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

Patent No. 10,129,825 B2

**PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 10,129,825 B2**

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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 ("*Rauhala*") published on May 10, 2000
Exhibit 1005	Japanese Patent Application Publication No. 08228118A to Masaaki ("*Masaaki*") published on September 3, 1996
Exhibit 1006	Modern Dictionary of Electronics, Seventh Edition, by Rudolf F. Graf ("*Graf*") published in 1999
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Exhibit 1010	Electric Circuits, Fourth Edition, by Mahmood Nahvi et al. ("*Nahvi*") published in 2002

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

I. INTRODUCTION

Lenovo (United States) Inc. and Motorola Mobility LLC (collectively, "Petitioners") request *inter partes* review of claims 1, 3, 4, and 8 ("the challenged claims") of U.S. Patent No. 10,129,825 ("the '825 patent") (Ex. 1001), assigned to Theta IP, LLC ("Patent Owner"). As explained below, the challenged claims should be found unpatentable and cancelled.

II. MANDATORY NOTICES

Real Party-in-Interest: The real parties-in-interest for this Petition are Lenovo (United States) Inc. ("Lenovo US"); Motorola Mobility LLC ("Motorola"); and Lenovo Group Ltd ("LGL").[2]

Related Matters: Patent Owner has asserted the '825 patent against Lenovo US, Motorola, and LGL in *Theta IP, LLC v. Motorola Mobility LLC, et al*., 1:22-cv-03441 (N.D. Ill.) ("co-pending litigation").

The '825 patent issued from U.S. Application No. 15/080,432, which is a continuation of U.S. Application No. 11/318,646 ("the '646 application"), which matured into U.S. Patent No. 9,331,728. The '646 application is a continuation of

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[2] Petitioners identify LGL out of an abundance of caution because it is a named party in the co-pending litigation, but maintain that LGL is not a proper party to the co-pending litigation.

U.S. Application No. 10/784,613 ("the '613 application"), which matured into U.S. Patent No. 7,010,330 ("the '330 patent"). The '613 application claims the benefit of priority to U.S. Application No. 60/451,229 ("the '229 application") and U.S. Application No. 60/451,230 ("the '230 application"), both of which are expired provisional applications.

Petitioners have filed a petition for IPR challenging claims 1, 23, 29, and 30 of the '330 patent.

Petitioners have also filed a petition for IPR challenging claims 7-11, 13, and 19-21 of U.S. Patent No. 10,524,202 ("the '202 patent"), which is also assigned to Patent Owner and is a continuation of the '613 application.

Counsel and Service Information: Lead counsel is Dinesh N. Melwani (Reg. No. 60,670), and Backup counsel is Sangwoo Ahn (Reg. No. 76,905). Service information is: Bookoff McAndrews, PLLC, 2020 K Street, NW, Suite 400, Washington, DC 20006; Tel.: 202.808.3497; Fax.: 202.450.5538; email: docketing@bomcip.com, dmelwani@bomcip.com, and sahn@bomcip.com. Petitioners consent to electronic service.

III. PAYMENT OF FEES

The PTO is authorized to charge any fees due during this proceeding to Deposit Account No. 50-5906.

IV. GROUNDS FOR STANDING

Petitioners certify that the ’825 patent is available for review and Petitioners are not barred/estopped from requesting review on the following grounds.

V. PRECISE RELIEF REQUESTED AND GROUNDS

The challenged claims should be cancelled as unpatentable based on:

Ground 1: Claims 1, 3, and 8 are unpatentable under 35 U.S.C. § 102(b) as anticipated by European Patent Application No. 0 999 649 A2 (“*Rauhala*”) (Ex. 1004).

Ground 2: Claim 4 is unpatentable under 35 U.S.C. § 103(a) as obvious over *Rauhala* in view of Japanese Patent Application Publication No. 08228118A (“*Masaaki*”) (Ex. 1005). [3]

The application that matured into the ’825 patent was filed on March 24, 2016, as a continuation of the ’646 application, filed on December 27, 2005, which is a continuation of the ’613 application, filed on February 23, 2004, which claims the benefit of priority to the ’229 application and the ’230 application, both of

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[3] For each Ground, Petitioner does not rely on any reference other than those listed here. Other references are discussed to show the state of the art at the time of the invention. *See Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015).

which were filed on March 1, 2003. Ex. 1001 at pages 1-2. For the purposes of this proceeding only, Petitioners assume the priority date of the ’825 patent is March 1, 2003.

Rauhala was published on May 10, 2000, i.e., more than one year before March 1, 2003, and is prior art under 35 U.S.C. § 102(b).

Masaaki was published on September 3, 1996, i.e., more than one year before March 1, 2003, and is prior art under 35 U.S.C. § 102(b).

VI. LEVEL OF ORDINARY SKILL

A person of ordinary skill in the art (“POSITA”) as of the claimed priority date of the ’825 patent would have had a bachelor’s degree in electrical engineering, electronics engineering, or the equivalent, and two or more years of experience in electronic circuits and mobile communication devices including transceivers. Ex. 1002 at ¶¶ 27-31. More practical experience could qualify one not having the aforementioned education as a POSITA, while a higher level of education could offset lesser experience. *Id.*

VII. THE ’825 PATENT AND PRIOR ART

A. The ’825 Patent

The ’825 patent describes methods for reducing power dissipation in wireless transceivers. Ex. 1001 at 1:19-21; Ex. 1002 at ¶ 37. The ’825 patent asserts that the techniques described are useful in wireless networking devices, such as portable laptops and cellular telephones, in which wireless performance can impact battery life. Ex. 1001 at 1:19-58 and 2:3-7; Ex. 1002 at ¶¶ 37.

The ’825 patent purports specifically to address power dissipation in a wireless transceiver. Ex. 1001 at 1:19-21; Ex. 1002 at ¶ 37. According to the ’825 patent, the receiver signal path includes an antenna on which signals are received. Ex. 1001 at 4:35-38. From the antenna, the received signals pass through various circuits, such as amplifiers, filters, and mixers, for processing. Ex. 1001 at 4:35-50; Ex. 1002 at ¶¶ 47 and 57.

When the receiver is active, received signals include a desired signal, which contains useable information, as well as interfering signals. Ex. 1001 at 5:20-24; Ex. 1002 at ¶ 38. During operation, the qualities of the desired signal and the interfering signals can vary. Ex. 1001 at 5:31-65; Ex. 1002 at ¶¶ 38-42. For example, the desired signal may be weak and the interfering signals may be strong, which the ’825 patent refers to as a “worst-case input signal.” Ex. 1001 at 6:4-10 and 33-34; Ex. 1002 at ¶¶ 40-41. On the other hand, the ’825 patent refers to when the desired signal is strong and the interfering signals are weak as the “best-case input signal.” Ex. 1001 at 6:14-16; Ex. 1002 at ¶ 39.

According to the ’825 patent, in order for the receiver to function properly in the “worst-case” operating condition, the receiver must dissipate large amounts of power and the battery life is therefore drained rapidly. Ex. 1001 at 1:29-40; Ex.

1002 at ¶¶ 40-42. Power dissipation can be reduced in the "best-case" operating condition, however, by adjusting certain parameters of the receiver's circuits. Ex. 1001 at 6:16-19; Ex. 1002 at ¶ 39. The parameters that are adjusted for the "best-case" operating condition can include impedances and bias currents. Ex. 1001 at 6:20-23; Ex. 1002 at ¶ 39.

Figures 9B and 9C of the '202 patent, reproduced below, illustrate an example of how impedance of a receiver circuit can be adjusted for a better-than-worst-case operating condition according to the disclosure. Ex. 1001 at 9:39-62; Ex. 1002 at ¶ 51. As shown by the graphical representations of Figures 9B and 9C, the desired signals 936 and 946 of a signal spectrum are strong, while the interfering signals 937, 938, 947, and 948 are relatively weak. Ex. 1001 at 9:46-48; Ex. 1002 at ¶ 51. The receiver represented by Figure 9B is configured for the "worst-case" operating condition with a high maximum signaling capability 931 and a low noise floor 933. Ex. 1001 at 9:53-56; Ex. 1002 at ¶ 51. The receiver of Figure 9B therefore experiences high power dissipation. Ex. 1002 at ¶ 51. Due to the strong desired signal and weak interfering signals, however, the noise floor 933 as shown in Figure 9B can be permitted to rise to the level of noise floor 943 as shown in Figure 9C without impacting signal reception. Ex. 1001 at 9:56-58; Ex. 1002 at ¶ 51.

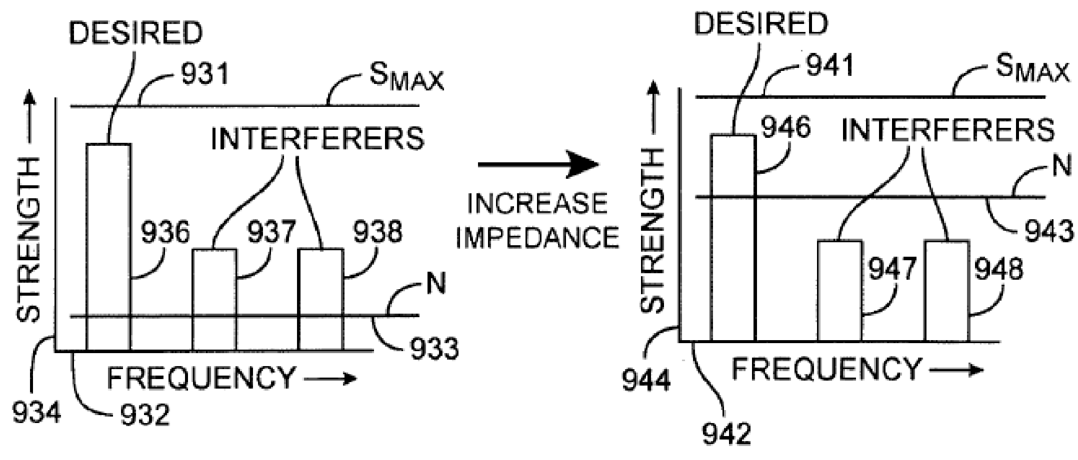

FIG. 9B FIG. 9C

According to the ’825 patent, the noise floor can be increased as shown in FIG. 9C by increasing an impedance of a circuit in the receiver. *Id*. The increased impedance results in decreased drive current through the circuit and lower power dissipation. Ex. 1001 at 9:58-60; Ex. 1002 at ¶ 51. Despite the reduced power dissipation, the desired signal 946 remains within the receivable signal band of the receiver. Ex. 1001 at FIG. 9C; Ex. 1002 at ¶ 51.

The ’825 patent explains that other power saving adjustments to receiver circuits can be made depending on desired signal strength and interferer signal strength. Ex. 1001 at 8:20-9:38 and 9:63-10:59, and FIGs. 8A-12; Ex. 1002 at ¶¶ 52-55. The ’825 patent summarizes these adjustments in Figure 12, reproduced below. Ex. 1001 at 10:60-11:32; Ex. 1002 at ¶ 55.

	RECEIVED SIGNAL (1210)		RESPONSE TO RECEIVED SIGNAL (1220)		
	SIGNAL STRENGTH	INTERFERER STRENGTH	DECREASE SMAX	INCREASE IMPEDANCE NOT GAIN	INCREASE IMPEDANCE AND GAIN
1230	SMALL	SMALL	YES	NO	YES
1240	LARGE	SMALL	NO	YES	NO
1250	LARGE	LARGE	NO	YES	NO
1260	SMALL	LARGE	NO	NO	NO

FIG. 12

For example, in row 1230, the desired signal and interferer signal strengths are both weak or small. Ex. 1001 at 10:63-64; Ex. 1002 at ¶¶ 48-49. In response, the ’825 patent calls for an increase in impedance of a circuit. Ex. 1001 at 10:64-67; Ex. 1002 at ¶¶ 48-49. In row 1240, the desired signal strength is strong or large, while the interfering signals are small. Ex. 1001 at 11:8-9; Ex. 1002 at ¶ 51. Similar to the example of Figures 9B and 9C, the ’825 patent calls for an increase of a circuit impedance. Ex. 1001 at 11:9-11; Ex. 1002 at ¶ 51. In row 1250, both the desired signals and interfering signal strengths are large. Ex. 1001 at 11:13-14; Ex. 1002 at ¶ 52. In response, the ’825 patent calls for an increase of a circuit impedance. Ex. 1001 at 11:14-16; Ex. 1002 at ¶ 52. In row 1260, the received desired signal strength is weak or small, while the interfering signals are large. Ex. 1001 at 11:17-18; Ex. 1002 at ¶¶ 53-54. As this is the worst-case operating condition, the '825 patent calls for no adjustment of impedance or gain and power dissipation is not reduced. Ex. 1001 at 11:18-20; Ex. 1002 at ¶¶ 40, 53, and 55.

