

LENOVO (UNITED STATES) INC. and
MOTOROLA MOBILITY LLC,

v.

THETA IP, LLC

IPR 2023-00697 (Patent No. 10,129,825 B2)

IPR 2023-00698 (Patent No. 10,524,202 B2)

Petitioners' Demonstrative Exhibit

July 24, 2024

Roadmap

Overview

- '825 and '202 Patents (*Tsividis* Patents)
- *Rauhala* Prior Art Reference

Patentability Disputes

- *Rauhala* discloses “[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 “adjusting an impedance”...“in the receiver signal path”
- *Rauhala* discloses “comparing the desired signal strength to the interferer signal strength”
- *Rauhala* discloses “increasing impedance,” which “reduces a drive current”

Overview of the *Tsividis* Patents

(12) **United States Patent**
Tsivdis

(10) **Patent No.:** **US 10,129,825 B2**
(45) **Date of Patent:** ***Nov. 13, 2018**

(54) **POWER DISSIPATION REDUCTION IN WIRELESS TRANSCIVERS**

(71) Applicant: **Theta IP, LLC**, Coppell, TX (US)
(72) Inventor: **Yannis Tsivdis**, New York, NY (US)
(73) Assignee: **Theta IP, LLC**, Coppell, TX (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **15/080,432**

(22) Filed: **Mar. 24, 2016**

(65) **Prior Publication Data**
US 2016/0212701 A1 Jul. 21, 2016

Related U.S. Application Data
(63) Continuation of application No. 11/318,646, filed on Dec. 27, 2005, now Pat. No. 9,331,728, which is a (Continued)

(51) **Int. Cl.**
H04B 1/38 (2015.01)
H04M 1/00 (2006.01)
(Continued)

(52) **U.S. Cl.**
CPC **H04W 52/0209** (2013.01); **H04B 1/09** (2013.01); **Y02D 70/00** (2018.01); **Y02D 70/42** (2018.01); **Y02D 70/40** (2018.01)

(58) **Field of Classification Search**
CPC ... **H04B 1/04**; **H04B 1/16**; **H04B 1/40**; **H04B 1/109**; **H04B 1/0457**; **H04B 1/1007**;
(Continued)

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Primary Examiner — Quochien B Vuong
(74) *Attorney, Agent, or Firm* — Wumble Bond Dickinson (US) LLP

(57) **ABSTRACT**

Processes, methods and circuits for improving battery life by reducing the battery power-drain of battery-powered devices using wireless transceivers is disclosed. Embodiments of the present invention provide for dynamically changing the bias current, impedance, and gain, either separately or in combination, during circuit operation to optimize or to reduce power dissipation. The dynamic variations may be implemented by varying the value of a resistance and/or a capacitance by opening switches across one or more portions of the resistance. Also, the dynamic variations may include setting any of the gain, bias current, or impedance parameters of the receiver circuit in between a high and low level, followed by adjusting the parameter up or down in response to a desired signal and an interferer signal.

8 Claims, 15 Drawing Sheets

- US 10,129,825 and US 10,524,202
 - “Power Dissipation Reduction in Wireless Transceivers”
 - Both claim priority through continuation applications to provisional applications filed **March 1, 2003**
 - Share common specifications

Ex. 1001 ('697 IPR); Ex. 1001 ('698 IPR)

Claim 1 of the '825 Patent and Claim 7 of the '202 Patent

1. 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:

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

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 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:

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

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

receiving the wireless signal having the desired signal and the interferer signal by the receiver;
determining the strength of the desired signal;
determining the strength of the interferer signal;
comparing the strength of the desired signal relative to the strength of the interferer signal; and
based on the comparison, when the plurality of circuits are functioning at better than the worst-case condition, dynamically adjusting one or more of an impedance, a bias or a gain of one or more of the plurality of circuits in the signal path, thereby controlling power dissipation.

Ex. 1001 ('697 IPR), claim 1; Ex. 1001 ('698 IPR), claim 7

Claim 7 of the '202 Patent

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

- receiving the wireless signal having the desired signal and the interferer signal by the receiver;
- determining the strength of the desired signal;
- determining the strength of the interferer signal;
- comparing the strength of the desired signal relative to the strength of the interferer signal; and
- based on the comparison, when the plurality of circuits are functioning at better than the worst-case condition, dynamically adjusting one or more of an impedance, a bias or a gain of one or more of the plurality of circuits in the signal path, thereby controlling power dissipation.

