

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

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

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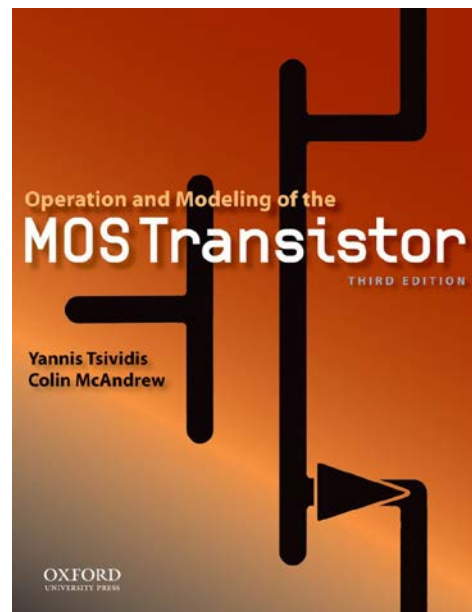
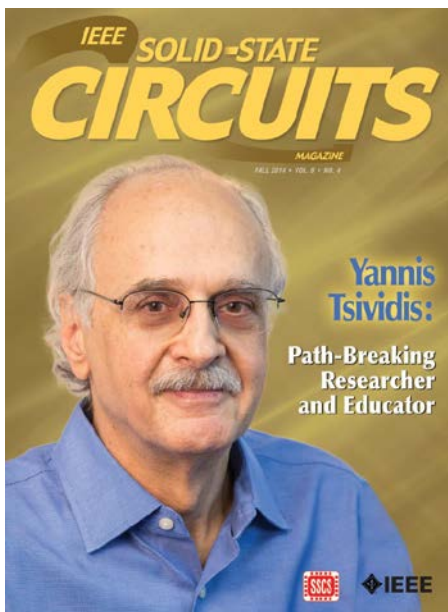
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Patent Owner's Exhibit List	
EX2001	Declaration of Corey Johanningmeier in Support of Motion for <i>Pro Hac Vice</i> Admission
EX2002	"Yannis Tsividis, Path-Breaking Researcher and Educator," IEEE Solid State Circuits Magazine, Fall 2014
EX2003	Y. Tsividis <i>et al.</i> , "Internally Varying Analog Circuits Minimize Power Dissipation," IEEE Circuits & Devices Magazine, Jan. 2003
EX2004	Y. Tsividis, "Signal-to-Noise Ratio, Dynamic Range, and Power Dissipation," IEEE Solid State Circuits Magazine, Fall 2018
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
EX2010	Excerpts of Phillip A. Laplante, <i>Electrical Engineering Dictionary</i> , 2000
EX2011	Excerpts of Mahmood Nahvi, Ph.D. & Joseph A. Edminister, <i>Schaum's Outline of Theory and Problems of Electric Circuits</i> (4th ed. 2003)
EX2012	Prosecution History of U.S. Patent No. 7,010,330 B1 – Filed by Petitioners in IPR2023-00694 as EX1003

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. 10,524,202 (“the ’202 Patent”).

I. Introduction

The inventor of the ’202 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 '202 Patent is part of 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):

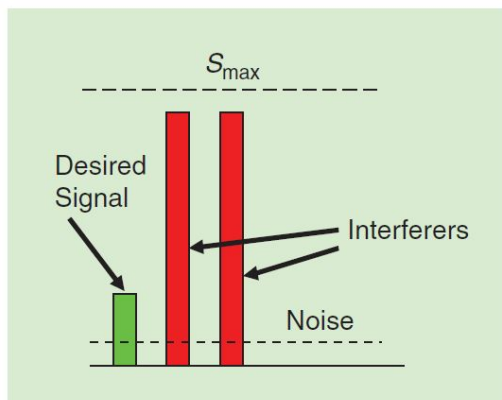


FIGURE 18: The worst-case scenario: minimum desired signal with maximum interference.

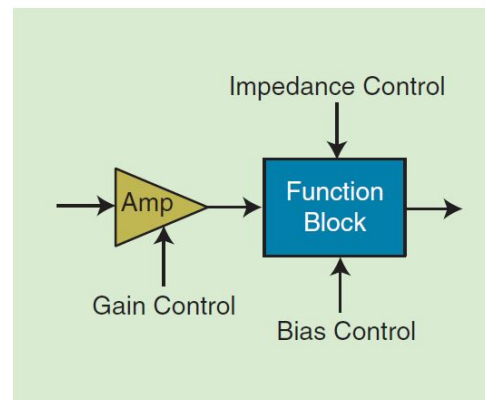


FIGURE 11: The three adaptive power strategies: adaptive gain, adaptive bias, and adaptive impedance.

The '202 Patent parent 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 '202 Patent, circuit designers could use bias current reductions and/or impedance variation to dynamically vary drive currents in an RF receiver system. EX1001, 7:29-48, Fig. 5, 7:49-8:5, Fig. 6. The specification also discusses—and other claims address—separate dynamic controls for gain of amplifier circuits (*id.*, 8:6-21, Fig. 7). *See also id.*, Figs. 2B, 8A:

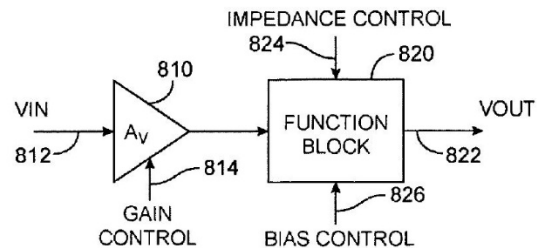
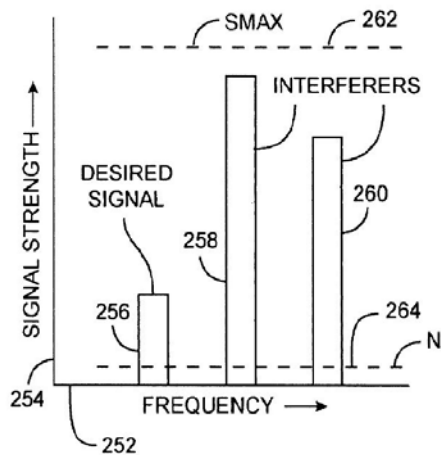


FIG. 8A

The '202 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.*, 1:60-63. And it taught many specific approaches to doing so, based on variations in possible

signal conditions. *See, e.g., id.*, 9:47-64, Figs. 9B & 9C (demonstrating a signal spectrum where impedance varying to raise the noise floor N can save power):

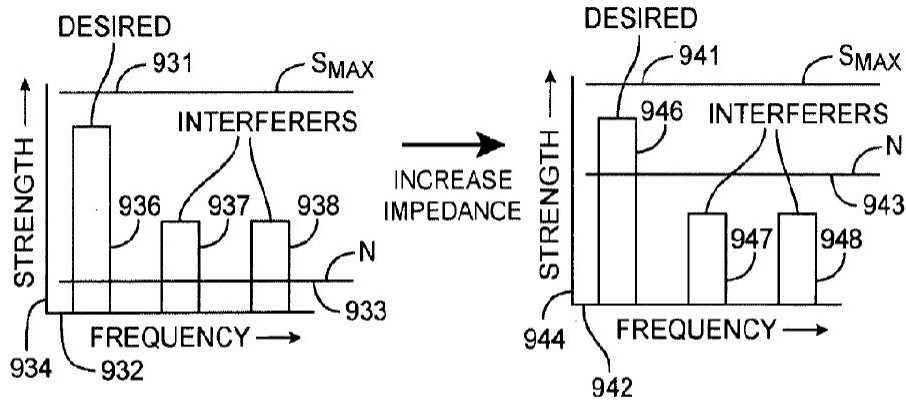


FIG. 9B

FIG. 9C

The application and specification that led to issuance of the parent of the '202 Patent also led to six (so far) additional patents. Moreover, the Tsividis Patents in this family have 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 (parent to the '202 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 '202 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

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.

elements—in a vain attempt to undo the Office’s detailed examination and issuance 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 18. The Board routinely and properly dismisses defective Petitions like Lenovo’s at the outset.

As shown below, Lenovo’s Grounds—both relying on alleged anticipation by *Rauhala*, exclusively (anticipation Ground 1) or for all elements disputed here (obviousness Ground 2)—all fail to properly interpret or to show any disclosure of key elements common to all 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, each challenged claim requires “determining the strength of the desired signal” **and** separately “determining the strength of the interferer signal.” *Rauhala*, the only reference relied on for alleged disclosure of these elements, discloses only a single detector—one that has to be re-tuned to be used for a neighboring channel indication. This is not disclosure of the claimed elements. The entire Petition fails on this point alone.

