York City. He has taught circuits and devices for over 45 years, is beloved by his students, and has written or edited multiple widely-used textbooks on devices and circuits. Not only is Dr. Tsividis a prolific inventor and life fellow of the IEEE, but in 2014, the IEEE publication Solid State Circuits devoted an entire Special Edition of its magazine to him. EX2002.



The '330 Patent is the first in a series of patents that teach and claim foundational inventions for controlling high-power analog circuits in radio frequency (RF) transceivers used in every cell phone. The patents' chief purpose and benefit is power savings, enabling the longer battery life that smartphone consumers demand.

Intelligent circuit design for power conservation was and remains a vital issue in the mobile communications industry—about which Professor Tsividis has published and taught many times throughout his distinguished career, and throughout the life of the patents. *See, e.g.*, EX2003; EX2004 (Tsividis, Y., “Signal-to-Noise Ratio, Dynamic Range, and Power Dissipation,” IEEE Solid State Circuits Magazine, Fall 2018):

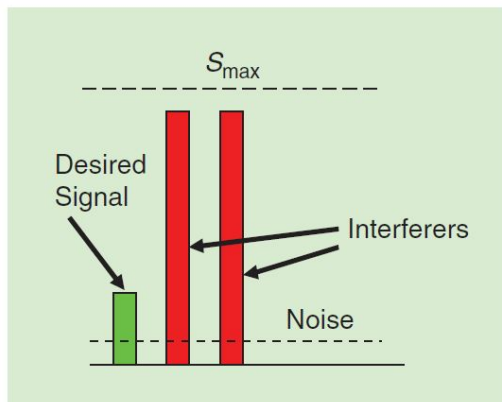


FIGURE 18: The worst-case scenario: minimum desired signal with maximum interference.

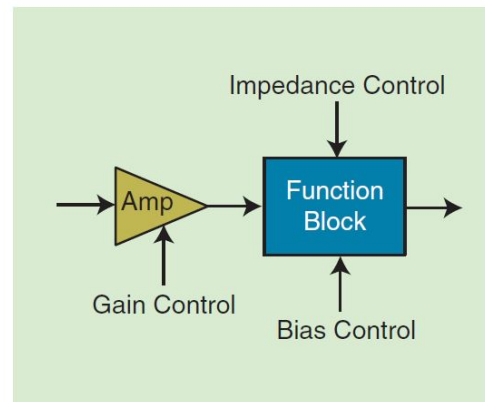


FIGURE 11: The three adaptive power strategies: adaptive gain, adaptive bias, and adaptive impedance.

The '330 Patent application first taught and claimed these power-saving circuit design techniques more than twenty years ago—demonstrating multiple ways that circuits could adapt to desired signal and interferer signal conditions to save power. For example, and relevant to the challenged claims of the '330 Patent, circuit designers could use impedance variation to dynamically vary drive currents in an RF receiver system. EX1001, 7:44-67, Fig. 6. The specification also discusses—and other claims address—separate dynamic controls for bias currents (*id.*, 7:24-43, Fig. 5), and for gain of amplifier circuits (*id.*, 8:1-16, Fig. 7). *See also id.*, Figs. 2B, 8A:

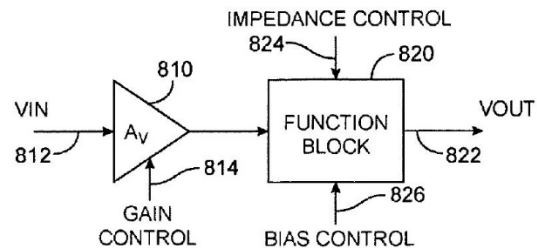
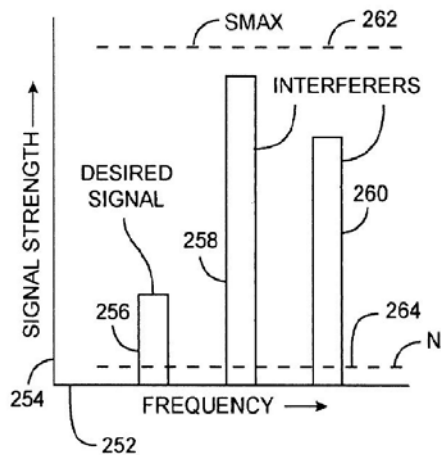


FIG. 8A

The '330 Patent taught that by dynamically adjusting one or more of these variables in response to determined signal conditions, circuit designers can “reduce power dissipation in response to better-than-worst case conditions.” *Id.*, 1:55-58. And it taught many specific approaches to doing so, based on variations in possible

signal conditions. *See, e.g., id.*, 9:42-59, Figs. 9B & 9C (demonstrating a signal spectrum where impedance varying to raise the noise floor N can save power):

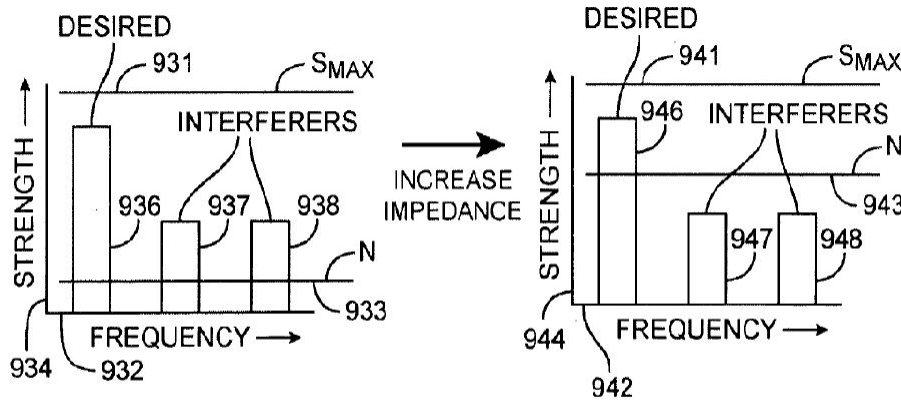


FIG. 9B

FIG. 9C

The application and specification that led to issuance of the '330 Patent also led to six (so far) additional patents. Moreover, the '330 Patent has been widely cited by the industry and by Examiners during the prosecution of other patents, including those of Qualcomm, Samsung, Intel, Marvell, Ericsson, Matsushita, and others. For example, Qualcomm, itself a pioneer in RF circuits for wireless, has been forced by patent Examiners in the USPTO and Europe to cite to and even quote Professor Tsividis' foundational '330 Patent in its own applications. *See, e.g.,* EP2151924B1 at [0004]; EP2018705B1 at [0005]; U.S. Patent No. 8,781,426.

Patents in this family were the subject of two district court litigations against Samsung, leading to a courthouse-steps settlement within hours of the start of a jury trial. Notably, Samsung—the most prolific filer of IPRs since the proceeding was

created—never filed IPRs against the Tsividis patents.¹ As both industry participants and litigants have acknowledged, the '330 Patent and its family made important, valuable contributions to the public knowledge—just as Professor Tsividis has always been known for doing in his distinguished teaching and professional career.

In short, Professor Tsividis' foundational teaching patents here are nothing like the proverbial “bad patents” for which Congress responded to industry pressure and created the *Inter Partes* Review procedure. There are no flaws in the Tsividis patents' lengthy and continued prosecution by Office Examiners, and nothing wrong with their claim scope. The inventions therein are novel, were not obvious to persons of ordinary skill—and offer valuable contributions not previously disclosed in the art.

Against this background establishing the foundational importance and non-obviousness of the inventions in Professor Tsividis' patents here, Lenovo assembles a disparate collection of references—none of which disclose or suggest key elements—in a vain attempt to undo the Office's detailed examination and issuance

¹ According to the Lex Machina database as queried on July 10, 2023, Samsung and related entities are a Petitioner on at least 917 (or 6.2%) of the 14,889 *Inter Partes* Review petitions ever filed.

of this patent family. But none of Lenovo’s grounds have any reasonable likelihood of success, ***failing to meet Petitioners’ evidentiary burden at the outset.***

Lenovo has the burden of proof here. 35 U.S.C. §316(e); *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”) (*citing* 35 U.S.C. §312(a)(3) (2012) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). Lenovo’s Petitions must contain evidence to show “that there is a reasonable likelihood that the petitioner would prevail.” 35 U.S.C. §314(a). They do not. And the Board must not institute to fill gaps in Petitions, to answer questions for which Lenovo offers no evidence, or to construe claim terms for which Lenovo asserts no construction is required. *See* Petition at 20. The Board routinely and properly dismisses defective Petitions like Lenovo’s at the outset.

As shown below, Lenovo’s obviousness Grounds—arranging five disparate references in six different ways—all fail to properly interpret or to show any suggestion of key elements common to all four challenged claims. Trial on this deficient Petition would be a waste of the Board’s limited resources and a prejudicial delay to Theta’s ongoing enforcement of its properly granted and presumptively valid patent rights.

For example, Lenovo fails to acknowledge the prior claim construction, or even the plain Electrical Engineering 101 definition of, “impedance” as an alternating current, frequency domain concept—then proceeds to apply a reference that at most only discloses changing from one direct bias current to another with resistors. *Rauhala* does not even arguably disclose or suggest the claimed dynamic impedance variation, and no other reference is even alleged to do so. The entire Petition fails on this point alone.

As another example, the Petition completely ignores the “in the signal path” elements of each challenged independent claim—because the alleged impedance asserted to be changed *isn’t in that signal path*. The entire Petition must fail on this point as well.

As another example, the Petition relies on an alleged change to a bias current, I_B , just as the Examiner did with the *Clark* reference during prosecution. *See, e.g.*, Petition at 38, 42. The amendment made to overcome that rejection required instead that the dynamic impedance variation directly alter a “switching” or drive current. *See* EX1003 at 163 (citing “Figure 6 and related discussion”); EX1001, Fig. 6, 3:24-27, 7:44-67 (doubling the “impedance of the load seen by driver” so that the drive current is reduced). Altering a bias current—as in the overcome prior art—cannot disclose or render obvious the very language added to overcome that prior art rejection.

