

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

IPR2023-00697
Patent No. 10,129,825 B2

**PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE
UNDER 37 C.F.R. § 42.23**

TABLE OF CONTENTS

TABLE OF AUTHORITIES	ii
LISTING OF EXHIBITS.....	iii
I. INTRODUCTION	1
II. Claim Construction.....	3
A. “Impedance”	3
B. “a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal”	5
III. ARGUMENT	6
A. <i>Rauhala</i> ’s disclosure related to the “detector” teaches the claimed “a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal.”	6
B. <i>Rauhala</i> teaches varying “an impedance.”	9
1. <i>Rauhala</i> ’s disclosure of supply current control teaches varying an “impedance” under plain meaning.	10
2. <i>Rauhala</i> ’s disclosure of supply current control still teaches varying an “impedance,” even under PO’s improper construction of “impedance.”	12
C. <i>Rauhala</i> teaches varying an impedance “in the receiver signal path.”	15
1. Circuit 61 and control circuit 62 are both part of the same amplifier in <i>Rauhala</i> ’s FIG. 6.....	16
2. Even if circuit 61 and control circuit 62 are separable, “impedance” in circuit 61 is varied by varying “impedance” in control circuit 62.....	23
D. <i>Rauhala</i> teaches increasing an impedance to decrease a “drive current.”	24

E.	Petitioner provided the motivation to combine with respect to dependent claim 4.	27
IV.	Conclusion	27

TABLE OF AUTHORITIES

Cases

<i>Axonics, Inc. v. Medtronic, Inc.</i> , 75 F.4th 1374, 1383-84 (Fed. Cir. 2023)	5
<i>Rembrandt Diagnostics, LP v. Alere, Inc.</i> , 76 F.4th 1376, 1385 (Fed. Cir. 2023)	5
<i>Hewlett-Packard Co. v. Mustek Sys., Inc.</i> , 340 F.3d 1314, 1324 (Fed. Cir. 2003) ...	6
<i>In re Robertson</i> , 169 F.3d 743 (Fed. Cir. 1999)	6
<i>Ex parte Miller</i> , Appeal No. 2020-004369, 2021 WL 4492109, at *3 (P.T.A.B. Sept. 29, 2021)	7
<i>Ex parte Wiedeman</i> , Appeal No. 2008-003454, 2009 WL 211777, at *3 (B.P.A.I. Jan. 27, 2009)	7
<i>Ex parte Koutsky</i> , Appeal No. 2008-000557, 2008 WL 4359775, at *2 (B.P.A.I. Sept. 23, 2008)	7
<i>cxLoyalty, Inc. v. Maritz Holdings Inc.</i> , 986 F.3d 1367, 1378 (Fed. Cir. 2021)	23

LISTING OF EXHIBITS¹

Exhibit	Description
Exhibit 1001	U.S. Patent No. 10,129,825 B2
Exhibit 1002	Declaration of R. Jacob Baker, P.E., Ph.D.
Exhibit 1003	Prosecution History of U.S. Patent No. 10,129,825 B2
Exhibit 1004	European Patent Application Publication No. 0 999 649 A2 to Rauhala (“ <i>Rauhala</i> ”) published on May 10, 2000
Exhibit 1005	Japanese Patent Application Publication No. 08228118A to Masaaki (“ <i>Masaaki</i> ”) published on September 3, 1996
Exhibit 1006	Modern Dictionary of Electronics, Seventh Edition, by Rudolf F. Graf (“ <i>Graf</i> ”) published in 1999
Exhibit 1007	Getting to Know Capacitors, by Doug DeMaw (“ <i>DeMaw</i> ”) published in 1984
Exhibit 1008	Filtering Techniques: Isolating Analog and Digital Power Supplies in TI’s PLL-Based CDC Devices, by Kal Mustafa (“ <i>Mustafa</i> ”) published in 2001
Exhibit 1009	Scheduling Order, <i>Theta IP, LLC v. Motorola Mobility LLC</i> , No. 1:22-cv-03441 (N.D. Ill. Sep. 29, 2022), ECF No. 26
Exhibit 1010	Electric Circuits, Fourth Edition, by Mahmood Nahvi et al.

¹ Citations to Ex. 1001 are to column:line number of the patent. Citations to Exs. 1002, 1004, 1005, and 1019 are to the paragraph numbers of the exhibit. Citations to Exs. 1003, 1006, 1007, 1008, 1009, 1010, 1016, and 1017 are to the page numbers of the exhibit. Citations to Ex. 1018 are to page:line number of the exhibit.

	(“ <i>Nahvi</i> ”) published in 2002
Exhibits 1011-1015	Reserved
Exhibit 1016 (<i>New</i>)	David A. Johns & Ken Martin, <i>Analog Integrated Circuit Design</i> (1997)
Exhibit 1017 (<i>New</i>)	Lawrence E. Larson, <i>RF and Microwave Circuit Design for Wireless Communications</i> (1997)
Exhibit 1018 (<i>New</i>)	Transcript of Cross-Examination of Lawrence E. Larson, Ph.D. taken on April 18, 2024
Exhibit 1019 (<i>New</i>)	Declaration of R. Jacob Baker, P.E., Ph.D. in Support of Petitioners’ Replies to Patent Owner’s Responses

I. INTRODUCTION

Petitioners submit this reply brief in support of its Petition for IPR of claims 1, 3-4, and 8 of U.S. Patent No. 10,129,825 (“the ’825 Patent”) (Ex. 1001), assigned to Theta IP, LLC (“Patent Owner” or “PO”).

The Patent Owner Response (“POR”) disputes whether *Rauhala* teaches:

- (i) “a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal,”
- (ii) varying “an impedance,”
- (iii) “in the receiver path,” and
- (iv) increasing an impedance to decrease a “drive current.”

PO concedes the various other limitations of claims 1, 3-4, and 8 are taught by the cited art. As explained below, PO’s limited arguments are easily rejected.