The '825 patent contends that by making the foregoing adjustments to receiver circuit parameters, power can be saved over time. Ex. 1001 at 11:33-42; Ex. 1002 at ¶ 56. Figure 13, reproduced below, depicts a graphical representation of the purported power savings. Ex. 1001 at 11:33-36; Ex. 1002 at ¶ 56. Line 1310 represents power dissipation for a receiver configured to operate under worst-case conditions. Ex. 1001 at 11:37-38; Ex. 1002 at ¶ 56. By adjusting gains, impedances, and biasing, power dissipation represented by line 1320 can be reduced when conditions allow, thereby reducing the overall average power dissipated represented by line 1330. Ex. 1001 at 11:38-42; Ex. 1002 at ¶ 56.

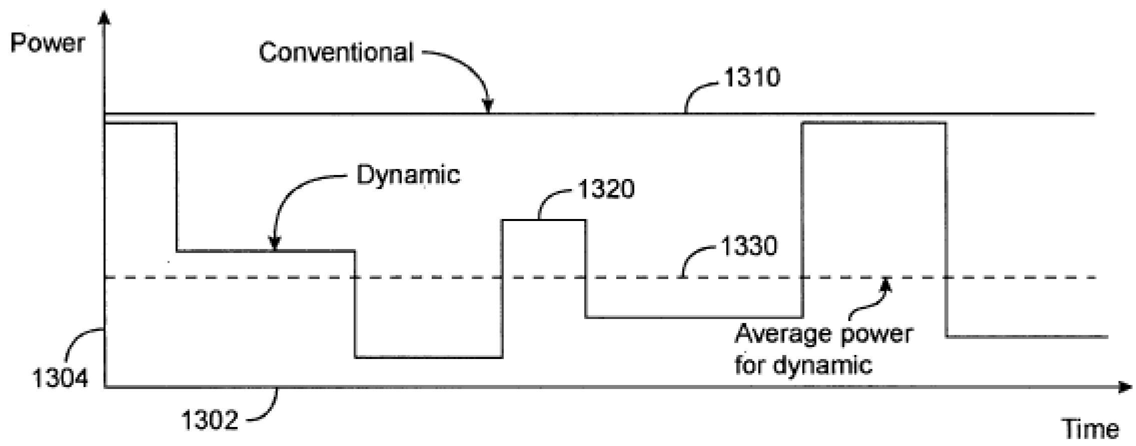

FIG 13

B. Prosecution Summary of the ’825 patent

The ’825 patent was filed as Application No. 15/080,432 (“the ’432 application”) on March 24, 2016. While the claims originally filed in the ’432 application and the challenged claims of the ’825 patent have some overlap in scope, they are substantially different from each other. *Compare* Ex. 1003 at 401-406, *with* Ex. 1001 at 12:60-14:12 and 16:10-49.

In the first Office Action dated November 1, 2016, all of the claims were rejected over prior art. Ex. 1003 at 371-381. Further, claims 1-2, 12-13, and 18 were rejected as failing to comply with the written description requirement, and claim 8 was rejected as being indefinite. *Id.* at 369-371. Furthermore, all of the claims were rejected on the ground of nonstatutory double patenting as being unpatentable over certain related patents and a related patent application. *Id.* at

381-384.

In the Reply dated April 27, 2017, claims 1-7, 12, 14, 16, and 18 were amended, including changing "variably scaling" or "switching" to "dynamically changing," "dynamically varying," or "dynamically adjusting," among other things. *Id.* at 213-219. In the supplemental Reply dated June 27, 2017, claims 1-6, 12, 14-16, and 18 were further amended, including changing "a signal path" to "a receiver signal path," and changing "changing" or "varying" to "adjusting" in certain places, among other things. *Id.* at 197-203. The supplemental Reply was filed following the issuance of a Memorandum and Order on Claim Construction, in order to "eliminate from the present claims, terms which were not construed by the court, and to replace those terms with terms which were construed by the court." *Id.* at 204.

In the Final Office Action dated September 6, 2017, all of the claims were again rejected over the same prior art that were cited in the prior, first Office Action. *Id.* at 159-169. Further, all of the claims were again rejected on the ground of nonstatutory double patenting as being unpatentable over the same patents and patent application that were cited in the prior, first Office Action. *Id.* at 169-188.

In the Reply dated March 6, 2018, all of claims 1-18 were canceled, and new claims 19-26 were added. *Id.* at 140-145. These new claims are identical to the claims of the ’825 patent. Specifically, claims 19, 21, 22, and 26 that were added in this Reply are identical to the challenged claims of the ’825 patent, namely claims 1, 3, 4, and 8 of the ’825 patent. *Compare* Ex. 1003 at 140-142 and 144-145, *with* Ex. 1001 at 12:60-14:12 and 16:10-49. For instance, independent claim 21 recited “‘[a] method for power dissipation reduction in a receiver of a wireless transceiver of a battery powered portable wireless device’ … by ‘causing the bias current of the one or more of the plurality of circuits in the receiver signal path of the wireless transceiver to be decreased’ using a criterion based on the signal strength of an interferer signal and the signal strength of the desired signal,” and independent claim 26 recited “‘[a] method for power dissipation reduction in a receiver of a wireless transceiver of a battery powered portable wireless device’ … by ‘causing a bias current and an impedance to vary in one or more of the plurality of circuits in the receiver signal path of the wireless transceiver’ using a criterion based on the signal strength of an interferer signal and the signal strength of the desired signal.” Ex. 1003 at 146-147.

In the Non-Final Office Action dated April 13, 2018, all of the claims were rejected on the ground of nonstatutory double patenting as being unpatentable over the claims of a related patent. *Id.* at 124-132. All of the claims were subsequently allowed upon the filing of a Terminal Disclaimer on June 1, 2018. *Id.* at 115-116.

C. The Prior Art

The claimed features of the ’825 patent were well-known at the time of the alleged invention. .

1. ***Rauhala***

Rauhala discloses “a method and an arrangement for linearizing a radio receiver,” which “can be advantageously applied in the reception circuits of mobile stations.” Ex. 1004 at ¶ [0001]; Ex. 1002 at ¶ 59.

Specifically, the receiver includes a control unit (e.g., control unit 42) that “receives … an indication about either the receive channel signal strength RSS or the strength of any signal on the reception band” and, based on the strengths of the receive channel signal and the neighboring channel signal, “provides two one-bit control signals C_A and C_M” to the amplifiers and mixers in the receiver. Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 66. Each of the control signals C_A and C_M thus includes a zero (“0”) or a one (“1”), which may indicate a low current or a high current, respectively. *Id*. The control signal C_A indicates the level of current to be supplied to amplifiers A1 and A2. The control signal C_M indicates the level of current to be supplied to mixers M1 and M2, and amplifier A3. *Id*.

	RSS_n	RSS	I_A	I_M
Row 1 →	<Sn	>S4	I_{Al}	I_{Ml}
Row 2 →	<Sn	≤S4	I_{Ah}	I_{Ml}
Row 3 →	≥Sn	>S4	I_{Ah}	I_{Ml}
Row 4 →	≥Sn	≤S4	I_{Ah}	I_{Mh}

Ex. 1004 at ¶ [0017] (emphasis added).

As discussed previously, the control signals sent to the linear units depend on the receive channel signal strength RSS and the neighboring channel signal strength RSS_n. Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 63. The table annotated and reproduced above illustrates different signal conditions and the levels of current to be supplied to the linear units under each of the different signal conditions. *Id.* *Rauhala* discloses, "[w]hen the signal strength on the receive channel is normal or relatively high, and on the neighboring channels normal or relatively low," which represents the best case signal condition corresponding to Row 1 in the above table, "all linear unit supply current are set to the lower values." Ex. 1004 at ¶ [0018]; Ex. 1002 at ¶ 64. *Rauhala* further discloses "[w]hen the signal strength on the receive channel drops relatively low and on a neighboring channel relatively high," which represents the worst case signal condition corresponding to Row 4 in the table, "the supply currents of all linear units are set to the higher values." *Id.*

In other signal conditions that are neither best case nor worst case, a current level supplied to one or more linear units may be different from a current level supplied to one or more other linear units. Ex. 1004 at ¶ [0018]; Ex. 1002 at ¶ 65. For example, *Rauhala* discloses that "[w]hen the signal strength on the receive channel is at least normal, but relatively high on a neighboring channel," which represents the condition corresponding to Row 3 in the table, "the supply currents of amplifiers A1 and A2 are set to the higher values and the supply currents of the other linear units to the lower values." *Id*. Furthermore, *Rauhala* discloses, with reference to Row 2 in the table above, a signal condition where the signal strength on the receive channel is relatively low and on the neighboring channels normal or relatively low, in which the supply currents of amplifiers A1 and A2 are set to the higher values and the supply currents of the other linear units to the lower values. Ex. 1004 at ¶¶ [0017]-[0018]; Ex. 1002 at ¶ 65.

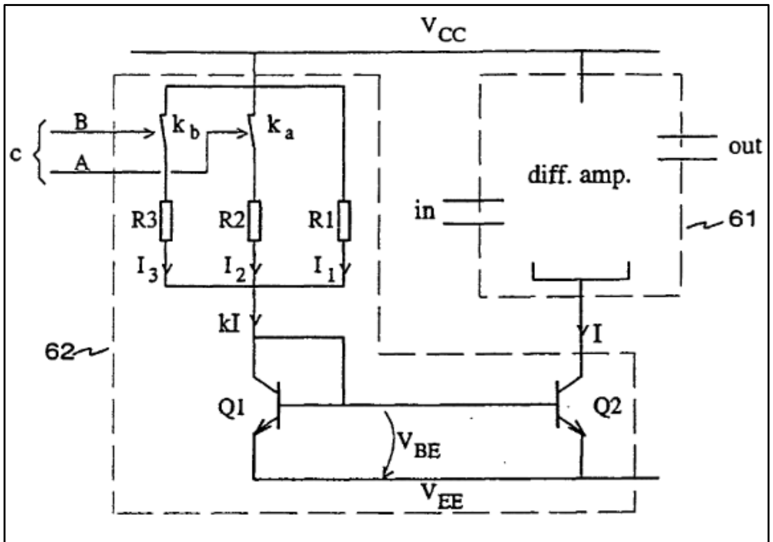

Fig. 6

With reference to FIG. 6 reproduced above, *Rauhala* discloses an example of "a linear unit's supply current control." Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶ 67.

The supply current control 62 is configured to vary the current supplied to the linear unit 61, by varying the impedance within the enclosed circuit. *Id*. For instance, the impedance of the circuit can be varied by adding or removing the resistors R2, R3 from the circuit via the corresponding switches k_a, k_b. Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶¶ 67-70. Adding one or more resistors to the circuit will increase the impedance of the circuit, which will lead to a decreased current kI. Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶¶ 67-70 and 139. On the contrary, removing one or more resistors from the circuit will decrease the impedance of the circuit, which will lead to an increased current kI. *Id*. The current I that is supplied to the linear unit 61 will be the same as kI by way of the "current mirror" configuration implemented in the supply current control 62. Ex. 1004 at ¶ [0022]; Ex. 1002 at ¶ 69.