These proof flaws and misinterpretations of the claim language are directly discernable from the Petition itself, and nothing further is needed to see the lack of merit in Lenovo's arguments. Nor does Dr. Baker's Declaration—made up almost entirely of verbatim copying of attorney argument from the Petition that he has endorsed with his signature—add anything to the proceedings. For these and other reasons, as explained in more detail in the arguments below, the Petition fails to meet its threshold burden of showing a reasonable likelihood of success as to any of the asserted grounds of obviousness. Because the Petition on its face fails to show a reasonable likelihood of success, Petitioners' request for a trial should be denied.²

II. Institution should be denied because Petitioners have failed to show a reasonable likelihood of success on any challenged claim.

The Board should deny institution, pursuant to its discretionary authority under 35 U.S.C. §314, because the Petitioners failed to establish a reasonable likelihood of demonstrating that even a single challenged claim is unpatentable.

² The issues detailed herein are not the only procedural or substantive flaws in the Petition. If the Board institutes trial on any of the challenged claims notwithstanding the issues addressed herein, Patent Owner will address in detail in its §42.120 Response each of the numerous substantive errors and shortcomings that underlie each of Petitioners' arguments and their purported evidence.

Lenovo fails to establish that *Rauhala*, alone or in any of the alleged combinations, would have rendered obvious any of the challenged claims.

For example, *Rauhala*, the only reference alleged to do so, fails to disclose, suggest, or otherwise render obvious the elements requiring dynamically changing “an impedance” in the “signal path”—as in each of the challenged claims of the ’330 Patent. This is both because the alleged changed parameter is not an impedance as a POSITA would understand it, and because the alleged changed impedance is not in the signal path as required by the claims.

In addition, *Rauhala*, the only reference alleged to do so, fails to disclose, suggest, or otherwise render obvious the elements requiring the dynamic impedance adjustment to “reduce a switching current in response to the first signal strength.”

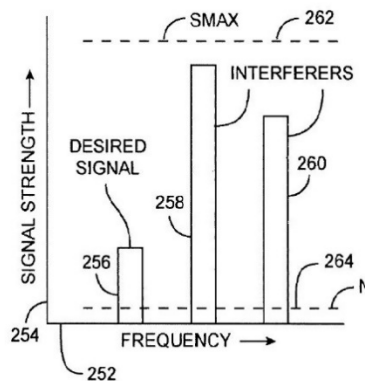
Because Petitioners’ unsupported arguments fail to establish a reasonable likelihood of proving any challenged claim unpatentable, trial should not be instituted here.

A. The ’330 Patent

The ’330 Patent was first in a series of patents that disclose and claim Professor Tsividis’ inventive systems and techniques for optimizing mobile wireless device power consumption—and thus battery life. *See, e.g.*, EX1001 (“’330 Patent”), Abstract, 1:52-58. In the early days of mobile communications, receivers were designed to operate in the worst-case conditions to ensure that

connectivity was available to the greatest extent possible. This meant that devices operated at a high power level all of the time, draining the battery quickly. *Id.*, 1:31-37.

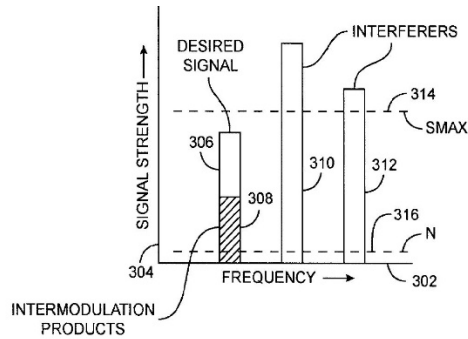
Professor Tsividis invented systems and methods that optimized battery life by making various adjustments to components in a receiver based on determining signal strength—or the relationships between the strength of desired signal (such as the signal carrying voice data) and the strength of interferer signals (originating from other wireless devices or electronic equipment, for example)—to achieve power savings. *Id.*, 2:11-15, 5:17-27, 5:51-52, Figs. 2A & 2B (showing example desired signal and interferer signal spectrum):



B. The '330 Patent Specification

The '330 Patent specification explained and showed examples of when to employ the various power saving circuit techniques, based on different signal spectra being determined to be better than a worst-case condition. *Id.*, 1:55-64, 8:46-10:56. A worst-case condition occurs when a low desired signal is

accompanied by high interferer signals—and can result in unacceptable levels of distortion, *e.g.*, intermodulation products, if the maximum signal handling capability is not kept sufficiently high. *See, e.g., id.*, 6:28-46, Fig 3:



The '330 Patent describes three different adjustments, or “degrees of freedom” that can be dynamically optimized to reduce power in response to the various ways signal conditions can improve over a worst case. Specifically, the patent discusses dynamic changes to bias currents, circuit impedances, and gain. *See, e.g., id.*, Abstract (“Embodiments of the present invention use bias current reduction, impedance scaling, and gain changes either separately or in combination to reduce power dissipation.”), 1:55-64, Fig. 9A:

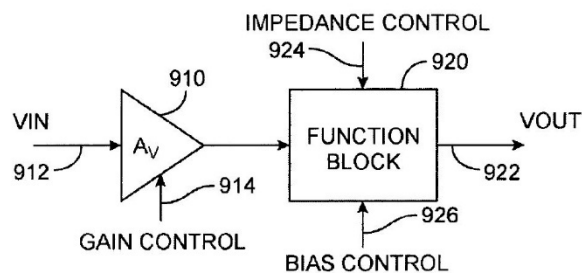
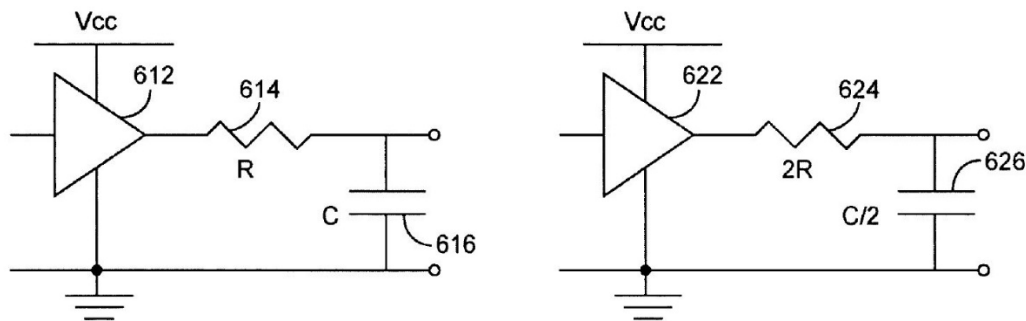


FIG. 9A

For example, the specification discusses circumstances calling for changes to bias currents, and techniques for doing so. *Id.*, 7:24-43, Fig. 5. For example, a bias current might be changed by increasing a resistance “by opening switches across portions of the resistance.” *Id.*, 7:36-41.

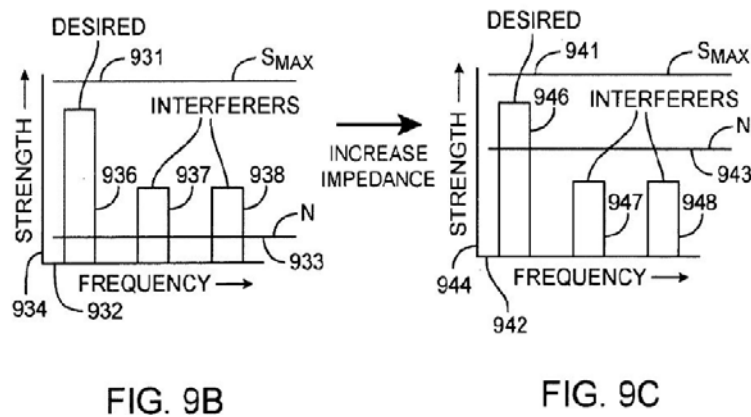
Alternatively, and in contrast, “a circuit’s impedances may be scaled to reduce drive currents” or even associated bias currents. *Id.*, 7:44-59, Fig 6. A basic example of this, with a common RC impedance load on a driver, is shown in Figure 6:



In this figure, the driver load impedance from R and C is replaced by impedance from 2R and C/2, such that: “the impedance of the load seen by driver 622 is double that seen by 612, thus the output current required by the driver 622 is reduced by one-half. *Id.*, 7:47-52.

The '330 Patent also discusses and gives examples of gain adjustment. See, *e.g.*, *id.*, 8:1-15, Fig. 7. It then goes on to discuss that: “These variables, or degrees of freedom, specifically reducing bias currents, increasing impedances, and

increasing gain may be used as in the following examples.” *Id.*, 8:17-19. A lengthy discussion follows, providing particular examples of signal spectra and corresponding adjustments that can advantageously be made. *See id.*, Figs. 8A & 8B, 9A & 9B, 10A & 10B, 11A & 11B, 12, and corresponding text discussions:



See also id., 3:30-46 (“FIGS. 9A-9C illustrate one of the possible power saving techniques that may be used when a received desired signal is strong while all interfering signals are at a low power level.”), Fig. 9A, 9:42-49:

Accordingly, one or more impedance[s] in the function block 920 may be increased, such that the noise floor 943 rises as shown in FIG. 9C. In this way one or more [of] the driving currents in the function block 920 may be reduced.

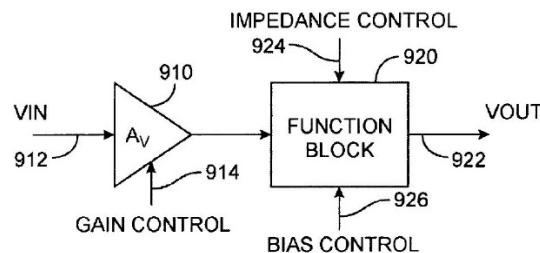


FIG. 9A

Again, the adjustments made to circuits in the claimed inventions are dynamic, based on monitoring the interferer signal levels and desired signal levels to optimize the changes in gain, bias, and impedance of the circuit components. The '330 Patent also teaches specific examples and techniques for locations within receiver circuits at which the beneficial power-saving dynamic adjustments can be performed. *See, e.g., id.*, 11:61-64 (low noise amplifier (LNA) adjustments), 11:65-12:2 (mixer), 12:3-15 (voltage controlled oscillator (VCO) adjustments).