PO’s first argument – that *Rauhala* fails to disclose determining the strengths of a desired signal and an interferer signal that are “received together” or “in one spectrum,” (POR, 35-45) – is formulated based on a false assumption that *Rauhala*’s signal strength detection capability consists of a single diode detector, while ignoring relevant portions of *Rauhala* concerning how the signals are detected and compared. PO also attempts to narrow the scope of the claim limitation at issue by introducing terms that are not in the claims. POR, 32-33.

PO's next argument relies on an overly-restrictive construction of the term "impedance," alleging the term can only be used to refer to AC currents/circuits. POR, 26-32, 45-51. The proper construction should include a plain and ordinary meaning, e.g., an opposition to current in a circuit, including resistance and/or reactance. *See infra* Section II.A. Under the proper construction, *Rauhala*'s three-branch parallel connection in the supply current control circuit teaches varying an impedance. *See infra* Section III.B. Furthermore, even under the PO's construction, *Rauhala*'s supply current control circuit of the linear units teaches varying an impedance. *Id.*

To avoid *Rauhala*'s switchable, parallel resistors in the linear unit of FIGs. 6-7, PO's third argument excises the indispensable portion of the linear unit (e.g., an amplifier or a mixer) containing those resistors from *Rauhala*'s signal path. POR, 51-54.

Finally, PO's assertion that *Rauhala* does not disclose increasing an impedance to decrease a drive current (POR, 55-59) improperly equates the recited "drive current" to a term that is not recited in the '825 patent, namely a "switching current." POR, 55. PO further alleges that reducing a drive current via an impedance increase is a separate adjustment from reducing a bias current. POR, 57. However, even the '825 patent teaches that an impedance scaling can reduce both the drive current and the bias current. *See infra* Section III.D. Additionally,

Rauhala's teachings related to the supply current control circuit of the linear units teaches increasing an impedance to decrease a drive current. *Id.*

II. CLAIM CONSTRUCTION

A. "Impedance"

Petitioners maintain that the term "impedance" does not require construction. Petition, 19. Similarly, the Board did not address construction of this term in the Institution Decision. Decision, 10-17, 35. Nonetheless, if the Board deems it necessary to construct this term, it should reject PO's unduly-restrictive definition of "impedance" and give the term its plain and ordinary meaning.

PO's overly restrictive construction of the term "impedance" and its position that the term can only be used in reference to AC circuits/currents is incorrect. POR, 26-32.

PO asserts "[i]mpedance is undisputedly an alternating current parameter", only citing definitions that mention the alternating current aspect (e.g., "alternating current," "AC current," "sinusoidal," "frequency domain," etc.). POR, 28. PO leaves out other definitions that have no mention of the type of current. For example, in the same section of the dictionary cited by PO in the POR (Graf, Modern Dictionary of Electronics, Seventh Edition), "impedance" is defined as "[c]ombined opposition to current resulting from resistance, capacitance, and

inductance,” or “[t]he combination of resistance and reactance,” without any mention of the type of current it opposes. POR, 27; Ex. 1006, 9; Ex. 1019, ¶8.

Consistent with these definitions, “impedance” is generally expressed by the formula $Z = \sqrt{(R^2 + (X_L + X_C)^2)}$ or $Z = R + jX$. Ex. 2015, ¶54; Ex. 1019, ¶10. The former represents the magnitude of an impedance, and the latter represents the impedance in Cartesian form expressing the real part (resistance R) and the imaginary part (reactance X). *Id.* From these formulas, a POSITA would have understood that impedance is the sum of any resistance and reactance, but does not require both of those to be non-zero. Ex. 1019, ¶¶10-12. That is, the impedance Z of a circuit is equal to the resistance R if no reactance components exist in the circuit. *Id.* Dr. Larson acknowledged as much. Specifically, he admitted that impedance, represented as Z in the formula, could still be determined even when the circuit did not include two of the variables included in the formula (e.g., X_L and X_C). Ex. 1018, 55:3-13.

Accordingly, the Board should adopt the plain and ordinary meaning of “impedance”, and should reject PO’s overly-restrictive definition limiting the term solely as an AC parameter.

To the extent PO asserts that any of Petitioners’ arguments or evidence relating to “impedance” extends beyond the scope of the Petition, such arguments and evidence are responsive to PO’s proposed construction for “impedance.”

Petitioners “must be given the opportunity in [their] reply to argue and present evidence of anticipation or obviousness under the new construction.” *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1383-84 (Fed. Cir. 2023); *See also Rembrandt Diagnostics, LP v. Alere, Inc.*, 76 F.4th 1376, 1385 (Fed. Cir. 2023).

B. “a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal”

Petitioners agree with the Board’s determinations with respect to the “circuit” limitation: the claim language at issue does not require (i) “that the circuits are separate, different, distinct, or otherwise state that each ‘a circuit’ is not the same circuit,” (ii) a certain number of circuits, (iii) “that only one circuit be used for determining the signal strength of both signals,” (iv) “the same circuit determining a signal strength of the interferer signal and determining a signal strength of the desired signal.” Decision, 11-17.

The POR again advances a construction that seeks to import terms not in the claims and inconsistent with the Board’s construction. *Id.* PO argues “the circuit must determine two components of one received spectrum.” POR, 33. This is inconsistent with the Board’s construction and must be rejected. Even under the PO construction, *Rauhala* still teaches “the circuit” limitation. *See infra* Section III.A.

III. ARGUMENT

A. *Rauhala*'s disclosure related to the “detector” teaches the claimed “a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal.”

PO argues that *Rauhala* does not teach “a circuit for determining” elements because “a single structure” cannot perform two steps. POR, 35-36. PO's argument further relies on the addition of limitations recited nowhere in the claims and on a fundamental misinterpretation of the *Rauhala* reference. This is incorrect.

The claims do not recite whether the circuits are separate, different, distinct, or same. POR, 37-39. None of the “determining” elements recite a temporal requirement. *Id.*, 37-38. And none of the “determining” elements recite any requirement to perform the “determining” without “an intervening re-tuning of the receiver.” *Id.*, 37. Without seeking a narrowing construction of the “determining” elements, PO's argument invites the Board to read any or all of these limitations into the claims. The Board must decline. *Hewlett-Packard Co. v. Mustek Sys., Inc.*, 340 F.3d 1314, 1324 (Fed. Cir. 2003) (“We cannot construe the claim to add a limitation not present in the claim itself.”)

