

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

IPR2023-00698
Patent No. 10,524,202 B2

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

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Exhibit 1001	U.S. Patent No. 10,524,202 B2
Exhibit 1002	Declaration of R. Jacob Baker, P.E., Ph.D.
Exhibit 1003	Prosecution History of U.S. Patent No. 10,524,202 B2
Exhibit 1004	European Patent Application Publication No. 0 999 649 A2 to Rauhala (“ <i>Rauhala</i> ”) published on May 10, 2000
Exhibit 1005	U.S. Patent No. 5,513,387 B2 to Saito (“ <i>Saito</i> ”) issued on April 30, 1996
Exhibit 1006	Rudolf F. Graf, <i>Modern Dictionary of Electronics</i> (7 th ed. 1999)
Exhibit 1007	Claim Construction Order, <i>Theta IP, LLC v. Samsung Electronics Co.</i> , No. W-20-CV-00160-ADA (W.D. Tex. Jan. 7, 2020)
Exhibit 1008	Memorandum and Order on Claim Construction, <i>Theta IP, LLC v. Samsung Electronics Co.</i> , No. 2:16-CV-527-JRG-RSP (E.D. Tex. Jun. 6, 2017)
Exhibit 1009	Patent Owner’s Claim Construction Brief, <i>Theta IP, LLC v. Samsung Electronics Co.</i> , No. 2:16-CV-527-JRG-RSP (E.D. Tex. April 11, 2017), ECF No. 63
Exhibit 1010	Patent Owner’s Claim Construction Reply Brief, <i>Theta IP, LLC v. Samsung Electronics Co.</i> , No. W-20-CV-00160-ADA (W.D. Tex. Dec. 16, 2020), ECF No. 45
Exhibit 1011	A. Kestenbaum et al., Design Concepts for Process Control, Ind. Eng. Chem., Process Des. Dev., Vol. 15, No. 1, (1976)
Exhibit 1012	Lijun Qian, Optimal Power Control in Cellular Wireless Systems, Ph.D. diss., Rutgers The State University of New Jersey, School of Graduate Studies (2001)

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Exhibit 1013	United States Patent No. 3,880,104 to Saye (“ <i>Saye</i> ”) issued on April 29, 1975
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Exhibit 1015	Mahmood Nahvi, Ph.D. & Joseph A. Edminister, <i>Schaum’s Outline of Theory and Problems of Electric Circuits</i> (4 th ed. 2003)
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

Lenovo (United States) Inc. and Motorola Mobility LLC (collectively, “Petitioners”) respectfully submit this reply under 37 C.F.R. § 42.23 in support of their Petition for *inter partes* review of claims 7-11, 13, and 19-21 (“the challenged claims”) of U.S. Patent No. 10,524,202 (“the ’202 patent”), assigned to Theta IP, LLC (“Patent Owner” or “PO”).

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

- (i) “determining the strength of the desired signal” and “determining the strength of the interferer signal;”
- (ii) “comparing the strength of the desired signal relative to the strength of the interferer signal;” and
- (iii) varying “an impedance” of a circuit “in the signal path.”

PO concedes that the remaining limitations of claims 7-11, 13, and 19-21 are taught by the cited prior art.

PO does not argue that any of the foregoing elements are wholly absent from *Rauhala*. Instead, PO attempts to both rewrite the claims to include extraneous limitations, and to contort basic teachings of *Rauhala* in ways that no reasonable POSITA would accept, to generate non-existent distinctions between *Rauhala* and the challenged claims. With respect to the “determining” elements, PO argues that a “single” detector allegedly cannot perform both steps, though the claims require

no particular structure and *Rauhala* is not limited to a single detector. PO argues that *Rauhala*'s signal-to-noise ratio does not satisfy the "comparing" element because the signal-to-noise ratio is allegedly not calculated in a particular way with particular inputs, though the claims require no such particularities. To avoid *Rauhala*'s switchable, parallel resistors in the amplifier of Figure 6, PO redefines "impedance" to allegedly exist only in AC circuits and excises the indispensable parallel resistor circuit from *Rauhala*'s signal path.

At root, the '202 patent identifies the same problem for wireless transceivers as *Rauhala* (varying of desired signals strengths relative to interfering signal strengths), proposes the same solution (controlling currents in the receiver), to yield the same advantage (reducing power dissipation and/or energy consumption). Compare Ex. 1001, 1:43-53 with Ex. 1004, [0002], [0006]-[0007]. PO's arguments are no more than a *post hoc* effort to move the boundaries of the claims so as not to envelop the pre-existing *Rauhala* reference. For the reasons set forth below and in the Petition, the challenged claims should be deemed unpatentable.

II. CLAIM CONSTRUCTION

A. "dynamically adjusting" and "dynamically" varying

PO agrees with Petitioners' proposed constructions for the terms "dynamically adjusting" and "dynamically [increasing / reducing / decreased / increased]." POR, 28-29. Accordingly, "dynamically adjusting" should be

construed to mean “adjusting during operation based, at least in part, on information gained during operation.” Pet., 18-23. “Dynamically [increasing / reducing / decreased / increased]” should be construed to mean “[increasing/reducing/decreased/increased] during operation based, at least in part, on information gained during operation.” Pet., 23.