In keeping with Professor Tsividis' long teaching career, the specification of the '330 Patent explains the embodiments of the disclosed and claimed inventions in clear detail and with examples much like those in his textbooks, magazine articles, and teaching slides. *See, e.g.,* EX2003, EX2004, Figs. 11, 18. As described above, the industry has shown continued interest in these techniques even decades after their invention by Professor Tsividis. For example, in Fall of 2018, he provided an article to the IEEE Solid-State Circuits magazine teaching many of these power-saving techniques. EX2004. In Figure 18 of that article, for example, there is an example showing a combination of both impedance scaling (multiplying RC impedance by n via nR_x combined with C/n), and also bias current scaling (dividing I_{bias} by n):

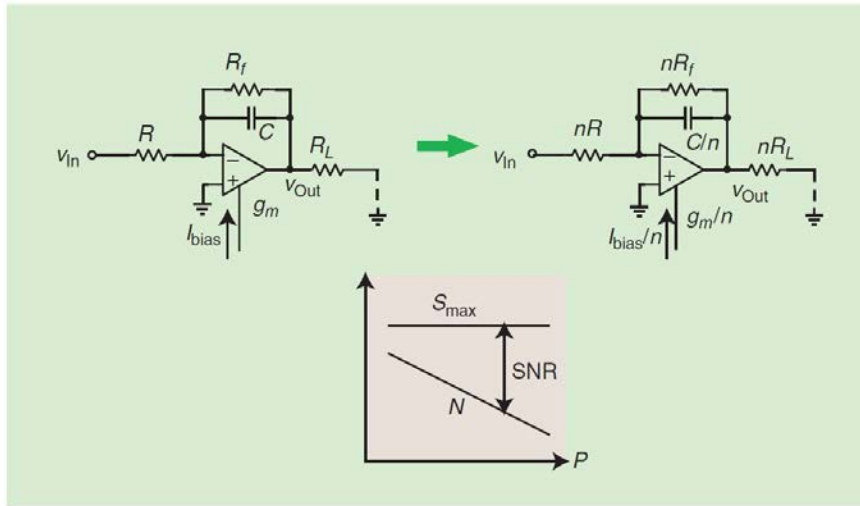


FIGURE 16: Bias-impedance scaling for an active RC circuit.

See also *id.*, Figure 23 (showing effect of a combination of bias and impedance adjustments—lowering maximum signal handling capability and raising the noise floor, respectively, with creation of some intermodulation products):

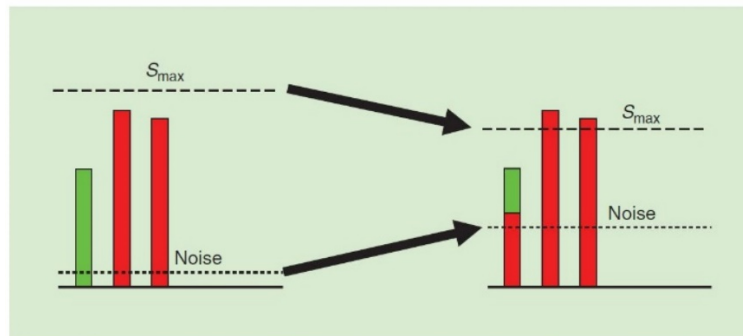
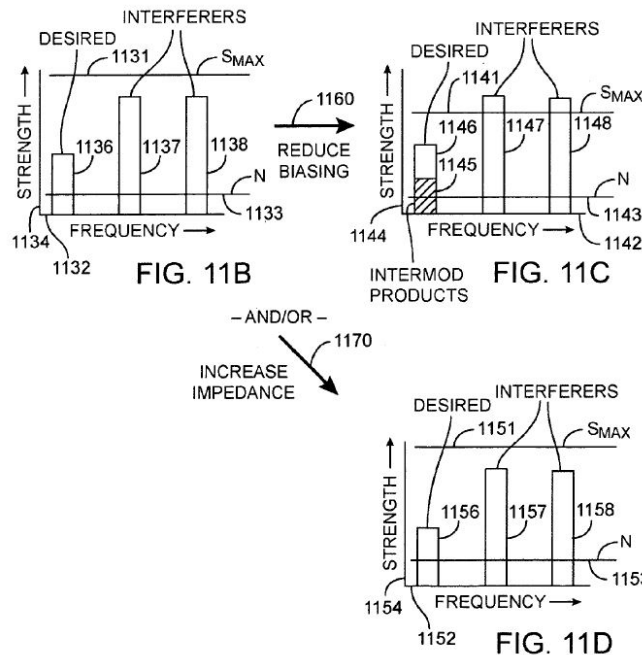


FIGURE 23: Power adaptation in the case of a medium desired signal and large interference.

The same combination of dynamic adjustments to impedance and to bias current as in Figure 23 above was also discussed by Professor Tsividis more than fifteen years prior, in the specification of the '330 patent. EX1001, 10:27-56, Figs. 11B, 11C, & 11D:



The '330 Patent discloses that decreases in bias current can be used to lower the maximum signal handling capability. *See, e.g., id.*, 9:5-7. The '330 Patent also discloses that the noise floor can be “increased by increasing impedances in the function block,” which also “reduces the required drive current.” *See, e.g., id.*, 10:15-18.

The fact that the IEEE remained interested in publishing Professor Tsividis' innovative approaches for dynamic circuit adjustments for power savings, even in the Fall of 2018, is one of the many indicators of the non-obviousness of the inventions also taught and claimed in the '330 Patent. Others are mentioned above in Section I. The '330 Patent was groundbreaking and foundational, and the

inventions taught and claimed therein are still used throughout the mobile communications industry.

C. The '330 Patent Prosecution History

The application that issued as the '330 Patent was filed on February 23, 2004 and claims priority to two provisional applications filed on March 1, 2003 (App. Nos. 60/451,229 and 60/451,230).

Relevant to the Petition arguments here, the pending claims were initially rejected as obvious over a combination that included the *Clark* reference (U.S. Patent No. 5,001,776). EX1003, 171. *Clark* did not explicitly or inherently disclose “dynamically changing an impedance” of a “component in the signal path.” *Id.*, 171-172. Instead, the Examiner asserted obviousness based on disclosure of varying an injection voltage and “the current consumption of the mixer 110.” *Id.*, 171 (*citing Clark*, 2:34-4:66); EX2007 (*Clark*), 3:62-4:3.

Applicant responded to this rejection in two ways. First, rejected independent claims 1 and 23 were amended to clarify that the dynamic impedance adjustment would be to “reduce a switching current.” EX1003, 157, 160. Second, applicant argued that the identified disclosures of *Clark* only taught changing a “bias current,” which was understood to be different than a switching or drive current. *Id.* at 163:

A bias current is not the same as a switching current. One skilled [in] the art understands that a bias current is a DC or quiescent current, while a switching current is a dynamic or transient current that occurs during voltage transitions. (See for example, the pending application, Figure 6 and related discussion.)

See also EX1001, 7:44-59 (“In this way, an impedance can be scaled in order to decrease a circuit’s required drive current.”), Fig. 6.

The Examiner then reversed the prior obviousness rejection and allowed the claims based on Applicant’s amendments and arguments. EX1003, 133-134. The Examiner recognized that *Clark*’s disclosure of modifying a DC or quiescent current did not disclose or render obvious “reducing a switching current by dynamically changing an impedance.” *Id.*, 134. Accordingly, the allowed claims cannot be deemed obvious here in view of *Rauhala*’s similar disclosure of modifying a DC or quiescent current.

D. The ’330 Patent Challenged Claims

Lenovo challenges four claims of the ’330 Patent here. Each of the three challenged independent claims contains elements requiring a dynamic change to “an impedance”—in the “signal path” (claims 1 and 23) or in the claimed “second circuit,” which is in the signal path (claim 29). EX1001, 12:57-67 (claim 1), 14:15-28 (claim 23), 15:21-16:12 (claim 29).

For example, challenged system claim 23 recites:

23. A wireless transceiver integrated circuit comprising:
a receiver comprising a signal path, the signal path comprising:
a low-noise amplifier;
a mixer having an input coupled to an output of the low-noise amplifier; and
a low-pass filter having an input coupled to an output of the mixer, and
a first signal strength indicator circuit coupled to the signal path, and configured to determine a first signal strength;
wherein *an impedance in the signal path is configured to be dynamically adjusted to reduce a switching current* in response to the first signal strength.³

Similarly, challenged method claim 1 recites:

1. A method of receiving a signal using an integrated circuit, the integrated circuit comprising a signal path including a low-noise amplifier configured to receive the signal, a mixer having an input coupled to an output of the low-noise amplifier, and a low-pass filter

³ All ***bold italic*** emphasis herein added unless otherwise noted.

having an input coupled to an output of the mixer, the method comprising:

determining a first signal strength at a first node in the signal path in the integrated circuit; and

reducing a switching current in the signal path by dynamically changing an impedance of a component in the signal path based on the first signal strength.

Challenged system claim 29 also requires “an impedance” in a second circuit in the signal path be “configured to be dynamically adjusted” in response to a signal strength determination. *Id.*, 15:21-16:12 (“...the ***signal path comprising***: ... a second circuit” and “***an impedance*** in the second circuit”)

As discussed below, *Rauhala*—the only reference alleged to—does not even arguably disclose or suggest these highlighted elements, which are included directly or by dependency in every challenged claim. Lenovo’s Petition relies on disclosure of changing resistors controlling a static DC current. That is ***not*** changing an impedance, is ***not*** in the signal path, and is ***not*** a switching current. The Petition fails to show a reasonable likelihood of success and must be dismissed pursuant to 35 U.S.C. §314.