As another example, Lenovo fails to show explicit (or inherent) disclosure of elements of each challenged claim requiring “comparing the strength of the desired signal relative to the strength of the interferer signal.” *Rauhala*, the only reference relied on for alleged disclosure of these elements, does not explicitly disclose a comparison. And the SNR calculation mentioned—but not explained—in *Rauhala* could be done without the claimed comparison, ruling out inherent disclosure as a matter of law.

As another 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 dynamically varied impedance of certain challenged claims, and no other reference is even alleged to do so.

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. 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

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.

likelihood of demonstrating that even a single challenged claim is unpatentable. Lenovo fails to establish that *Rauhala* would have disclosed any of the challenged claims.

For example, *Rauhala*, the only reference alleged to do so, fails to disclose the two elements requiring “determining the strength of the desired signal” and separately “determining the strength of the interferer signal”—elements which appear in each of the challenged claims of the ’202 Patent, directly or by dependency. *See, e.g.*, EX1001, 14:5-6 (claim 7), 14:41-42 (claim 11), 15:18-19 (claim 13), 17:27-28 (claim 19). Lenovo attempts to argue disclosure of both required determining circuits by the same single detector of *Rauhala*—ignoring that the two elements require different determining functions on the received input spectrum at the same time, and the single *Rauhala* detector must be re-tuned to provide the same detection for a different channel. Petition, 31-34; EX1001, 14:3-8; EX1004, [0017], Fig. 4.

As another example, *Rauhala*, the only reference alleged to do so, fails to disclose the elements requiring “comparing the strength of the desired signal relative to the strength of the interferer signal”—elements which appear in each of the challenged claims of the ’202 Patent, directly or by dependency. *See, e.g.*, EX1001, 14:7-8 (claim 7), 14:43-44 (claim 11), 15:20-21 (claim 13), 17:29-30 (claim 19) (“comparing the desired signal strength to the interferer signal

strength”). Lenovo points only to an off-hand mention of an unexplained SNR calculation in *Rauhala*—but the sparse discussion identified in the reference does not disclose the claimed comparison, and that comparison is not inherent in calculating SNR. Petition, 34-35; EX1004, [0014] (“unit 23 provides signal SNR”); EX2005, ¶¶76-78.

In addition, *Rauhala*, the only reference alleged to do so, fails to disclose, suggest, or otherwise render obvious the elements of certain challenged claims requiring “dynamically adjusting” or increasing “an impedance.” See, e.g., EX1001, 14:9-14 (claim 7), 14:18-20 (claim 8), 17:32-37 (claim 19). 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 “of” a circuit “in the [receiver] signal path” as required.

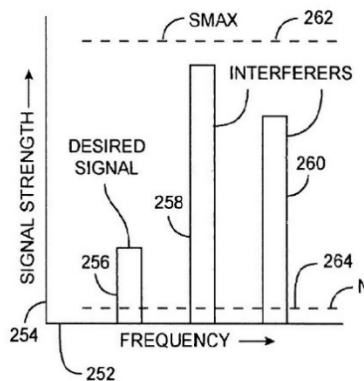
Because Petitioners’ unsupported arguments fail to establish a reasonable likelihood of proving any challenged claim unpatentable, trial should not be instituted here.

A. The ’202 Patent

The ’202 Patent is part of 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 (“’202 Patent”), Abstract, 1:57-62. 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.*, 1:36-42.

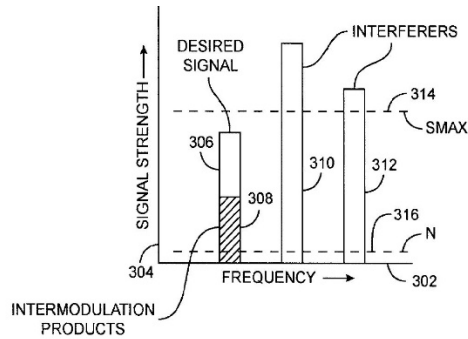
Professor Tsividis invented systems and methods that optimized battery life by making various adjustments to components in a receiver based on determining signal strength—or the relationships between the strength of desired signal (such as the signal carrying voice data) and the strength of interferer signals (originating from other wireless devices or electronic equipment, for example)—to achieve power savings. *Id.*, 5:22-32, 5:56-58, Figs. 2A & 2B (showing example desired signal and interferer signal spectrum):



B. The '202 Patent Specification

The '202 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.*, 1:60-2:2, 8:51-10:62. 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.*, 6:33-51, Fig 3:



The '202 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.”), 1:60-2:2, Fig. 9A:

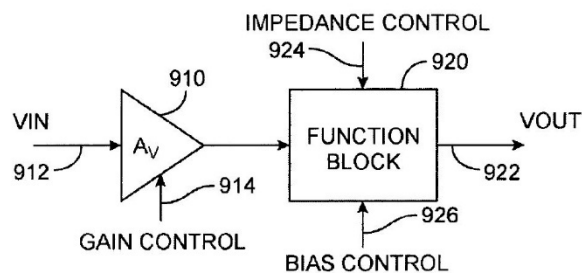
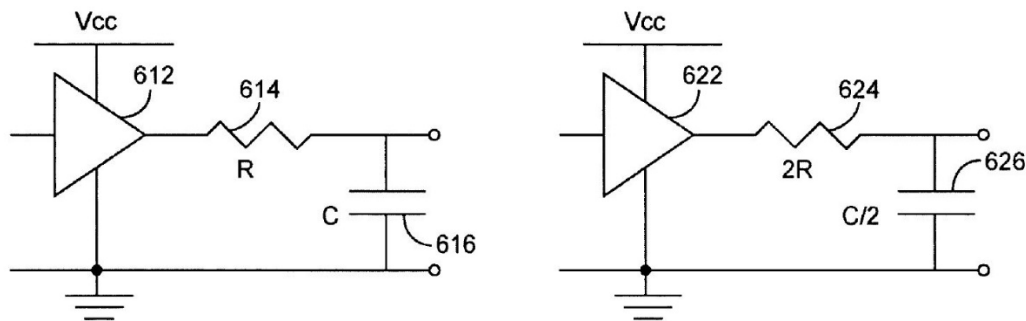


FIG. 9A

For example, the specification discusses circumstances calling for changes to bias currents, and techniques for doing so. *Id.*, 7:29-48, Fig. 5. For example, a bias current might be changed by increasing a resistance “by opening switches across portions of the resistance.” *Id.*, 7:41-46.

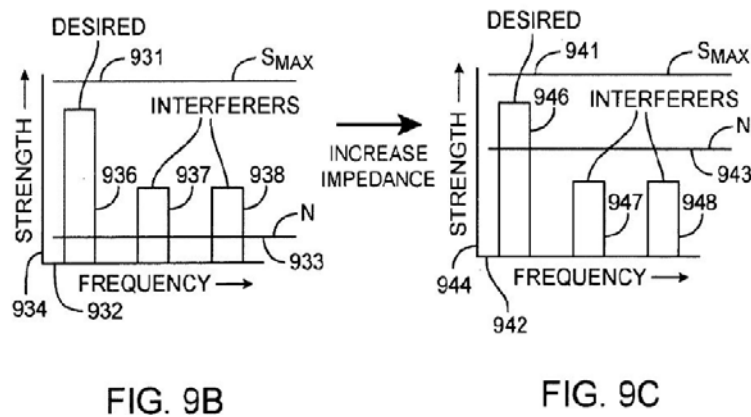
Alternatively, and in contrast, “a circuit’s impedances may be scaled to reduce drive currents” or even associated bias currents. *Id.*, 7:49-64, Fig 6. A basic example of this, with a common RC impedance load on a driver, is shown in Figure 6:



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.*, 7:52-57.

The '202 Patent also discusses and gives examples of gain adjustment. See, *e.g.*, *id.*, 8:6-21, 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.*, 8:22-24. 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., 3:35-51 (“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, 9:47-54:

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.

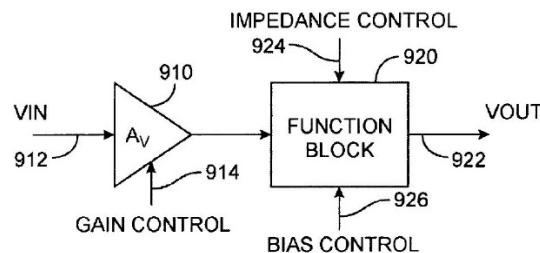


FIG. 9A

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 '202 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.*, 11:65-12:3 (low noise amplifier (LNA) adjustments), 12:4-8 (mixer), 12:9-21 (voltage controlled oscillator (VCO) adjustments).