B. “impedance”

Petitioners maintain, consistent with the Petition, that the term “impedance” does not require construction. Pet., 18. The Board declined construe the term in its Institution Decision. Paper 10, 10-11. Nevertheless, if the Board deems it necessary to construe this term in light of PO’s arguments, the Board should reject PO’s definition of “impedance” and give the term its plain and ordinary meaning.

PO seeks a restrictive construction of “impedance” that limits its applicability to AC circuits or AC currents. POR, 29-35. PO asserts that “[i]mpedance is undisputedly an alternating current parameter,” citing only definitions that mention alternating current (e.g., “alternating current,” “AC current,” “sinusoidal,” “frequency domain,” etc.). POR, 29-31. PO excludes other definitions that do not specify current type. For example, in the same dictionary PO cites, “impedance” is also defined as “[c]ombined opposition to current resulting from resistance, capacitance, and inductance,” and “[t]he combination of resistance

and reactance,” without any mention of the type of current it opposes. POR, 30; Ex. 1006, 7; Ex. 1019, ¶¶8-9.

Consistent with these definitions, “impedance” is expressed by the formula $sZ = \sqrt{R^2 + (X_L + X_C)^2}$ or $Z = R + jX$. Ex. 2015, ¶54; Ex. 1019, ¶10. The former represents the magnitude of an impedance, and the latter expresses the real part (resistance R) and the imaginary part (reactance X) in Cartesian form. Ex. 1019, ¶10. 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. In other words, a POSITA would have understood that the impedance Z of a circuit is equal to the resistance R if no reactance components exist in the circuit. *Id.* During cross-examination, Dr. Larson admitted that impedance could be determined even when a circuit lacks inductive reactance and capacitive reactance (*i.e.*, X_L and X_C). Ex. 1018 at 55:3-13. Based on the foregoing, the Board should reject PO’s limited construction of “impedance” and apply the term’s plain and ordinary meaning.

To the extent PO asserts that any of Petitioners’ arguments or evidence relating to “impedance” extends beyond the scope of the original 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).

III. *RAUHALA* TEACHES EACH AND EVERY ELEMENT OF THE CHALLENGED CLAIMS.

A. *Rauhala* teaches “determining the strength of the desired signal” and “determining the strength of the interferer signal” via the detector (DET).

PO argues that *Rauhala* does not teach the “determining” elements because “a single structure” allegedly cannot perform two method steps. POR, 37-38. PO’s argument relies on adding limitations recited nowhere in the claims and on a fundamental misinterpretation of the *Rauhala* reference. Due to either of these flaws in PO’s position, and in light of Petitioners’ evidence, the Board should find that *Rauhala* teaches the “determining” elements.

All of the challenged claims in this proceeding are method claims and each of the challenged independent claims recites the “determining” elements as method steps. Ex. 1001, 13:58-6 (claim 7); 14:31-42 (claim 11), 15:11-19 (claim 13), 17:9-29 (claim 19). None of the “determining” elements require performance by a particular component or structure. None of the “determining” elements recite a temporal requirement, such as contemporaneously determining the respective strengths of the desired signal and interferer signal. And none of the “determining” elements recite any requirement to perform the “determining” without “an intervening re-tuning of the receiver.” Without explicitly 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. *See* POR, 37-41. 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 Institution Decision that the claims do not require any of these extraneous limitations and distinguished the *In re Robertson* precedent PO cited. Paper 10, 22-23. Nothing has changed since institution, including PO’s misplaced insistence that *In re Robertson* is “directly analogous.” POR, 41. Unlike the method claims at issue here, *Robertson* involved an apparatus claim directed to a “mechanical fastening system” and reciting specific structural elements— “[first/second/third] mechanical fastening elements”—each having specified functions. *In re Robertson*, 169 F.3d 743, 744 (Fed. Cir. 1999). The method claims at issue, on the other hand, recite no structure whatsoever for the determining functions. Tellingly, not a single one of the remaining cases PO cites concern a method claim. *See, e.g., Ex parte Miller*, Appeal No. 2020-004369, 2021 WL 4492109, at *1 (P.T.A.B. Sept. 29, 2021) (“7. A non-transitory computer readable medium comprising[...]”); *Ex parte Wiedeman*, Appeal No. 2008-003454, 2009 WL 211777, at *1 (B.P.A.I. Jan. 27, 2009) (“1. A seat adapted for use in a vehicle having a floor and a roof,

comprising[...]; “25. A seat adapted for use in a vehicle having a floor and a roof, comprising[...];”); *Ex parte Koutsky*, Appeal No. 2008-000557, 2008 WL 4359775, at *1 (B.P.A.I. Sept. 23, 2008) (“1: A vehicle seat suspension apparatus comprising[...];”).