Challenged claim 30 depends from claim 29, and no reasonable likelihood of success is shown for it either, for the same reasons as discussed herein for claim 29. EX1001, 16:13-20 (claim 30); *see also* Petition, 56-60 (Ground 3), 70-71 (Ground

6). Nothing is added in these claim 30 grounds, or from the alleged combination references *Meador* or *Furuno*, to the deficient showing concerning independent claim 29. *Id.* The Board need not address the separate deficiencies in those references, or the alleged motivation to combine, in order to deny institution for failure to show a reasonable likelihood of success here.

Lenovo's Petition fails completely on key elements of all independent challenged claims and should be denied institution on its (lack of) merits.

E. Claim Construction

For purposes of *inter partes* review, disputed claim terms are construed to give them “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *See* 83 Fed. Reg. 51341 (Oct. 11, 2018) (adopting the standard of *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005)). The proper construction is considered in the context of, and must be consistent with, the specification—and the claim language should be read in light of the specification as it would be interpreted by one of ordinary skill in the art. *See, e.g., Phillips*, 415 F.3d at 1313.

A person of ordinary skill in the art with respect to the '330 Patent would have at least a Bachelor's Degree in Electrical or Electronics Engineering, along with approximately five years of relevant experience in the design of transceiver architecture, RF systems and components, and analog and mixed signal circuits, as

well as experience in control algorithms for such system and familiarity with wireless standards—with additional education substituting for experience and vice versa. EX2005, ¶48.

As Lenovo acknowledges, claims of the '330 Patent and related patents have been twice construed by district courts. EX1009, EX1010. The claims will be construed again in two other district court litigations.⁴ This heightens the importance of guidance that the Board should not construe terms beyond what is necessary to make its determinations. *See, e.g., Sandoz Inc. v. Abbvie Biotechnology Ltd.*, No. IPR2017-01987, 2018 WL 1230583, at *5 (P.T.A.B. Mar. 9, 2018) (“[B]ecause neither of those phrases requires construction for us to resolve the instant dispute, we decline to construe them. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (‘only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy’).”).

The challenged independent claims here have specific elements requiring changes to “an impedance,” that is in the “signal path,” and controls a “switching

⁴ The district court will hold a *Markman* hearing in Theta’s litigation against Petitioners on May 17, 2024. EX2008. A *Markman* hearing date has not yet been set in *Theta IP LLC v. Apple Inc.*, No. 6:23-cv-00314-ADA (W.D. Tex.).

current.” See Section II.D above. It is at least those elements that Lenovo has failed to show disclosed or suggested in the prior art asserted here. Other than adopting the plain meaning—and prior consistent construction—of “impedance,” construction by the Board is not needed to see why these elements are not present or suggested in the cited art.

1. “dynamically changing” and “dynamically adjust[ed]”

In light of Lenovo’s complete failure to provide evidence raising a reasonable likelihood of success on other elements, as discussed herein, Theta does not believe that these “dynamically” changing/adjusting terms need to be construed by the Board.

Theta agrees that if these terms were to be construed, they could be properly construed—consistent with *Theta IP, LLC v. Samsung Electronics Co. Ltd.*, No. W-20-CV-00160-ADA (W.D. Tex.), see EX1009, 2-3—as “adjusting during operation based, at least in part, on information gained during operation.” See Petition, 20-21. As Lenovo points out, such a construction would be consistent with Theta’s own arguments in both prior litigations. See Petition, 24-25.

But because institution can and should be denied based on Lenovo’s other failures to sustain its burden vis- à-vis other elements, the Board need not reach or consider claim construction of the “dynamically” changing/adjusting terms. It

should not do so, based on its own practice of construing “only to the extent necessary to resolve the controversy.” *See, e.g., Vivid Techs.*, 200 F.3d at 803.

2. “changing” or adjusting “an impedance”

Tellingly, in this Petition Lenovo, and its declarant Dr. Baker, nowhere point to or discuss the plain and ordinary meaning of “impedance” to a person of skill in the art. This is because what Lenovo is calling changing “an impedance” here, just isn’t. A person of ordinary skill in the art would not find changing an impedance obvious from *Rauhala*’s disclosure of adding a simple resistor in series with a DC supply current—because impedance is well-known to mean the total opposition of a circuit to an alternating current.

Impedance is an alternating current parameter: “The total opposition (*i.e.*, resistance and reactance) a circuit offers to the flow of alternating current at a given frequency.” Graf, *Modern Dictionary of Electronics*, Seventh Edition, EX2009, 6:

impedance — 1. The total opposition (*i.e.*, resistance and reactance) a circuit offers to the flow of alternating current at a given frequency; the ratio of the potential difference across a circuit or element of a circuit to the current through the circuit or element. It is measured in ohms, and its reciprocal is called admittance. Symbol: *Z*. 2. The combination of resistance and reactance 3. Combined opposition to current resulting from resistance, capacitance, and inductance. 4. The sinusoidal terminal voltage of a circuit divided by the current through it. 5. A speaker’s resistance to an alternating current, which varies with frequency. A speaker’s rated impedance is usually the value measured at 400 Hz. 6. The opposition to alternating current in a circuit, generally categorized as either high or low, and measured in ohms. 7. The total opposition that a circuit offers to the flow of alternating current or any other varying current at a particular frequency. It is a combination of resistance, *R*, and reactance, *X*, measured in ohms.

see also IPR2023-00697, EX1006, 9; Laplante, *Electrical Engineering Dictionary*, 2000, EX2010, 3 (“electrical property of a network that measures its ability to conduct electrical AC current for a given AC voltage”); Nahvi, *et al.*, *Electric Circuits*, Fourth Ed., EX2011, 9 (“sinusoidal voltage or current” and “When impedance is written in Cartesian form the real part is the resistance R and the imaginary part is the reactance X”), 11 (“impedance in the frequency domain”); Wikipedia, Electrical Impedance, at https://en.wikipedia.org/wiki/Electrical_impedance (“In electrical engineering, impedance is the opposition to alternating current presented by the combined effect of resistance and reactance in a circuit”). Impedance is a well-known term of art with a well-known definition to a POSITA reading the ’330 Patent. EX2005, ¶¶54-56.

This definition is not in dispute, nor could it be. Lenovo relies on both the Graf and Laplante dictionaries, and the Nahvi textbook—but failed to include the pages with these definitions here in its Petition or accompanying declaration. EX1006; EX1015; EX1022. This was not a very effective hiding of the ball, however, because Lenovo and its declarant do cite this “well known in the field” definition in co-pending IPRs against related patents. *See, e.g.*, IPR2023-00697, Petition, Paper 1, 53; *id.*, EX2002, ¶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” ...

And Lenovo **does** include the ordinary “opposition to the flow of alternating current” impedance definitions when it excerpts Graf and Nahvi in those related IPRs. See IPR2023-00697, EX1006, 9; IPR2023-00697, EX1010, 7-9. That definition should, and does, apply here as well—whether mentioned by Petitioners here or not.

In Theta’s first litigation against Samsung, the parties agreed, and Judge Gilstrap construed the term “impedance” to mean: “opposition to the flow of alternating current.” EX1010, 15. In Theta’s second litigation against Samsung, the parties each proposed variations of this definition, and Judge Albright declined to further elaborate on the plain and ordinary meaning of impedance. EX1009, 5.

The ’330 Patent specification uses the term consistently with its ordinary definition of total opposition to the flow of alternating current. For example, in Figure 6 and related discussions of “impedance scaling,” the impedance of the load seen by the driver is the total AC opposition including both resistive and capacitive (reactance) components. EX1001, 7:44-52, Fig. 6. The discussion of “frequency response” is also consistent with the ordinary understanding of a POSITA that impedance is an alternating current, frequency domain circuit analysis parameter.

Id.; see also EX2005, ¶¶54-56; IPR2023-00697, EX1002, ¶149 (“...combination of resistance, R, and reactance, X,’ where the reactance X means ‘[t]he opposition offered an alternating flow by a capacitance or inductance related to the frequency of the alternating current.’”).

Because impedance is indisputably an AC circuit parameter, persons of skill in the art do not ordinarily refer to a resistance to a DC current as an impedance. EX2005, ¶56. More importantly, the ’330 Patent does not do so—using the term “resistance” when discussing DC circuits, such as those for setting bias currents. See, e.g., EX1001, 7:35-41 (describing changing a DC bias current through “a resistance” by “by opening switches across portions of the resistance”), 8:12-14 (“increasing a load resistance using switches”). In contrast, when the circuit load includes reactance (e.g., capacitors) and an AC signal current is being driven, the specification uses the term “impedance.” *Id.*, 7:44-59. This is in keeping with ordinary usage of the terms. EX2005, ¶¶57-58.