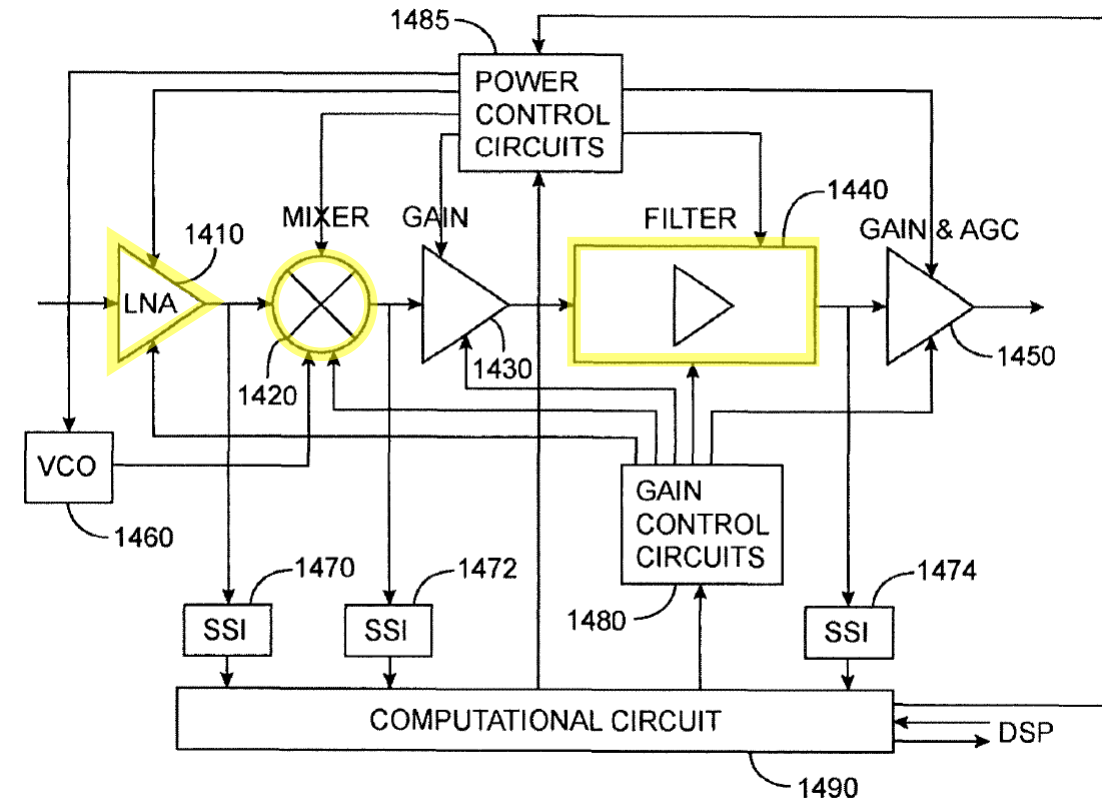


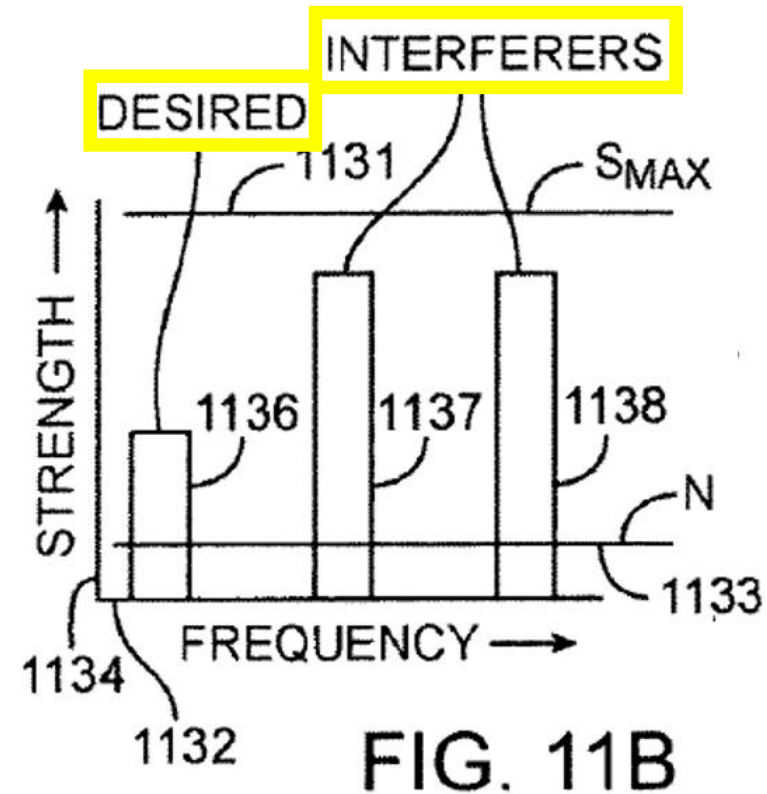
FIG. 14

Ex. 1001 ('698 IPR), claim 7, FIG. 14 (annotated)

Claim 7 of the '202 Patent

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

- receiving the wireless signal having the desired signal and the interferer signal by the receiver;
- determining the strength of the desired signal;
- determining the strength of the interferer signal;
- comparing the strength of the desired signal relative to the strength of the interferer signal; and
- based on the comparison, when the plurality of circuits are functioning at better than the worst-case condition, dynamically adjusting one or more of an impedance, a bias or a gain of one or more of the plurality of circuits in the signal path, thereby controlling power dissipation.

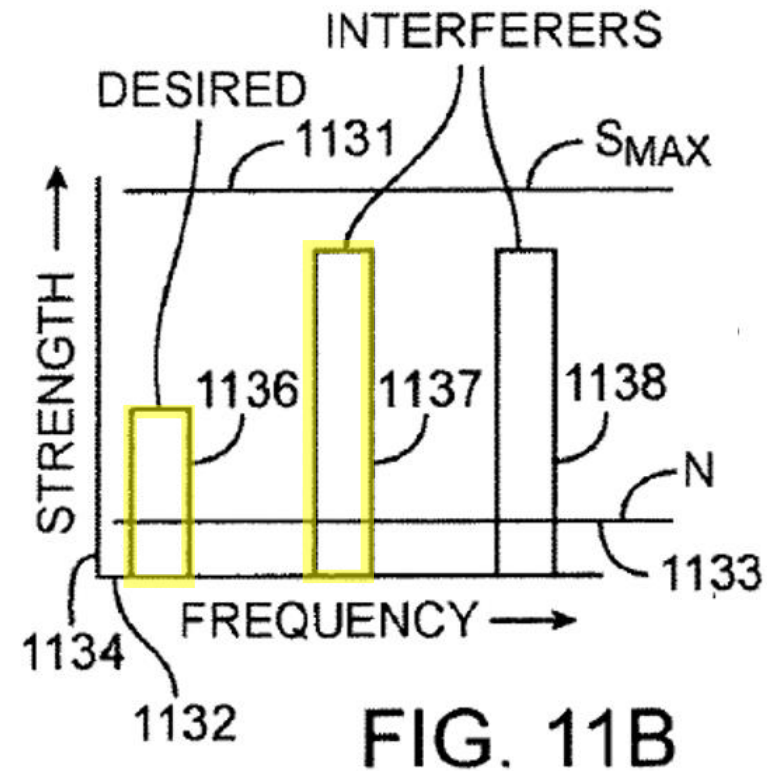


Ex. 1001 ('698 IPR), claim 7, FIG. 11B (annotated)

Claim 7 of the '202 Patent

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

- receiving the wireless signal having the desired signal and the interferer signal by the receiver;
- determining the strength of the desired signal;
- determining the strength of the interferer signal;
- comparing the strength of the desired signal relative to the strength of the interferer signal; and
- based on the comparison, when the plurality of circuits are functioning at better than the worst-case condition, dynamically adjusting one or more of an impedance, a bias or a gain of one or more of the plurality of circuits in the signal path, thereby controlling power dissipation.



Ex. 1001 ('698 IPR), claim 7, FIG. 11B (annotated)

Claim 7 of the '202 Patent

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

- receiving the wireless signal having the desired signal and the interferer signal by the receiver;
- determining the strength of the desired signal;
- determining the strength of the interferer signal;
- comparing the strength of the desired signal relative to the strength of the interferer signal; and
- based on the comparison, when the plurality of circuits are functioning at better than the worst-case condition, dynamically adjusting one or more of an impedance, a bias or a gain of one or more of the plurality of circuits in the signal path, thereby controlling power dissipation.

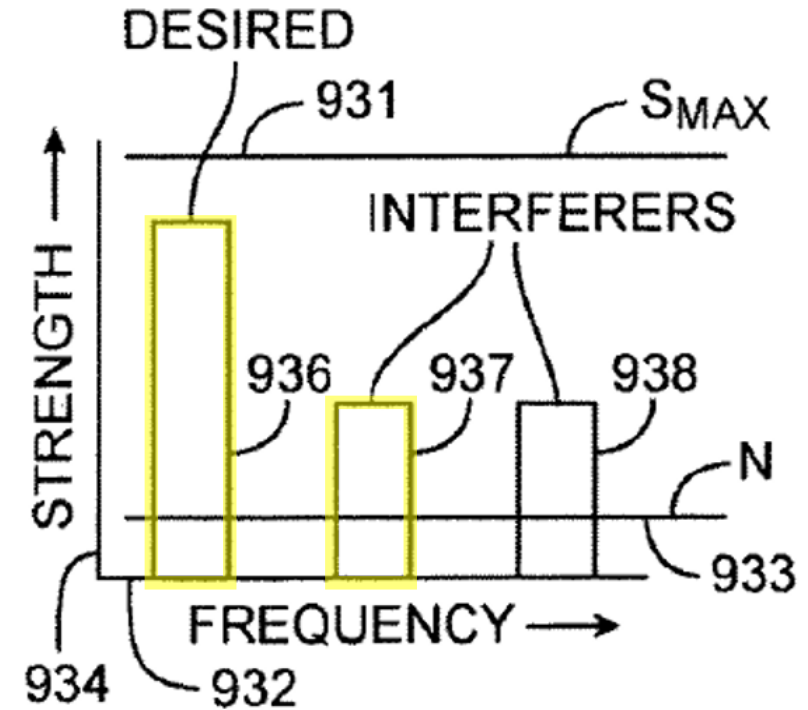


FIG. 9B

Ex. 1001 ('698 IPR), claim 7, FIG. 9B (annotated)

Claim 7 of the '202 Patent

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

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

determining the strength of the desired signal;

determining the strength of the interferer signal;