Rauhala also discloses another example of a supply current control circuit in FIG. 7 (not reproduced here), which has a slightly different configuration compared to that of the supply current control circuit in FIG. 6 but follows a similar principle of varying the supply current by varying the impedance. Ex. 1004 at ¶ [0024] and FIG. 7; Ex. 1002 at ¶ 69.

2. *Masaaki*

Masaaki discloses "an automatic gain control (AGC) circuit which improves the intermodulation characteristics of an amplification circuit used in a radio receiver such as a pager, and minimizes power consumption in the radio receiver." Ex. 1005 at Abstract; Ex. 1002 at ¶ 71.

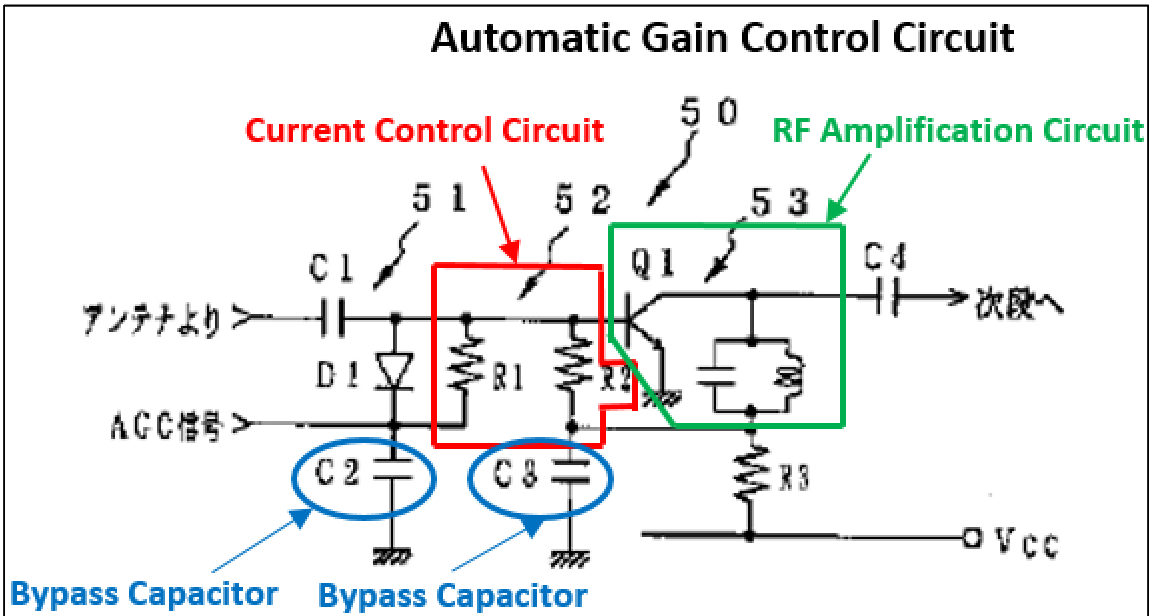

FIG. 3

Masaaki, with reference to FIG. 3 annotated and reproduced above, teaches an automatic gain control circuit 50 including "a current control circuit 52 configured by resistors R1, R2" and "bypass capacitors C2, C3." Ex. 1005 at ¶ [0036]; Ex. 1002 at ¶ 72. "The current control circuit 52 reduces the base current of the transistor Q1 in the RF amplification circuit 53 using the resistors R1, R2 and reduces the gain of the transistor Q1 when the field strength of the desired wave becomes stronger." Ex. 1005 at ¶ [0038]; Ex. 1002 at ¶ 72. As shown in FIG. 3 above, the bypass capacitors C2 and C3 are positioned proximate the resistors R1 and R2, respectively. Ex. 1005 at ¶ [0036]; Ex. 1002 at ¶ 72.

Masaaki further discloses that, when the received signal is weak, "AGC signal is set to high impedance by the control circuit" and "no current is flowing through the resistor R1 in the current control circuit 52, and a bias current corresponding to the bias voltage set by dividing the power voltage Vcc by the voltage division resistor R3 and the resistor R2 in the current control circuit 52 is supplied to the base electrode of the transistor Q1 in the RF amplification circuit 53 … the terminal-to-terminal voltage of the diode D1 of the attenuator circuit 51 is 0 V, and therefore the amount of attenuation of the input desired signal into the RF amplification circuit 53 of the attenuator circuit 51 is 0." Ex. 1005 at ¶¶ [0040]-[0041]; Ex. 1002 at ¶ 73. As a result, "the desired wave signal is input … to the RF amplification circuit 53 without being attenuated." Ex. 1005 at ¶ [0041]; Ex. 1002 at ¶ 73.

When the received signal is strong however, "the impedance of the AGC signal is reduced by the control circuit … the gain of the transistor Q1 is reduced by the base current which is input into the transistor Q1 in the RF amplification circuit 53 being reduced by the resistors R1, R2 in the current control circuit 52." Ex. 1005 at ¶ [0042]; Ex. 1002 at ¶ 74. Further, "the impedance of the AGC signal is further reduced by the control circuit and the potential of the resistor R1 side of the current control circuit 52 exceeds the ON voltage of the diode D1, the diode D1 is turned ON." Ex. 1005 at ¶ [0043]; Ex. 1002 at ¶ 74. The attenuation is then activated, which leads to the desired wave signal being attenuated before it is input "to the base of the transistor Q1 in the RF amplification circuit 53." *Id*.

VIII. CLAIM CONSTRUCTION

The claims of the '825 patent should be construed under the Phillips standard. 37 C.F.R. § 42.100(b); *see generally Phillips v. AWH Corp*., 415 F.3d 1303 (Fed. Cir. 2005). Under *Phillips*, claim terms are typically given their ordinary and customary meanings, as would have been understood by a POSITA, at the time of the invention, having taken into consideration the language of the claims, the specification, and the prosecution history. *Phillips*, 415 F.3d at 1313; *see also Id.* at 1312–16. The Board, however, only construes the claims when necessary to resolve the underlying controversy. *Toyota Motor Corp. v. Cellport Sys., Inc*., IPR2015-00633, Paper No. 11 at 16 (Aug. 14, 2015). Petitioners believe that no express constructions of the claims are necessary to assess whether the prior art reads on the challenged claims.[4]

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[4] Petitioners reserve all rights to raise claim construction and other arguments in district court. For example, Petitioners have not raised all challenges to the '825 patent in this petition, including validity under 35 U.S.C. § 112, and a comparison of the claims to any accused products in litigation may raise controversies needing resolution through claim constructions not presented here.

IX. DETAILED EXPLANATION OF GROUNDS

A. Ground 1: *Rauhala* Anticipates Claims 1, 3, and 8

Claims 1, 3, and 8 are unpatentable under 35 U.S.C. § 102(b) as anticipated by *Rauhala*.

1. Claim 1

a. "A method for power dissipation reduction in a receiver of a wireless transceiver of a battery powered portable wireless device, and a corresponding increase in battery life of the battery powered portable wireless device, the method comprising:"

Rauhala discloses "[t]he invention relates to a method and an arrangement for linearizing a radio receiver" and "[t]he invention can be advantageously applied in the reception circuits of mobile stations," which corresponds to the recited "receiver of a wireless transceiver of a … portable wireless device." Ex. 1004 at ¶ [0001]; Ex. 1002 at ¶ 77. *Rauhala* further discloses that the advantage of the invention includes reduction in "the energy consumption of the receiver … without degrading the signal quality," which translates to "longer life for the battery." Ex. 1004 at ¶ [0007]; Ex. 1002 at ¶ 77. This corresponds to the recited "power dissipation reduction" and "a corresponding increase in battery life" of the wireless device. Ex. 1002 at ¶ 77. Furthermore, *Rauhala* teaches in FIG. 1 "a radio receiver" that includes "[a]n antenna ANT … which is needed e.g. in mobile phones." Ex. 1004 at ¶ [0012].

b. “receiving a wireless signal having a desired signal and an interferer signal, by the wireless transceiver of the battery powered portable wireless device,”

Rauhala discloses that the receiver “monitors the signal strength on the receive channel and neighboring channels.” Ex. 1004 at ¶ [0006]; Ex. 1002 at ¶¶ 78-79. Further, *Rauhala* discloses a “detector DET” configured to provide “an indication about either the receive channel signal strength RSS or the strength of any signal on the reception band,” which may include “RSS_n [that] stands for the signal strength of the neighboring channel.” Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 83. *Rauhala* further discloses that the radio receiver is of a mobile station that is battery powered. Ex. 1004 at ¶¶ [0001] and [0007]; Ex. 1002 at ¶ 80. Accordingly, *Rauhala* discloses the recited “desired signal” as the receive channel signal and the recited “interferer signal” as the neighboring channel signal, and that these signals are received at the recited “wireless transceiver of the battery powered portable wireless device.” Ex. 1002 at ¶¶ 78-79.

c. **"the wireless transceiver having a receiver signal path comprising a plurality of circuits, wherein the plurality of circuits includes an amplifier, a filter, and a mixer, and"**

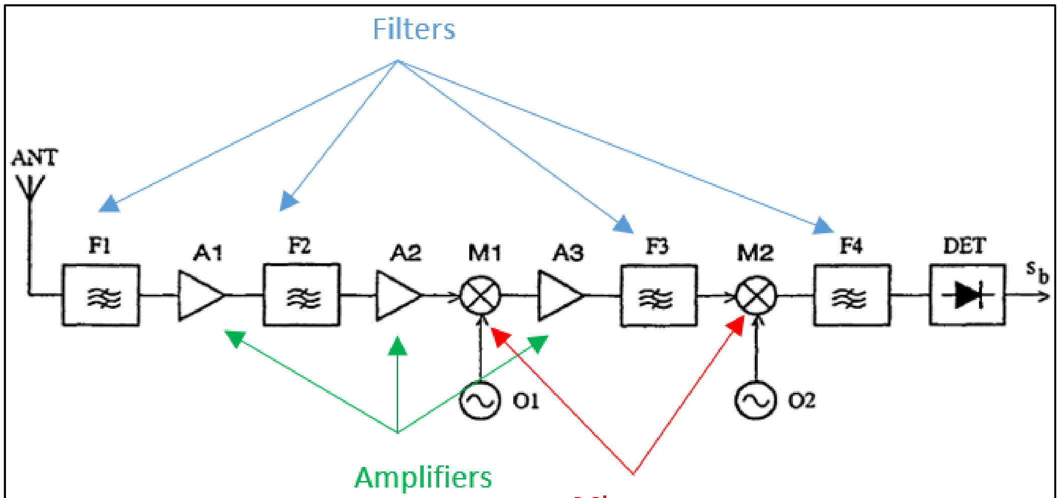


Fig. 1

Rauhala discloses, with reference to FIG. 1 reproduced and annotated above, "a simplified example of a radio receiver" comprising filters (e.g., F1, F2, F3), amplifiers (e.g., A1, A2, A3), and mixers (e.g., M1, M2) placed on a signal path, which corresponds to the recited "wireless transceiver having a receiver signal path comprising a plurality of circuits … includ[ing] an amplifier, a filter, and a mixer." Ex. 1004 at ¶ [0012]; Ex. 1002 at ¶ 81. *Rauhala* then discloses that additional circuit components may be implemented on this simplified receiver configuration in order to adjust currents based on signal conditions, as illustrated in FIGs. 2-5 and the corresponding sections of the disclosure. Ex. 1004 at ¶¶ [0013]-[0020]; Ex. 1002 at ¶ 82.

d. "wherein the wireless transceiver comprises a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal;"

As discussed above, *Rauhala* discloses that the receiver "monitors the signal strength on the receive channel and neighboring channels." *See supra* Section IX.A.1.b.; Ex. 1004 at ¶ [0006]; Ex. 1002 at ¶ 83. Further, *Rauhala* discloses a "detector DET" configured to provide "an indication about either the receive channel signal strength RSS or the strength of any signal on the reception band," which may include "RSS_n [that] stands for the signal strength of the neighboring channel." Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 83. As a result, *Rauhala* teaches that the receiver in *Rauhala* includes a circuit (e.g., a "detector DET") for determining a signal strength of the neighboring channel signal as well as the receive channel signal, which corresponds to the recited "a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal." Ex. 1002 at ¶ 83.

e. **"wherein a worst-case power dissipation condition results when the signal strength of the desired signal is low and the signal strength of the interferer signal is high; and"**

	RSS_n	RSS	I_A	I_M
Row 1 →	<Sn	>S4	I_{Al}	I_{Ml}
Row 2 →	<Sn	≤S4	I_{Ah}	I_{Ml}
Row 3 →	≥Sn	>S4	I_{Ah}	I_{Ml}
Row 4 →	≥Sn	≤S4	I_{Ah}	I_{Mh}

Worst-case power dissipation condition

Ex. 1004 at ¶ [0017] (emphasis added).