As described above, the ’330 Patent teaches control of bias currents, and control of impedances, as separate concepts. See, e.g., 1:55-57 (“bias current reduction, impedance scaling, gain, and other dynamic changes either separately or in combination”), 8:17-19 (“These variables, or degrees of freedom, specifically reducing bias currents, increasing impedances, and increasing gain may be used as in the following examples”), Fig 9A:

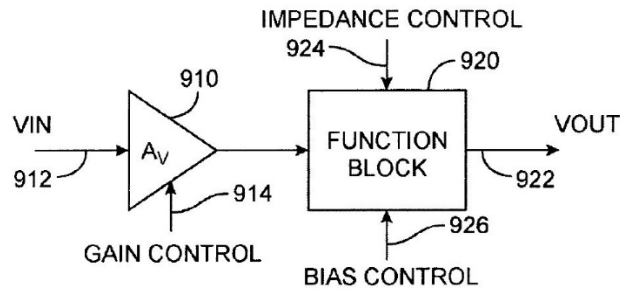
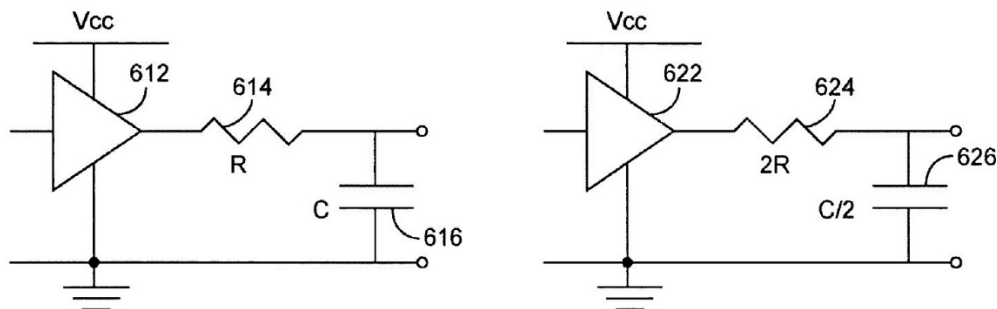


FIG. 9A

This teaching of separate and distinct control variables would make no sense if switching portions of “resistance” in or out to control a DC bias current (as in the example given with Figure 5) were also interpreted as an impedance control. *Id.*, 7:36-41 (“resistance”), Fig. 5. The patent discusses “impedance” changes separately, in context that makes clear it is referring to an alternating current, frequency domain signal—in an example circuit that happens to include resistive and reactive (*e.g.*, capacitive) circuit elements. *Id.*, 7:44-59 (“impedance”), Fig. 6:



This ordinary understanding of impedance as used in the '330 Patent is also consistent with the prosecution history. As described above, Applicant distinguished changes in a DC current, allegedly shown in prior art, from the

claimed impedance change affecting an AC switching current. EX1003, 163 (“a bias current is a DC or quiescent current, while a switching current is a dynamic or transient current”).

The Petition avoids any definition of impedance, but relies only on a resistor(s) controlling a DC supply current—for alleged disclosure of the key elements of dynamically changing an impedance. Petition, 39 (“switched between two different resistance configurations”). That is wrong. A person of ordinary skill in the art wouldn’t call this changing an impedance.

Switching a resistance in series to a DC current isn’t changing an impedance in the context of the ’330 Patent—as impedance is indisputably defined as the opposition to the flow of AC current. A person of ordinary skill wouldn’t understand or describe *Rauhala*’s supply current switch as dynamically adjusting an impedance as claimed—just as the Examiner didn’t when allowing the claims over the “DC or quiescent current” change disclosed in *Clark*. EX2005, ¶¶62, 64-65; EX1003, 163, 134.

The Board may construe “impedance” as “opposition to the flow of alternating current,” as determined in the Eastern District of Texas (EX1010, 15)—or may simply agree with the Western District of Texas (EX1009, 5), *Lenovo*, and *Theta* that impedance has this “well-known” meaning in the art. Either way, *Lenovo*’s implicit redefinition here of the term—to allegedly apply to quiescent

supply currents controlled through a resistor network—must be rejected. That redefinition is inconsistent with the proper and agreed meaning of impedance as an alternating current parameter. *See, e.g.*, IPR2023-00697, Petition, 53 (The definition of the term “impedance” is “[t]he total opposition (i.e., resistance and reactance) a circuit offers to the flow of alternating current at a given frequency”); *id.*, EX1002, ¶149.

Patent Owner reserves the right to propose or challenge constructions of terms other than those discussed herein in its §42.120 Response if any trial is instituted.

F. There is no reasonable likelihood that Petitioners will prevail in their contention that the challenged claims are obvious over *Rauhala* alone or in combination

Rauhala, the only reference cited to or relied on for several important elements of each independent challenged claim, does not disclose or render obvious those elements as claimed. The Petition does not properly interpret, or show teaching or suggestion in *Rauhala* of, “an impedance” as claimed. The Petition completely ignores the requirement—not disclosed or suggested in *Rauhala*—of changing an impedance in the “signal path.” And the Petition fails to show any teaching or suggestion of reducing a “switching current” as claimed.

Each of these gaps in Lenovo’s required proof is fatal to the Petition at the outset. Lenovo has no likelihood of success, and a trial would unduly waste the

Board's time and resources.

Further, *Rauhala* and the other references are not properly combined. And there are numerous additional substantive deficiencies in the Petition, including with respect to dependent claim 30. But the fatal flaws concerning each independent claim discussed herein are sufficient to warrant denial of institution without even needing to reach those issues.

The Petition fails to show, as required by §314 and 37 C.F.R. §42.108, that there is a reasonable likelihood that Petitioner would prevail with respect to any one of the claims challenged. Accordingly, institution should be denied.

1. Petitioners failed to show that *Rauhala* discloses or renders obvious dynamically varying “an impedance” according to the challenged claims

Lenovo failed to show that *Rauhala*, alone or in combination, discloses or suggests to a person of ordinary skill in the art dynamically varying “***an impedance***” as disclosed and claimed in the '330 Patent. *See, e.g.*, EX1001, 12:57-67 (claim 1). The impedance-varying elements are recited in the body or included by dependency in all challenged claims. *Id.*; *see also id.*, 14:15-28 (claim 23), 15:21-16:12 (claim 29). Accordingly, Lenovo's failure to demonstrate any disclosure or suggestion of the elements applies to and refutes all Grounds.

As discussed above in Section II.E, the Petition never mentions or addresses the proper definition of “impedance”—as would be understood by a person of

ordinary skill at the time reading the '330 Patent. Impedance indisputably refers to the opposition of a circuit to **AC current**—as the term has been construed before, and as Lenovo and its declarant agree in parallel proceedings. EX1010, 15; IPR2023-00697, Paper 1, Petition, 53. But here Lenovo has instead pointed to a change to resistors in series with a **DC supply current**. See Petition, 39. That does not disclose a change to an impedance as taught and claimed in the '330 Patent.

The sole identified disclosure of *Rauhala* for these elements does not meet the “well-known” definition of impedance—omitted from the papers here by Lenovo but admitted to in parallel proceedings—that is used in and understood from the '330 patent. See Section II.E.2 above. The identified disclosure of *Rauhala* does not disclose or render obvious changing the total “opposition to the flow of alternating current”—including because it relates instead **only to DC or quiescent supply current**.

Specifically, the Petition cites only *Rauhala*'s supply current “control circuit 72” as allegedly disclosing the impedance-varying elements. Petition, 39-42. The Petition relies on series resistor R1, which can be supplemented by adding in parallel resistor R2, to change direct current I_B from one static value to another. *Id.*, 39-40; EX1004, Fig. 7:

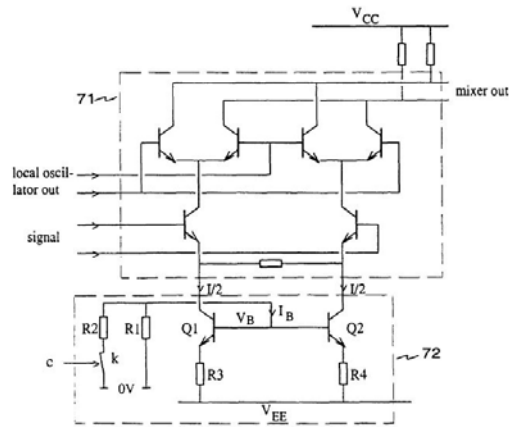
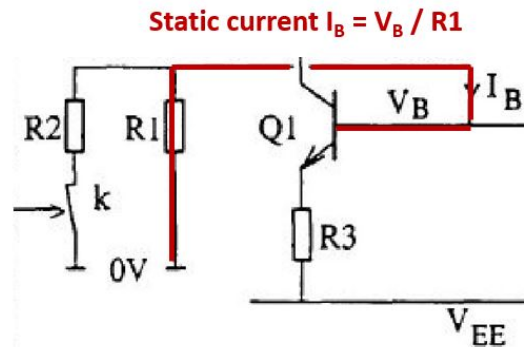


Fig. 7

The alleged impedance change is entirely resistive, and critically, ***applies only to a static DC current I_B*** . This is not disputed, or disputable, by Lenovo. Petition, 39 (“first (low) resistance configuration” and “second (high resistance) configuration”), 40 (“High” current “ $V_B/R1 + V_B/R2$ ” and “Low” current “ $V_B/R1$ ”). There are no alternating currents in this circuit for setting I_B . EX2005, ¶65. By design, control current I_B keeps a constant, quiescent value for the duration of time that one of $R1$ or $R1 + R2$, is selected. EX1004, [0023], Fig. 7 (annotated detail below):



This functionality of the relied-upon circuit is confirmed by Professor Larson. He notes that current I_B , used to bias the supply current transistors Q1 and Q2 in control circuit 72, keeps a constant DC value based on one of two configurations of resistors R1 and R2. EX2005, ¶¶64-65. Lenovo and Dr. Baker agree, stating the current I_B takes one of two possible constant values depending on whether R2 is included in parallel. Petition, 39-40; EX1002, ¶¶127-129. There is no dispute about how *Rauhala*'s control circuit 72 operates that would require a trial to resolve.

And as described above, there is no dispute about what “an impedance” means to a person of ordinary skill in the art: that it measures the total opposition of a circuit to ***alternating current***. Lenovo improperly ignores this agreed definition and ordinary usage in trying to relate ***direct current*** through a resistance to changing an impedance. Its attempt to do so fails.