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

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

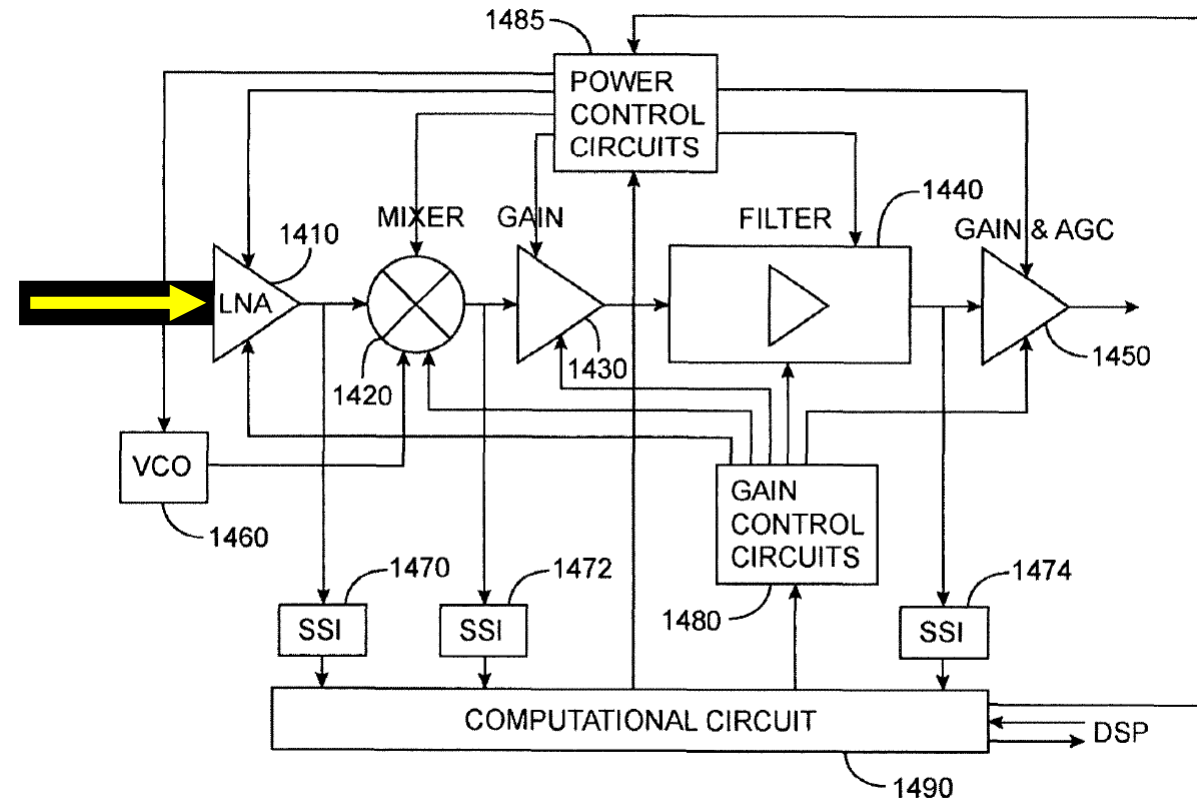


FIG. 14

Ex. 1001 ('698 IPR), claim 7, FIG. 14 (annotated)

Claim 7 of the '202 Patent

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

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

determining the strength of the desired signal;

determining the strength of the interferer signal;

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

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

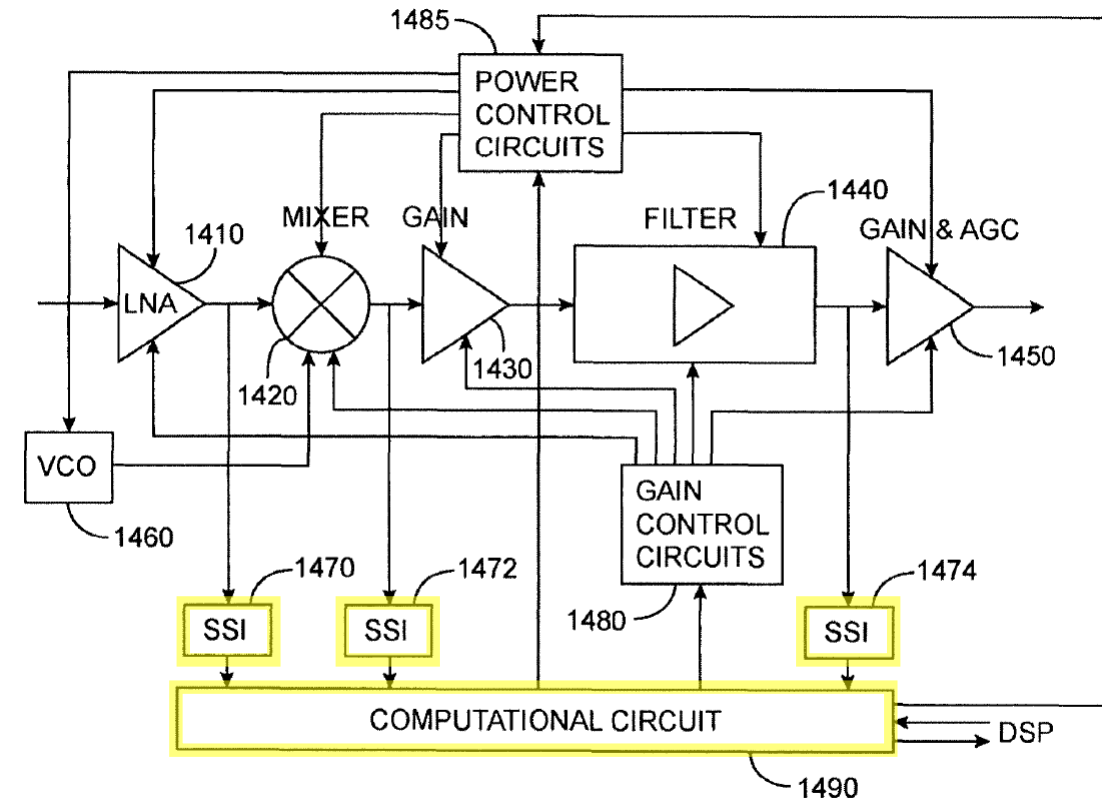


FIG. 14

Ex. 1001 ('698 IPR), claim 7, FIG. 14 (annotated)