With reference to the table reproduced and annotated above, *Rauhala* discloses different signal conditions under which different levels of currents are supplied to the linear units (e.g., amplifiers and mixers). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶¶ 84-85. Below is a description of each of the symbols in the above table:

RSS = signal strength on the receive channel
RSS_n = signal strength on the neighboring channel
I_A = current supplied to A1 and A2
I_M = current supplied to M1, A3, and M2

Sn = relatively high signal strength
S4 = relatively low receive signal strength
I_{Ah} = high current supplied to A1 and A2
I_{A1} = low current supplied to A1 and A2
I_{Mh} = high current supplied to M1, A3, M2
I_{M1} = low current supplied to M1, A3, M2

Id.

With reference to the above table, *Rauhala* teaches a signal condition "[w]hen the signal strength on the receive channel drops relatively low and on a neighboring channel relatively high." Ex. 1004 at ¶ [0018]; Ex. 1002 at ¶ 86. This signal condition is described in Row 4 of the table and corresponds to the recited "worst-case power dissipation condition from the battery," as the receive channel signal strength RSS is relatively low (RSS $\leq$ S4) and the neighboring channel signal strength RSS_n is relatively high ($RSS_n \geq Sn$), and as the power dissipation from the battery of the wireless device will be greater due to the high currents supplied to all of the linear units. Ex. 1004 at ¶¶ [0017]-[0018]; Ex. 1002 at ¶ 86.

f. "wherein the power dissipation reduction in the receiver is achieved by causing a bias current to vary in one or more of the plurality of circuits in the receiver signal path of the wireless transceiver as the signal strength of the interferer signal and the signal strength of the desired signal vary according to the following:"

Rauhala discusses "[t]he basic idea of the invention" at an earlier part of the disclosure. Ex. 1004 at ¶ [0006]. For instance, *Rauhala* discloses that the "receiver monitors the signal strength on the receive channel and neighboring channels" and, "[i]n normal conditions, i.e., when the signal strength is satisfactory on the receive channel and ordinary on the neighboring channels, the supply currents of the receiver's front-end amplifiers and at least the first mixer are kept relatively low." Ex. 1004 at ¶ [0006]; Ex. 1002 at ¶ 89. However, "[i]f the signal strength goes below a certain value on the receive channel or exceeds a certain value on a neighboring channel, said supply currents are increased." *Id*. *Rauhala* provides additional examples of how the supply currents are varied based on the changing signal conditions. Ex. 1004 at ¶¶ [0017]-[0018]; Ex. 1002 at ¶¶ 87-88. Accordingly, *Rauhala* teaches the concept of varying the currents supplied (corresponds to the recited "bias current") to the linear units as the signal strength of the receive channel signal and the signal strength of the neighboring channel signal vary. Ex. 1002 at ¶¶ 87-93.

Rauhala further explains the advantage of the above concept: "the energy consumption of the receiver can be reduced without degrading the signal quality … longer life for the battery or, if the life of the battery is kept unchanged, that a smaller battery can be used." Ex. 1004 at ¶ [0007]; Ex. 1002 at ¶ 89.

g. "(i) when the signal strength of the interferer signal is high and the signal strength of the desired signal is low, and the desired signal is larger than in the worst-case power dissipation condition,"

The neighboring channel signal strength, RSSn, is high, and the receive channel signal strength, RSS, can be seen as *low and larger than in the worst-case power dissipation condition.*

	RSS_n	RSS	I_A	I_M
Row 1	<Sn	>S4	I_{Al}	I_{Ml}
Row 2	<Sn	≤S4	I_{Ah}	I_{Ml}
Row 3	≥Sn	>S4	I_{Ah}	I_{Ml}
Row 4	≥Sn	≤S4	I_{Ah}	I_{Mh}

Worst-case power dissipation condition

Ex. 1004 at ¶ [0017] (emphasis added).

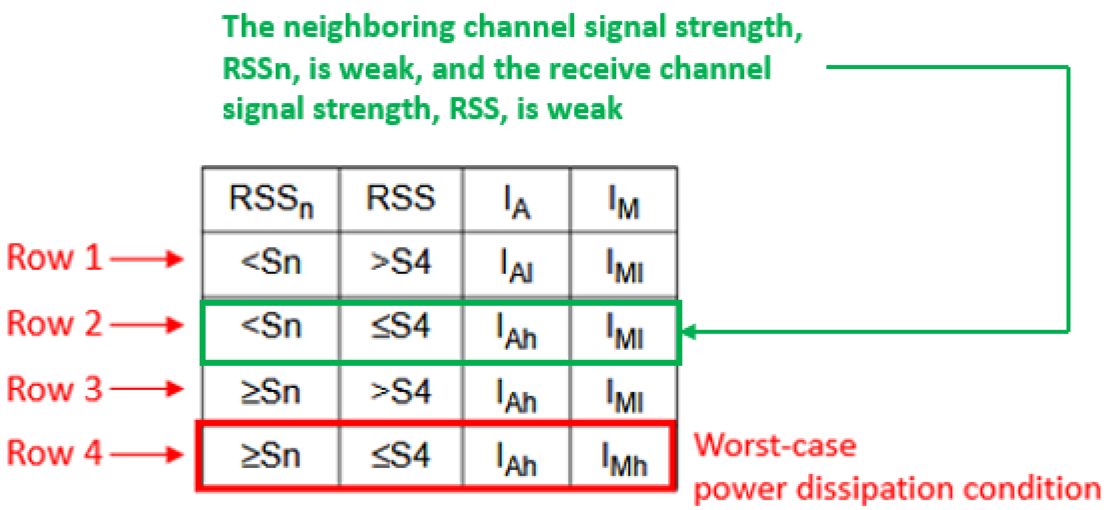
With reference to the table reproduced and annotated above (which is the same table shown under Section IX.A.1.e. above), *Rauhala* teaches a signal condition in Row 3, where the neighboring channel signal strength RSS_n is higher than or equal to relatively high ($RSS_n \geq Sn$) and the receive channel signal strength RSS is higher than relatively low (RSS > S4). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 96. This signal condition corresponds to the recited "when the signal strength of the interfere signal is high and the signal strength of the desired signal is low, and the desired signal is larger than in the worst-case power dissipation condition." Ex. 1002 at ¶ 96.

Although *Rauhala* does not explicitly use the word "low" when describing the receive channel signal strength, a POSITA would have readily understood that a signal strength that is greater than *relatively* low could still cover a low signal strength. Ex. 1002 at ¶ 97. Furthermore, the receive channel signal strength indicated in Row 3 (RSS > S4) is larger than the receive channel signal strength indicated in Row 4 (RSS ≤ S4), which describes the worst-case power dissipation condition as discussed above in Section IX.A.1.e. Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 96.

h. "causing the bias current of the one or more of the plurality of circuits in the receiver signal path of the wireless transceiver to be reduced compared to the worst-case power dissipation condition, thereby saving power; and"

Rauhala further discloses, under the signal condition described in Row 3 of the table reproduced above, the current supplied to the linear units M1, A3, and M2 are set to lower values (I_{M1}). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 98. The table clearly shows that the level of current supplied to these linear units under the signal condition described in Row 3 (I_{M1}) is lower than the level of current supplied to the same linear units under the worst-case power dissipation condition (I_{Mh}), described in Row 4. *Id.* Accordingly, *Rauhala* teaches that there is a reduction in the level of current supplied to the linear units M1, A3, and M2 under the better-than-worst-case power dissipation condition, relative to the level of current supplied to the same linear units under the worst-case power dissipation condition. Ex. 1002 at ¶ 98. A POSITA would have readily understood that such a reduction in the level of current supplied to the linear units would lead to a corresponding reduction in the receiver's power dissipation, thus saving power. *Id.*

i. "(ii) when the signal strength of the interferer signal is weak and the signal strength of the desired signal is weak,"



RSS_n	RSS	I_A	I_M
<Sn	>S4	I_{Al}	I_{Ml}
<Sn	≤S4	I_{Ah}	I_{Ml}
≥Sn	>S4	I_{Ah}	I_{Ml}
≥Sn	≤S4	I_{Ah}	I_{Mh}

Ex. 1004 at ¶ [0017] (emphasis added).

With reference to the table reproduced and annotated above (which is the same table shown under Section IX.A.1.e. above), *Rauhala* teaches a signal condition in Row 2, where the neighboring channel signal strength RSS_n is lower than relatively high ($RSS_n < Sn$) and the receive channel signal strength RSS is lower than or equal to relatively low ($RSS \leq S4$). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶¶ 99-100. This signal condition corresponds to the recited "when the signal strength of the interferer signal is weak and the signal strength of the desired signal is weak." Ex. 1002 at ¶ 100.

j. "causing the bias current of the one or more of the plurality of circuits in the receiver signal path of the wireless transceiver to be decreased compared to the worst-case power dissipation condition, thereby saving power."

Rauhala further discloses, under the signal condition described in Row 2 of the table reproduced above, the current supplied to the linear units M1, A3, and M2 are set to lower values (I_{Ml}). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 101. The table clearly shows that the level of current supplied to these linear units under the signal condition described in Row 2 (I_{Ml}) is lower than the level of current supplied to the same linear units under the worst-case power dissipation condition (I_{Mh}), described in Row 4. *Id.* Accordingly, *Rauhala* teaches that there is a decrease in the level of current supplied to the linear units M1, A3, and M2 under the better-than-worst-case power dissipation condition, relative to the level of current supplied to the same linear units under the worst-case power dissipation condition. Ex. 1002 at ¶ 101. A POSITA would have readily understood that such a decrease in the level of current supplied to the linear units would lead to a corresponding reduction in the receiver's power dissipation, thus saving power. *Id.*

2. Claim 3

a. "A method for power dissipation reduction in a receiver of a wireless transceiver of a battery powered

portable wireless device, and a corresponding increase in battery life of the battery powered portable wireless device, the method comprising:"

Rauhala discloses "[t]he invention relates to a method and an arrangement for linearizing a radio receiver" and "[t]he invention can be advantageously applied in the reception circuits of mobile stations," which corresponds to the recited "receiver of a wireless transceiver of a … portable wireless device." Ex. 1004 at ¶ [0001]; Ex. 1002 at ¶ 103. *Rauhala* further discloses that the advantage of the invention includes reduction in "the energy consumption of the receiver … without degrading the signal quality," which translates to "longer life for the battery." Ex. 1004 at ¶ [0007]; Ex. 1002 at ¶ 103. This corresponds to the recited "power dissipation reduction" and "a corresponding increase in battery life" of the wireless device. Ex. 1002 at ¶ 103. Furthermore, *Rauhala* teaches in FIG. 1 "a radio receiver" that includes "[a]n antenna ANT … which is needed e.g. in mobile phones." Ex. 1004 at ¶ [0012].

b. "receiving a wireless signal having a desired signal and an interferer signal, by the wireless transceiver of the battery powered portable wireless device,"