In keeping with Professor Tsividis' long teaching career, the specification of the '202 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):

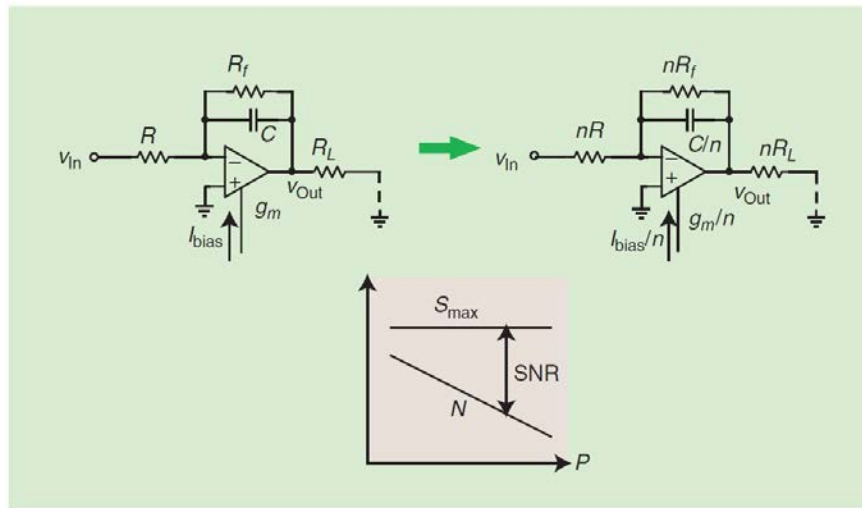


FIGURE 16: Bias-impedance scaling for an active RC circuit.

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):

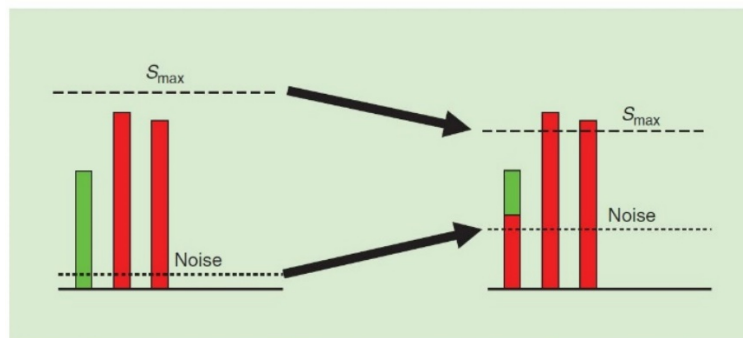
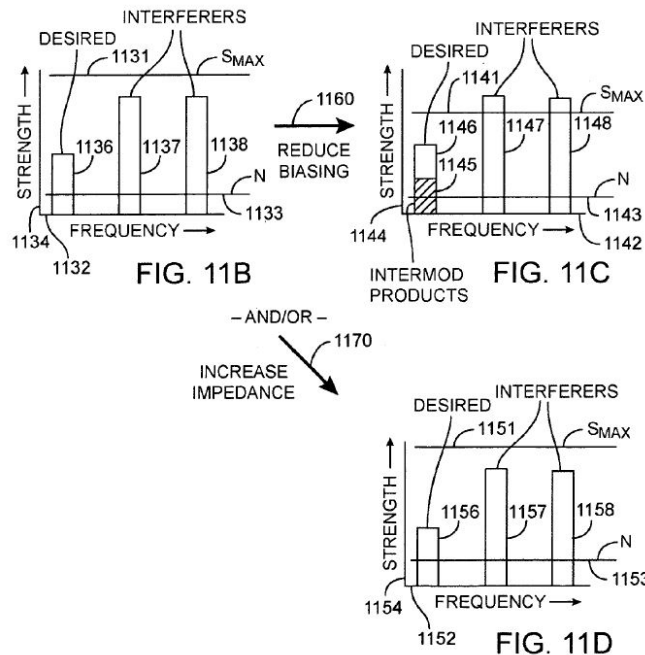


FIGURE 23: Power adaptation in the case of a medium desired signal and large interference.

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 '202 Patent. EX1001, 10:32-61, Figs. 11B, 11C, & 11D:



The '202 Patent discloses that decreases in bias current can be used to lower the maximum signal handling capability. *See, e.g., id.*, 9:10-12. The '202 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.*, 10:20-23.

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 '202 Patent. Others are mentioned above in Section I. The '202 Patent was groundbreaking and foundational, and the

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

C. The '202 Patent (and parent '330 Patent) Prosecution History

The application that issued as the '202 Patent was filed on November 28, 2017 and claims priority to two provisional applications filed on March 1, 2003 (App. Nos. 60/451,229 and 60/451,230). The '202 Patent is a continuation that has the '330 Patent, filed on February 23, 2004, as its ultimate parent.

As acknowledged in the Petition, during prosecution, versions of the issued claims were rejected, including in view of the *Clark* reference—*e.g.*, on April 12, 2019. Petition 10-11; EX1003, 159 (rejection). After various amendments, argument, and new claims, the Examiner allowed the claims. EX1003, 95 (Notice of Allowability).

In the earlier prosecution of the parent '330 Patent, the pending claims were also initially rejected as obvious over a combination that included the *Clark* reference (U.S. Patent No. 5,001,776). EX2012, 171. The Examiner found that *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 by arguing that the identified disclosures of *Clark* only taught changing a “bias current,” which was understood to be different than a switching or drive current. EX2012, 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, 7:49-64 (“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 ’330 Patent claims based on Applicant’s amendments and arguments. EX2012, 133-134. In allowing these two claim sets after rejections in view of *Clark*, the Examiner necessarily recognized that modifying a DC or quiescent current, as in *Clark*, did not disclose elements involving “dynamically changing an impedance.” *Id.*, 134. Accordingly, claims here—requiring varying “an impedance” in a circuit “in the [receiver] signal path”—cannot be invalidated here based on *Rauhala*’s similar disclosure of modifying a DC or quiescent current.

D. The '202 Patent Challenged Claims

Lenovo challenges nine claims of the '202 Patent here. Each of the four challenged independent claims contains elements requiring “determining the strength of the desired signal” and “determining the strength of the interferer signal”—elements which appear in the body or by dependency in each of the challenged claims of the '202 Patent. *See, e.g.*, EX1001, 14:5-6 (claim 7), 14:41-42 (claim 11), 15:18-19 (claim 13), 17:27-28 (claim 19). Each claim also contains elements, directly or by dependency, requiring “comparing the strength of the desired signal relative to the strength of the interferer signal.” *See, e.g., id.*, 14:7-8 (claim 7), 14:43-44 (claim 11), 15:20-21 (claim 13), 17:29-30 (claim 19)

For example, challenged claim 7 recites (elements discussed herein emphasized):

7. A method for power dissipation control in a receiver of a wireless transceiver of a battery-powered portable wireless device, the receiver having a signal path comprising a plurality of circuits including at least an amplifier, a filter, and a mixer, wherein the receiver is configured to receive a wireless signal having a desired signal and an interferer signal, wherein the plurality of circuits are designed to function between a worst-case condition when a strength of the desired signal is low and a strength of the interferer signal is high, and a best-case

condition when the strength of the desired signal is high and the strength of the interferer signal is low, the method comprising:

receiving the wireless signal having the desired signal and the interferer signal by the receiver;

determining the strength of the desired signal;

determining the strength of the interferer signal;

comparing the strength of the desired signal relative to the strength of the interferer signal; and

based on the comparison, when the plurality of circuits are functioning at better than the worst-case condition, ***dynamically adjusting*** one or more of ***an impedance***, a bias or a gain ***of one or more of the plurality of circuits in the signal path***, thereby controlling power dissipation.

EX1001, 13:58-14:14 (claim 7); *see also id.*, 15:18-21 (independent claim 13, containing identical determining and comparing elements):

13. ...

receiving the wireless signal having the desired signal and the interferer signal by the receiver;

determining the strength of the desired signal;

determining the strength of the interferer signal;

*comparing the strength of the desired signal
relative to the strength of the interferer signal; and*

... .

Identical or very similar language also exists in challenged claims 11 and 19. *Id.*, 14:41-44, 17:27-31.

As discussed below, *Rauhala*—the only reference alleged to—does not disclose the determining desired signal strength and determining interferer signal strength elements, which are included directly or by dependency in every challenged claim. Lenovo’s Petition improperly relies on *Rauhala*’s brief reference to a single detector for alleged disclosure of both determining elements—a detector that is only disclosed to indicate a threshold crossing, and only for the one signal channel that it is tuned for at a time. And for the comparing elements, Lenovo’s Petition incorrectly relies on *Rauhala*’s passing mention of an explained SNR calculation—which never discusses a comparison and needn’t involve one.