Claim 7 of the '202 Patent

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

- receiving the wireless signal having the desired signal and the interferer signal by the receiver;
- determining the strength of the desired signal;
- determining the strength of the interferer signal;
- comparing the strength of the desired signal relative to the strength of the interferer signal; and
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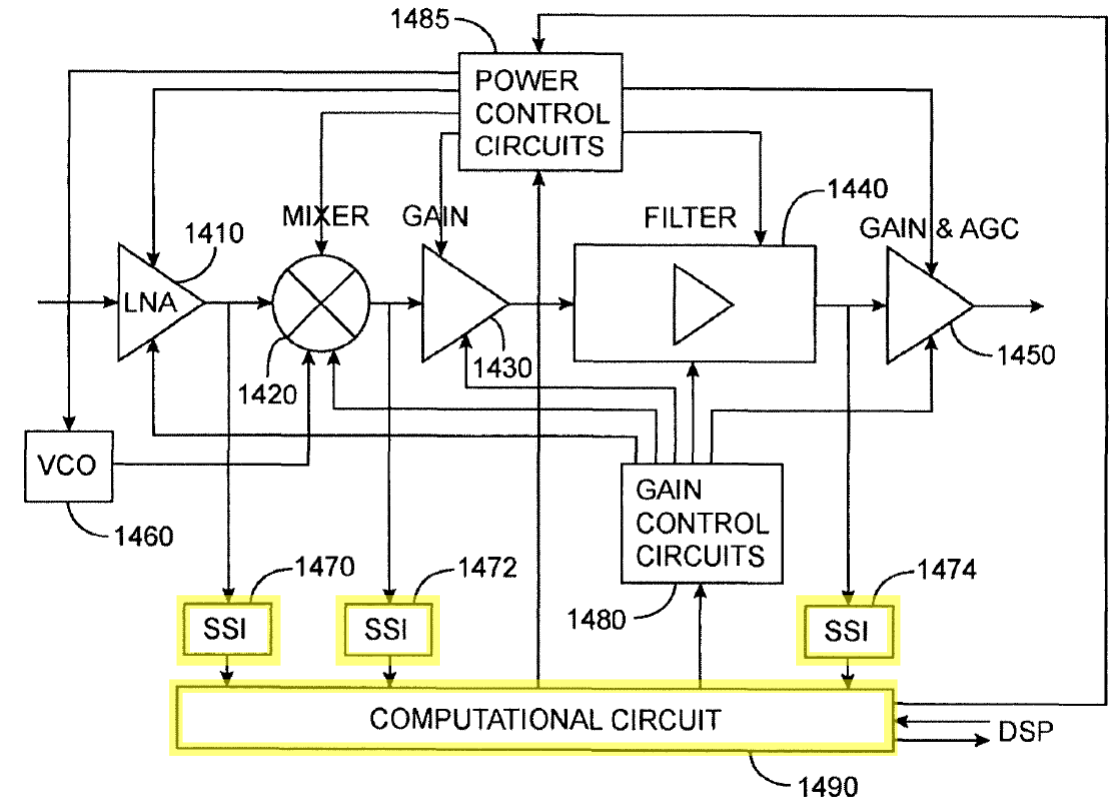


FIG. 14

Ex. 1001 ('698 IPR), claim 7, FIG. 14 (annotated)

Claim 7 of the '202 Patent

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

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

- determining the strength of the desired signal;

- determining the strength of the interferer signal;

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

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

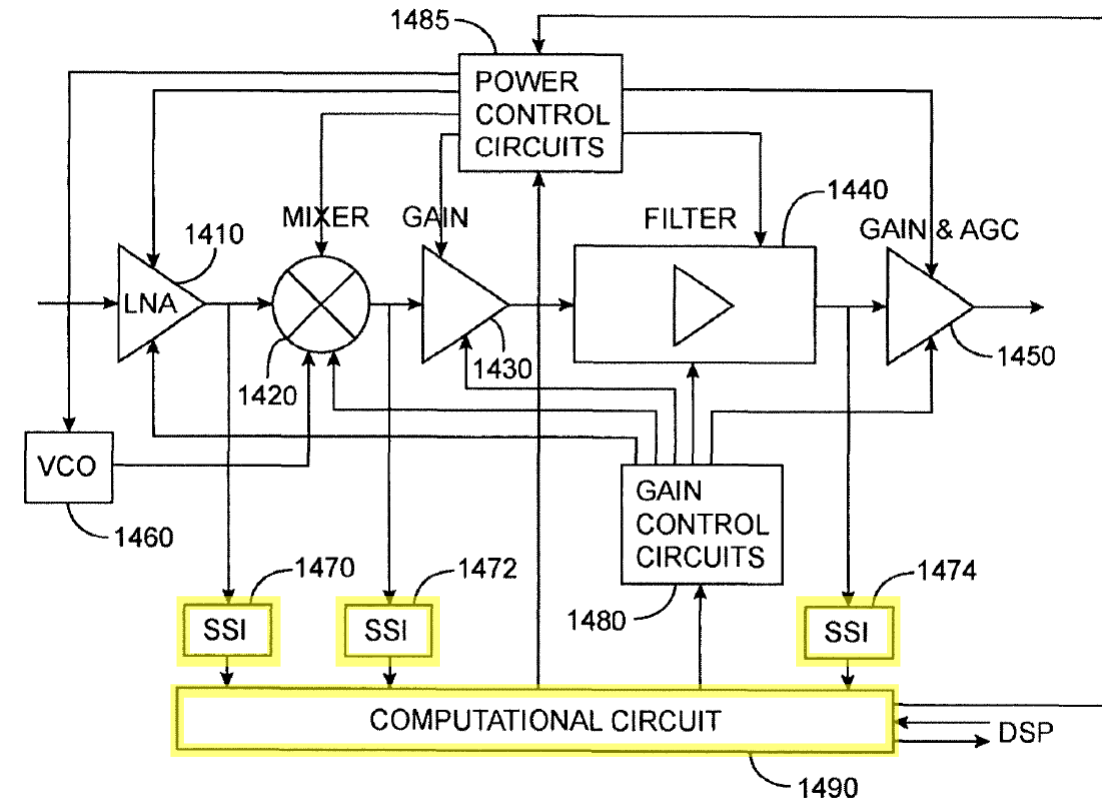


FIG. 14

Ex. 1001 ('698 IPR), claim 7, FIG. 14 (annotated)

Claim 7 of the '202 Patent

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

- receiving the wireless signal having the desired signal and the interferer signal by the receiver;
- determining the strength of the desired signal;
- determining the strength of the interferer signal;
- comparing the strength of the desired signal relative to the strength of the interferer signal; and

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

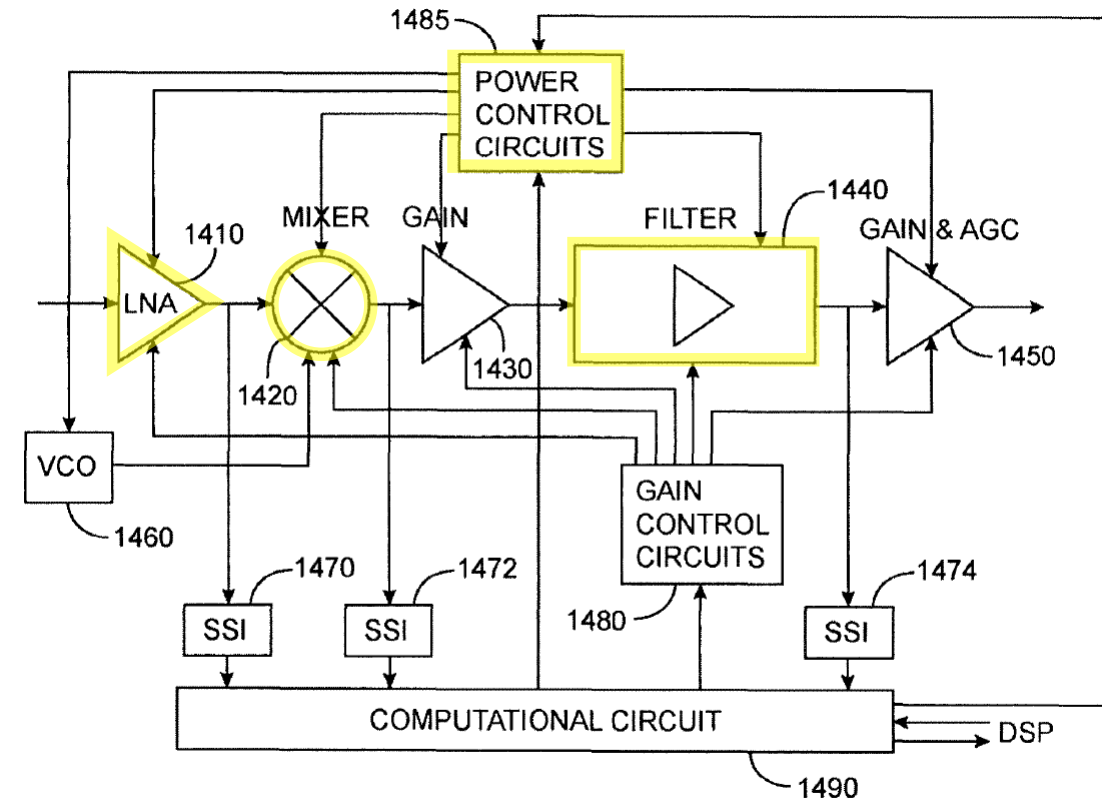


FIG. 14

Ex. 1001 ('698 IPR), claim 7, FIG. 14 (annotated)