Dr. Baker's Declaration adds no evidence or insight here—both because ***it does not address or disagree with the well-known definition of impedance***, and because it is nothing more than a near-verbatim copy of the Petition attorney argument, signed by Dr. Baker. See below (verbatim text highlighted):

Petition, pg. 39	Declaration ¶126
<i>Rauhala</i> shows two resistors R1 and R2 that are in parallel to one another. Ex. 1004 at [0023] and FIG. 7; Ex. 1002 at ¶126.	126. <i>Rauhala</i> shows two resistors R1 and R2 that are in parallel to one another. Ex. 1004 at [0023] and FIG. 7.
Petition, pg. 39-40	Declaration ¶127, 128
Therefore, the resistance of the parallel circuit shown in FIG. 7 can be switched between two different resistance configurations. Ex. 1004 at [0023]; Ex. 1002 at ¶127. The first (low) resistance configuration is when the switch k is closed such that resistor R2 is placed in parallel with R1. Ex. 1004 at [0023]; Ex. 1002 at ¶127. The second (high resistance) configuration is when the switch k is open such that the resistance of the circuit is equal to R1. Ex. 1004 at [0023]; Ex. 1002 at ¶127. <i>Rauhala</i> discloses that the control current IB when switch k is open is equal to a low value VB/R1. Ex. 1004 at [0023]; Ex. 1002 at ¶128.	127. Therefore, the resistance of the parallel circuit can be switched between two different resistance configurations. Ex. 1004 at [0023]. The first (low) resistance configuration is when the switch k is closed such that resistor R2 is placed in parallel with R1. <i>Id.</i> ... 128. The second (high resistance) configuration is when the switch k is open such that the resistance of the circuit is equal to R1. <i>Rauhala</i> discloses that the control current IB when switch k is open is equal to a low value VB/R1. Ex. 1004 at [0023].

Dr. Baker’s signature—endorsing attorney argument—is not evidence, and declarations like his are frequently and properly ignored. *See, e.g., Samsung Electronics Co., Ltd. v. Rightquestion, LLC*, No. IPR2022-00251, Paper 17 at 25 (P.T.A.B. June 9, 2022) (declining to credit testimony where “declarant makes these same statements verbatim, without more, and with no additional citations to

evidence”). The Board gives such conclusory, unsupported assertions by experts little or no weight. *Id.*; see also *In re Am. Acad. of Sci. Tech Ctr.*, 367 F.3d 1359, 1368 (Fed. Cir. 2004) (“[T]he Board is entitled to weigh the declarations and conclude that the lack of factual corroboration warrants discounting the opinions expressed in the declarations.”); *Rohm and Haas Co. v. Brotech Corp.*, 127 F.3d 1089, 1092 (Fed. Cir. 1997) (noting that a fact finder is not required to “credit the unsupported assertions of an expert witness”); 37 C.F.R. §42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”).

And here, even if the conclusory declaration / attorney argument were credited as relevant testimony, it fails to raise a reasonable likelihood of success on the merits. The declaration, and Petition, merely assert that changing a resistor across a static DC current is changing an impedance. It is not, and a person of skill in the art would not understand it to be in the context of the teaching and claims of the ’330 Patent, for all the reasons given above.

The Petition cites to and relies only on *Rauhala* for alleged disclosure of these claim elements. See, e.g., Petition at 39-42 (Ground 1, claim 1), 47 (Ground 1, claim 23), 56 (Ground 2, claim 29), 62 (Ground 4, claim 1), 67 (Ground 4, claim 23), 69 (Ground 5, claim 29). And the Petition only argues explicit **disclosure, not obviousness**, for these elements. *Id.* But *Rauhala* simply does not disclose them.

Indeed, *Rauhala* never uses the word “impedance,” including when referring to the resistors R1 and R2 of Figure 7, only as resistance. EX1004, [0023].

The Board need go no further to find a complete lack of any reasonable likelihood of success, and needn’t consider the other references or the merits of the claimed combinations directed to other elements—which add nothing to *Rauhala*’s missing disclosure here.

In sum, Petitioners’ *Rauhala* arguments are facially deficient, and do not show a reasonable likelihood that *Rauhala*—alone or with any other reference—could render obvious any challenged claim. There is simply no teaching or suggestion in *Rauhala* of the claimed dynamic changing of “an impedance.” Petitioners’ Grounds, each of which cite to and rely only on *Rauhala* for 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).

2. Petitioners failed to show that *Rauhala* discloses or renders obvious dynamically varying an impedance “in the signal path” according to the challenged claims

As discussed above, each of the challenged independent claims requires dynamically changing an impedance ***in the signal path***. EX1001, 12:65-67 (claim 1: “an impedance of a component in the signal path), 14:26-28 (claim 23: “an impedance in the signal path”), 15:21-16:12 (claim 29: “the signal path comprising ... a second circuit ... an impedance in the second circuit”).

Lenovo never discusses this “in the signal path” aspect of the claim elements. See, e.g., Petition at 39-42 (claim 1), 47 (claim 23), 56 (claim 29). To do so would expose Lenovo’s failure of proof. The switched resistance controlling a bias current that is (incorrectly) alleged to be the changed impedance—R1 and R2 of supply control circuit 72, see Petition at 39-40—**is not in the signal path**. EX2005, ¶¶63, 66. This is plain from the relied upon figure, which shows the signal path from differential “signal” input to differential output “mixer out,” in “multiplier 71”—which is separate and apart from “control circuit 72” for the supply current. EX1004 (Rauhala), [0023], Fig. 7 (annotated below):

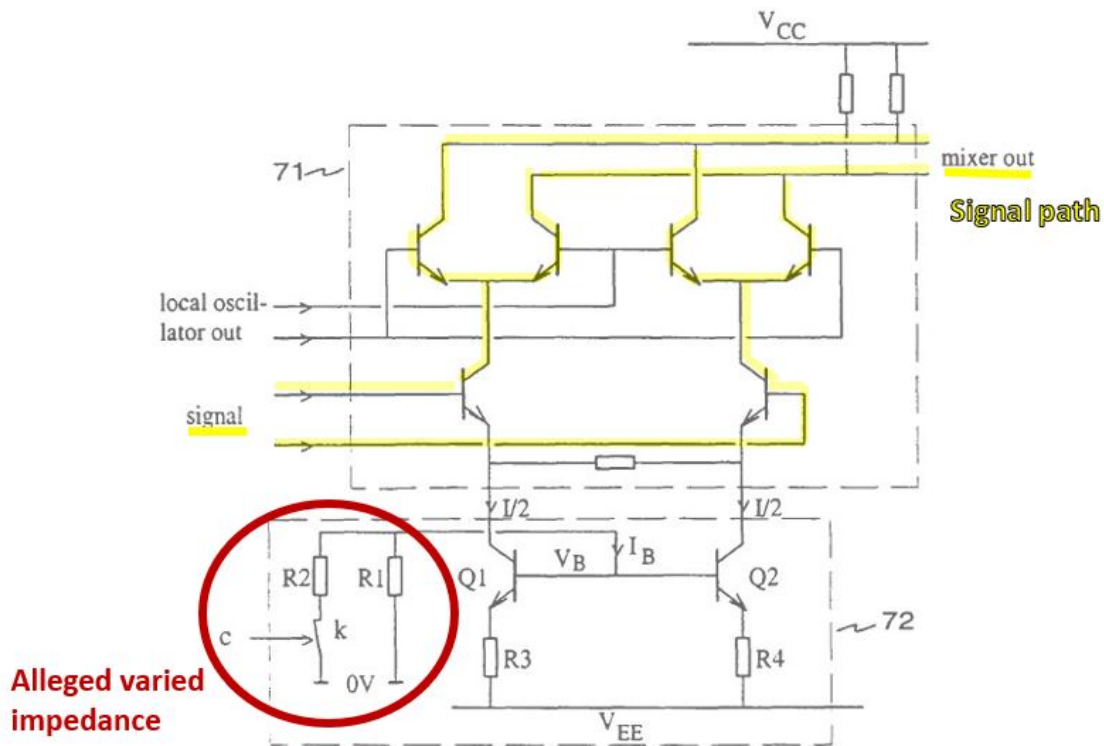


Fig. 7

See also EX2005, ¶63 (“not in the signal path”); EX1004, [0021], Fig. 6 (showing “supply current control circuit 62” that is clearly not in the signal path, *e.g.*, from “in” to “out” of amplifier 61).

Even if switching *Rauhala*’s DC bias current I_B from $V_B/R1$ to $V_B/R1 + V_B/R2$ were changing an impedance as claimed—and it is not, for the reasons detailed in the section above—***that would still not be changing an impedance of a component “in the signal path”*** as required by the claim language of each challenged claim. This is because the alleged impedance is not in the signal path. See Petition, 40. Lenovo does not, and cannot, argue otherwise. *Id.*, 39-42.

Dr. Baker’s Declaration adds nothing here, both because ***it never discusses the “signal path” in relation to the alleged disclosure of an impedance change***, and because it is again a near-verbatim copy of the Petition argument. See below (verbatim text highlighted):

Petition, pg. 40	Declaration ¶128-129
<i>Rauhala</i> discloses that the control current I_B when switch <i>k</i> is open is equal to a low value $V_B/R1$. Ex. 1004 at [0023]; Ex. 1002 at ¶128. The impedance (high or low), and the control current (low or high), based on the state of switch <i>k</i> is summarized in the table below. Ex. 1004 at [0023]; Ex. 1002 at ¶129.	128. ... <i>Rauhala</i> discloses that the control current I_B when switch <i>k</i> is open is equal to a low value $V_B/R1$. Ex. 1004 at [0023]. 129. The impedance (high or low), and the control current (low or high), based on the state of switch <i>k</i> is summarized in the table below.

Petition, pg. 41	Declaration ¶131
<i>Rauhala</i> discloses that as the control current I_B increases, the supply current I increases. Ex. 1004 at [0023]; Ex. 1002 at ¶131. As control current I_B decreases, the current flowing in Q1 and Q2 decreases, since the current in Q1 and Q2 is controlled by I_B, and thus the supply current I, that provides current to Q1 and Q2 (and thus the rest of the circuit) also would decrease. Ex. 1002 at ¶131.	<i>Rauhala</i> discloses that as the control current I_B increases, the supply current I increases. Ex. 1004 at [0023]. A person of ordinary skill would have understood that as control current I_B decreases, the current flowing in Q1 and Q2 decreases, since the current in Q1 and Q2 is controlled by I_B, and thus the supply current I, that provides current to Q1 and Q2 (and thus the rest of the circuit) also would decrease.