Rauhala discloses that the receiver "monitors the signal strength on the receive channel and neighboring channels." Ex. 1004 at ¶ [0006]; Ex. 1002 at ¶¶ 104-105. Further, *Rauhala* discloses a "detector DET" configured to provide "an indication about either the receive channel signal strength RSS or the strength of any signal on the reception band," which may include "RSS_n [that] stands for the signal strength of the neighboring channel." Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 109. *Rauhala* further discloses that the radio receiver is of a mobile station that is battery powered. Ex. 1004 at ¶¶ [0001] and [0007]; Ex. 1002 at ¶ 106. Accordingly, *Rauhala* discloses the recited "desired signal" as the receive channel signal and the recited "interferer signal" as the neighboring channel signal, and that these signals are received at the recited "wireless transceiver of the battery powered portable wireless device." Ex. 1002 at ¶¶ 104-105.

c. "the wireless transceiver having a receiver signal path comprising a plurality of circuits, wherein the plurality of circuits includes an amplifier, a filter, and a mixer, and"

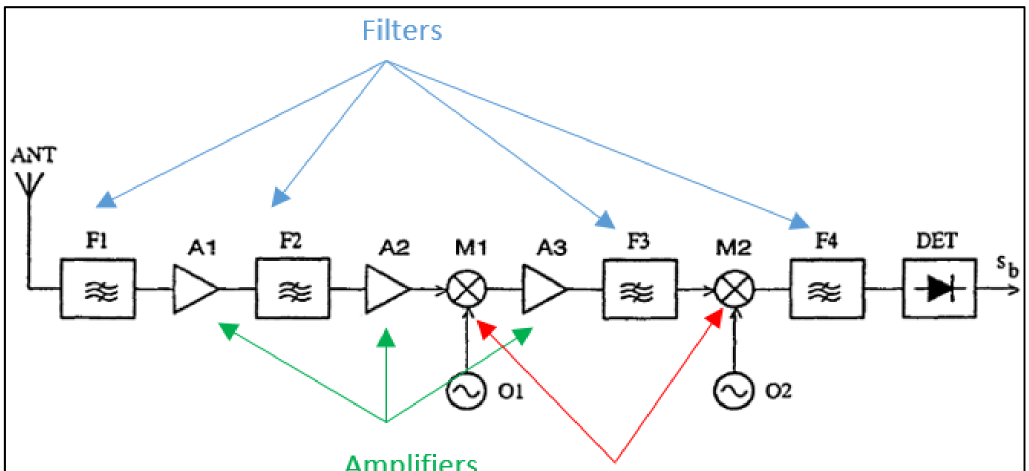


Fig. 1

Rauhala discloses, with reference to FIG. 1 reproduced above, "a simplified example of a radio receiver" comprising filters (e.g., F1, F2, F3), amplifiers (e.g., A1, A2, A3), and mixers (e.g., M1, M2) placed on a signal path, which corresponds to the recited “wireless transceiver having a receiver signal path comprising a plurality of circuits … includ[ing] an amplifier, a filter, and a mixer.” Ex. 1004 at ¶ [0012]; Ex. 1002 at ¶ 107. *Rauhala* goes on to disclose that additional circuit components may be implemented on this simplified receiver configuration in order to adjust currents based on signal conditions, as illustrated in FIGs. 2-5 and the corresponding sections of the disclosure. Ex. 1004 at ¶¶ [0013]-[0020]; Ex. 1002 at ¶ 108.

d. “wherein the wireless transceiver comprises a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal;”

As discussed above, *Rauhala* discloses that the receiver “monitors the signal strength on the receive channel and neighboring channels.” *See supra* Section IX.A.2.b.; Ex. 1004 at ¶ [0006]; Ex. 1002 at ¶ 109. Further, *Rauhala* discloses a “detector DET” configured to provide “an indication about either the receive channel signal strength RSS or the strength of any signal on the reception band,” which may include “RSS_n [that] stands for the signal strength of the neighboring channel.” Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 109. It is thus evident that the receiver in *Rauhala* includes a circuit (e.g., a “detector DET”) for determining a signal strength of the neighboring channel signal as well as the receive channel signal, which corresponds to the recited “a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal." Ex. 1002 at ¶ 109.

> **e. "wherein a worst-case power dissipation condition from the battery results when the signal strength of the desired signal is low and the signal strength of the interferer signal is high; and"**

	RSS_n	RSS	I_A	I_M
Row 1 →	<Sn	>S4	I_{Al}	I_{Ml}
Row 2 →	<Sn	≤S4	I_{Ah}	I_{Ml}
Row 3 →	≥Sn	>S4	I_{Ah}	I_{Ml}
Row 4 →	≥Sn	≤S4	I_{Ah}	I_{Mh}

Worst-case power dissipation condition

Ex. 1004 at ¶ [0017] (emphasis added).

With reference to the table reproduced and annotated above, *Rauhala* discloses different signal conditions under which different levels of currents are supplied to the linear units (e.g., amplifiers and mixers). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 110. Below is a description of each of the symbols in the above table:

RSS = signal strength on the receive channel
RSS_n = signal strength on the neighboring channel
I_A = current supplied to A1 and A2
I_M = current supplied to M1, A3, and M2

Sn = relatively high signal strength
S4 = relatively low receive signal strength
I_{Ah} = high current supplied to A1 and A2
I_{A1} = low current supplied to A1 and A2
I_{Mh} = high current supplied to M1, A3, M2
I_{M1} = low current supplied to M1, A3, M2

Id.

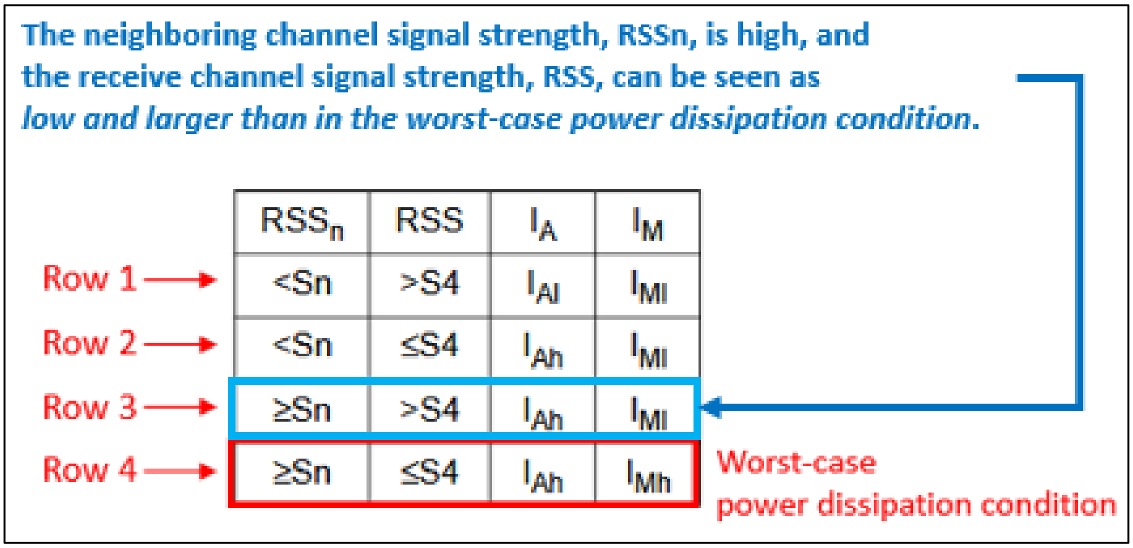
With reference to the above table, *Rauhala* teaches a signal condition "[w]hen the signal strength on the receive channel drops relatively low and on a neighboring channel relatively high." Ex. 1004 at ¶ [0018]; Ex. 1002 at ¶ 111. This signal condition is described in Row 4 of the table and corresponds to the recited "worst-case power dissipation condition from the battery," as the receive channel signal strength RSS is relatively low (RSS $\leq$ S4) and the neighboring channel signal strength RSS_n is relatively high ($RSS_n \geq Sn$), and as the power dissipation from the battery of the wireless device will be greater due to the high currents supplied to all of the linear units. Ex. 1004 at ¶¶ [0017]-[0018]; Ex. 1002 at ¶ 111.

f. "wherein the power dissipation reduction in the receiver is achieved by causing a bias current to vary in one or more of the plurality of circuits in the receiver signal path of the wireless transceiver as the signal strength of the interferer signal and the signal strength of the desired signal vary according to the following:"

Rauhala discusses "[t]he basic idea of the invention" at an earlier part of the disclosure. Ex. 1004 at ¶ [0006]. For instance, *Rauhala* discloses that the "receiver monitors the signal strength on the receive channel and neighboring channels" and, "[i]n normal conditions, i.e., when the signal strength is satisfactory on the receive channel and ordinary on the neighboring channels, the supply currents of the receiver's front-end amplifiers and at least the first mixer are kept relatively low." Ex. 1004 at ¶ [0006]; Ex. 1002 at ¶ 114. However, "[i]f the signal strength goes below a certain value on the receive channel or exceeds a certain value on a neighboring channel, said supply currents are increased." *Id*. *Rauhala* provides additional examples of how the supply currents are varied based on the changing signal conditions. Ex. 1004 at ¶¶ [0017]-[0018]; Ex. 1002 at ¶¶ 112-113. Accordingly, *Rauhala* teaches the concept of varying the currents supplied (which corresponds to the recited "bias current") to the linear units as the signal strength of the receive channel signal and the signal strength of the neighboring channel signal vary. Ex. 1002 at ¶¶ 112-113.

Rauhala further explains the advantage of the above concept: "the energy consumption of the receiver can be reduced without degrading the signal quality … longer life for the battery or, if the life of the battery is kept unchanged, that a smaller battery can be used." Ex. 1004 at ¶ [0007]; Ex. 1002 at ¶ 114.

g. "when the signal strength of the interferer signal is high and the signal strength of the desired signal is low, and the desired signal has a signal strength that is larger than in the worst-case power dissipation conditions,"



RSS_n	RSS	I_A	I_M
<Sn	>S4	I_{Al}	I_{Ml}
<Sn	≤S4	I_{Ah}	I_{Ml}
≥Sn	>S4	I_{Ah}	I_{Ml}
≥Sn	≤S4	I_{Ah}	I_{Mh}

Ex. 1004 at ¶ [0017] (emphasis added).

With reference to the table reproduced and annotated above (which is the same table shown under Section IX.A.2.e. above), *Rauhala* teaches a signal condition in Row 3, where the neighboring channel signal strength RSS_n is higher than or equal to relatively high ($RSS_n \geq Sn$) and the receive channel signal strength RSS is higher than relatively low (RSS > S4). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 115. This signal condition corresponds to the recited "when the signal strength of the interfere signal is high and the signal strength of the desired signal is low, and the desired signal has a signal strength that is larger than in the worst-case power dissipation condition." Ex. 1002 at ¶ 115.

Although *Rauhala* does not explicitly use the word "low" when describing the receive channel signal strength, a POSITA would have readily understood that a signal strength that is greater than *relatively* low could still cover a low signal strength. Ex. 1002 at ¶ 116. Furthermore, the receive channel signal strength indicated in Row 3 (RSS > S4) is larger than the receive channel signal strength indicated in Row 4 (RSS ≤ S4), which describes the worst-case power dissipation condition as discussed above in Section IX.A.1.e. Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 115.

h. "causing the bias current of the one or more of the plurality of circuits in the receiver signal path of the wireless transceiver to be decreased compared to the worst-case power dissipation condition, causing a reduction in power dissipation."

Rauhala further discloses, under the signal condition described in Row 3 of the table reproduced above, the current supplied to the linear units M1, A3, and M2 are set to lower values (I_{Ml}). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 117. The table clearly shows that the level of current supplied to these linear units under the signal condition described in Row 3 (I_{Ml}) is lower than the level of current supplied to the same linear units under the worst-case power dissipation condition (I_{Mh}), described in Row 4. *Id.* Accordingly, *Rauhala* teaches that there is a decrease in the level of current supplied to the linear units M1, A3, and M2 under the better-than-worst-case power dissipation condition, relative to the level of current supplied to the same linear units under the worst-case power dissipation condition. Ex. 1002 at ¶ 117. A POSITA would have readily understood that such a decrease in the level of current supplied to the linear units would lead to a corresponding reduction in the receiver's power dissipation. *Id*.