Claim 7 of the '202 Patent

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

- receiving the wireless signal having the desired signal and the interferer signal by the receiver;
- determining the strength of the desired signal;
- determining the strength of the interferer signal;
- comparing the strength of the desired signal relative to the strength of the interferer signal; and
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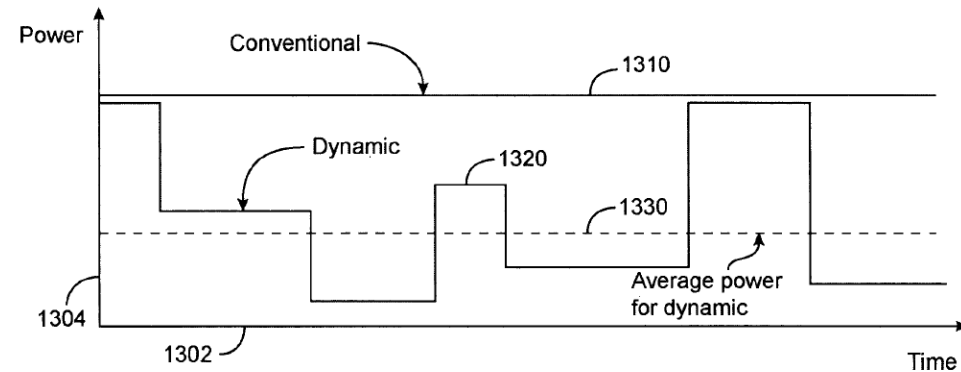


FIG. 13

FIG. 13 is an example shown how power may be saved as a function of time by employing one or more of these methods consistent with embodiments of the present invention. Power is plotted along a Y-axis 1304 as a function of time along X-axis 1302. Conventional worst case design would fix power dissipation at line 1310. As can be seen, dynamic power dissipation 1320 under the control of variable gains, impedances, biasing, or combination thereof, allows for a lower average power 1330 as compared to the power dissipated 1310 by the conventional design.

Overview of Grounds

IPR 2023-00697 ('825 Patent) – Instituted Grounds

Grounds	Claim	Reference(s)
Ground 1: § 102	1, 3, and 8	<i>Rauhala</i>
Ground 2: § 103	4	<i>Rauhala, Masaaki</i>

IPR 2023-00698 ('202 Patent) – Instituted Grounds

Grounds	Claim	Reference(s)
Ground 1: § 102	7-11, 13, and 19-21	<i>Rauhala</i>
Ground 2: § 103	7-11, 13, and 19-21	<i>Rauhala, Saito</i>

* All disputes relate to the disclosure of *Rauhala*.

Roadmap

Overview

- '825 and '202 Patents (*Tsividis* Patents)
- *Rauhala* Prior Art Reference

Patentability Disputes

- *Rauhala* discloses “[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 “adjusting an impedance”...“in the receiver signal path”
- *Rauhala* discloses “comparing the desired signal strength to the interferer signal strength”
- *Rauhala* discloses “increasing impedance,” which “reduces a drive current”

[0006] The basic idea of the invention is as follows: A receiver monitors the signal strength on the receive channel and neighboring channels. In addition, the receiver can determine the quality of the detected signal by calculating its bit error ratio or signal-to-noise ratio. In 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. If 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. This may happen also if the bit error ratio or signal-to-noise ratio deteriorates down to a certain limit. Adjustment of the supply currents may take place in one or more steps.

[0007] The advantage of the invention is that the energy consumption of the receiver can be reduced without degrading the signal quality. This means longer life for the battery or, if the life of the battery is kept unchanged, that a smaller battery can be used. If the mean energy consumption is kept the same as in receivers of the prior art, the advantage is a better signal quality.

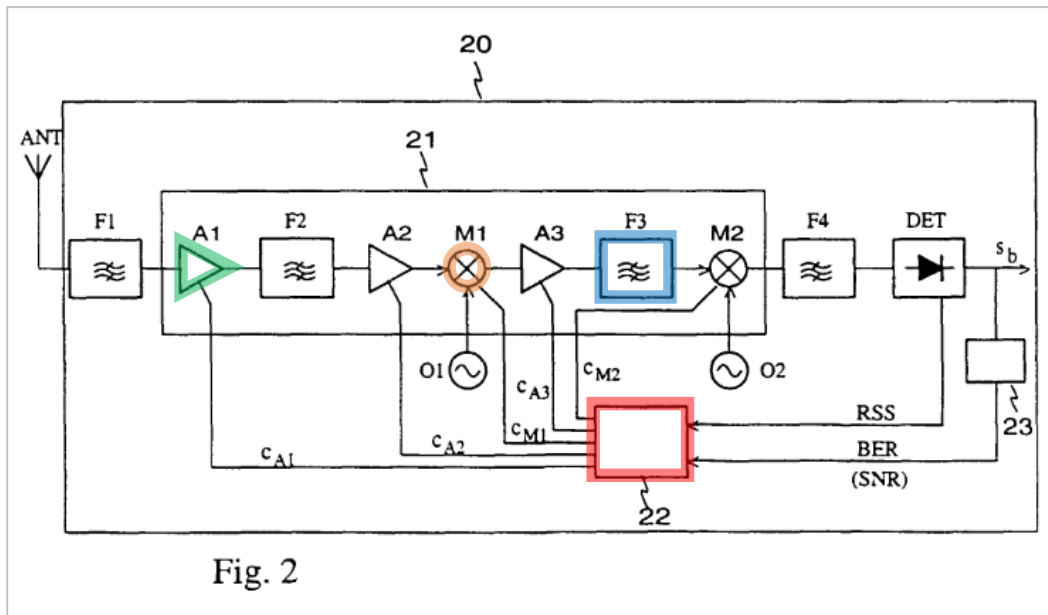


Fig. 2

- Rauhala's signal path includes an amplifier A1 (green), a mixer M1 (orange), and a filter F3 (blue).
- Control unit 22 (red) controls supply currents of the amplifiers and mixers.