Even if the Board accepts PO’s addition of limitations to the claims, 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, 38), is misleading. Neither the Petition nor Dr. Baker ever concedes that *Rauhala*’s functional block labeled “DET” and referred to as “detector 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.*, Pet., 31-33; Ex. 1002, ¶¶111-116.

Moreover, PO’s assertion that the detector DET in *Rauhala* must be “a single diode detector that must be re-tuned to measure another spectrum,” (POR, 43), 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, ¶¶45-46. 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 “*assume[s]* 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. Ex. 1019, ¶46.

Additionally, *Rauhala*’s detector DET cannot 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, 39-41 and Ex. 2015, ¶¶70, 72 with Ex. 1019, ¶¶45-51. *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* 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[...] 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 at [0017]; Ex. 1019, ¶48. A POSITA therefore would have understood that detector DET must simultaneously determine a desired signal strength (RSS) and (RSS_n). Ex. 1019, ¶48. 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.*, ¶¶49-50. 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 (emphasis in original). Dr. Larson is correct that such a system would be impractical—so impractical, in fact, that *Rauhala* does not and would not describe such a system.

For all these reasons and those in the Petition, *Rauhala* teaches the “determining” elements of the claims by detector DET.

B. *Rauhala* teaches “comparing the strength of the desired signal relative to the strength of the interferer signal” by calculating the signal-to-noise ratio.

While PO does not dispute that *Rauhala* discloses calculating a signal-to-noise ratio (SNR) or that a ratio is by definition a comparison, PO argues that *Rauhala*’s SNR calculation does not satisfy the “comparing” elements of independent claims 7, 11, 13, and 19. *Compare* POR, 47-54 with *e.g.*, Pet., 34-35; Ex. 1002, ¶¶117-120. PO’s argument suffers from two fatal flaws: (1) PO asserts that the “comparing” elements require more than is claimed; and (2) PO sidesteps *Rauhala*’s explanation of how SNR addresses the very same problem identified by the ’202 patent. Applying the plain and ordinary meaning, a POSITA would have understood that calculating SNR according to *Rauhala* is “comparing the strength

of the desired signal relative to the strength of the interferer signal.” Ex. 1019, ¶¶52-64.

PO spends multiple pages of its Response quibbling with how exactly SNR is calculated in *Rauhala*, what the inputs for the calculation are, and whether multiple ways to calculate SNR exist. POR, 48-52. None of this is relevant to whether *Rauhala* teaches the claimed limitations. As the Board correctly concluded in its Institution Decision, the “claims do not specify a particular way of comparing the strengths of the desired signals and interfering signals.” Paper 10, 24; *see also* Ex. 1019, ¶54.

Sifting through PO’s arguments about phantom requirements of the “comparing” elements, what little remains ignores *Rauhala*’s plain text. *Rauhala* makes clear by its third sentence that it is concerned with the “quality of a signal in a radio receiver [being] degraded by [...] noise and interference indirectly caused by other radio signals,” such as “a signal on a neighboring channel.” Ex. 1004, [0002]; Ex. 1019, ¶62. The metric *Rauhala* associates with such degradation is signal-to-noise ratio, stating that a “signal on a neighboring channel [...] degrades the signal-to-noise ratio at the amplifier output.” Ex. 1004, [0002]; Ex. 1019, ¶62. *Rauhala* then summarizes the “basic idea of the invention,” stating that a “receiver monitors the signal strength on the receive channel and neighboring channels,” and “can determine the quality of the detected signal by calculating its bit error ratio or

signal-to-noise ratio.” Ex. 1004, [0006]; Ex. 1019, ¶64. Instead of addressing this disclosure, PO and Dr. Larson point to other measures never mentioned in *Rauhala*, such as signal-to-interference ratio (SIR) and signal-to-interference-plus-noise ratio (SINR). POR, 51-52; Ex. 2015, ¶77. These measures would have been irrelevant to a POSITA’s understanding of *Rauhala*’s SNR. Ex. 1019, ¶64.

As it is undisputed that *Rauhala*’s SNR is a ratio and therefore a comparison, the only remaining issue for the Board to resolve is whether SNR is a comparison of the desired signal strength to the interferer signal strength. *Rauhala*’s specific concern with signal quality degradation by “other radio signals” and use of SNR to quantify that degradation would lead a POSITA to conclude that *Rauhala*’s SNR is a comparison of desired signal strength to interferer signal strength. Ex. 1019, ¶¶61-64. Indeed, a POSITA would have naturally read *Rauhala*’s introduction identifying the problem and solution, and would have concluded that *Rauhala*’s SNR calculation teaches comparing the strength of the desired signal relative to the strength of the interferer signal (other radio channels and/or a signal on a neighboring channel). *Id.* Dr. Larson even admitted on cross-examination that his own textbook uses signal-to-noise ratio with reference to interference of FM signals by other signals in the FM band. Ex. 1018, 110:5-114:11.