3. Claim 8

a. "A method for power dissipation reduction in a receiver of a wireless transceiver of a battery powered portable wireless device, and a corresponding reduction in power dissipation and an increase in battery life of the battery powered portable wireless device, the method comprising:"

Rauhala discloses "[t]he invention relates to a method and an arrangement for linearizing a radio receiver" and "[t]he invention can be advantageously applied in the reception circuits of mobile stations," which corresponds to the recited "receiver of a wireless transceiver of a … portable wireless device." Ex. 1004 at ¶ [0001]; Ex. 1002 at ¶ 119. *Rauhala* further discloses that the advantage of the invention includes reduction in "the energy consumption of the receiver … without degrading the signal quality," which translates to "longer life for the battery." Ex. 1004 at ¶ [0007]; Ex. 1002 at ¶ 119. This corresponds to the recited "power dissipation reduction" and "an increase in battery life" of the wireless device. Ex. 1002 at ¶ 119. Furthermore, *Rauhala* teaches in FIG. 1 "a radio receiver" that includes "[a]n antenna ANT … which is needed e.g. in mobile phones." Ex. 1004 at ¶ [0012].

b. "receiving a wireless signal having a desired signal and an interferer signal, by the wireless transceiver of the battery powered portable wireless device,"

Rauhala discloses that the receiver "monitors the signal strength on the receive channel and neighboring channels." Ex. 1004 at ¶ [0006]; Ex. 1002 at ¶¶ 120-121. Further, *Rauhala* discloses a "detector DET" configured to provide "an indication about either the receive channel signal strength RSS or the strength of any signal on the reception band," which may include "RSS_n [that] stands for the signal strength of the neighboring channel." Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 125. *Rauhala* further discloses that the radio receiver is of a mobile station that is battery powered. Ex. 1004 at ¶¶ [0001] and [0007]; Ex. 1002 at ¶ 122. Accordingly, *Rauhala* discloses the recited "desired signal" as the receive channel signal and the recited "interferer signal" as the neighboring channel signal, and that these signals are received at the recited "wireless transceiver of the battery powered portable wireless device." Ex. 1002 at ¶¶ 120-121.

c. **"the wireless transceiver having a receiver signal path comprising a plurality of circuits, wherein the plurality of circuits includes an amplifier, a filter, and a mixer, and"**

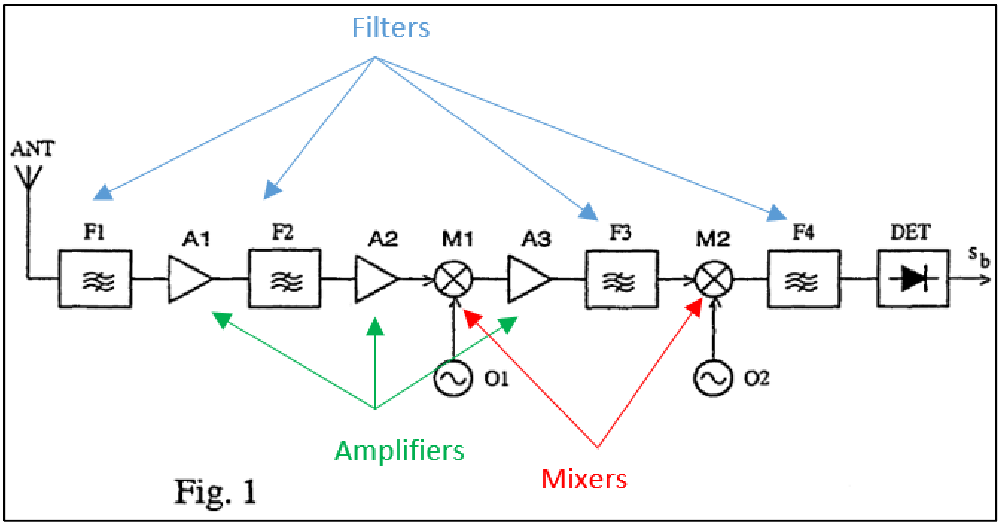


Fig. 1

Rauhala discloses, with reference to FIG. 1 reproduced above, "a simplified example of a radio receiver" comprising filters (e.g., F1, F2, F3), amplifiers (e.g., A1, A2, A3), and mixers (e.g., M1, M2) placed on a signal path, which corresponds to the recited "wireless transceiver having a receiver signal path comprising a plurality of circuits … includ[ing] an amplifier, a filter, and a mixer." Ex. 1004 at ¶ [0012]; Ex. 1002 at ¶ 123. *Rauhala* goes on to disclose that additional circuit components may be implemented on this simplified receiver configuration in order to adjust currents based on signal conditions, as illustrated in FIGs. 2-5 and the corresponding sections of the disclosure. Ex. 1004 at ¶¶ [0013]-[0020]; Ex. 1002 at ¶ 124.

d. "wherein the wireless transceiver comprises a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal;"

Rauhala discloses that the receiver "monitors the signal strength on the receive channel and neighboring channels." Ex. 1004 at ¶ [0006]; Ex. 1002 at ¶ 125. Further, *Rauhala* discloses a "detector DET" configured to provide "an indication about either the receive channel signal strength RSS or the strength of any signal on the reception band," which may include "RSS_n [that] stands for the signal strength of the neighboring channel." Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 125. Therefore, the receiver in *Rauhala* includes a circuit (e.g., a "detector DET") for determining a signal strength of the neighboring channel signal as well as the receive channel signal, which corresponds to the recited "a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal." Ex. 1002 at ¶ 125.

e. "wherein a worst-case power dissipation condition from the battery results when the signal strength of the desired signal is low and the signal strength of the interferer signal is high; and"

	RSS_n	RSS	I_A	I_M
Row 1 →	<Sn	>S4	I_{Al}	I_{Ml}
Row 2 →	<Sn	≤S4	I_{Ah}	I_{Ml}
Row 3 →	≥Sn	>S4	I_{Ah}	I_{Ml}
Row 4 →	≥Sn	≤S4	I_{Ah}	I_{Mh}

Worst-case power dissipation condition

Ex. 1004 at ¶ [0017] (emphasis added).

With reference to the table reproduced and annotated above, *Rauhala* discloses different signal conditions under which different levels of currents are supplied to the linear units (e.g., amplifiers and mixers). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 126. Below is a description of each of the symbols in the above table:

> RSS = signal strength on the receive channel
> RSS_n = signal strength on the neighboring channel
> I_A = current supplied to A1 and A2
> I_M = current supplied to M1, A3, and M2
>
> Sn = relatively high signal strength
> S4 = relatively low receive signal strength
> I_{Ah} = high current supplied to A1 and A2
> I_{A1} = low current supplied to A1 and A2
> I_{Mh} = high current supplied to M1, A3, M2
> I_{M1} = low current supplied to M1, A3, M2

Id.

With reference to the above table, *Rauhala* teaches a signal condition "[w]hen the signal strength on the receive channel drops relatively low and on a neighboring channel relatively high." Ex. 1004 at ¶ [0018]; Ex. 1002 at ¶ 127. This signal condition is described in Row 4 of the table and corresponds to the recited "worst-case power dissipation condition from the battery," as the receive channel signal strength RSS is relatively low (RSS ≤ S4) and the neighboring channel signal strength RSS_n is relatively high ($RSS_n \geq Sn$), and as the power dissipation from the battery of the wireless device will be greater due to the high currents supplied to all of the linear units. Ex. 1004 at ¶¶ [0017]-[0018]; Ex. 1002 at ¶ 127.

f. "wherein the power dissipation reduction in the receiver is achieved by causing a bias current and an impedance to vary in one or more of the plurality of circuits in the receiver signal path of the wireless transceiver as the signal strength of the interferer signal and the signal strength of the desired signal vary, according to the following:"

Rauhala discusses "[t]he basic idea of the invention" at an earlier part of the disclosure. Ex. 1004 at ¶ [0006]. For instance, *Rauhala* discloses that the "receiver monitors the signal strength on the receive channel and neighboring channels" and, "[i]n normal conditions, i.e. when the signal strength is satisfactory on the receive channel and ordinary on the neighboring channels, the supply currents of the receiver's front-end amplifiers and at least the first mixer are kept relatively low." Ex. 1004 at ¶ [0006]; Ex. 1002 at ¶ 130. However, "[i]f the signal strength goes below a certain value on the receive channel or exceeds a certain value on a neighboring channel, said supply currents are increased." *Id*. *Rauhala* provides additional examples of how the supply currents are varied based on the changing signal conditions. Ex. 1004 at ¶¶ [0017]-[0018]; Ex. 1002 at ¶¶ 128-129. Accordingly, *Rauhala* teaches the concept of varying the currents supplied (analogous to the recited "bias current") to the linear units as the signal strength of the receive channel signal and the signal strength of the neighboring channel signal vary. Ex. 1002 at ¶¶ 128-130.