Challenged independent claims 7 and 19, along with challenged dependent claim 8 also contain elements requiring “dynamically adjusting” or “dynamically

increasing” “an impedance” of a circuit “in the [receiver] signal path.” EX1001, 14:9-14 (claim 7) (see above), 14:18-20 (claim 8) (“dynamically increasing the impedance of one or more of the plurality of circuits in the signal path”), 17:32-37 (claim 19):

19. ...

determining the desired signal strength;

determining the interferer signal strength;

comparing the desired signal strength to the interferer signal strength to determine an operating signal condition of the receiver;

based on the comparing, when the receiver operating signal condition is better than the worst case operating signal condition, ***dynamically adjusting*** one or more of ***an impedance***, a bias, or a gain ***of one or more of the plurality of circuits in the receiver signal path***, thereby optimizing power consumption to save power.

As also discussed below, *Rauhala*—the only reference alleged to—does not even arguably disclose or suggest these claimed impedance variation elements. Lenovo’s Petition relies on *Rauhala*’s disclosure of changing resistors controlling

a static DC bias current. That is **not** changing an impedance, and *Rauhala*'s kI bias control circuit is **not** in the receiver signal path.

The Petition fails to show a reasonable likelihood of success on any challenged claim and must be dismissed pursuant to 35 U.S.C. §314.

Challenged claims 8, 9, and 10 depend from independent claim 7. EX1001, 14:15-30. And challenged claims 20 and 21 depend from independent claim 19. *Id.*, 17:38-18:6. No reasonable likelihood of success is shown for these dependent claims either, for the same reasons as discussed herein for their independent claims.

Similarly, nothing is added in Ground 2—or from the alleged combination reference *Saito*—to the deficient showing concerning the independent claims in Ground 1. Petition, 73-77. Indeed, Ground 2 simply refers back to the alleged anticipatory disclosure argued in Ground 1 for all of the elements discussed herein. *Id.*, 73 (“As discussed herein previously, *Rauhala* teaches each element of, and therefore anticipates, claims 7-11, 13, and 19-21.”). The Board need not address the separate deficiencies in *Saito*, or the alleged motivation to combine, in order to deny institution for failure to show a reasonable likelihood of success here.

Again, 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 '202 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 '202 Patent and related patents have been twice construed by district courts. EX1008, EX1009. The claims will be

construed again in two other district court litigations.³ 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’).”).

Challenged dependent claim 8 here has specific elements requiring changes to “an impedance,” of a circuit “in the signal path.” *See* EX1001, 14:15-20 (claim 8). Lenovo has failed to show these elements are disclosed in *Rauhala* as alleged. Other than adopting the plain meaning—and prior consistent construction—of “impedance,” construction by the Board is not needed to see why the claim elements are not present or suggested in the cited art.

³ 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.).

1. “dynamically adjusting” and “dynamically” varying

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 adjusting” or “dynamically [increasing / reducing / decreased / increased]” 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* EX2014, 2-3—as “adjusting during operation based, at least in part, on information gained during operation.” *See* Petition, 18, 22, 23. As Lenovo points out, such a construction would be consistent with Theta’s own arguments in both prior litigations. *See* Petition, 22-23.

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”

In this Petition, Lenovo, and its declarant Dr. Baker, admit that impedance has a well-known meaning, and that it is an AC circuit parameter. Petition, 41; EX1002, ¶134 (“[t]he total opposition (i.e., resistance and reactance) a circuit offers

to the flow of alternating current at a given frequency”). 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. *Id.*

Impedance is undisputedly 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 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”); EX1010, 7, 8; 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 ’202 Patent. EX2005, ¶¶54-56.

This definition is not in dispute. Lenovo agrees with it and relies on the same Graf dictionary shown above. EX1006, 7; *see also* Petition, 41; EX2002, ¶134 (“The total opposition (i.e., resistance and reactance) a circuit offers to the flow of alternating current at a given frequency”).

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.” EX1008, 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. EX1007, 5.

The ’202 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, 7:49-57, 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; EX1002, ¶134 (“The total opposition (i.e., resistance and reactance) a circuit offers to the flow of alternating current at a given frequency”).

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 ’202 Patent does not do so—using the term “resistance” when discussing DC circuits, such as those for setting bias currents. *See, e.g.*, EX1001, 7:40-46 (describing changing a DC bias current through “a resistance” by “by opening switches across portions of the resistance”), 8:17-19 (“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.*, 7:49-64. This is in keeping with ordinary usage of the terms. EX2005, ¶¶57-58.

As described above, the ’202 Patent teaches control of bias currents, and control of impedances, as separate concepts. *See, e.g.*, 1:60-62 (“bias current reduction, impedance scaling, gain, and other dynamic changes either separately or in combination”), 8:22-24 (“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:

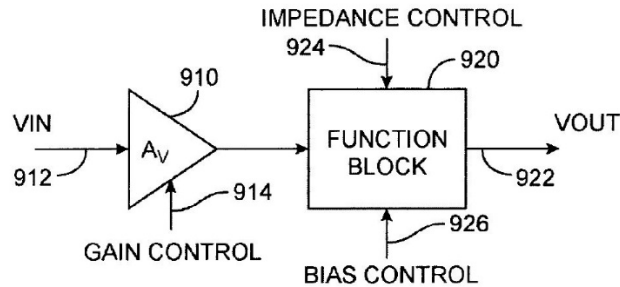
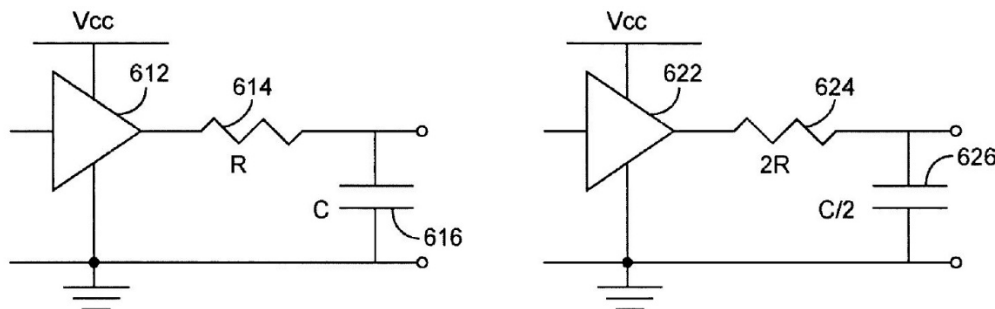


FIG. 9A

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.*, 7:41-46 (“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.*, 7:49-64 (“impedance”), Fig. 6:



This ordinary understanding of impedance as used in the '202 Patent is also consistent with the prosecution history. In prosecution of the parent '330 Patent, Applicant distinguished changes in a DC current, allegedly shown in prior art, from the claimed impedance change affecting an AC switching current. EX2012, 163 (“a bias current is a DC or quiescent current, while a switching current is a dynamic or transient current”).

The Petition relies only on a resistor(s) controlling a DC supply current—for alleged disclosure of the elements of increasing an impedance. Petition, 40-41 (“Changing the foregoing resistances in the circuit of Figure 6 changes the impedance”). 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 '202 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; EX2012, 163, 134.

The Board may construe “impedance” as “opposition to the flow of alternating current,” as determined in the Eastern District of Texas (EX2008, 15)—

or may simply agree with the Western District of Texas (EX2007, 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.*, Petition, 41 (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”); EX1002, ¶134.

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 disclosed by *Rauhala*

Rauhala, the only reference cited to or relied on for alleged disclosure of all elements of each independent challenged claim, does not disclose key elements as claimed.

For all claims, the Petition does not show disclosure of “determining the strength of the desired signal” and “determining the strength of the interferer signal.” The single detector of *Rauhala* cannot be used to disclose two claimed determining elements with different functions—which both operate and are used

together in the claimed inventions. *See, e.g., In re Robertson*, 169 F.3d 743, 744-45 (Fed. Cir. 1999) (reversing determination that one fastener could disclose multiple claimed fasteners that performed different functions).

And for all claims, as discussed further below, the Petition fails to show disclosure of “comparing the strength of the desired signal relative to the strength of the interferer signal.”

With respect to certain claims, the Petition does not properly interpret, or show disclosure in *Rauhala* of, dynamically varying “an impedance” as claimed. And the Petition completely ignores the requirements—not disclosed or suggested in *Rauhala*—of changing an impedance of a circuit “in the [receiver] signal path.”

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 *Saito* reference cited in alternative Ground 2 are not properly combined. And there are numerous additional substantive deficiencies in the Petition, including with respect to dependent claims. But the fatal flaws concerning each independent claim discussed herein are sufficient to warrant denial of institution without even needing to reach those issues.