The Board properly recognized in its Decision that the claims do not require any of the extraneous limitations suggested by PO and distinguished the *In re Robertson* precedent PO cited. Decision, 12-13. Nothing has changed since institution. POR, 38. PO's reliance on *In re Robertson* continues to be misplaced.

As the Board found, *In re Robertson* is irrelevant because “the claim language [at issue] does not expressly require that the circuits are separate, different, distinct, or otherwise state that each ‘a circuit’ is not the same circuit.” Decision, 12-13. The other cited cases are similarly irrelevant. *See, e.g., Ex parte Miller*, Appeal No. 2020-004369, 2021 WL 4492109, at *3 (P.T.A.B. Sept. 29, 2021); *Ex parte Wiedeman*, Appeal No. 2008-003454, 2009 WL 211777, at *3 (B.P.A.I. Jan. 27, 2009); *Ex parte Koutsky*, Appeal No. 2008-000557, 2008 WL 4359775, at *2 (B.P.A.I. Sept. 23, 2008).

Even if the Board accepted PO’s assertions, which it should not, PO’s argument rests on a misrepresentation of the Petition and a factually incorrect reading of *Rauhala*. Ex. 1019, ¶¶46-47. First, PO’s representation that there “is no dispute that there is only one disclosed detector, or that it can only give one indication at a time,” (POR, 35), is misleading. Neither the Petition nor Dr. Baker represents that *Rauhala*’s functional block “DET” necessarily includes only one detecting component or that the functional block can only provide one signal strength indication at any given time. *See, e.g.,* Petition, 23, 33, and 42; Ex. 1002, ¶¶61-66, 83, 109, and 125.

Moreover, PO’s assertion that the detector DET in *Rauhala* must be a “single diode detector” that must be “re-tuned” to another channel to provide a second signal strength indication, (POR, 36-38), is contradicted by *Rauhala*’s plain

text. *Rauhala* does not specify that detector DET is a diode detector or even include the word “diode.” *See generally* Ex. 1004; Ex. 1019, ¶¶46-47. Dr. Larson recognizes this, admitting that “*Rauhala* does not give any details about the internal functioning of the detector.” Ex. 2015, ¶60. Despite the supposed lack of detail, Dr. Larson manages to “**assume** that the detector is a simple type of envelope detector known as a ‘diode detector,’” based on the “diode symbol used in the figures.” Ex. 2015, ¶60 (emphasis added). Dr. Larson’s assumption is misguided and cannot form the basis for a factual finding. Ex. 1019, ¶47.

Additionally, detector DET cannot possibly require “re-tuning” after determining the desired signal strength (RSS) but before determining the interferer signal strength (RSS_n), as PO and Dr. Larson allege. *Compare* POR, 36-38 and Ex. 2015, ¶¶70 and 72 with Ex. 1019, ¶¶46-51. *Rauhala*’s basic statement of the problem is that “quality of a signal in a radio receiver is degraded by noise and interference [...] caused by other radio signals.” Ex. 1004, [0002]. *Rauhala* solved this problem, at least in part, using a “receiver [that] monitors the signal strength on the receive channel **and** neighboring channels” and “[a]djust[ing] supply currents” of receiver components accordingly. *Id.*, [0006] (emphasis added). Detailing the supply current control mechanisms, *Rauhala* unmistakably describes supply current control signals that vary based on simultaneous determinations of RSS and RSS_n: “Signal c_A is 0 when signal RSS is greater than

S4 and signal RSS_n is at the *same time* smaller than $Sn[\dots]$ Signal c_M is 1 when signal RSS is not greater than S4 and signal RSS_n is at the *same time* at least Sn .” Ex. 1004, [0017]; Ex. 1019, ¶47. A POSITA therefore would have understood that detector DET must simultaneously determine a desired signal strength (RSS) and (RSS_n). Ex. 1019, ¶¶47-49. A POSITA would have also recognized that, because signal conditions could change in an instant, adjusting the current supplied to the linear units based on determinations made at different times would result in a faulty device that does not actually function as intended. *Id.*, ¶¶48-49. Dr. Larson agrees, characterizing a system that “cannot determine a desired signal strength ‘and’ an interferer signal strength,” as “a significant impractical handicap.” Ex. 2015, ¶70. Dr. Larson is of course correct that such a system would be impractical – so impractical, in fact, that *Rauhala* does not and would not describe such a system.

Accordingly, *Rauhala*’s detector DET teaches the claimed “a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal.”

B. *Rauhala* teaches varying “an impedance.”

PO argues that “impedance” is solely an AC circuit parameter and a POSITA would not refer to a varied resistance from resistor(s) controlling a DC bias current, as shown in *Rauhala*, as an impedance. POR, 26-32; *see supra*

Section II.A. The Board should not adopt this definition. However, even if PO's definition of "impedance" were accepted here, *Rauhala* still teaches varying an impedance of a circuit in at least FIGs. 6 and 7.

1. *Rauhala's* disclosure of supply current control teaches varying an "impedance" under plain meaning.

PO points to several definitions provided in electronics dictionaries to argue that the term "impedance" can only be used in reference to an AC current/circuit. POR, 27-29. As discussed above in the Claim Construction section, this is incorrect and the term should be given its plain and ordinary meaning. *See supra* Section II.A. Based on the plain and ordinary meaning of "impedance," a POSITA would have understood that *Rauhala's* disclosure of supply current control teaches varying an "impedance."