And even if Dr. Baker’s declaration were credited, neither it, nor the Petition ever asserts that the allegedly varied impedance is in the signal path—never even using the term “signal path” or “path” in the discussion of these elements, except in quoting the claim language or prosecution history. Petition, 35-46; EX1002, ¶¶118-140. The allegedly varied impedance (via components R1 and R2) is undisputedly **not** in the signal path. EX1004, Fig. 7 (annotated above); EX2005, ¶¶63, 66, 68 (“not in the signal path”).

As was the case for Lenovo’s identification of the alleged dynamically changed impedance, discussed in the section above, here the Petition cites to and relies only on *Rauhala* for alleged disclosure of these claim elements. See, e.g., Petition at 39-42 (Ground 1, claim 1), 47 (Ground 1, claim 23), 56 (Ground 2, claim 29), 62 (Ground 4, claim 1), 67 (Ground 4, claim 23), 69 (Ground 5, claim 29).

And again, the Petition only argues explicit disclosure, not obviousness, for these elements. *Id.* The Board need go no further to find a complete lack of any reasonable likelihood of success, and needn't consider the other references or the merits of the claimed combinations—which add nothing to *Rauhala*'s missing disclosure here.

In sum, Petitioners' *Rauhala* arguments are facially deficient, and do not show a reasonable likelihood that *Rauhala*—alone or with any other reference—could render obvious any challenged claim. There is simply no teaching or suggestion in *Rauhala* of the claimed dynamic changing of “an impedance” that is in the “signal path.” Petitioners' Grounds, each of which cite to and rely only on *Rauhala* for these elements, must fail.

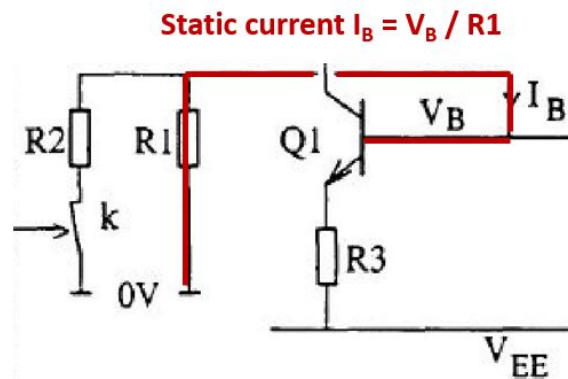
3. Petitioners failed to show that *Rauhala* discloses or renders obvious dynamically varying an impedance to reduce a “switching current” according to challenged claims

Lenovo also fails to raise any argument showing disclosure in *Rauhala* of a third element—namely reducing a “switching current” by dynamically changing an impedance in the signal path. As discussed above, these elements were added during prosecution to claims 1 and 23, along with discussion of why changing a DC bias current did not show or suggest the claimed “dynamically changing an impedance of a component in the signal path.” EX1003, 157, 160, 163:

A bias current is not the same as a switching current. One skilled [in] the art understands that a bias current is a DC or quiescent current, while a switching current is a dynamic or transient current that occurs during voltage transitions. (See for example, the pending application, Figure 6 and related discussion.) Accordingly, the cited references do not show or suggest reducing a switching current in the signal path by dynamically changing an impedance of a component in the signal path as required by the claim.

In other words, and as discussed herein, changing a resistance to alter a DC bias current does not disclose or suggest the claim elements, for at least three reasons: 1) impedance is instead an AC circuit parameter, see Section II.F.1 above; 2) the components and DC bias current here are not in the signal path, see Section II.F.2 above; and 3) the affected DC bias current isn't a "switching current."

Lenovo does not claim that *Rauhala's* DC bias current I_B in control circuit 72 is a switching current. It clearly is not—applying nothing more complicated than Ohm's law. EX2005, ¶¶66-68; EX1004, [0023], Fig. 7 (annotated detail below):

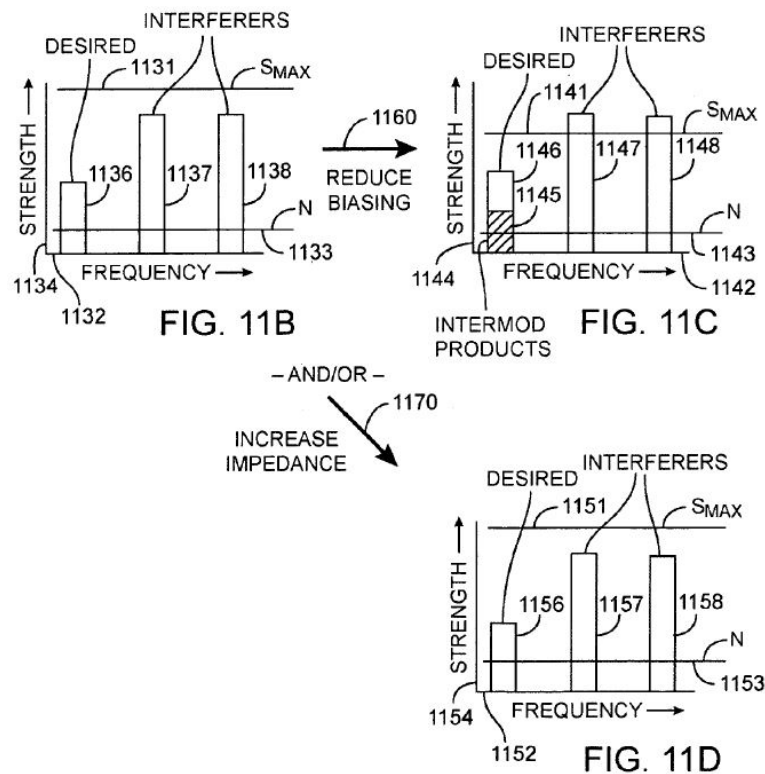


This lack of disagreement should be yet another end to Lenovo’s challenge. Even if changing DC current I_B from $V_B/R1$ to $V_B/R1 + V_B/R2$ were changing an impedance as claimed, as it is not—and even if these components were in the signal path, as they undisputedly are not—**reduced current I_B is undisputedly not a “switching current”** as required by the claims. Lenovo doesn’t say it is.

Instead, Lenovo argues that through a series of indirections, a change in bias current I_B results in a change in (maximum) supply current I , which results in a change in (maximum) collector current $I/2$. Petition, 42. Lenovo analogizes collector current $I/2$ to the claimed switching current. *Id.*

But this is simply attempting to argue around the distinction made during prosecution—between bias current and switching currents—by pointing to the indirect effects on the rest of a circuit that can arise from changing the bias current. Treating such indirect biasing effects in this way conflicts with the teaching, prosecution history, and claims of the ’330 Patent.

The '330 Patent teaches that reducing a switching or drive current via an impedance increase in the signal path is a different adjustment than reducing a bias current. EX1001, 6:7-10 (“Circuit impedances and currents are set such that the noise floor 264 is sufficiently low for an acceptable bit-error rate, while bias currents are set sufficiently high for the required S_{max} 262”), Figs. 11B, 11C, & 11D:



As the '330 Patent teaches, increasing an impedance in the signal path of the circuit causes the noise floor to rise, and causes “driving currents in the function block” to decrease. *Id.*, 9:53-57, 10:15-17, Fig. 11D. Reducing a bias current is a separate adjustment that causes the maximum signal handling capability to drop, and also

reduces current and saves power across the circuit. *Id.*, 1:59-60; 10:45-52 (“power may be reduced in this way”), Fig. 11C.

A person of ordinary skill would not find the claimed reducing of a switching or drive current by an impedance adjustment in the signal path to be disclosed by *Rauhala*’s discussion of a DC bias current adjustment outside of the signal path. As discussed above, a person of ordinary skill would **not** refer to such an adjustment as a change to an AC impedance. And as discussed above they would understand that the bias circuit components are **not** in the signal path. And they would further understand that the bias current is **not** “a switching current in the signal path” according to the claims. EX1001, 12:65 (claim 1); EX1003, 163 (“A bias current is not the same as a switching current”).

Dr. Baker’s Declaration again adds nothing, because it is yet again a near-verbatim copy of the Petition argument. See below (verbatim text highlighted):

Petition, pg. 35-36	Declaration ¶119
The ’330 specification does not define “switching current.” However, the Patent Owner did define “switching current” to be “a dynamic or transient current that occurs during voltage transitions,” during prosecution of the ’330 patent. In particular, in the response, the Patent Owner argued that: ... Ex. 1003 at 163; Ex. 1002 at ¶119.	119. The ’330 specification does not expressly define “switching current.” However, the patentee did expressly define “switching current” to be “a dynamic or transient current that occurs during voltage transitions,” during prosecution of the ’330 patent. In particular, in the response, the patentee argued that: ... Ex. 1003 at 163.

Petition, pg. 42	Declaration ¶133
Since the control current I_B is reduced when the impedance of control circuit 72 is increased, and supply current (I) is reduced when the control current is reduced, the collector current $I/2$ is reduced when the impedance of the control circuit 72 is increased. Ex. 1004 at [0023]; Ex. 1002 at ¶133.	Since the control current I_B is reduced when the impedance of control circuit 72 is increased, and supply current (I) is reduced when the control current is reduced, a person of ordinary skill would have understood that the collector current $I/2$ is reduced when the impedance of the control circuit 72 is increased.

The Petition’s suggestion, endorsed by Dr. Baker—that changing a bias current can lower the maximum signal handling level and can have indirect effects on other currents in the circuit—is not a matter of factual dispute. But the ’330 Patent teaches that such indirect effects of bias changes are separate from, e.g., “reducing a switching current in the signal path by dynamically changing an impedance of a component in the signal path.” A person of ordinary skill would understand that these claim elements refer to changing an impedance in the signal path to, e.g., directly attenuate a switching driver current. *See, e.g.*, EX1001, 6:44-59 (“a circuit’s impedances may be scaled to reduce drive currents”). *Rauhala* does not teach or suggest that kind of dynamic impedance adjustment anywhere—and is not alleged to by Lenovo.