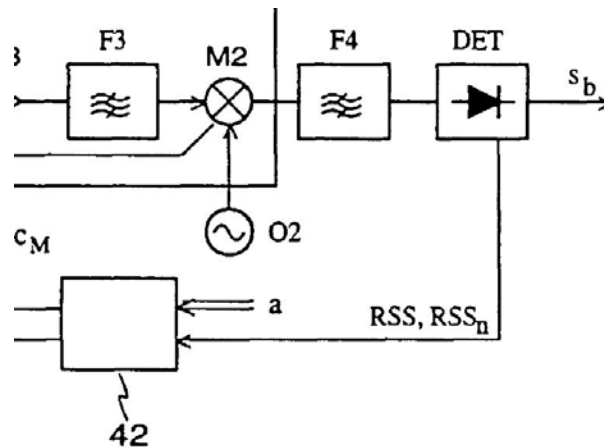
The Petition fails to show, as required by §314 and 37 C.F.R. §42.108, that there is a reasonable likelihood that Petitioners would prevail with respect to any one of the claims challenged. Accordingly, institution should be denied.

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

Lenovo failed to show that *Rauhala* discloses to a person of ordinary skill in the art elements of every challenged claim requiring both “determining the strength of the desired signal” *and separately* “determining the strength of the interferer signal.” *See, e.g.*, EX1001, 14:5-6 (claim 7), 14:41-42 (claim 11), 15:18-19 (claim 13), 17:27-28 (claim 19). The ’202 Patent teaches that the desired signal and the interferer signal are part of the same received signal input spectrum—in other words, they are received together. *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.”), 14:2-3 (claim 7: “receiving the wireless signal having the desired signal and the interferer signal by the receiver”).

Lenovo points only to a single structure as allegedly disclosing both “determining the strength of the desired signal” and “determining the strength of the interferer signal”—a single “detector (DET)” shown in *Rauhala*. *See, e.g.*,

Petition, 31-32. There is no dispute that there is only one disclosed detector, or that it can only give one indication at a time. *Id.* (“a ‘detector DET’ configured to provide ‘an indication about **either** the receive channel signal strength RSS or the strength of [another channel]”); EX1004, [0017] (“receives from detector DET an indication about either ... or ...”), Fig. 4 (showing a single detector with a single output that can be either RSS or RSS_n, depending on “a”);



See also EX2005, ¶¶60, 69-70 (“a single detector “DET,” which can generate “an indication about either the receive channel signal strength RSS or the signal strength of a neighboring channel RSS_n”). *Rauhala* does not describe how the detector works, only that it can give “an indication” whether the signal strength crossed a threshold. *Id.*; EX1004, [0017] (“Signal RSS has one threshold value S4”); EX2005, ¶71.

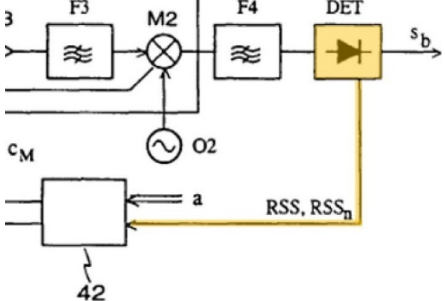
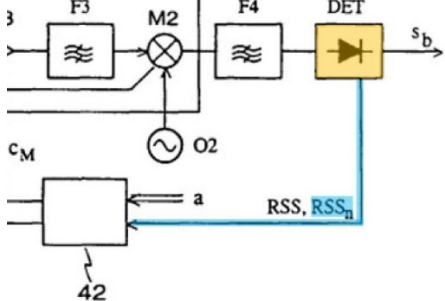
It is also apparent from *Rauhala* that the detector must be re-tuned to another channel in order to provide an indication from it. See, e.g., EX1004, [[0017]

(“Signal a from the receiver’s tuner control indicates the channel”); EX2005, ¶61. Lenovo agrees, as it must, because *Rauhala* directly states that: “[d]etector DET provides information about the signal strength (RSS) **on the channel to which the receiver is tuned.**” Petition, 31 (citing EX1004, [0013]).

Rauhala does not disclose how the threshold indications from the channels may be combined, but it is clear from the circuit diagram of Fig. 4 that the threshold indications for “S4” and “Sn” shown in the table in [0017] must come from at least two distinct uses of the **single** disclosed detector. EX1004, [0017] (“receives from detector DET an indication about either ... RSS or ... RSS_n”), [0013] (“the channel to which the receiver is tuned”), Fig. 4; EX2005, ¶70.

Lenovo agrees that the single detector can at most give one indication: “an indication about either the receive channel signal strength RSS or ... [RSS_n].” Petition, 13. Lenovo’s two-page discussion of these claim elements simply uses the same argument twice, and does not explain how one single-indication detector—requiring an intervening re-tuning of the receiver—could disclose two determinations at once in the claim. *Id.*, 31-34. The second time it points to the disclosure of the one detector, Lenovo colors it blue. *Id.*:

p.32: “Figure 4 of <i>Rauhala</i> , reproduced below with annotations, depicts the position of detector DET along the receiver signal path and the	p.33: “Figure 4 of <i>Rauhala</i> , reproduced below with annotations, depicts the position of detector DET along the receiver signal path and the
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transmission of RSS to control unit 42.”	transmission of RSS_n to control unit 42.”
 <i>Rauhala Figure 4</i>	 <i>Rauhala Figure 4</i>

Coloring aside, Lenovo can’t, as a matter of settled law, use one disclosure to anticipate two separate elements of a claim, and its Petition fails on this point—both as a matter of logic and of law. As a matter of logic, a detector with one output, which must be re-tuned to provide an indication for a different channel, cannot be said to provide two different channel indications at once. *See also* EX2005, ¶¶70-72. As a matter of law, Petitioners cannot show anticipatory disclosure of two circuits that perform different functions together—from one circuit alleged to be capable of each, but one at a time. *See, e.g., In re Robertson*, 169 F.3d at 744-45 (discussed further below).

Dr. Baker’s declaration adds no evidence or insight here—because the only testimony presented is nothing more than a near-verbatim copy of the Petition attorney argument, signed by Dr. Baker. *See below* (verbatim text highlighted):

Petition, pg. 32	Declaration ¶113
For each of the several configurations, <i>Rauhala</i> explains that a detector DET measures the receive signal strength (RSS) and transmits the RSS to a control unit. Ex. 1004 at ¶¶[0015], [0017], [0019]; Ex. 1002 at ¶113. For example, <i>Rauhala</i> teaches that “control unit 42 receives from detector DET an indication about [...] the receive channel signal strength RSS.” Ex. 1004 at ¶[0017]. Figure 4 of <i>Rauhala</i>, reproduced below with annotations, depicts the position of detector DET along the receiver signal path and the transmission of RSS to control unit 42. Ex. 1004 at ¶[0017], FIG. 2; Ex. 1002 at ¶¶113-114.	113. For each of the several exemplary configurations for controlling supply currents of amplifiers and mixers, <i>Rauhala</i> explains that a detector DET measures the receive signal strength (RSS) and transmits the RSS to a control unit. Ex. 1004 at [0015], [0017], [0019]. For example, <i>Rauhala</i> teaches that “control unit 42 receives from detector DET an indication about [...] the receive channel signal strength RSS.” Ex. 1004 at [0017]. Figure 4 of <i>Rauhala</i>, reproduced below with annotations, depicts the position of detector DET along the receiver signal path and the transmission of RSS to control unit 42. Ex. 1004 at [0017], FIG. 2.
Petition, pg. 33	Declaration ¶115
<i>Rauhala</i> teaches this element. Ex. 1002 at ¶¶115-116. <i>Rauhala</i> states that the “receiver monitors the signal strength on the [...] neighboring channels.” Ex. 1004 at ¶[0006]. With reference to the configuration of Figure 4, <i>Rauhala</i> explains that “control unit 42 receives from detector DET an indication about [...] the strength of any signal on the reception band.” <i>Id.</i> at ¶[0017]. <i>Rauhala</i> refers to this value as RSS_n, which “stands for the signal strength	115. <i>Rauhala</i> teaches determining the strength of the interferer signal. <i>Rauhala</i> states that the “receiver monitors the signal strength on the [...] neighboring channels.” Ex. 1004 at [0006]. With reference to the configuration depicted in Figure 4, <i>Rauhala</i> explains that “control unit 42 receives from detector DET an indication about [...] the strength of any signal on the reception band.” <i>Id.</i> at [0017]. <i>Rauhala</i> refers to this value as RSS_n, which “stands for the

of the neighboring channel in which the signal strength is greater.” *Id.*; Ex. 1002 at ¶115. Figure 4 of *Rauhala*, reproduced below with annotations, depicts the position of detector DET along the receiver signal path and the transmission of RSS_n to control unit 42. Ex. 1004 at ¶[0017], FIG. 4; Ex. 1002 at ¶¶115-116.

signal strength of the neighboring channel in which the signal strength is greater.” *Id.* Figure 4 of *Rauhala*, reproduced below with annotations, depicts the position of detector DET along the receiver signal path and the transmission of RSS_n to control unit 42. Ex. 1004 at [0017], FIG. 4.