The formulas for impedance Z are consistent with the definitions provided in the Graf dictionary cited by PO in POR, such as "[c]ombined opposition to current resulting from resistance, capacitance, and inductance," or "[t]he combination of resistance and reactance." POR, 27; Ex. 1006, 9; Ex. 1019, ¶8. A POSITA would have understood that the impedance Z still has a non-zero value containing the real part indicating resistance, even when the imaginary part indicating reactance is not present in a circuit. Ex. 1019, ¶¶10-12. PO's expert also agreed, stating a circuit that does not have any component exhibiting reactance characteristics can have a

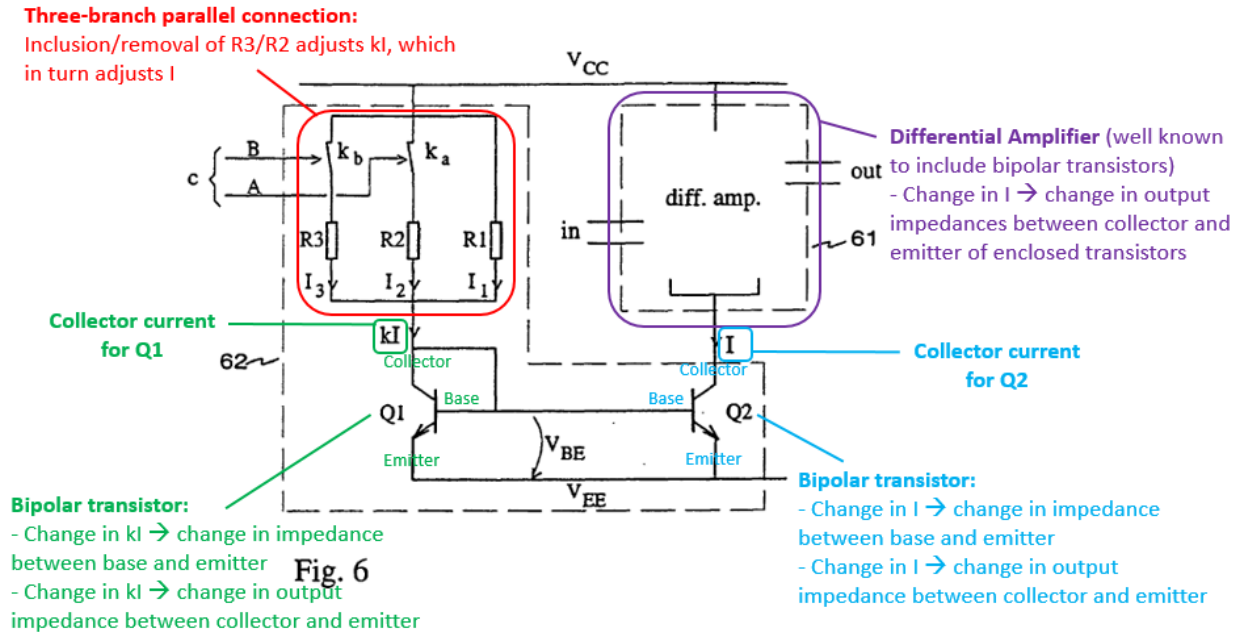
non-zero impedance value Z , as long as the circuit has other component(s) exhibiting resistance characteristics. Ex. 1019, ¶12; Ex. 1018, 55: 3-13.

A POSITA would not restrict the use of the term “impedance” solely to describing AC currents/circuits, as the term connotes the total, or the sum, of any real part and any imaginary part of a circuit, and the impedance value Z can still be calculated even when one or more of resistance, capacitive reactance, and inductive reactance are not present in the circuit. Ex. 1019, ¶¶10-12. Applying this to the context of FIG. 6 of *Rauhala*, the impedance is equal to the resistance provided by R_1 , R_2 , and R_3 . Ex. 1019, ¶¶11-12; Petition, 45-46; Ex. 1004, [0021] and FIG. 6. As discussed above, impedance can still exist in a circuit even when the imaginary part including capacitive reactance and/or inductive reactance is not present. Ex. 1019, ¶¶10-12; Ex. 1018, 55: 3-13. Therefore, a POSITA would have understood that the supply current control circuit 62 in *Rauhala*’s FIG. 6 varies the amount of impedance of the circuit by including or removing R_2 and/or R_3 in the three-branch parallel connection, in order to vary the current kI , which in turn sets the supply current I for the linear unit 61 (e.g., a differential amplifier). Ex. 1019, ¶11; Petition, 45-46; Ex. 1004, [0021] and FIG. 6.

2. *Rauhala*'s disclosure of supply current control still teaches varying an "impedance," even under PO's improper construction of "impedance."

Even if the Board adopts the PO's narrow construction of "impedance", *Rauhala* teaches varying an impedance of a circuit. Particularly, in FIG. 6, the change in kI and I resulting from the removal or inclusion of resistors $R3$ and/or $R2$ causes a change in the impedances of the transistors $Q1$, $Q2$ and the transistors in the differential amplifier 61. Ex. 1019, ¶¶13-16.

As was well known, a bipolar transistor has an impedance between its base and emitter terminals, due to the diffusion capacitance (C_d) resulting from the current flowing in its collector, I_C . *Id.*, ¶15. Additionally, a bipolar transistor has an output impedance (r_o) between its collector and emitter terminals that changes based on the amount of collector current I_C . *Id.*, ¶16. *Rauhala*'s FIG. 6 shows several transistors being used in the circuit, $Q1$ and $Q2$, and the transistors in the differential amplifier 61.



In FIG. 6, *Rauhala* teaches a current mirror consisting of two bipolar transistors Q1 and Q2. Ex. 1004, [0022]. Each of the transistors Q1 and Q2 has an impedance between its base and emitter, which changes based on the current flowing in the collector, kI or I , respectively. Ex. 1019, ¶15. The currents kI and I are varied based on the inclusion or removal of R2 and/or R3 in the three-branch parallel connection. Ex. 1019, ¶14; Petition, 45-46. A POSITA would have understood that by adding or removing the resistors R2 and R3 by way of switches k_b and k_a , the impedances of the transistors Q1 and Q2 are also adjusted based on the varied collector currents kI and I , respectively. Ex. 1019, ¶¶14-15. Therefore, even under PO's construction, *Rauhala*'s disclosure of varying the impedances of the transistors Q1 and Q2, caused by the variance of kI or I from the inclusion or

removal of resistor(s) in the three-branch parallel connection, discloses varying an impedance. Ex. 1019, ¶¶14-15.