Pet., Paper 1 ('697 IPR), p. 22; Pet., Paper 1 ('698 IPR), pp. 24-25; Ex. 1004 (Rauhala), ¶¶[0006]-[0007], [0012]-[0013], FIG. 2 (annotated)

Rauhala

RSS_n	RSS	I_A	I_M	Best-case condition
$<S_n$	$>S_4$	I_{A1}	I_{M1}	
$<S_n$	$\leq S_4$	I_{Ah}	I_{M1}	Worst-case condition
$\geq S_n$	$>S_4$	I_{Ah}	I_{M1}	
$\geq S_n$	$\leq S_4$	I_{Ah}	I_{Mh}	

RSS	BER	I_{A1}	I_{A2} and I_{M1}	I_{A3} and I_{M2}	Best-case condition
$>S_{51}$	$<E_1$	1	1	1	
$>S_{51}$	$>E_1, <E_2$	3	2	1	Worst-case condition
$>S_{51}$	$>E_2$	4	4	2	
$<S_{51}, >S_{52}$	$<E_1$	2	1	1	
$<S_{51}, >S_{52}$	$>E_1, <E_2$	3	2	1	
$<S_{51}, >S_{52}$	$>E_2$	4	4	2	
$<S_{52}$	$<E_1$	2	2	1	
$<S_{52}$	$>E_1, <E_2$	3	3	2	
$<S_{52}$	$>E_2$	4	4	2	

- Rauhala* describes controlling supply currents according to a “receive signal strength” (RSS), a “strength of any signal on the reception band” (RSS_n), a “receive channel bit error ratio” (BER), and/or a “signal-to-noise ratio” (SNR).

- Rauhala*’s controls range from worst-case conditions, to best-case conditions, with steps in between.

Pet., Paper 1 ('697 IPR), p. 14; Pet., Paper 1 ('698 IPR), pp. 51-54; Ex. 1004, ¶¶[0006]-[0007], [0017], [0019]

Overview of Disputes

Disputed Issue		Claims
1.	“Determining” signal strengths	'202 patent, claims 7, 11, 13, and 19 '825 patent, claims 1, 3, and 8
2.	Varying or adjusting “an impedance ”	'202 patent, claims 7, 8, and 19 '825 patent, claim 8
3.	Varying or adjusting an impedance “ in the receiver signal path ”	'202 patent, claims 7, 8, and 19 '825 patent, claim 8
4.	“Comparing the strength of the desired signal relative to the strength of the interferer signal”	'202 patent, claims 7, 11, 13, and 19
5.	Causing an impedance to be increased, thereby causing “a drive current ” to be decreased	'825 patent, claim 8

Roadmap

Overview

- '825 and '202 Patents (*Tsividis* Patents)
- *Rauhala* Prior Art Reference

Patentability Disputes

- *Rauhala* discloses “[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 “adjusting an impedance”...“in the receiver signal path”
- *Rauhala* discloses “comparing the desired signal strength to the interferer signal strength”
- *Rauhala* discloses “increasing impedance,” which “reduces a drive current”

1. *Rauhala* Teaches “Determining” Signal Strengths

- *Rauhala* teaches that detector DET (yellow) generates and provides receive signal strength (RSS) (green), which is “determining a strength of the desired signal”
- *Rauhala* teaches that detector DET (yellow) generates and provides neighboring channel signal strength (RSS_n) (red), which is “determining a strength of the interferer signal”

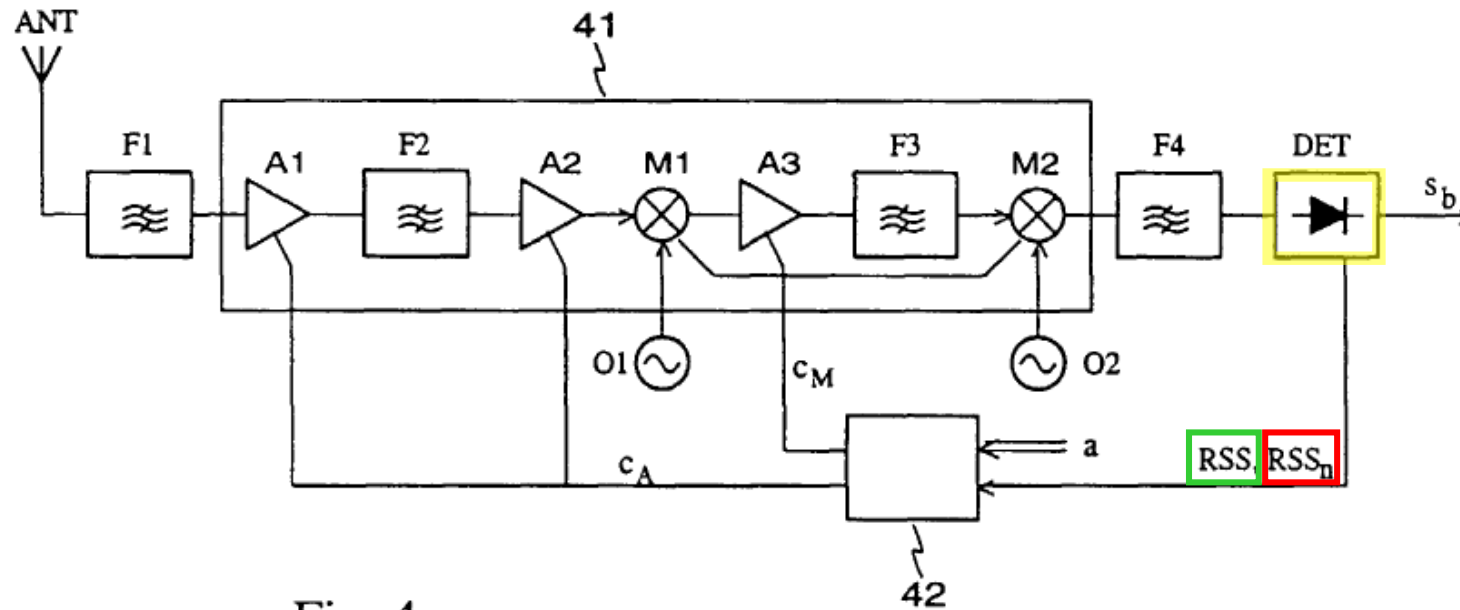


Fig. 4

Pet., Paper 1 ('697 IPR), pp. 33-34; Pet., Paper 1 ('698 IPR), pp. 51-54; Ex. 1002 ('697 IPR), ¶109; Ex. 1002 ('698 IPR), ¶¶111-116; Ex. 1004, ¶¶[0017], FIG. 4 (annotated)

1. *Rauhala* Teaches “Determining” Signal Strengths

PO’s arguments require improperly reading additional limitations into the claims.

Claim 1 of '825 patent:

... 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 ...

Claim 7 of '202 patent:

... determining a signal strength of the desired signal;
determining a signal strength of the interferer signal ...

PO argues that these limitations:

- require **simultaneous** determinations; and
- require separate circuits to perform the determining.

Paper 15 ('697 IPR), pp. 35-45; Paper 22 ('697 IPR), pp. 8-14;
Paper 15 ('698 IPR), pp. 37-47; Paper 21 ('698 IPR), pp. 5-11

1. *Rauhala* Teaches “Determining” Signal Strengths

The Board properly rejected PO’s attempted narrowing.

Claim 1 of '825 patent:

... 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 ...

Claim 7 of '202 patent:

... determining a signal strength of the desired signal;
determining a signal strength of the interferer signal ...

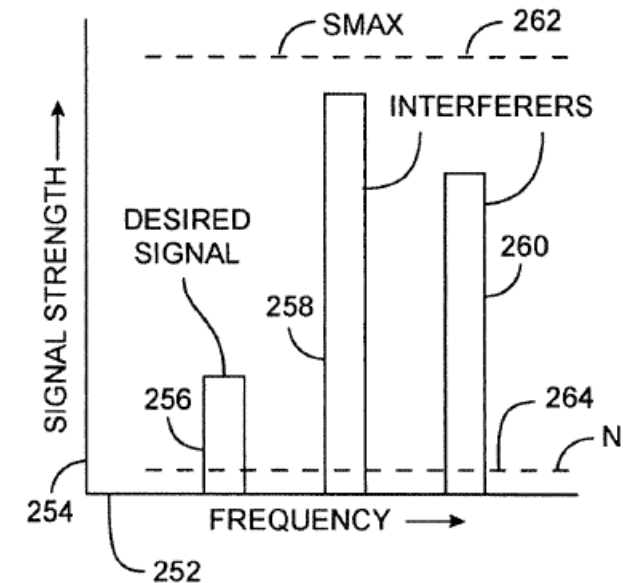
- Simultaneous determinations **not** required.
- Separate circuits to perform the determining **not** required.
- PO has introduced **no new** evidence that would require the Board to rule otherwise.