These repetitious paragraphs, copied as “testimony,” are the extent of both the Petition’s argument and Dr. Baker’s testimony allegedly relating *Rauhala* to these claim elements.

Dr. Baker’s signature—endorsing attorney argument—is not evidence, and declarations like his are frequently and properly ignored. *See, e.g., Samsung Elecs. 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. There is no fact question here that would require institution to explore or resolve. *Rauhala* undisputedly does not disclose two detectors. So even if Lenovo were correct that *Rauhala*’s detector were capable of determining a signal strength as claimed, two determinations of two different signal strengths together is not disclosed. Lenovo’s Petition should be dismissed. Anticipation requires disclosure of every element, and the challenged claims have two elements requiring two different determinations from the same received signal spectrum.

Lenovo’s contrary attorney argument—that disclosure of one detector can meet two claim elements requiring a determination of one thing **and** another determination of another thing—is nothing more than that: unsupported attorney argument. “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”). And unsupported attorney argument does not meet

the Board’s standard for instituting a trial—particularly when that attorney argument is legally incorrect.

The Federal Circuit has held, in directly analogous circumstances, that a single structure can’t be used to show anticipatory disclosure of elements requiring multiple structures with two functions—even if the single structure is capable of doing both functions. In *Robertson*, 169 F.3d at 744-45, a claim required fasteners (for holding a diaper in place) and another fastener (for holding the diaper closed for disposal) . The patent challenger pointed to a reference disclosing only fasteners for securing the diaper, but suggesting that they could be re-tasked for disposal. *Id.*

The Federal Circuit reversed the Board’s finding of anticipation, stating that the required fastener for disposal was neither expressly nor inherently disclosed by the suggestion to reuse the disclosed fasteners for disposal. *Id.* at 745. This is precisely the situation presented by Lenovo’s faulty allegations here. A claim element, requiring two determinations of two different functions, is not anticipated by a reference containing one threshold detector circuit alleged to be capable of doing either one or the other function. *See, e.g., id.*

Numerous other cases also refute Lenovo’s argument here. *See, e.g., Lantech, Inc. v. Kelp Machine Co.*, 32 F.3d 542, 547 (Fed. Cir. 1994) (a single conveyor held to not to meet claim element requiring at least two conveyors); *Ex parte Miller*, Appeal No. 2020-004369, 2021 WL 4492109, at *3 (P.T.A.B. Sept.

29, 2021) (“When a claim requires two separate elements, one element construed as having two separate functions does not meet the claim’s terms,”); *Ex parte Wiedeman*, Appeal No. 2008-003454, 2009 WL 211777, at *3 (B.P.A.I. Jan. 27, 2009) (“Consistent with the principle that all limitations in a claim must be considered to be meaningful, it is improper to rely on the same structure in the Lohr reference as being responsive to two different elements . . . in claim 1”); *Ex parte Koutsky*, Appeal No. 2008-000557, 2008 WL 4359775, at *2 (B.P.A.I. Sept. 23, 2008) (“when a claim requires two separate elements using one element construed as performing two separate functions will not suffice to meet the terms of the claim”).

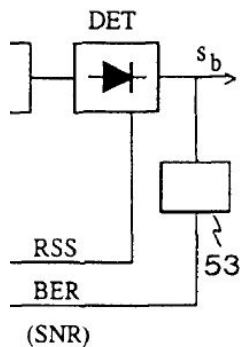
In sum, Petitioners’ *Rauhala* arguments are facially deficient as a matter of law, and it would be reversible error to credit them and find anticipatory disclosure in *Rauhala*’s single detector. The Board need not and should not institute, because Lenovo has failed to show a reasonable likelihood that *Rauhala* discloses any challenged claim. There is simply no teaching or suggestion in *Rauhala* of the elements requiring both “determining the strength of the desired signal” **and** “determining the strength of the interferer signal,” which 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—see Petition, 31-34 (claim 7), 54-55 (claim 11), 60 (claim 13), 69 (claim 19)—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); *Robertson*, 169 F.3d at 745 (“Anticipation ... requires that ‘each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.’”). *Rauhala* does not disclose every element and cannot anticipate. Lenovo’s Petition must fail and does not meet the Board’s standard for institution.

2. Petitioners failed to show that *Rauhala* discloses “comparing” according to the challenged claims

Lenovo failed to show that *Rauhala* discloses to a person of ordinary skill in the art elements of every challenged claim requiring “comparing the strength of the desired signal relative to the strength of the interferer signal”—elements which appear in each of the challenged claims of the ’202 Patent, directly or by dependency. *See, e.g.,* EX1001, 14:7-8 (claim 7), 14:43-44 (claim 11), 15:20-21 (claim 13), 17:29-30 (claim 19).

Lenovo relies for these elements only on a mention in *Rauhala* of a signal-to-noise ratio (SNR) calculation by “unit 53” of Figure 5—a proverbial black box. Petition, 35. *Rauhala*’s entire related disclosure is two sentences and an empty box in Figures. EX1004, [0014] (“Alternatively, the quality of the detected signal can be determined by calculating its signal-to-noise ratio. In that case, unit 23 provides signal SNR (signal-to-noise ratio).”), Fig 5 (detail below):



This does not disclose “comparing the strength of the desired signal relative to the strength of the interferer signal.” There is no discussion or indication of how the SNR is calculated. See EX1004, [0014]; EX2005, ¶74. Lenovo asserts without support that the calculation involves the determined desired and interferer signal strengths (see Petition, 35), but that is not disclosed in *Rauhala*—and indeed is not possible based on what little is disclosed.

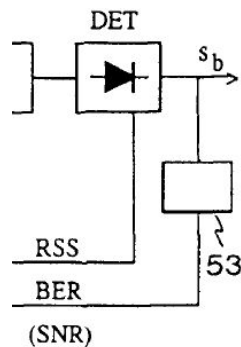
To begin with, the alleged determinations of desired and interferer signal strengths discussed in the section above—that Lenovo asserts both come from detector DET—are not inputs to the calculation. This is clear from the Figures, which show only signal s_b as input to box 23 or 53, not RSS. EX1004, Fig. 2, Fig. 5. *Rauhala* does not disclose, and Lenovo does not suggest, any mechanism for getting Lenovo’s alleged determinations to Lenovo’s alleged comparison. Petition, 35.

Further, the only “indication” from detector DET that is discussed anywhere in *Rauhala* is an indication whether a signal has crossed a threshold. See EX1004,

[0017] (“Signal RSS has one threshold value S4”); EX2005, ¶¶61, 75. Thresholds are not suitable for comparing two numbers. *Id.*

For example, if all one knows is that A is some number greater than 3, and B is some number greater than 5, no comparison between A and B is possible. A could be 4 and B could be 20 ($A < B$). A and B could both be 6 ($A = B$), or A could be 500 and B could be 7 ($A > B$). *Rauhala* does not disclose, and Lenovo does not suggest, any mechanism for deriving a comparison from two threshold indications. Petition, 35.

This speculation about how “unit 53” could, or could not work, conclusively answers the question of explicit disclosure. *Rauhala* doesn’t explain any way that “unit 53” and its SNR calculation works. EX1004, [0014]. *Rauhala*’s Figures give no clues as to how it works either. *Id.*, Fig. 5 (detail):



Lenovo completely failed to show explicit disclosure of “comparing the strength of the desired signal relative to the strength of the interferer signal” from the empty box of “unit 53.”

Lenovo and Dr. Baker fail to allege (much less show) inherent disclosure. There are multiple ways to calculate SNR. *See, e.g.*, EX2005, ¶76. Mystery “unit 53” could derive a SNR calculation from any number of error rate or other indicators that do not involve “comparing the strength of the desired signal relative to the strength of the interferer signal.” EX2005, ¶¶76-78. Further, and as the ’202 Patent teaches, there are multiple components of “noise” and multiple ways to estimate it. *Id.*; EX1001, 5:22-32 (“The noise may be thermal, shot, or other noise generated on the integrated circuit, in addition to received noise generated by sources external to the chip.”). Without more information—of which *Rauhala* offers none—the claimed comparison is not disclosed, explicitly or inherently, from an unexplained instruction to calculate SNR.

Lenovo has not shown anticipation of the comparing elements from the sparse and unexplained disclosures identified from *Rauhala*. Lenovo’s single sentence and citation on the subject is no more than a conclusory assertion. Petition, 35. And again Dr. Baker’s declaration simply repeats it verbatim. EX1002, ¶120.

The Board need not and should not institute, because Lenovo has failed to show a reasonable likelihood that *Rauhala* discloses any challenged claim. There is simply no teaching or suggestion in *Rauhala* of the elements requiring “comparing,” which 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—see Petition, 34-35 (claim 7), 55 (claim 11), 60 (claim 13), 69-71 (claim 19), 73 (Ground 2, referring back to “anticipates” allegations of Ground 1)—must fail. *Rauhala* does not disclose every element and cannot anticipate. Lenovo’s Petition does not meet the Board’s standard for institution.