Further, the transistors Q1 and Q2, as well as the transistors in the differential amplifier 61, have output impedances that change as the currents kI and I change. Ex. 1019, ¶¶15-16. This is also consistent with Dr. Larson's testimony that the output impedances of the transistors Q1, Q2, and those used in the differential amplifier 61 change as the current kI and I change. Ex. 1018, 92:6-10 ("Q: Would the output impedance of Q1 change as kI changes? A: ... yes. As kI changes, the output impedance of Q1 will change as well.") and 96:8-16 ("Q: And as supply current I changes, would the impedances of the transistors in the differential amplifier also change? ... A: Yeah, As the supply current I to the differential amplifier changes, that will change the DC bias current through the transistors and that will change their impedances."). Specifically, the currents kI and I are varied based on the inclusion or removal of R2 and/or R3 in the three-branch parallel connection. Ex. 1019, ¶14; Petition, 45-46. A POSITA would have understood, by adding or removing the resistors R2 and/or R3 by way of switches k_b and k_a , the output impedances of the transistors Q1 and Q2 and the transistors in the differential amplifier 61 are also adjusted based on the adjusted currents kI and I . Ex. 1019, ¶¶15-16. Moreover, the resistances of the transistors in the differential amplifier 61 represented by the respective output impedances

provide an opposition to the flow of an AC current received at the differential amplifier 61. Ex. 1019, ¶16 (footnote 3). Therefore, this condition meets even the overly-restrictive definition for “impedance” proposed by PO. Ex. 1019, ¶16.

For all these reasons and those in the Petition, *Rauhala*’s disclosure related to supply current control teaches varying an impedance.

C. *Rauhala* teaches varying an impedance “in the receiver signal path.”

PO argues that *Rauhala* does not teach varying an impedance “in the receiver signal path” because, in connection with this limitation, Petitioners identified three parallel resistors (R1, R2, and R3) in *Rauhala* Figure 6, as being varied. PO contends that these resistors are not in the “signal path” because they are in a part of the amplifier circuit labeled “control circuit.” POR, 51-54. The undisputed record establishes that *Rauhala* discloses varying an impedance “in the receiver signal path” for at least two reasons.

First, the record establishes that parallel resistors R1, R2, and R2 (within control circuit 62, in *Rauhala* Figure 6) are part of the *same* amplifier in the “signal path” as the circuit 61 in *Rauhala* Figure 6. Specifically, PO’s expert, Dr. Larson, conceded that circuit 61 *requires* control circuit 62 to function because control circuit 62 is the sole source of power for circuit 61. Ex. 1018, 30:3-31:3. As Dr. Baker explains, a POSITA would consider control circuit 62 and circuit 61 to be the same amplifier. That is, without both parts of this amplifier, there is no

amplification, and the entirety of the amplifier must therefore be part of the “signal path.” Ex. 1019, ¶¶35-38.

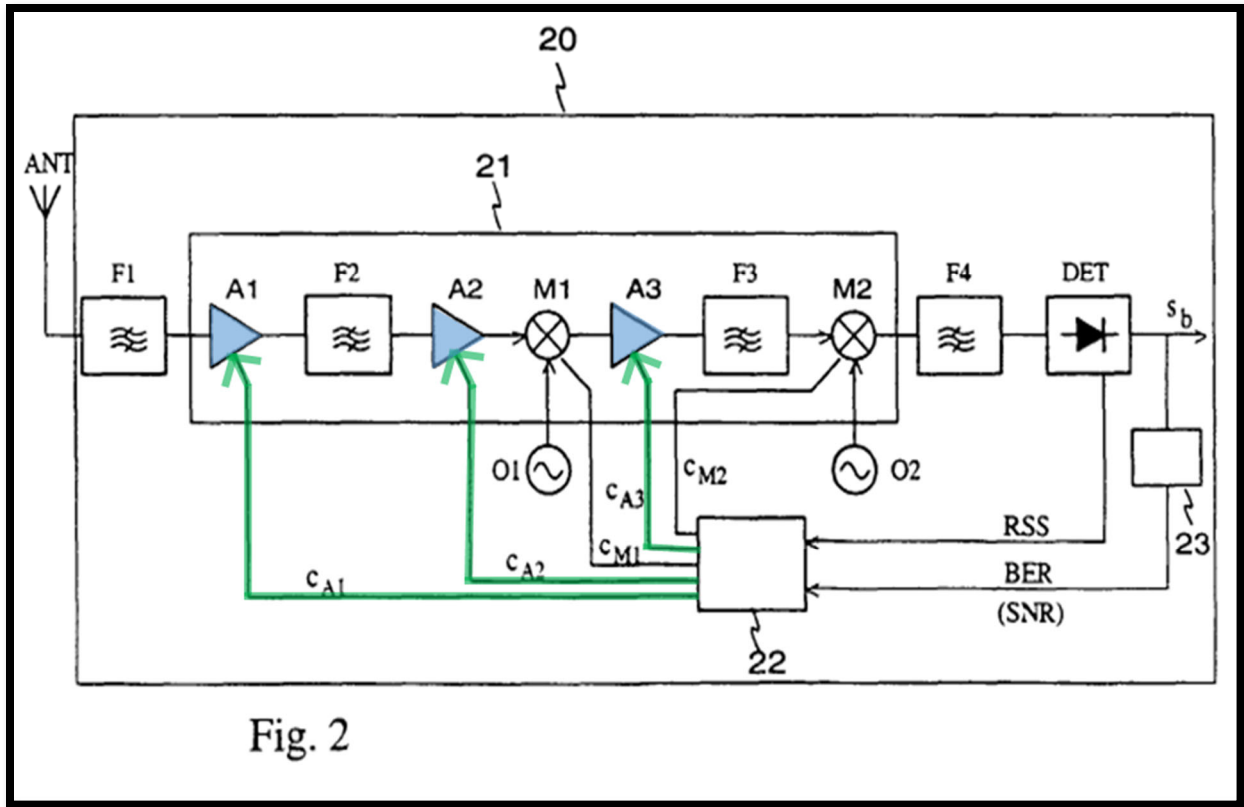
Second, even assuming circuit 61 and control circuit 62 are separable units (which they are not), the record establishes that one adjusts the “impedance” and “bias current” in circuit 61 (which PO admits is in the “signal path”) by adjusting the “impedance” in control circuit 62. Dr. Baker explains that there is an inverse relationship between bias current and “impedance.” Ex. 1019, ¶16. A higher bias current reduces impedance and vice versa. *Id.*, ¶¶15-17. Thus, when one adjusts the bias current supplied to circuit 61 by control circuit 62 (*e.g.*, increases it), one also adjusts the “impedance” in circuit 61 (*e.g.*, decreases it). PO admits that circuit 61 is in the “signal path.” *Rauhala*, thus, teaches varying an impedance “in the receiver signal path” by adjusting the parameters of control circuit 62.