PO's remaining arguments that *Rauhala* must explicitly explain how SNR is calculated or that SNR must "necessarily" be calculated in a certain way are without merit. Anticipation by *Rauhala* requires that "one skilled in the art would reasonably understand or infer from the prior art reference's teaching that every claim [limitation] was disclosed in that single reference." *Genentech, Inc. v. Hospira, Inc.*, 946 F.3d 1333, 1340 (Fed. Cir. 2020). Petitioners' evidence establishes that a POSITA would have understood *Rauhala* to teach the "comparing" elements. *See* Ex. 1019, ¶64.

C. *Rauhala* teaches "dynamically adjusting [...] an impedance [...] in the receiver signal path."

PO argues that *Rauhala* does not teach "dynamically adjusting [...] an impedance [...] of one or more of the plurality of circuits in the signal path," as recited in independent claims 7 and 19 of the '202 patent, because Petitioner identified three parallel resistors (R1, R2, and R3) in *Rauhala* Figure 6 as being "adjusted." 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, 55-59. 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 *Rauhala*'s parallel resistors R1, R2, and R3 (within control circuit 62 in Figure 6) are part of the *same* amplifier in the "signal

path” as the circuit 61 in Figure 6. PO’s expert, Dr. Larson, conceded on cross-examination 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.

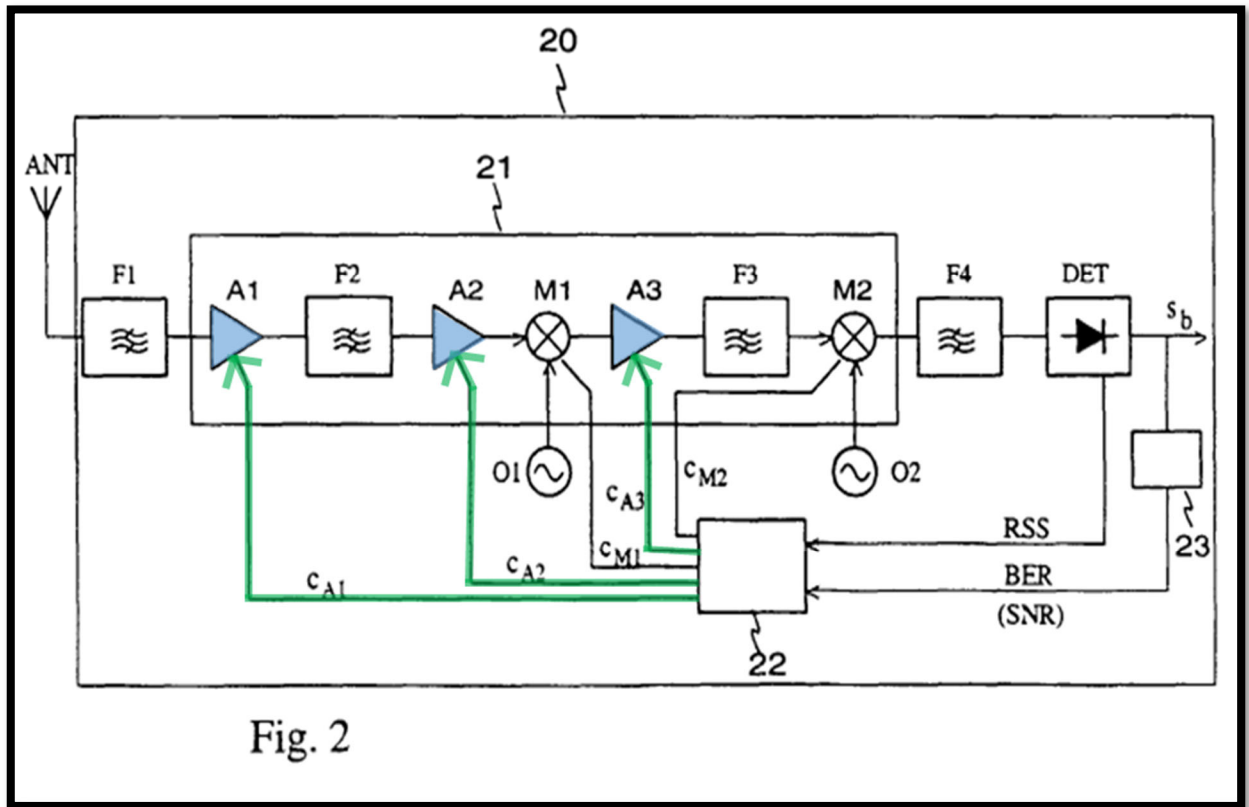
Second, even assuming circuit 61 and control circuit 62 are separable units (which they are not), the record establishes that one adjusts the “impedance” and “bias current” in circuit 61 (which PO admits is in the “signal path”) by adjusting the “impedance” in control circuit 62. Dr. Baker explains that 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). As PO admits that circuit 61 is in the “signal path,” *Rauhala* teaches varying an impedance in the “signal path” by adjusting the parameters of control circuit 62. Ex. 1019, ¶¶13-17.

1. Circuit 61 and control circuit 62 are both part of the same amplifier in *Rauhala* Figure 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, ¶86; Ex. 1019, ¶20; POR, 54-57. *Rauhala* states explicitly that Figure 2 shows a “**signal path** structure” including an antenna ANT, detector DET, and “linear units” there between. Ex. 1004, [0012]-[0013] (emphasis added); 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.