Again here, the Petition cites to and relies only on *Rauhala* for alleged disclosure of these claim elements. *See, e.g.*, Petition at 35-38 (Ground 1, claim 1),

47 (Ground 1, claim 23), 62 (Ground 4, claim 1), 67 (Ground 4, claim 23). And again, the Petition only argues explicit disclosure, not obviousness, for these elements. *See, e.g., id.*, 35 (“*Rauhala* discloses ...”). Nothing from the other references, alone or in combination, is offered in support for these elements, and the Board need look no farther than the deficient disclosures of *Rauhala* to dismiss the Petition.

Lenovo has failed to show any likelihood that it will find success with its challenge—which completely ignores the teachings of the ’330 Patent and the language added to the claims during prosecution to overcome similar arguments about bias currents. The Petition should be dismissed under section 314(a) for these reasons as well as those detailed in Sections II.F.1 and II.F.2 above.

4. Petitioners’ conclusory attorney argument cannot meet its burden to show disclosure or suggestion of these elements

Lenovo’s Petition fails to show any likelihood of success that would warrant proceeding to trial, because it offers no competent evidence on which a trial proceeding could be based. Lenovo asserts obviousness grounds. But the Petition’s only references to what would be obvious to a person of skill relate to its cursory discussions of motivation to combine. *See, e.g.,* Petition, 49. As shown above, the Petition does not argue that the impedance, signal path, or switching current elements are obvious from *Rauhala* or any other reference or combination. Lenovo

argues only ***anticipatory disclosure, not obviousness***, for the elements disputed here. *See, e.g.*, Petition, 35-38, 39-41, 42 (“*Rauhala* discloses...”).

And on the question of alleged disclosure, Lenovo offers only incorrect, conclusory attorney argument—asserting without support that things mean what they plainly do not. No further proceedings are needed for the Board to determine, as shown above, that the elements simply aren’t disclosed in *Rauhala*. Lenovo’s arguments about explicit disclosure fail to establish any likelihood of success for all of the reasons given in the sections above.

Lenovo’s argumentative conclusions about disclosure in *Rauhala* are not supported by evidence, but only by citation to a declaration—one that repeats the conclusion as opinion without offering further support. *See, e.g.*, Petition, 36, 38; EX1002, ¶¶120, 125 (verbatim text highlighted):

Petition, pg. 36	Declaration ¶120
FIG. 7 of <i>Rauhala</i> shows a double-balanced mixer with two switching pairs of transistors. Ex. 1004 at [0023] and FIG. 7; Ex. 1002 at ¶¶120-125. The switching pairs are driven by a local oscillator. Ex. 1004 at [0023] and FIG. 7; Ex. 1002 at ¶¶120-125. A first switching pair includes a first transistor (annotated 1A) and a second transistor (annotated 1B). Ex. 1004 at [0023] and FIG. 7; Ex. 1002 at ¶¶120-125. The signal from the local oscillator would switch first	120. FIG. 7 of <i>Rauhala</i> shows a double-balanced mixer with two switching pairs of transistors. Ex. 1004 at [0023] and FIG. 7. The switching pairs are driven by a local oscillator. <i>Id.</i> A first switching pair includes a first transistor (annotated 1A) and a second transistor (annotated 1B). <i>Id.</i> It is my opinion that a person of ordinary skill in the art would have understood that the signal from the local oscillator would switch first transistor 1A and second

transistor 1A and second transistor 1B in a complementary manner. Ex. 1004 at [0023] and FIG. 7; Ex. 1002 at ¶¶120-125.	transistor 1B in a complementary manner.
Petition, pg. 38	Declaration ¶125
The current I/2 directed to transistors 1A and 1B is a “switching current” as defined by the patentee because it is “a dynamic or transient current that occurs during voltage transitions.” Ex. 1002 at ¶¶120-125. Each on-off switching event at transistors 1A/1B of <i>Rauhala</i> is a voltage transition. Ex. 1002 at ¶¶120-125. Each current I/2 is transient and dynamic, as it is constantly switched from first transistor 1A or second transistor 1B. Ex. 1002 at ¶¶120-125.	125. Therefore, it is my opinion that a person of ordinary skill would have understood that the current I/2 directed to transistors 1A and 1B is a “switching current” as defined by the patentee because it is “a dynamic or transient current that occurs during voltage transitions.” Each on-off switching event at transistors 1A/1B of <i>Rauhala</i> is a voltage transition. It is my opinion that current I/2 is dynamic because it is transient and dynamic, as it is constantly switched from first transistor 1A or second transistor 1B.

In relevant portion, as repeatedly shown above, Dr. Baker’s declaration is nothing more than a verbatim copy of counsel’s arguments in the Petition. Whether endorsed with a declarant’s signature or not: “Attorney argument is not evidence.” *Icon Health & Fitness, Inc. v. Strava, Inc.*, 849 F.3d 1034, 1043 (Fed. Cir. 2017) (reversing Board for relying on argument); MPEP §2145 (“arguments of counsel cannot take the place of factually supported objective evidence”).

Attorney argument does not become evidence by being copied into an expert’s declaration. *See, e.g., Kinetic Techs., Inc. v. Skyworks Solutions, Inc.*, No.

IPR2014-00529, 2014 WL 4787238, Paper 8 at 15 (P.T.A.B. Sept. 23, 2014) (“merely repeating an argument from the Petition in the declaration of a proposed expert does not give that argument enhanced probative value”); *Infobionic, Inc. v. Braemer Mfg., LLC*, No. IPR2015-01704, 2016 WL 1081571, Paper 11 at 6 (P.T.A.B. Feb. 16, 2016). The Board gives such conclusory, unsupported assertions by experts little or no weight. *Id.*; *Facebook, Inc. v. Windy City Innovations, LLC*, 973 F.3d 1321 (Fed. Cir. 2020) (upholding finding that copied testimony “did not ‘add materially to Petitioner’s unpersuasive attorney argument’”); *Facebook, Inc. v. Windy City Innovations, LLC*, No. IPR2016-01156, 2017 WL 6210806 at *12, Paper 52 at 30 (P.T.A.B. Dec. 6, 2017) (“merely repeats Petitioner’s argument, nearly verbatim, without citation to the basis for his testimony”).

Here, there is even less reason to credit Dr. Baker’s testimony. As shown above, Lenovo has excised his opinion about the “extremely well-known” definition of impedance (as the “[t]otal opposition that a circuit offers to the flow of alternating current ...”), from the declaration and Petition here. *See, e.g.*, IPR2023-00697, EX1002, ¶149. This was presumably because that agreed definition conflicts with finding any disclosure of changed impedance, properly understood, in *Rauhala*.

Lenovo had the burden to come forward with specific evidence here. 35 U.S.C. §316(e); *Harmonic*, 815 F.3d at 1363 (“the petitioner has the burden from

the onset to show with particularity why the patent it challenges is unpatentable”). It has failed to do show any disclosure of key elements that appear in every challenged claim—for example by pointing to components undisputedly ***not in the signal path*** for elements that require change to an impedance of components in the signal path. Dr. Baker’s declaration, which merely copies the Petition, also lacks any testimony showing disclosure of these elements.

Because Lenovo has failed to support its Petition attorney argument with any meaningful expert testimony, Lenovo has further failed to show a reasonable likelihood that it will find success with its arguments.

III. Conclusion

As detailed above, with the ’330 Patent, Professor Tsividis made foundational inventive and teaching contributions to the field. The techniques taught and claimed in his patents have been recognized for their importance and cited across the industry, and have remained interesting and worthy of publication to this day. EX2004. In contrast, Lenovo’s challenges to these patents are so weak as to be unworthy of the time and expense of a Board trial.

The Board needn’t look any further than *Rauhala*’s Figure 7, the only alleged disclosure of the elements discussed above, to determine that the Petition must fail and should not be instituted. The alleged varied impedance affects only a DC bias current and is not an AC impedance as claimed. The alleged varied impedance is

not even arguably in the signal path as required by the claims. And the disclosed bias current I_B —changed by the alleged varied impedance—is not a switching current and is itself not in the signal path. See EX1004, Fig. 7 (annotated below):

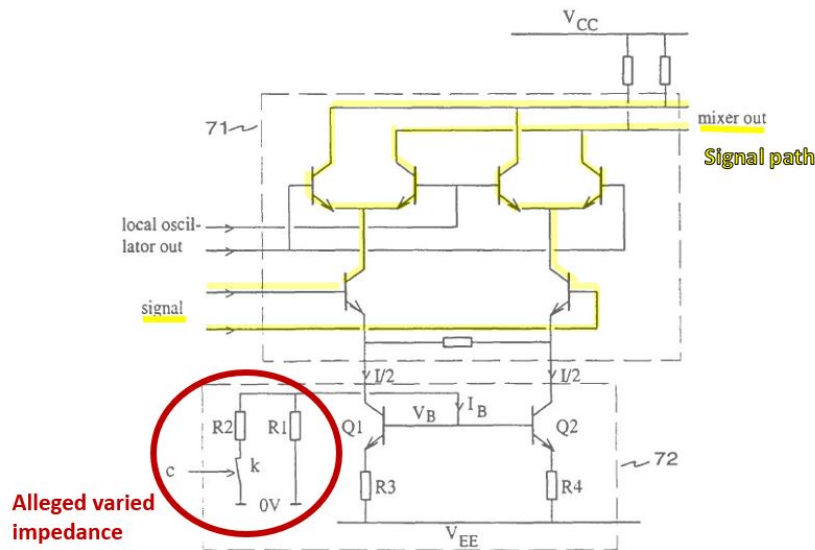


Fig. 7

For all of the reasons detailed above, including because the Petition fails to establish a reasonable likelihood of success as to any challenged claim, institution should be denied.

Dated: July 26, 2023

Respectfully submitted,

/s/ Aaron R. Hand

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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 10,297 words, as determined using the standard word counting feature of the Microsoft Word program.

Dated: July 26, 2023

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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 July 26, 2023, a copy of the foregoing document was served by email upon the following counsel at the below email addresses:

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