1. Circuit 61 and control circuit 62 are both part of the same amplifier in *Rauhala*’s FIG. 6

It is undisputed that *Rauhala* Figure 2 shows a signal path, including at minimum antenna ANT, detector DET, and the “linear units” between them. *See, e.g.*, Ex. 1004, [0012]-[0013]; Ex. 1002, ¶¶123-124; Ex. 1019 at ¶¶18-20; POR at 51-54. *Rauhala* states explicitly that Figure 2 shows a “**signal path** structure” including an antenna ANT, detector DET, and “linear units” between the antenna and the detector. Ex. 1004, [0012]-[0013]; Ex. 1019, ¶¶20-22. Dr. Larson agreed that “the signal goes from the antenna through ... to the final block which is

labeled DET.” See Ex. 1018, 24:8-26:5. *Rauhala*’s FIG. 2² additionally shows “a control unit 22 . . . for controlling the supply currents of the linear units” which include amplifiers labelled A1, A2, and A3. Ex. 1004, [0013]; Ex. 1019, ¶¶23-24. The outputs of control unit 22 (control signals C) are sent to the amplifiers. *Id.* This is shown graphically in annotated Figure 2 of *Rauhala* below, with the control signals C_{A1}, C_{A2}, and C_{A3} annotated in green, and *Rauhala*’s amplifiers annotated in blue.

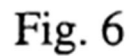
² Additionally, *Rauhala*’s FIG. 4 shows a similar “control unit 42” used for “supply current control for the linear units” including amplifiers A1, A2, and A3. Ex. 1004, [0017]; Ex. 1019, ¶¶23-24. Similar to control unit 22, control unit 42 provides control signals C (C_A and C_M) to the linear units, and these control signals set the supply currents of the respective linear units. *Id.*



Ex. 1004, FIG. 2 (annotated).

The entirety of the circuitry shown in *Rauhala*'s FIG. 6 is an example of an amplifier like A1, A2, and A3, each of which is in the signal path. Ex. 1004, [0021]; Ex. 1019, ¶¶20-26. *Rauhala* explains that FIG. 6 shows "an example of a linear unit's supply current control," where the linear unit is an amplifier. Ex. 1004, [0021]; Ex. 1019, ¶24. *Rauhala*'s FIG. 6 shows the amplifier including its control circuit 62. Ex. 1019, ¶25. The control circuit 62 includes switches k_a and k_b , which are controlled with a two-bit digital signal C, like C_{A1} , C_{A2} or, C_{A3} from FIG. 2. *Id.* The control circuit 62 is the only structure in FIG. 6 that receives the control signal C. Thus, in order for the amplifier in FIG. 6 to receive the output of

³ The relationship between *Rauhala* FIGS. 4 and 6 is substantially similar to the relationship between FIGS. 2 and 6 except control signal C would include C_A or C_M.



Ex. 1004, FIG. 6 (annotated).

That the “signal path” encompasses the entirety of the amplifier shown in *Rauhala* FIG. 6, and the entirety of the mixer shown in *Rauhala* FIG. 7, is consistent with the challenged claims. The independent claims at issue define the “receiver signal path” only in terms of the functional components it must include. Ex. 1019, ¶31. Claim 8 of the ’825 patent recites a “receiver signal path comprising a plurality of circuits, wherein the plurality of circuits includes an amplifier, a filter, and a mixer.” Ex. 1001, 16:18-21; *see also id.*, 13:1-3 (claim 1); *id.*, 13:46-48 (claim 3). The “receiver signal path” is not otherwise qualified by the claims and the claims do not purport to exclude any portions of amplifiers from the “signal path.” Ex. 1019, Ex. 1019, ¶¶32-33. Instead, a POSITA would have understood the “signal path” includes the functional components recited in the claims, like the entire amplifier shown in *Rauhala*’s FIG 6. Ex. 1019, ¶¶30-33.

Moreover, PO argues that circuit 61 of FIG. 6 “is separate and apart from ‘control circuit 62’ for the supply current and its bias current kI .” POR, 52. Essentially, PO urges the Board to draw a line through the FIG. 6 amplifier, and to consider only one side as within the “signal path.” Control circuit 62, however, cannot be separated from FIG. 6 without rendering the remaining circuitry non-functional. Ex. 1019, ¶¶34-38. Dr. Larson agreed, stating “if you removed 62 ...

then there would be no DC current going through the differential amplifier and there would be no gain.” Ex. 1018, 30:14-32:3.