Paper 10 ('697 IPR), pp. 23-25; Paper 10 ('698 IPR), pp. 22-23;
compare Ex. 2005, ¶¶69-72 *with* Ex. 2015, ¶¶ 69-72

1. *Rauhala* Teaches “Determining” Signal Strengths

Patent Owner and Dr. Larson articulate no distinction between “parts of the same received wireless signal” and “different wireless signals”

- The '825 and '202 patents show examples of desired signals and interferer signals plotted on a frequency spectrum.
- PO never reconciles its “simple analogy” to FM radio with the '825 and '202 patents.
- PO offers no explanation or evidence as to why FM 99.3 cannot be an “interferer signal” when a radio is tuned to FM 98.7.



Ex. 1001, FIGS. 2A, 2B, 3; Paper 22 ('697 IPR), pp. 9-10; Paper 21 ('698 IPR), pp. 6-8; Ex. 2015, ¶72

1. *Rauhala* Teaches “Determining” Signal Strengths

Patent Owner’s “assertion that the detector DET in *Rauhala* must be a ‘single diode detector’ that must be ‘re-tuned’ to another channel to provide a second signal strength indication ... is contradicted by *Rauhala*’s plain text.”

[0006] The basic idea of the invention is as follows: A receiver monitors the signal strength on the receive channel and neighboring channels. In addition, the receiver can determine the quality of the detected signal by calculating its bit error ratio or signal-to-noise ratio. In normal conditions, i.e. when the signal strength is satisfactory on the receive

[0017]

which corresponds to a relatively high signal strength on the channel. The control unit 42 provides two one-bit control signals c_A and c_M . Signal c_A is 0 when signal RSS is greater than S_4 and signal RSS_n is at the same time smaller than S_n . Otherwise, signal c_A is 1. Signal c_A is taken to amplifiers A1 and A2. Signal c_M is 1 when signal RSS is not greater than S_4 and signal RSS_n is at the same time at least S_n . Otherwise, signal c_M is 0. Signal c_M is taken to mixer M1,

Paper 20 ('697 IPR), pp. 8-9; Paper 19 ('698 IPR), pp. 8-9; Ex. 1004 ¶¶[0006], [0017]

1. *Rauhala* Teaches “Determining” Signal Strengths

Patent Owner’s “assertion that the detector DET in *Rauhala* must be a ‘single diode detector’ that must be ‘re-tuned’ to another channel to provide a second signal strength indication ... is contradicted by *Rauhala*’s plain text.”

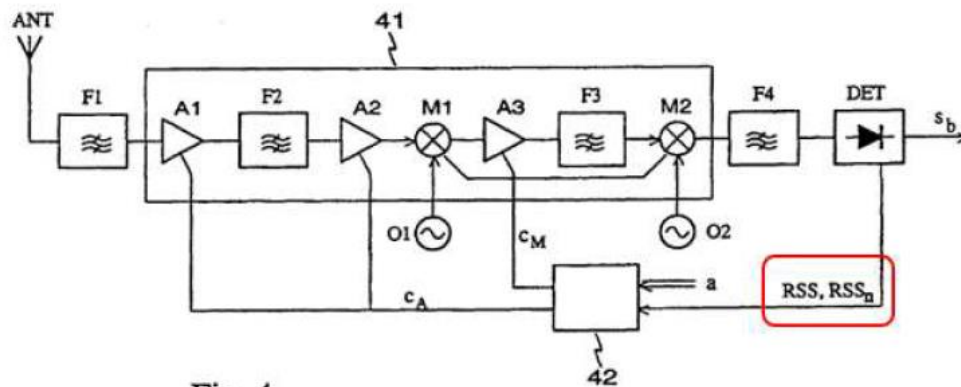


Fig. 4

RSS_n	RSS	I_A	I_M
$<S_n$	$>S_4$	I_{A1}	I_{M1}
$<S_n$	$\leq S_4$	I_{Ah}	I_{M1}
$\geq S_n$	$>S_4$	I_{Ah}	I_{M1}
$\geq S_n$	$\leq S_4$	I_{Ah}	I_{Mh}

47. For example, as clearly shown in Figure 4 (reproduced above), the detector DET provides RSS and RSS_n , which correspond to the receive signal strength and the neighboring signal strength respectively, to the control unit 42 to generate controls signals C_A and C_M . Ex. 1004 at Figure 4. In generating the control signals, the control unit 42 considers signal strengths of the two signals that are measured “at the same time.” Ex. 1004 at [0018] (“Signal C_A is 0 when signal RSS is greater than S_4 and signal RSS_n is at the same time smaller than S_n ... Signal C_M is 1 when signal RSS is not greater than S_4 and signal RSS_n is at the same time at least S_n .”).

Paper 20 ('697 IPR), pp. 8-9; Paper 19 ('698 IPR), pp. 8-9; Ex. 1019, ¶47; Ex. 1004 ¶[0018], Fig. 4 (annotated)

1. *Rauhala* Teaches “Determining” Signal Strengths

Patent Owner’s assertion that *Rauhala*’s receiver “requires re-tuning” is based on Dr. Larson’s assumption.

Rauhala does not give any details about the internal functioning of the detector. But from the common and well-known diode symbol used in the Figures, as well as the description of outputting a “RSS” indication, I would assume that the detector is a simple type of envelope detector known as a “diode detector.” This kind of detector was known and often used in RF receivers to measure the total received signal strength power, in a band around the frequency to which the receiver is tuned. Measuring a different signal power with a diode detector requires re-tuning the receiver, including for example by changing the input band-pass filter. This is

Ex. 2015, ¶60; Paper 20 ('697 IPR), pp. 7-8;
Paper 19 ('698 IPR), pp. 7-8

1. *Rauhala* Teaches “Determining” Signal Strengths

Dr. Larson and Dr. Baker agree that “re-tuning” between measurements would have been technically “impractical.”

Dr. Larson:

[0017]. Re-tuning the receiver changes what is being measured. This means that *Rauhala*’s system cannot determine a desired signal strength “and” an interferer signal strength within the same received spectrum. In a dynamic system, this is a significant impractical handicap, as signal strengths could change while the detector was being re-tasked. The total signal power in a band around a neighboring channel when tuned to that channel is not a direct measurement of interference received when the receiver is tuned to a first channel. The Tsivdis Patents teach and claim a circuit

Ex. 2015, ¶17.

Dr. Baker:

48. Consistent with these teachings of *Rauhala*, a POSITA would have recognized that the consideration of signal strengths detected at the same time would be essential to the proper functioning of *Rauhala*’s receiver. For instance, if we were to measure the receive channel signal strength in one instance, and measure the neighboring channel signal strength in another instance, which Dr. Larson alleges to be the teaching of *Rauhala* (Ex. 2015 at ¶ 71), the comparison of these signal strengths to the respective threshold values would be meaningless, as the conditions under which these signals propagate can change instantly as well as constantly over time.