3. Petitioners failed to show that *Rauhala* discloses varying “an impedance” according to challenged claims

Lenovo failed to show that *Rauhala* discloses to a person of ordinary skill in the art claim elements requiring “dynamically adjusting” or “dynamically increasing” “an impedance.” See, e.g., EX1001, 14:9-14 (claim 7), 14:18-20 (claim 8), 17:32-37 (claim 19).

As discussed above in Section II.E.2, the proper definition of “impedance”—as would be understood by a person of ordinary skill at the time reading the ’202 Patent—indisputably refers to the opposition of a circuit to **AC current**. This is how the term has been construed before, and what Lenovo and its declarant agree it means. Petition, 41; EX2008, 15. But here Lenovo has instead pointed to a change to resistors that are in series with a **DC supply current**. See Petition, 39-41. That does not disclose a change to an impedance as taught and claimed in the ’202 Patent.

The sole identified disclosures of *Rauhala* for these elements do not meet the “well-known” definition of impedance—admitted to by Lenovo—that is used in and understood from the ’202 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 62” as allegedly disclosing the impedance-varying elements. Petition, 39. The Petition relies on resistor R1 in series with a supply, which can be supplemented by adding in parallel resistor R2 and/or R3, to change direct current kI from one static value to another. *Id.*, 39-41 (“Changing the foregoing resistances in the circuit of Figure 6 changes the impedance of the circuit”); EX1004, Fig. 6:

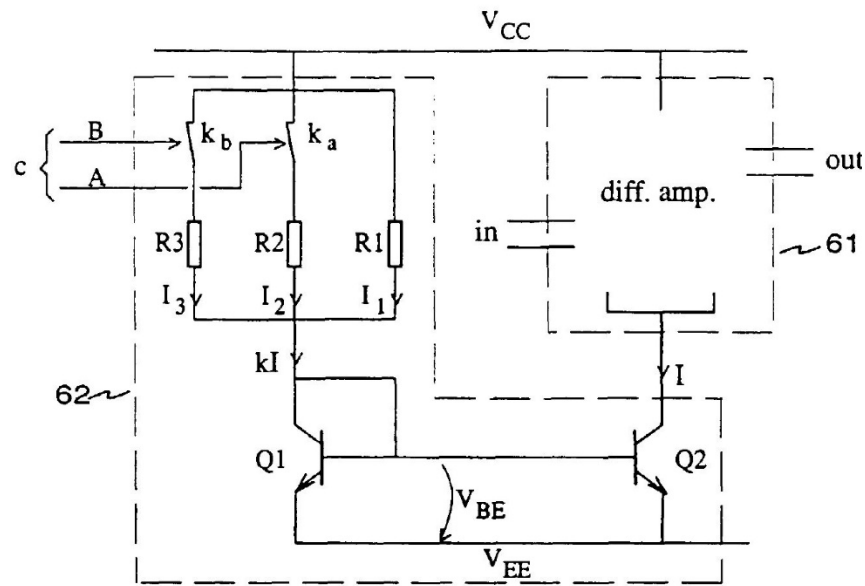
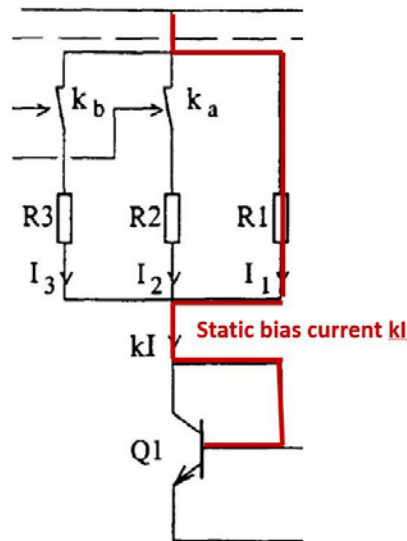


Fig. 6

The alleged impedance change is entirely resistive, and critically, ***applies only to a static DC bias current kI*** . This is not disputed, or disputable, by Lenovo. Petition, 39-41, EX1002, ¶133. There are no alternating currents in this circuit for setting kI . EX2005, ¶¶65, 68. By design, control current kI keeps a constant, quiescent value for the duration of time that one of R_1 or $R_1 + R_2$ and/or R_3 , is selected. EX1004, [0023], Fig. 6 (annotated detail below):



In the bias control circuit portion of *Rauhala's* Fig. 6, reproduced above, current kI is used to bias the mirrored supply current transistors $Q1$ and $Q2$ in control circuit 62, and the current kI keeps a **constant DC value** based on one the configurations of resistors $R1$, $R2$, and $R3$. *Lenovo* and *Dr. Baker* agree, stating the current kI changes values depending on whether $R2$ and/or $R3$ is included in parallel with $R1$. EX1002, ¶¶133. There is no dispute about how *Rauhala's* control circuit 62 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**. But there is no alternating current in the circuit for which resistance components $R1$, $R2$, and $R3$ are variously included, the kI bias current circuit in Fig. 6. EX2005, ¶¶62, 65. *Lenovo* and *Dr. Baker* do not say that there is. Instead, *Lenovo* improperly ignores the agreed definition and ordinary

usage of impedance in trying to relate **direct current** through a resistance to changing an impedance. Its attempt to do so fails.

Dr. Baker's declaration agrees with and quotes sources establishing that the ordinary definition of impedance is: "the total opposition (i.e., resistance and reactance) a circuit offers to the flow of alternating current at a given frequency," or "[t]he total opposition that a circuit offers to the flow of alternating current or any other varying current at a particular frequency." EX1002, ¶134.

But Dr. Baker completely fails to apply this definition, identifying no alternating current, no frequency component, and no reactance in the cited circuits. *Id.*, ¶¶131-134. The Petition also never applies the agreed definition of impedance, simply declaring—incorrectly—that a change to resistors carrying a DC current is a change to an impedance. Petition, 40-41 ("Changing the foregoing resistances in the circuit of Figure 6 changes the impedance of the circuit. Ex. 1002 at ¶134").

The Petition cites to Dr. Baker's declaration at ¶134 for this proposition. *Id.* But comparing the Petition and the declaration reveals something important. Despite humming along with verbatim copying of the Petition for paragraphs before it, when it comes time to copy Lenovo's argument that changing resistances in the circuit of Figure 6 changes its impedance ... Dr. Baker stops copying and doesn't say that! See below, verbatim text highlighted:

Petition, pg. 40	Declaration ¶133
To achieve the supply current I prescribed by <i>Rauhala</i> in the table appearing after paragraph [0019], switches k_a and k_b are opened or closed selectively. Ex. 1002 at ¶133; Ex. 1004 at ¶[0021]. Changing the configuration of either or both of switches k_a and k_b changes the resistance between higher power supply voltage VCC terminal and transistor Q1 and in turn changes current kI. Ex. 1002 at ¶133; Ex. 1004 at ¶[0021]. By virtue of the relationship between current kI and supply current I, supply current I is adjusted proportionally with current kI. Ex. 1002 at ¶133; Ex. 1004 at ¶[0021]. The resistance acting against supply current I likewise must change as the voltage supply is held constant. Ex. 1002 at ¶133; Ex. 1004 at ¶[0021].	134. To achieve the supply current I prescribed by <i>Rauhala</i> in the table appearing after paragraph [0019], switches k_a and k_b are opened or closed selectively. Ex. 1004 at [0021]. Changing the configuration of either or both of switches k_a and k_b changes the resistance between higher power supply voltage VCC terminal and transistor Q1 and in turn changes current kI. Ex. 1004 at [0021]. By virtue of the relationship between current kI and supply current I, supply current I is adjusted proportionally with current kI. Ex. 1004 at [0021]. The resistance acting against supply current I likewise must change as the voltage supply is held constant. Ex. 1004 at [0021]
Petition, pg. 40-41	Declaration ¶134
Changing the foregoing resistances in the circuit of Figure 6 changes the impedance of the circuit. Ex. 1002 at ¶134.	134. Impedance, when written in Cartesian form, includes a real component and an imaginary component...

This discontinuity in the wholesale adoption of the Petition’s argument by Dr. Baker—coming at the key point of argumentative conclusion—tells all. Changing the identified resistance in *Rauhala* Figure 6 isn’t changing the

impedance of the circuit. Dr. Baker didn't, or wouldn't, say that it is. Lenovo is left only with un-endorsed attorney argument on this point, and "[a]ttorney argument is not evidence." *Icon Health*, 849 F.3d at 1043 (Fed. Cir. 2017) (reversing Board for relying on argument); MPEP §2145 ("arguments of counsel cannot take the place of factually supported objective evidence"). There is no dispute of fact here that requires a trial to resolve—just an argument from Lenovo that contradicts the agreed ordinary definition of "impedance," and isn't backed by Lenovo's declarant.