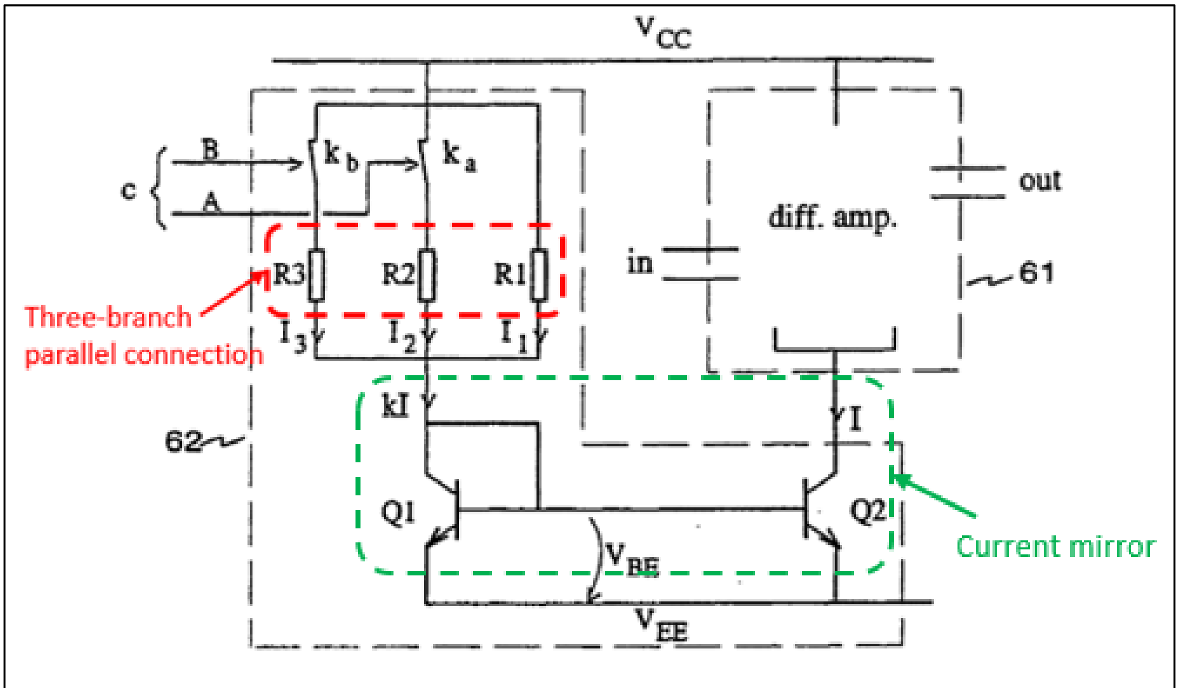


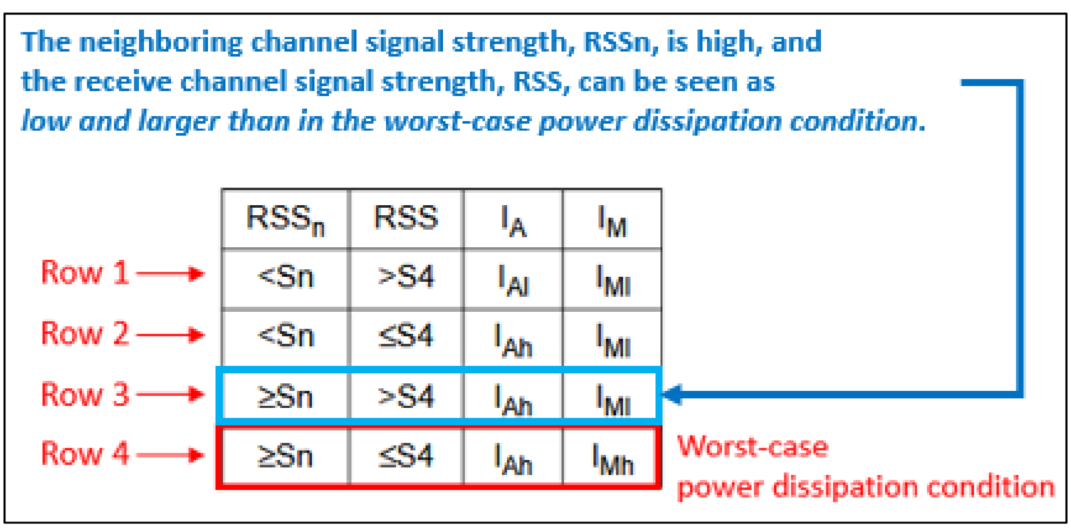
Fig. 6

Rauhala also discloses a supply current control circuit 62 that controls, or varies, the currents supplied to the linear units based on the signal condition. Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶ 131. To that end, the control circuit 62 varies the impedance of the circuit in order to vary the supply current. Ex. 1002 at ¶ 131. More specifically, with reference to FIG. 6 reproduced and annotated above, *Rauhala* discloses a "three-branch parallel connection" comprising three resistors R1, R2, and R3, where "[s]witch k_a is in series with resistor R2 and switch k_b is in series with resistor R3." Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶ 131. By including or excluding resistors R2 and/or R3 from the circuit by opening or closing switches k_a

and/or k_b, the impedance of the circuit is varied which also affects the current kI to be varied. Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶¶ 132-133. The current I that is supplied to the linear unit 61 will be the same as kI by way of the "current mirror" implemented in the control circuit 62. Ex. 1004 at ¶¶ [0021]-[0022]; Ex. 1002 at ¶ 134. Accordingly, *Rauhala* also teaches the concept of varying the impedance of the circuit as the signal strength of the receive channel signal and the signal strength of the neighboring channel signal vary. Ex. 1002 at ¶ 131-135.

Rauhala further explains the advantage of the above concepts: "the energy consumption of the receiver can be reduced without degrading the signal quality … longer life for the battery or, if the life of the battery is kept unchanged, that a smaller battery can be used." Ex. 1004 at ¶ [0007]; Ex. 1002 at ¶ 130.

g. "when the signal strength of the interferer signal is high and the signal strength of the desired signal is low, and the desired signal has a signal strength that is larger than in the worst-case power dissipation condition, causing:"



Ex. 1004 at ¶ [0017] (emphasis added.).

With reference to the table reproduced and annotated above (which is the same table shown under Section IX.A.3.e. above), *Rauhala* teaches a signal condition in Row 3, where the neighboring channel signal strength RSS_n is higher than or equal to relatively high ($RSS_n \geq Sn$) and the receive channel signal strength RSS is higher than relatively low (RSS > S4). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 136*. This signal condition corresponds to the recited "when the signal strength of the interfere signal is high and the signal strength of the desired signal is low, and the desired signal has a signal strength that is larger than in the worst-case power dissipation condition." Ex. 1002 at ¶ 136.

Although *Rauhala* does not explicitly use the word "low" when describing the receive channel signal strength, a POSITA would have readily understood that a signal strength that is greater than *relatively* low could still cover a low signal strength. Ex. 1002 at ¶ 137. Furthermore, the receive channel signal strength indicated in Row 3 (RSS > S4) is larger than the receive channel signal strength indicated in Row 4 (RSS ≤ S4), which describes the worst-case power dissipation condition as discussed above in Section IX.A.3.e.. Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 136.

h. "(i) the bias current of the one or more of the plurality of circuits in the receiver signal path of the wireless transceiver to be decreased; and"

Rauhala further discloses, under the signal condition described in Row 3 of the table reproduced above, the current supplied to the linear units M1, A3, and M2 are set to lower values (I_{Ml}). Ex. 1004 at ¶ [0017]; Ex. 1002 at ¶ 138. The table clearly shows that the level of current supplied to these linear units under the signal condition described in Row 3 (I_{Ml}) is lower than the level of current supplied to the same linear units under the worst-case power dissipation condition (I_{Mh}), described in Row 4. *Id.* Accordingly, *Rauhala* teaches that there is a decrease in the level of current supplied to the linear units M1, A3, and M2 under the better-than-worst-case power dissipation condition, relative to the level of current supplied to the same linear units under the worst-case power dissipation condition. Ex. 1002 at ¶ 138. A POSITA would have readily understood that such a decrease in the level of current supplied to the linear units would lead to a corresponding reduction in the receiver's power dissipation. *Id*.

i. "(ii) an impedance of the one or more of the plurality of circuits in the receiver signal path of the wireless transceiver to be increased, thereby causing a drive current of the one or more of the plurality of circuits to be decreased."

Rauhala discloses that the variance in the supply current is controlled by a supply current control circuit 62. Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶ 139. More specifically, the supply current can be decreased by including more resistors (e.g., R2 and/or R3) within the circuit, which will effectively increase the impedance of the circuit. Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶¶ 139-141.

B	A	kI	kI/I_1
0	0	I_1	1
0	1	I_1+I_2	2 if R1=R2
1	0	I_1+I_3	3 if R1=2·R3
1	1	$I_1+I_2+I_3$	4 if R1=R2=2·R3

Ex. 1004 at ¶ [0021].

With reference to the table reproduced above, *Rauhala* discloses various two-bit digital signals received at the supply current control 62, and the current kI generated based on each of the received signals. Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶ 140. Based on the received two-bit digital signal, R2 and/or R3 constituting the impedance of the circuit can be included or excluded via the corresponding switch, which will vary the current kI (which corresponds to the recited "drive current"). *Id*.

B. Ground 2 – Claim 4 Is Unpatentable Over *Rauhala* in view of *Masaaki*

Claim 4 is unpatentable under 35 U.S.C. § 103 over *Rauhala* in view of *Masaaki*.

1. Claim 4

As discussed above for independent claim 3, *Rauhala* anticipates each limitation of that claim. *See supra* Section IX.A.2. Ex. 1002 at ¶ 142. Claim 4, which directly depends on independent claim 3, further cites "wherein the change in the bias current of the one or more of the plurality of circuits in the receiver signal path is related to a change in an impedance in the one or more of the plurality of circuits in the receiver signal path; and wherein the impedance comprises at least a resistor and a capacitor."

a. "wherein the change in the bias current of the one or more of the plurality of circuits in the receiver signal path is related to a change in an impedance in the one or more of the plurality of circuits in the receiver signal path; and wherein the impedance comprises at least a resistor"

As discussed previously, *Rauhala* discloses that the variance in the supply current is controlled by a supply current control circuit 62, and that the supply current can be decreased by including more resistors (e.g., R2 and/or R3) within the circuit, which will effectively increase the impedance of the circuit. Ex. 1004 at ¶ [0021]; Ex. 1002 at ¶¶ 143-147; *see supra* Sections VII.C.1, IX.A.3.f, and

IX.A.3.i.. Accordingly, *Rauhala* discloses the recited "the change in the bias current of the one or more of the plurality of circuits in the receiver signal path [being] related to a change in an impedance in the one or more of the plurality of circuits in the receiver signal path" and "the impedance compris[ing] at least a resistor." Ex. 1002 at ¶¶ 143 and 146.

b. "wherein the impedance [also] comprises … a capacitor."

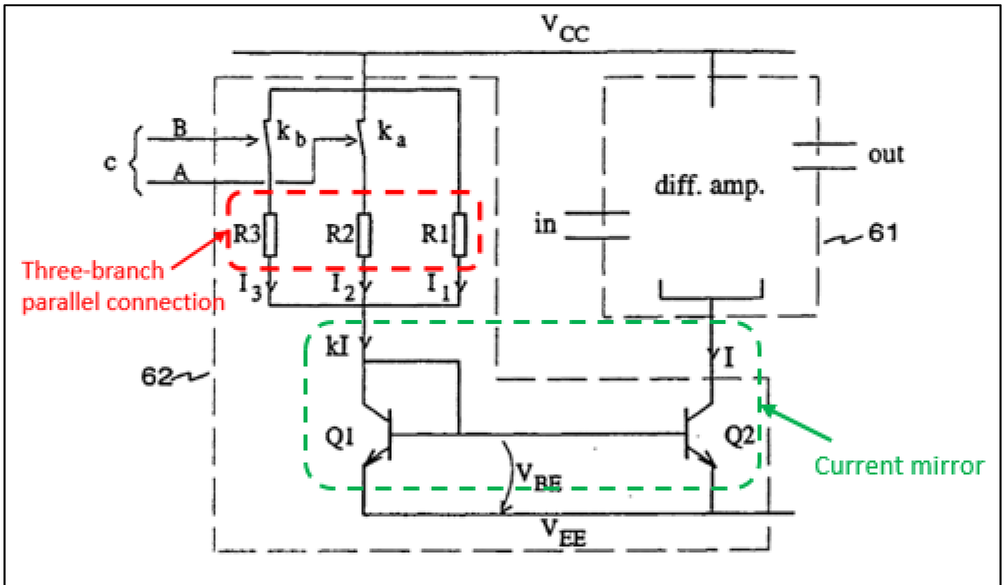


Fig. 6

As discussed previously and with reference to FIG. 6 reproduced and annotated above, *Rauhala* discloses a supply current control circuit 62 configured to increase or decrease the current supplied to the linear units by decreasing or increasing the impedance comprising resistors, as corresponding to the recited "change in the bias current … [being] related to a change in an impedance … wherein the impedance comprises at least a resistor." Ex. 1004 at ¶ [0021]; Ex.

1002 at ¶¶ 143-147; *see supra* Sections VII.C.1, IX.A.3.f, and IX.A.3.i.. However, *Rauhala* does not expressly state that the impedance can also comprise "a capacitor."