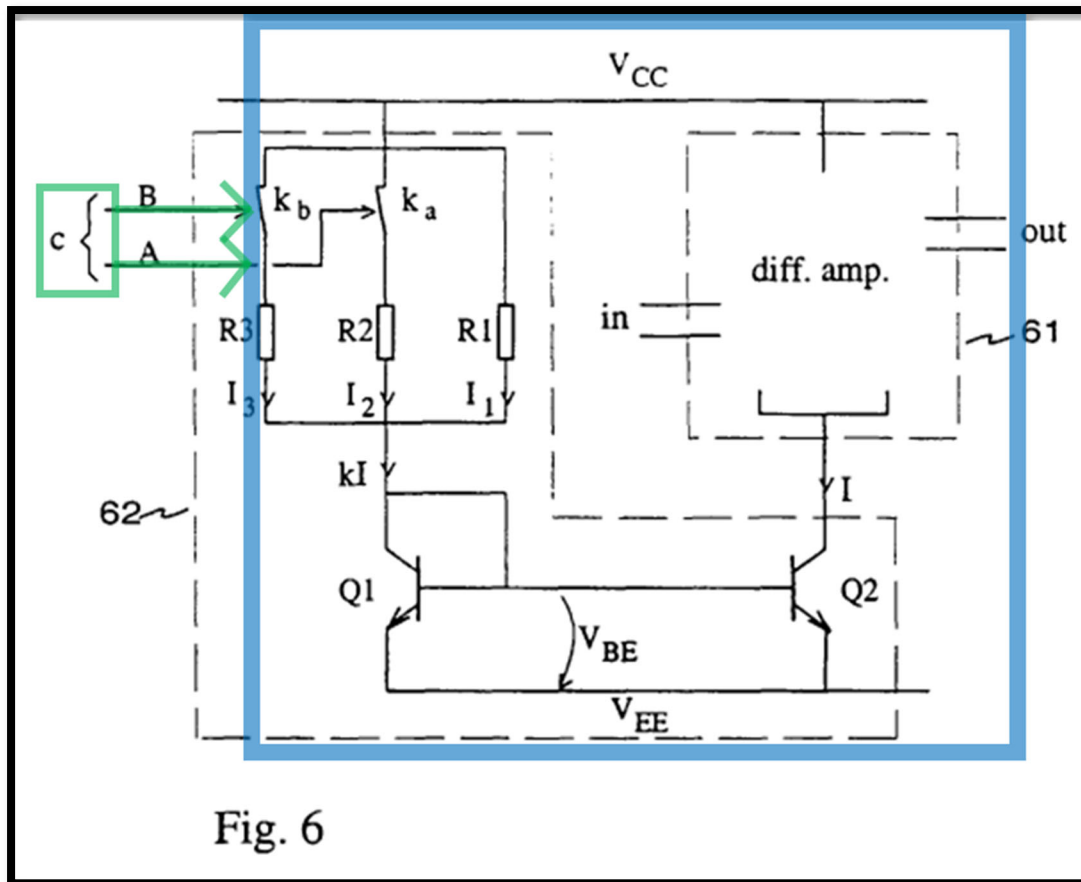
Rauhala Figure 2 additionally shows “a control unit 22 . . . for controlling the supply currents of the linear units” which include amplifiers A1, A2, and A3. Ex. 1004, [0013]; Ex. 1019, ¶21. The outputs of control unit 22 (control signals C) are sent to the amplifiers. Ex. 1004, [0013]; Ex. 1019, ¶¶23-24. Annotated Figure 2 of *Rauhala* below, shows control signals C_{A1}, C_{A2}, and C_{A3} annotated in green, and *Rauhala*’s amplifiers annotated in blue:



Ex. 1004, FIG. 2 (annotated).

The entirety of the circuitry shown in *Rauhala* Figure 6 is an amplifier like A1, A2, and A3, each of which are in the signal path. Ex. 1004, [0021]; Ex. 1019, ¶¶20-26. *Rauhala* explains that Figure 6 shows “an example of a linear unit's supply current control,” where the linear unit is an amplifier and shows the amplifier including its control circuit 62. Ex. 1004 at [0021]; Ex. 1019, ¶¶23-24. 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 Figure 2. Ex. 1004 at [0021]; Ex. 1019, ¶¶24-25. The control circuit 62 is the only structure in Figure 6 that receives the control signal C. Thus, for the amplifier in Figure 6 to receive the output of the

control unit 22, as described with reference to Figure 2, control circuit 62 must be part of the amplifier itself. Ex. 1019, ¶26. Control signal C is shown in green and *Rauhala*'s amplifier in blue in annotated Figure 6 below:



Ex. 1004, FIG. 6 (annotated).