For circuit 61 to perform any amplification function, supply current I must flow from the transistors within circuit 61 to the collector of transistor Q2. Ex. 1019, ¶¶36-37. For amplification, supply current I necessarily must have a non-zero value. *Id.* As explained by *Rauhala*, a current mirror is formed by transistors Q1 and Q2, resulting in a proportional relationship between supply current I and current kI within control circuit 62, where the “k” in kI is a current gain coefficient. Ex. 1004, [0021]-[0022]; Ex. 1019, ¶35. Supply current I is thereby controllable by adjusting kI in control circuit 62. Ex. 1004, [0021]; Ex. 1019, ¶35. The related currents kI (yellow) and I (purple) are shown in annotated FIG. 6 below:

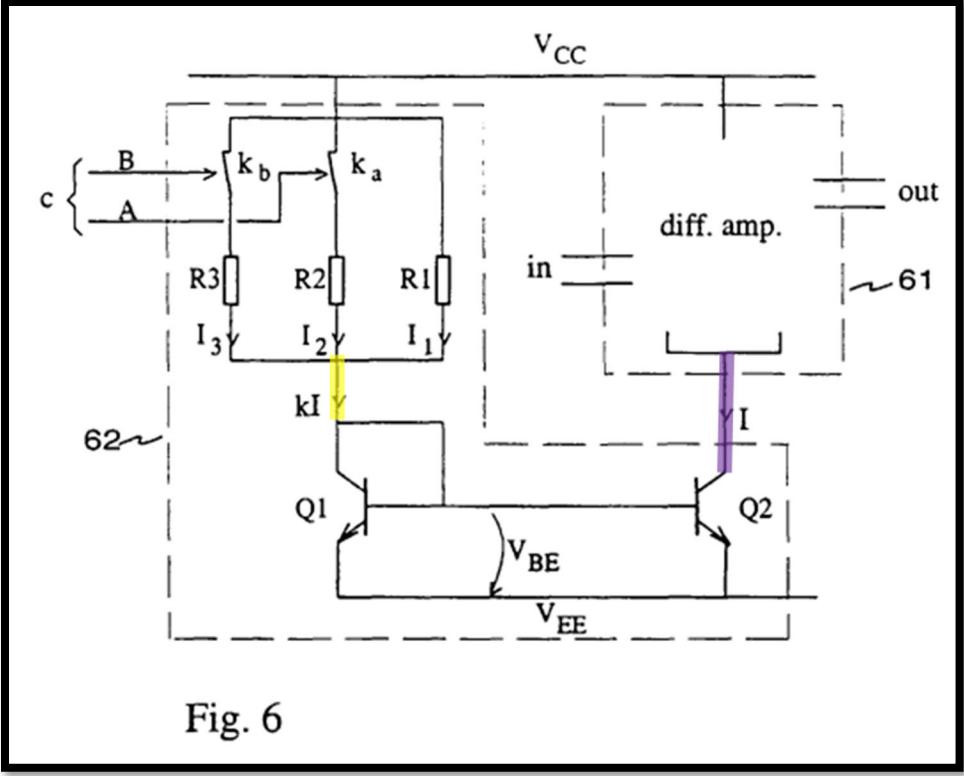


Fig. 6

Ex. 1004, FIG. 6 (annotated); Ex. 1019 at ¶35.

PO's contention that circuit 61 is "separate and apart from" control circuit 62 is belied by supply current I's dependence on control circuit 62. If control circuit 62 is separated from the structure shown in Figure 6, the electrical conduit through which supply current I flows would cease to connect with the collector of transistor Q2 and the current mirror. Ex. 1019, ¶¶35-37. Disconnected from the current mirror formed by Q1 and Q2, supply current I would have no relationship with kI . *Id.* With control circuit 62 separated from the structure, the electrical conduit carrying supply current I would also cease to connect to any other component. *Id.* Accordingly, supply current I would necessarily have zero value

and circuit 61 would not and could not perform its function. *Id.*; Ex. 1018, 30:14-32:3.

PO's argument that only circuit 61 of the amplifier shown in *Rauhala's* FIG. 6 qualifies as within the claimed "receiver signal path," rests on Dr. Larson's one-sentence conclusion that "the signal path ... proceeds from 'in' to 'out' of amplifier 61 in Figure 6." Ex. 2015, ¶63. The Board need "not accord weight to" Dr. Larson's "conclusory expert testimony" on this point. *cxLoyalty, Inc. v. Maritz Holdings Inc.*, 986 F.3d 1367, 1378 (Fed. Cir. 2021).

Dr. Larson's unsupported opinion cannot rebut the extensive record evidence that the amplifier of *Rauhala's* FIG. 6 is necessarily within the "signal path." *Compare* Ex. 2015, ¶63 *with* Ex. 1004, [0012]-[0013], [0021]; Ex. 1002, ¶¶123-124, 126-127, 131-135; Ex. 1019, ¶¶18-42.

2. Even if circuit 61 and control circuit 62 are separable, "impedance" in circuit 61 is varied by varying "impedance" in control circuit 62.

Even if circuit 61 and control circuit 62 were separable (which they are not), it is clear that "impedance" in circuit 61 (which PO admits is in the "signal path") is varied by varying the "impedance" in control circuit 62. Circuit 61 includes transistors, the impedances of which change in response to a change in supply current I , which is in turn controlled by the opening and closing of switches k_a and k_b . *See infra* Section III.B.2.

D. *Rauhala* teaches increasing an impedance to decrease a “drive current.”

PO points to the prosecution history of the parent '330 patent to argue *Rauhala* does not teach a “drive current.” POR, 55-56. Specifically, PO points to an argument made by PO that “[a] bias current is not the same as a switching current.” *Id.* PO appears to argue, because PO distinguished the switching current from the bias current during prosecution of the parent '330 patent, *Rauhala*'s supply current, which is a bias current, cannot be a drive current. This line of reasoning is incorrect.

The limitation at issue recites a “drive current,” not a “switching current.” None of the challenged claims recites a “switching current.” Ex. 1001, 12:60-16:49. The Board should reject PO's attempt to introduce yet another concept that is not recited in the claims, and should thus decline to consider PO's arguments based on the prosecution history of the parent '330 patent related to the “switching current.”