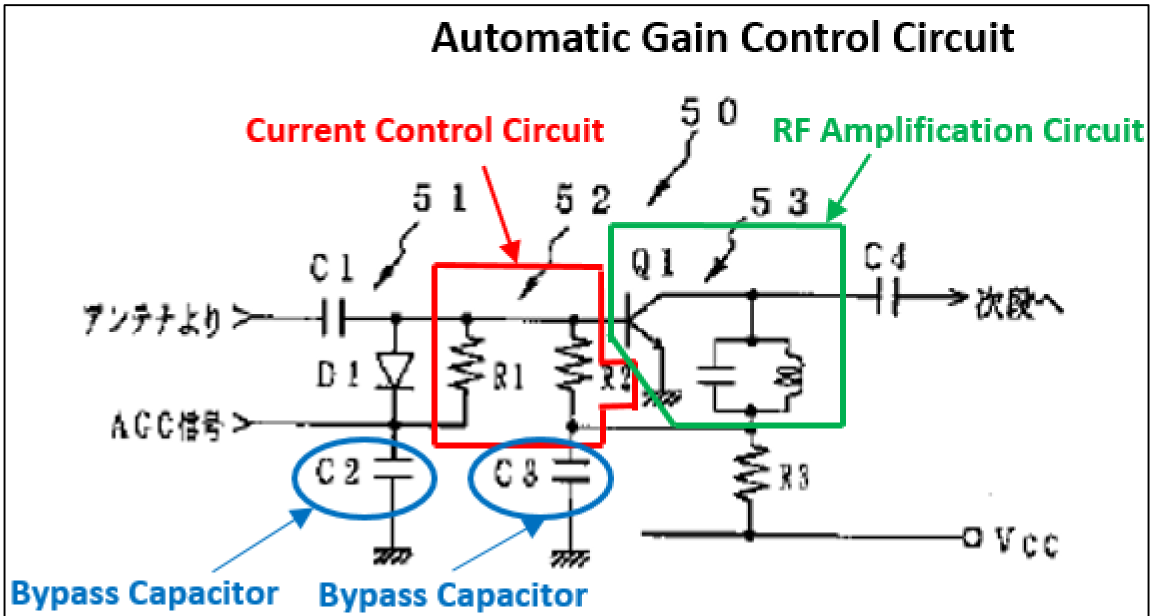


FIG. 3

With reference to FIG. 3 annotated and reproduced above, *Masaaki* teaches "a current control circuit 52 configured by resistors R1, R2" and "bypass capacitors C2, C3," which are implemented in and forms a part of "an automatic gain control circuit … disposed inside a radio receiver." Ex. 1005 at ¶¶ [0001] and [0036]; Ex. 1002 at ¶ 149. *Masaaki* further discloses that the current control circuit 52 "reduces the base current of the transistor Q1 in the RF amplification circuit 53 using resistors R1, R2." Ex. 1005 at ¶ [0038]; Ex. 1002 at ¶ 149. Therefore, similar to *Rauhala*, *Masaaki* teaches the concept of varying a current by varying an impedance (e.g., resistors R1 and R2) of a circuit. Ex. 1002 at ¶ 149.

Additionally, *Masaaki* teaches that the circuit also includes bypass capacitors proximate to the resistors, which corresponds to the recited "wherein the impedance [also] comprises … a capacitor." Ex. 1005 at ¶ [0036]; Ex. 1002 at ¶ 149. The definition of the term "impedance" had been well known in the field of electric fields well before the effective filing date of the '825 patent. For instance, *Graf*, which is an engineering dictionary published in 1999, defines the term "impedance" as "[t]he total opposition (i.e., resistance and reactance) a circuit offers to the flow of alternating current at a given frequency" or "[c]ombined opposition to current resulting from resistance, capacitance, and inductance." Ex. 1006 at 9; Ex. 1002 at ¶ 149. Since the bypass capacitors taught by *Masaaki* would add to the opposition to the flow of the current at a given frequency, the bypass capacitors can be considered a part of the total impedance of the circuit. Ex. 1002 at ¶ 149.

It would have been obvious to a POSITA to modify the supply current control circuit 62 of *Rauhala* to include bypass capacitors disclosed in *Masaaki*, specifically near the resistors R1, R2, R3 of the supply current control circuit 62 of *Rauhala*, in order to reduce noise in the circuit. Ex. 1002 at ¶¶ 150-151. Such a benefit of using bypass capacitors in a circuit had been well known in the art prior to the effective filing date of the '825 patent. *Id*. As just one example of many documents that explain the benefits of bypass capacitors, *DeMaw*, an article published in 1996 to explain the purposes capacitors serve in radio electronics, discloses placing bypass capacitors (C3, C4, C5, C6, and C8) next to resistors, and explains that such use of the capacitors is to "bypass[] unwanted ac [(alternative current)] … energy away from the circuit elements to which the capacitors are attached." Ex. 1007 at 4 and FIG. 5; Ex. 1002 at ¶ 150. As another example, *Mustafa*, a paper published in 2001 on power supply and ground noise-reduction techniques, discloses that "[t]he main function of bypass capacitors is to dampen th[e] ac ripple component or noise in … circuits" and "[t]he first function of a bypass capacitor connected between VDD and GND is to allow the ac ripple component of VDD to pass through to ground." Ex. 1008 at 2; Ex. 1002 at ¶ 150. Both *DeMaw* and *Mustafa* disclose the benefit of placing bypass capacitors in a circuit, namely bypassing or removing the noise in the circuit. Ex. 1007 at 4; Ex. 1008 at 2; Ex. 1002 at ¶ 150.

Therefore, modification of *Rauhala* with the teachings of *Masaaki* would have amounted to nothing more than the use of a known technique (e.g., *Masaaki*'s placement of bypass capacitors near resistors) to improve a similar device (e.g., *Rauhala*'s receiver circuit). *See KSR Int'l. Co. v. Teleflex, Inc.*, 550 U.S. 398, 417 (2007). As explained above in the preceding paragraphs of Section IX.B.1.b., a POSITA would have had the requisite skill level to readily modify the device disclosed by *Rauhala* to implement the teachings of *Masaaki* without any problem, and the results of the modification would have been predictable to a POSITA as evidenced by *DeMaw* and *Mustafa*. Ex. 1002 at ¶¶ 150-151.

Moreover, both *Rauhala* and *Masaaki* are analogous prior art to the claims of the '825 patent. *Rauhala* is analogous art because it is from the same field of endeavor, namely the field of wireless communication devices and circuitry thereon. Ex. 1004 at ¶ [0001]. Based on this fact alone, *Rauhala* should be considered analogous prior art. Even assuming, *arguendo*, *Rauhala* were not from the same field of endeavor, which the Petitioners do not concede, *Rauhala* is analogous art because it is reasonably pertinent to the problem faced by the Patent Owner in the '825 patent. The problem faced by the Patent Owner in the '825 patent was a "drain on battery life, especially for … portable devices," due to the "electronic circuits … [being] typically designed to function property under worst-case operating conditions." Ex. 1001 at 1:19-40. *Rauhala* is pertinent to this problem as it describes ways "to reduce the … disadvantages related to the prior art," namely power dissipation resulting from requiring "a relatively large supply of energy" or "a relatively large continuous current consumption" even when signal conditions at a particular time do not warrant such a large energy supply. Ex. 1004 at ¶¶ [0003]-[0005]; Ex. 1002 at ¶ 59.

Likewise, *Masaaki* is analogous art to the claims of the '825 patent because it is from the same field of endeavor, namely the field of wireless communication devices and circuitry thereon. Ex. 1005 at ¶ [0001]. Based on this fact alone, *Masaaki* should be considered analogous prior art. Even assuming, *arguendo*, *Masaaki* were not from the same field of endeavor, which the Petitioners do not concede, *Masaaki* is analogous art because it is reasonably pertinent to the problem faced by the Patent Owner in the '825 patent. As discussed in the immediately-preceding paragraph, the problem faced by the Patent Owner in the '825 patent was a "drain on battery life, especially for … portable devices," due to the "electronic circuits … [being] typically designed to function property under worst-case operating conditions." Ex. 1001 at 1:19-40. *Masaaki* is pertinent to this problem as it teaches techniques to "minimiz[e] power consumption in a radio receiver such as a pager without affecting the intermodulation characteristics of the RF amplifiers used in the radio receiver." Ex. 1005 at ¶ [0015]; Ex. 1002 at ¶ 71.

X. ARGUMENTS FOR DISCRETIONARY DENIAL SHOULD BE REJECTED

A. Section 325(d) Is Inapplicable Because the Asserted Art Was Never Evaluated During Examination.

The Board should not deny institution under §325(d) because the art asserted here was not before the Examiner and is not cumulative of art that was. As set forth below, the Examiner either (1) was not presented with the same or substantially the same art or arguments as Petitioners', or (2) materially erred in allowing the challenged claims. *Advanced Bionics, LLC v. Med-El*

Elektromedizinische Gerate GmbH, IPR2019-01469, Paper 6 at 8 (P.T.A.B. Feb. 13, 2020) (citing *Becton, Dickinson, & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (P.T.A.B. Dec. 15, 2017)).

***Becton, Dickinson* Factors (a), (b), and (d).** Neither "the same [nor] substantially the same" art or arguments were previously presented to the Office during prosecution of the challenged claims. *Rauhala* and *Masaaki* were never cited during prosecution of the '825 patent, let alone considered by the Examiner or made the subject of a rejection. *See generally* Ex. 1003. These references are also not substantially the same or cumulative of references considered during examination. During Examination, the pending claims were rejected under sections 102 and 103 over combinations of U.S. Patent No. 5,001,776 ("Clark") and U.S. Patent No. 6,870,425 ("Leifso"). Ex. 1003 at 159-169 and 371-381.

***Becton, Dickinson* Factors (c), (e), and (f).** As explained above, the answer to the first inquiry of *Advanced Bionics*—whether the same or substantially the same art or arguments were previously presented to the Office—is a definitive "no." Accordingly, analysis of Examiner error is unnecessary. Nevertheless, to the extent the Board disagrees and determines *Becton, Dickinson* factors (a), (b), and (d) do not favor institution, discretionary denial still is not warranted because the Examiner must have necessarily overlooked anticipatory disclosures of the art that was examined, constituting material error. *Advanced Bionics*, IPR2019-

01469, Paper 6, 10 (listing silence as evidence of error). As stated above in detail, *Rauhala* alone teaches every element of the challenged independent claims, and *Rauhala* and *Masaaki* together teach every element of the challenged dependent claim. To the extent any reference that was examined could be considered cumulative of *Rauhala* or *Masaaki*, the Examiner should have rejected the challenged claims under section 102 or section 103, and maintained the rejection(s).

B. Institution is Proper Under Section 314(a) and *Fintiv*.

The merits of this Petition are strong, which alone warrants institution. On June 21, 2022, Director Vidal issued an interim procedure regarding application of the *Fintiv* factors clarifying that "the PTAB will not deny institution [] under *Fintiv* (i) when a petition presents compelling evidence of unpatentability." Director Vidal, Memorandum, "Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation," 9 (June 21, 2022). Here, each ground in the Petition presents compelling evidence of unpatentability. For example, Ground I is an anticipation ground explaining how *Rauhala* discloses each and every limitation of the challenged independent claims. This evidence, "if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable," (*id.* at 4) and the Board must decline to exercise its discretion under

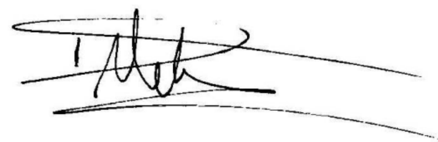
§314(a). *Id.; PopSockets LLC v. Flygrip, Inc.,* IPR2022-00938, Paper 8 (P.T.A.B. Nov. 1, 2022).

The *Fintiv* factors also weigh in favor of institution. First, the District Court has not yet scheduled a trial date. Ex. 1009. Second, the District Court will not hold a claim construction hearing until January 19, 2024, so the district court has not yet invested significant resources in this dispute. *See, e.g., Hulu LLC v. SITO Mobile R&D IP, LLC,* IPR2021-00298, Paper 11 at 13 (P.T.A.B. May 19, 2021). Third, "there is a reasonable likelihood that the Board will address the overlapping validity issues prior to the district court reaching them at trial [. . .] thereby providing the possibility of simplifying issues for trial." *Juniper Networks, Inc. v. Packet Intelligence LLC,* IPR2020-00339, Paper 21 at 18 (P.T.A.B. Sept. 10, 2020).

XI. CONCLUSION

For the reasons above, Petitioners request institution of IPR of the challenged claims based on all grounds.

Respectfully submitted,



Dated: March 7, 2023

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Lenovo (United States) Inc. and
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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petition for *Inter Partes* Review of U.S. Patent No. 10,129,825 B2 contains, as measured by the word-processing system used to prepare this paper, 12,112 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: March 7, 2023

Respectfully submitted,

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

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e) and 37 C.F.R. § 42.105(a), I hereby certify that on March 7, 2023, I caused a true and correct copy of the foregoing "PETITION FOR INTER PARTES REVIEW OF U.S. PATENT NO. 10,129,825 B2" and supporting exhibits to be served via Federal Express on the Patent Owner at the following correspondence address of record as listed in Patent Center:

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Dated: March 7, 2023

Respectfully submitted,

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