That the “signal path” encompasses the entirety of the amplifier shown in *Rauhala* Figure 6 is consistent with the challenged claims. The independent claims at issue define the “signal path” only in terms of the functional components it must include. Ex. 1019, ¶30. Claim 7 of the ’202 patent, for example, recites a “receiver having a signal path comprising a plurality of circuits including at least an

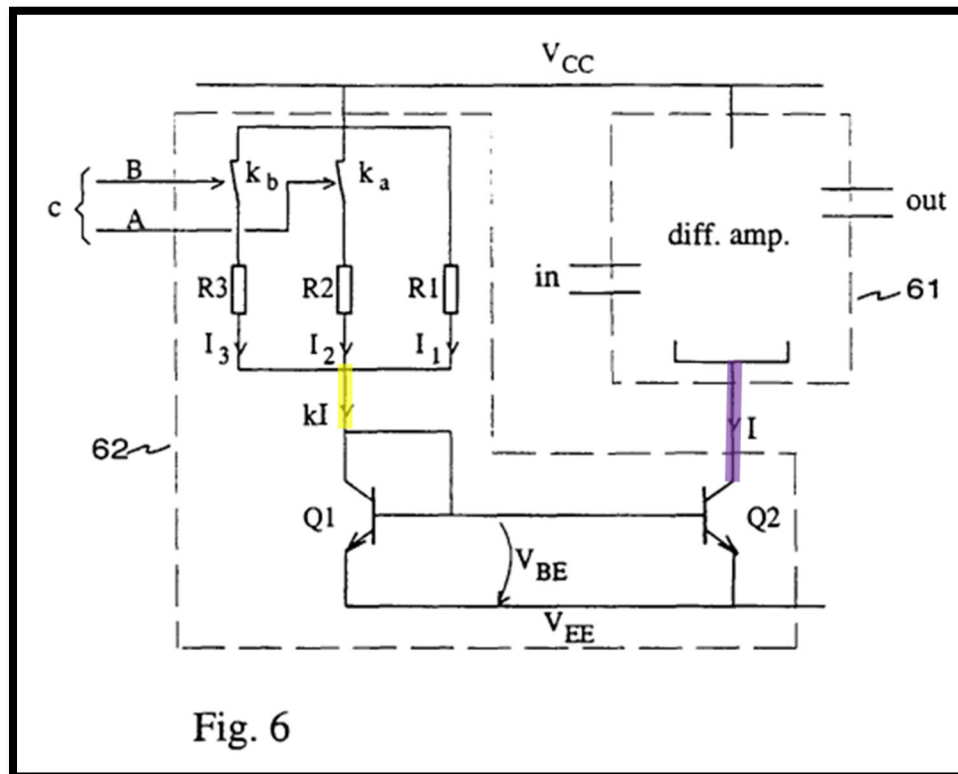
amplifier, a filter, and a mixer.” Ex. 1001, 13:60-62; *see also id.*, 14:33-35 (claim 11); *id.*, 15:13-15 (claim 13). The “signal path” is not otherwise qualified by the claims and the claims do not purport to exclude any portions of amplifiers from the “signal path.” Ex. 1019, ¶33. On the contrary, a POSITA would have understood that the “signal path” includes the functional components recited in the claims, like the entire amplifier shown in *Rauhala* Figure 6. Ex. 1019, ¶¶30-32.

Moreover, PO argues, without any evidentiary support, that circuit 61 of Figure 6 “is separate and apart from ‘control circuit 62’ for the supply current and its bias current kI .” POR, 34-35. PO urges the Board to draw a line through the amplifier shown in Figure 6, and to consider only one side of that line within the “signal path.” Control circuit 62, however, cannot be separated from Figure 6 without rendering the remaining circuitry non-functional. Ex. 1019, ¶¶34-38. Dr. Larson conceded as much, stating that “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. 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, ¶¶35-36. Accordingly, supply current I is controllable by adjusting kI in control circuit 62. Ex. 1004, [0021]; Ex. 1019, ¶¶35-36. The related currents kI (yellow) and I (purple) are shown in annotated Figure 6 below:



Ex. 1004, Figure 6 (annotated); Ex. 1019, ¶¶35-36.

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 were 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, ¶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.* As a result, supply current I would necessarily have zero value and circuit 61 would not and could not perform any amplification function. *Id.*; Ex. 1018, 30:14-32:3.

PO's argument that only circuit 61 of the amplifier shown in *Rauhala* Figure 6 qualifies as within the claimed "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. Dr. Larson cites no evidence to support his conclusion or to explain how he arrived at a meaning of "signal path." 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 conclusory and unsupported opinion cannot, on its own, rebut the extensive record evidence that the entire amplifier of *Rauhala* Figure 6 is within the "signal path." *Compare* Ex. 2015, ¶63 *with* Ex. 1004 at [0012]-[0013], [0021]; Ex. 1002 at ¶¶86, 126-136; Ex. 1019, ¶¶18-41.

2. Even if circuit 61 and control circuit 62 are separable, “impedance” in circuit 61 is adjusted by adjusting “impedance” in control circuit 62.

Even if circuit 61 and control circuit 62 were separable units (which they are not), the record establishes that “impedance” in circuit 61 (which PO admits is in the “signal path”) is adjusted by adjusting 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 . *Rauhala* therefore teaches “dynamically adjusting [...] an impedance [...] of one or more of the plurality of circuits in the signal path,” regardless of whether control circuit 62 can be separated from circuit 61. *See infra* Section III.D.2.