Moreover, PO's assertion that the supply current in *Rauhala* cannot be both a bias current and a drive current is flawed. POR, 56-57. First, in making that assertion, PO alleges that “reducing a drive current via an impedance increase in the signal path is a different adjustment than reducing a bias current,” pointing to a figure that shows “reduce biasing” and “increase impedance” separately. POR, 56-57. However, PO makes no mention of the other parts of the '825 patent indicating

both the drive current and the bias current can be reduced via a same adjustment, namely impedance scaling. For example, the '852 patent discloses “FIG. 6 is an example of how a circuit’s impedance may be scaled to reduce drive currents, **and**, depending on the circuit configuration used, **associated bias currents as well**,” “the circuit’s impedance may be increased, thus reducing required drive currents. **Similarly, bias currents may be lowered**, thus reducing the maximum signal in handling capability,” “one or more impedances in the function block 920 may be increased ... In this way one or more of the driving currents in the function block 920 may be reduced. Similarly, since the drive current is reduced, **one or more bias currents may also be reduced**,” and “the noise floor is increased by increasing impedances in the function block 1020. This reduces the required drive current, and **may also allow for a reduction in bias currents**.” Ex. 1001, 7:47-49, 6:20-23, 9:56-62, 10:18-21; Ex. 1019, 67.

Second, PO mischaracterizes Petitioners’ position with respect to the “drive current” limitation, alleging that Petitioners uses one element in *Rauhala* to cover two elements in a claim. POR, 55. This is not true. Rather, under a proper understanding of the term “drive current” and the operation of the circuits in *Rauhala*’s FIGs. 6-7, a POSITA would have understood the relationship between a bias current and a drive current in a circuit, and that both currents would be present in the circuits of *Rauhala*’s FIGs. 6-7. Consistent with the usage of the term “drive

current” in the ’825 patent, and as agreed by PO’s expert during cross-examination, a drive current means a current that drives a component or a load in a circuit. Ex. 1019, ¶68; Ex. 1018, 145:4-6. In FIG. 6 of *Rauhala*, the bias current I to the differential amplifier 61 becomes the drive current that drives the load (i.e., the components of the differential amplifier 61), when the differential amplifier 61 switches to a state where it needs a maximum current to drive the load. Ex. 1019, ¶69. Similarly, in FIG. 7, the bias current I/2 becomes the drive current for the mixer 71 when the mixer switches to a state where it needs a maximum current to drive the load (i.e., the components of the mixer 71). *Id.* As discussed in the Petition and the current Reply, each of the currents I and I/2 of *Rauhala*’s FIGs. 6 and 7, respectively, is varied (e.g., increased or reduced) by the addition or removal of the resistor(s) (i.e., the impedances) in the circuit. Petition, 16, 44-46; *See supra* Section III.B.; Ex. 1002, ¶¶ 69-70, 134-135, and 140-141; Ex. 1004, [0021]-[0023], FIGs. 6-7.

Accordingly, *Rauhala*’s disclosure of varying the current I supplied to the differential amplifier 61 of *Rauhala*’s FIG. 6 or varying the current I/2 supplied to the mixer 71 of *Rauhala*’s FIG. 7, by adding or removing the resistor(s) in the respective circuits, teaches increasing an impedance to reduce a drive current.

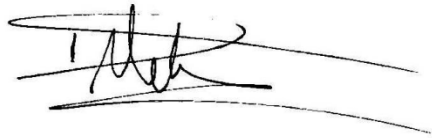
E. Petitioner provided the motivation to combine with respect to dependent claim 4.

The POR alleges that the Petition “fails to identify anything in *Rauhala* providing the required motivation to combine.” POR, 23. PO also alleges, without explanation, that the Petitioners “offer[] an improper motivation to engage in result-based hindsight reasoning, which does not support obviousness.” *Id.* Petitioners disagree with such conclusory statements and submit that the required motivation to combine the prior art references was provided at pages 53-56 of the Petition.

IV. Conclusion

For these reasons, the challenged claims should be cancelled.

Respectfully submitted,



Dated: April 30, 2024

Dinesh N. Melwani (Reg. No. 60,670)
Bookoff McAndrews, PLLC
2000 Pennsylvania Avenue NW, Suite 4001
Washington, D.C. 20006
202-808-3497

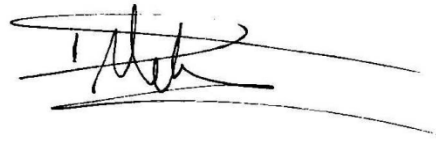
Attorney for Petitioners
Lenovo (United States) Inc. and
Motorola Mobility LLC

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petitioner's Reply contains, as measured by the word-processing system used to prepare this paper, 5597 words. This word count does not include the items excluded by 37 C.F.R. § 42.24 as not counting towards the word limit.

Dated: April 30, 2024

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'D. Melwani', is written over a horizontal line. There are additional horizontal strokes above and below the signature.

By:

Dinesh N. Melwani (Reg. No. 60,670)
Counsel for Petitioners

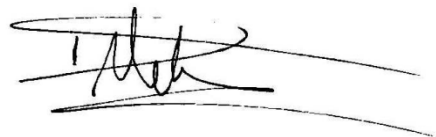
CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6, the undersigned hereby certifies that this
“PETITIONERS’ REPLY TO PATENT OWNER’S RESPONSE UNDER 37
C.F.R. § 42.23” was served by filing this document through the Patent Trial and
Appeal Case Tracking System (P-TACTS) and via e-mail to the following
attorneys of record for the Patent Owner listed below:

Lead Counsel	Aaron R. Hand Reg. No. 80,694 Bunsow De Mory LLP 701 El Camino Real Redwood City, CA 94063 Telephone: 650-351-7248 Facsimile: 415-426-4744 ahand@bdiplaw.com
Back-up Counsel	Corey Johanningmeier Bunsow De Mory LLP 701 El Camino Real Redwood City, CA 94063 Telephone: 650-351-7248 Facsimile: 415-426-4744 cjohanningmeier@bdiplaw.com
Service Email	BDIP_ThetaIP-Lenovo@bdiplaw.com

Dated: April 30, 2024

Respectfully submitted,



By:

Dinesh N. Melwani (Reg. No. 60,670)
Counsel for Petitioners