As discussed above, resistors carrying a DC current are called a resistance in the '202 Patent. *See, e.g.*, EX1001, 7:40-46 (describing changing a DC bias current through "a resistance" by "by opening switches across portions of the resistance"), 8:17-19 ("increasing a load resistance using switches"). Impedance is used in the '202 Patent, as in the agreed ordinary definition, as an AC circuit parameter.

Disclosing a DC current running through one or more resistors is not disclosure of impedance as used in the '202 Patent. For all of the reasons given in Section II.E.2 and above, *Rauhala* does not disclose varying an impedance—with cited circuits that only include resistance, without the alternating current and reactance in the agreed definition of impedance. A person of skill in the art would not understand *Rauhala*'s DC bias circuits for generating kI (Fig. 6) to disclose "an impedance" as that well-known term is used in the context of the teaching and

claims of the '202 Patent, for all the reasons given above. Indeed, ***Rauhala never uses the word “impedance,”*** including when referring to the resistors R1, R2 and R3 of Figure 6, only as ***resistance***. EX1004, [0021].

The Petition cites to and relies only on *Rauhala* for alleged anticipatory disclosure of these “impedance” varying claim elements. *See, e.g.*, Petition at 37-41 (Ground 1, claim 7), 46 (Ground 1, claim 8), 71 (Ground 1, claim 19), 73 (Ground 2: “As discussed herein previously, *Rauhala* teaches each element of, and therefore anticipates, claims 7-11, 13, and 19-21.”). And the Petition only argues explicit anticipatory ***disclosure, not obviousness***, for these elements. *Id.* But *Rauhala* simply does not disclose them. The Board need go no further to find a complete lack of any reasonable likelihood of success for this claim.

In sum, Petitioners’ *Rauhala* arguments are facially deficient, and do not show a reasonable likelihood that *Rauhala* discloses the dynamically varying an impedance elements of the challenged claims. There is simply no teaching or suggestion in *Rauhala* of the claimed changing of “an impedance.” Petitioners’ Grounds, each of which cite to and rely only on *Rauhala* for these elements, must fail.

4. Petitioners failed to show that *Rauhala* discloses dynamically varying “an impedance” of a circuit “in the signal path” according to challenged claims

Lenovo failed to show that *Rauhala* discloses to a person of ordinary skill in the art claim elements requiring dynamically varying “an impedance” that is “of one or more of the plurality of circuits in the signal path.” See, e.g., EX1001, 14:9-14 (claim 7), 14:18-20 (claim 8), 17:32-37 (claim 19) (“in the receiver signal path”).

Lenovo ignores and never discusses this “in the [receiver] signal path” aspect of the impedance varying claim elements. See, e.g., Petition, 37-41, 44-46, 71. To do so would expose Lenovo’s failure of proof. The resistances controlling a bias current that are (incorrectly) alleged to be the changed impedance—R1, R2, and R3 of supply control circuit 62, see Petition at 39-41—***are not in the receiver signal path***. EX2005, ¶¶63, 66. This is plain from the relied upon figure, which shows the signal path from differential signal input “in” to differential signal output “out,” in differential amplifier “61”—which is separate and apart from “control circuit 62” for the supply current and its bias current kI. EX1004, [0021], Fig. 6:

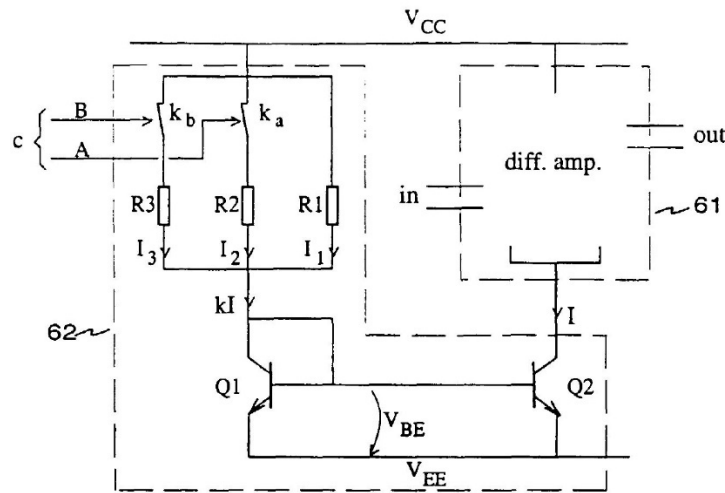


Fig. 6

See also EX2005, ¶63 (“not in the signal path”); EX1004, [0023], Fig. 7 (showing bias current I_B of “control circuit 72” that is clearly not in the signal path from “signal” to “mixer out” of mixer 71). These bias current setting circuits are not in the signal path because they indisputably do not carry alternating signal currents with any signal frequency component. EX2005, ¶¶65-66.

Even if changing *Rauhala*’s DC bias current kI by including or excluding resistors R2 and/or R3 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 circuit “in the [receiver] signal path”** as required by the language of these challenged claims. In Figure 6 of *Rauhala*, the alleged impedance change is on the opposite side of the current mirror from the signal-carrying amplifier. See Petition, 39 (citing *Rauhala* Fig. 6, annotated by Lenovo in IPR2023-00697 and further annotated below):

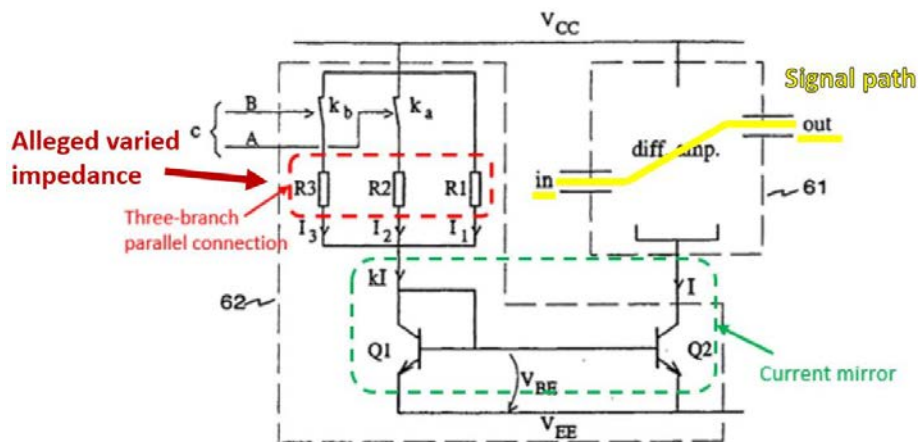


Fig. 6

The alleged varied impedance (via components R1, R2, and R3) of *Rauhala*'s Fig. 6 is **not** in the receiver signal path through differential amplifier 61. EX1004, Fig. 6 (annotated above); EX2005, ¶63 (“not in the signal path”). Lenovo does not, and cannot, argue otherwise—again, never mentioning this “signal path” aspect of the elements beyond quoting the claim in headings. Petition, 37-41, 44-46, 71.

As was the case for Lenovo's identification of the alleged varied 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 37-41 (Ground 1, claim 7), 46 (Ground 1, claim 8), 71 (Ground 1, claim 19), 73 (Ground 2: “As discussed herein previously, *Rauhala* teaches each element of, and therefore anticipates, claims 7-11, 13, and 19-21.”). And again, the Petition only argues explicit disclosure, not obviousness, for these elements. *Id.* But *Rauhala* simply

does not disclose them. The Board need go no further to find a complete lack of any reasonable likelihood of success for this claim.

In sum, Petitioners' *Rauhala* arguments are facially deficient, and do not show a reasonable likelihood that *Rauhala* discloses these challenged claims. There is simply no teaching or suggestion in *Rauhala* of the claimed varying of "an impedance" for a circuit that is "in the [receiver] signal path." Petitioners' Grounds, each of which cite to and rely only on *Rauhala* for these elements, must fail.

Lenovo has failed to show any likelihood that it will find success with its challenge. The Petition should be dismissed under section 314(a) for these reasons as well as those detailed in Sections II.F.1 through .3 above.

III. Conclusion

As detailed above, with the '202 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.

Lenovo failed its 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").

Lenovo failed to do show any disclosure—of elements that appear in every challenged claim—and thus cannot show anticipation of any claim.

The single detector of the *Rauhala* reference cannot anticipate claim elements requiring determining two different signal strengths at once. And even if *Rauhala*'s disclosed circuit had the facility to determine both signal strengths at once—which it does not—its unexplained mention of calculating SNR, by unknown means, does not explicitly or inherently disclose “comparing” the determined signal strengths. In addition, Lenovo’s arguments about elements relating to increasing an “impedance” fail under the proper and agreed definition of that term.

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,

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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 11,603 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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