D. Rauhala teaches adjusting “an impedance.”

PO argues that, because “impedance” means the total opposition of a circuit to an alternating current, it is solely an AC circuit parameter and a POSITA would not refer to *Rauhala*’s variable resistance as an impedance. POR at 58-63. As discussed previously, PO seeks an overly restrictive construction of “impedance” and argues that the term can only be used with AC circuits or AC currents. *See supra* Section II.B. The Board should not adopt this overly-restrictive definition. However, even if PO’s definition of “impedance” were accepted by the Board, *Rauhala* still teaches varying an impedance of a circuit in at least Figures 6 and 7.

Petitioners' arguments and evidence submitted herewith related to "impedance" are responsive to PO's new claim construction and arguments raised after institution, and should thus be considered by the Board. *See supra* Section II.B.

1. Rauhala's disclosure of supply current control teaches the adjusting an "impedance" according to the plain meaning.

PO selectively cites definitions of "impedance" to argue that the term can only be used in reference to an AC current or AC circuit. POR at 29-31. As explained previously, this is incorrect and the term should be given its plain and ordinary meaning. *See supra* Section II.B. Based on the plain and ordinary meaning of "impedance," a POSITA would have understood that *Rauhala's* supply current control teaches adjusting an "impedance."

The formulas for impedance Z are consistent with the definitions provided in the Graf dictionary cited by PO, such as "[c]ombined opposition to current resulting from resistance, capacitance, and inductance," or "[t]he combination of resistance and reactance." POR at 30; Ex. 1006, 7; Ex. 1019, ¶11. A POSITA would have understood that the impedance, denoted Z in the formula, 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, ¶11. PO's expert agreed that a circuit lacking any reactance component can have a non-zero

impedance value Z , as long as the circuit has a component exhibiting resistance characteristics. Ex. 1018, 55:3-13; Ex. 1019, ¶12.

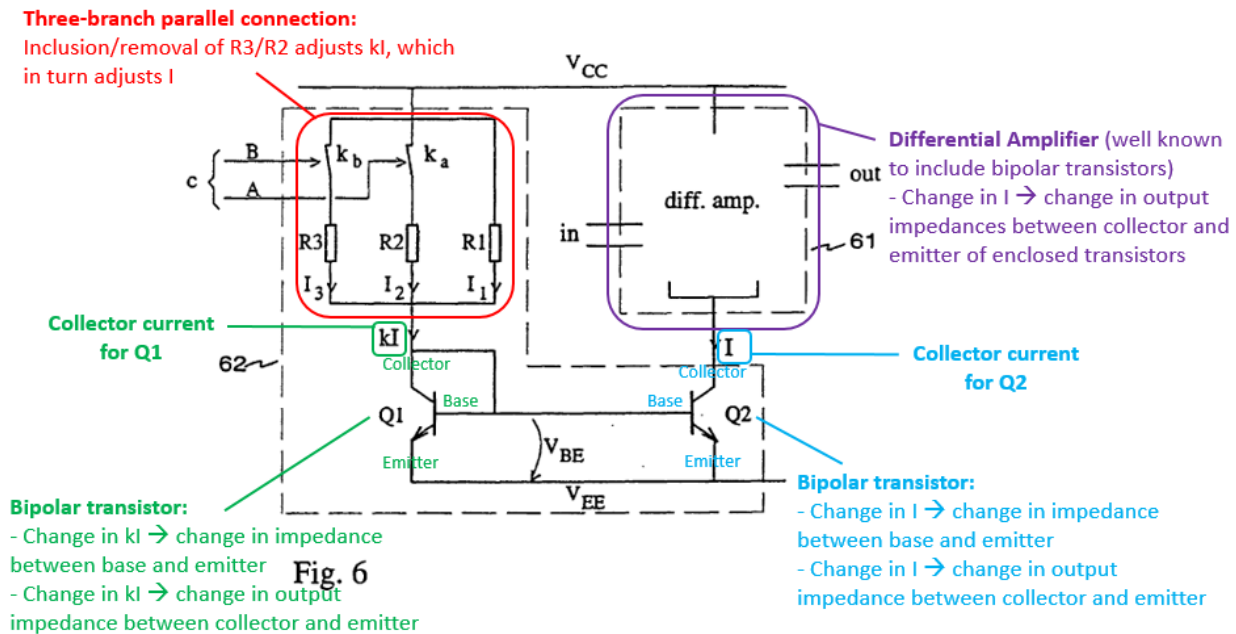
A POSITA would not restrict “impedance” solely to AC currents or AC circuits, as the term connotes the sum total of any real part and any imaginary part of a circuit, and the impedance value Z can still be calculated even when one or more of resistance, capacitive reactance, and inductive reactance are not present in the circuit. Ex. 1019, ¶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; Pet. 37-41; Ex. 1004, [0021], FIG. 6. Impedance still exists in the circuit even when the imaginary part including capacitive reactance and/or inductive reactance is not present. Ex. 1019, ¶12; Ex. 1018, 55:3-13. Therefore, a POSITA would have understood that the supply current control circuit 62 in *Rauhala*’s Figure 6 varies the impedance 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, ¶12; Pet. 37-41 at 45-46; Ex. 1004, [0021], FIG. 6.

2. *Rauhala*’s disclosure of supply current control still teaches the concept of varying an “impedance,” even under PO’s improper construction of “impedance.”

Even if the Board construes the term “impedance” as proposed by PO, *Rauhala* nevertheless teaches adjusting an impedance. In *Rauhala*’s Figure 6, the

change in kI and I resulting from the removal or inclusion of resistors $R2$ and/or $R3$ causes a change in the impedances of the transistors $Q1$, $Q2$ and the transistors in the differential amplifier 61. Ex. 1019, ¶¶15-16.

As was well known in the art, 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 . Ex. 1019, ¶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 . Ex. 1019, ¶16. *Rauhala's* Figure 6, reproduced below with annotations, shows transistors $Q1$ and $Q2$ and the transistors in the differential amplifier 61:



Ex. 1004, FIG. 6 (annotations added).

Rauhala Figure 6 shows a current mirror formed by Q1 and Q2. Ex. 1004 at [0022]. Each of 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, ¶¶15-16. As explained previously, 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; Pet., 15-16. 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, ¶¶14-17. Therefore, even under PO's incorrect construction, *Rauhala* teaches adjusting the impedances of transistors Q1 and Q2 by varying kI and/or I with the inclusion or removal of resistor(s) in the three-branch parallel connection. *Id.*

Further, transistors Q1 and Q2 and the transistors in the differential amplifier 61 have output impedances that change as the currents kI and I change. Ex. 1019, ¶¶15-16. Dr. Larson conceded this during cross-examination. 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.”); 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.”). A POSITA would have understood that, by adding or removing the resistors R2 and/or R3 by way of switches k_b and k_a , the output impedances of transistors Q1 and Q2 and the transistors in the differential amplifier 61 are also adjusted due to 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, fn.3. A POSITA, therefore, would understand that *Rauhala* teaches adjusting an opposition to the flow of an alternating current. Ex. 1019, ¶¶14-16, fn.3.

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

E. PO fails to address whether *Rauhala* teaches “dynamically adjusting [...] a bias” in a circuit in the “signal path.”

While PO argues for claims 7 and 19 that *Rauhala* does not teach “dynamically adjusting [...] an impedance” in a circuit in the “signal path,” PO does not dispute that *Rauhala* teaches “dynamically adjusting [...] a bias.” See POR, 54-63. Claims 7 and 19 each recite “impedance” and “bias” in the alternative, such that only “dynamically adjusting” *either* “impedance” *or* “bias” is required. Ex. 1001, 14:9:14, 17:33-38. The Petition and Dr. Baker each demonstrated that *Rauhala*’s supply currents, including supply current I flowing from differential

amplifier 61 in Figure 6, are biases that are adjusted. Pet., 37-41, 49-50, 57-59, 71; Ex. 1002, ¶¶126-136, 158-163, 198-206, 233-239, 286-296. Dr. Larson also conceded “that DC bias current through the transistors” in differential amplifier 61 is adjusted. Ex. 1018, 96:8-16.

As PO has raised no argument as to whether *Rauhala* teaches “dynamically adjusting [...] a bias,” any such argument is waived. Paper 11 (Scheduling Order) at p. 9 (“[A]rguments not raised in the response may be deemed waived.”).

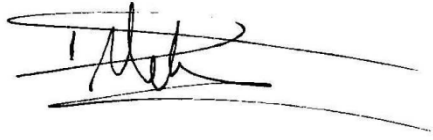
F. Dependent claims 8-10 fall with claim 7 and dependent claims 20-21 fall with claim 19.

PO raises no independent arguments for dependent claims 8-10 and 20-21, thereby conceding that the elements in those claims are taught by the prior art or do not lend patentability to the claims. Claims 8-10 thus rise or fall with claim 7 and claims 20-21 rise or fall with claim 19.

IV. CONCLUSION

For the reasons set forth above, in the Petition, and in the associated declarations and exhibits, claims 7-11, 13, and 19-21 of the '202 Patent should be deemed unpatentable.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'D. Melwani', with a horizontal line drawn underneath it.

Dated: April 30, 2024

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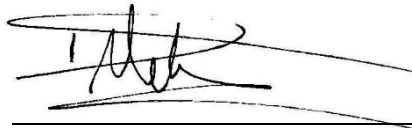
CERTIFICATE OF COMPLIANCE

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, 5,597 words, which is less than the 5,600 words permitted by 37 CFR § 42.24(c)(1). 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,

By:



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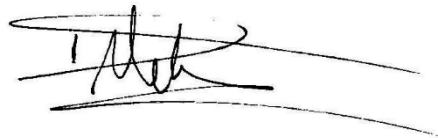
CERTIFICATE OF SERVICE

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
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