Ex. 1019, ¶48.

Roadmap

Overview

- '825 and '202 Patents (*Tsividis* Patents)
- *Rauhala* Prior Art Reference

Patentability Disputes

- *Rauhala* discloses “[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 “adjusting an impedance”...“in the receiver signal path”
- *Rauhala* discloses “comparing the desired signal strength to the interferer signal strength”
- *Rauhala* discloses “increasing impedance,” which “reduces a drive current”

2. “Impedance”

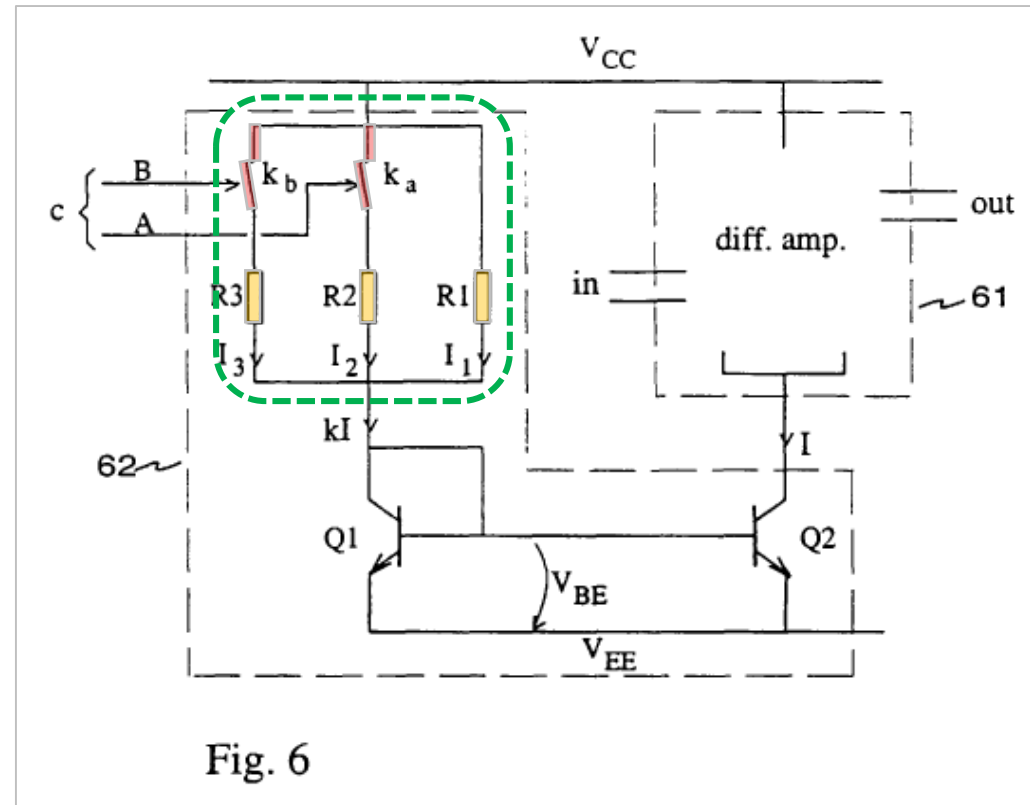
Disputed Term	Petitioners’ Construction	Patent Owner’s Construction
“Impedance”	Plain and ordinary meaning	“Total opposition of a circuit to an alternating current”

Paper 15 ('697 IPR), pp. 26-32; Paper 20 ('697 IPR), pp. 3-5;
Paper 15 ('698 IPR), pp. 29-35; Paper 19 ('698 IPR), pp. 3-5

2. *Rauhala* Teaches Adjusting an “Impedance”

Rauhala teaches adjusting an “impedance,” according to its plain and ordinary meaning.

- No dispute as to how circuit of *Rauhala* FIG. 6 functions.
- Switches k_a and k_b (red) are toggled to selectively connect resistors (yellow) R2 and R3 in parallel with R1.
- Impedance (green) opposing current k_I is thereby adjusted.



Pet., Paper 1 ('697 IPR), pp. 44-46; Pet., Paper 1 ('698 IPR), pp. 39-41; Paper 15 ('697 IPR), pp. 51-52; Paper 15 ('698 IPR), pp. 54-55; Ex. 1004, ¶¶[0021]-[0022], Fig. 6 (annotated)

2. PO's Improper Narrowing of "Impedance"

- PO argues that "impedance" should be limited to "the opposition to the flow of alternating current" (AC) only and *exclude* opposition to direct current (DC).
- PO argues that the "specification uses the term consistently with" its cherry-picked definitions.
- Specification **does not** define "impedance."
- "Alternating current" **does not** appear in the specification.
- "Direct current" **does not** appear in the specification.

Paper 15 ('697 IPR), pp. 26-32; Paper 22 ('697 IPR), pp. 2-6; Paper 15 ('698 IPR), pp. 29-35; Paper 21 ('698 IPR), pp. 2-5; Ex. 1001 ('697 IPR); Ex. 1001 ('698 IPR)

2. PO's Improper Narrowing of "Impedance"

Extrinsic evidence does not favor narrowing.

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

The "Graf" Dictionary with Annotations

Paper 20 ('697 IPR), pp. 3-4; Paper 19 ('698 IPR), pp. 3-4; Ex. 1019, ¶¶7-9

2. PO's Improper Narrowing of "Impedance"

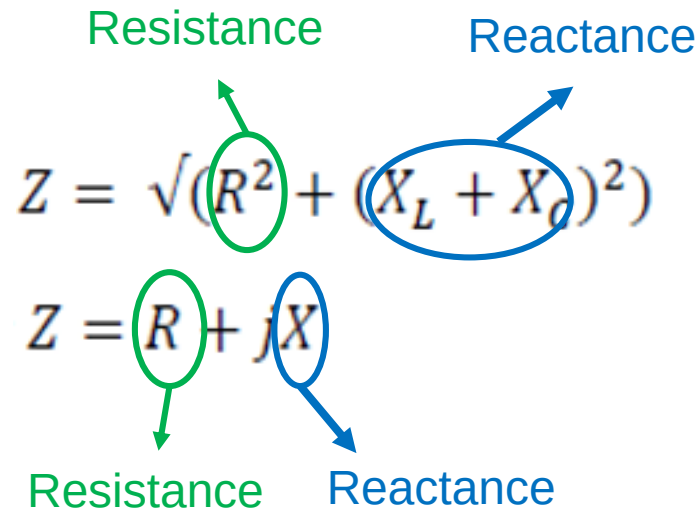
PO has not persuaded any court to construe "impedance" as it proposes.

- Eastern District of Texas: parties stipulated to construe "impedance" as PO proposes.
- Western District of Texas: both parties proposed limiting "impedance" to AC current; the Court rejected both proposals and afforded the term plain and ordinary meaning.

Ex. 2013 ('697 IPR) at 15; Ex. 2014 ('697 IPR) at 5;
Ex. 1008 ('698 IPR) at 15; Ex. 1007 ('698 IPR) at 5;

2. *Rauhala* Teaches Adjusting an “Impedance”

Resistances alone are an “impedance.”


$$Z = \sqrt{(R^2) + (X_L + X_C)^2}$$
$$Z = R + jX$$

- Dr. Larson and Dr. Baker agree as to the formula for impedance.
- When the reactance component of impedance is zero, impedance is equal to the resistance component.

Ex. 2015, ¶54; Ex. 1019, ¶¶10-12; Ex. 1018, 55:3-13

2. *Rauhala* Teaches Adjusting an “Impedance”

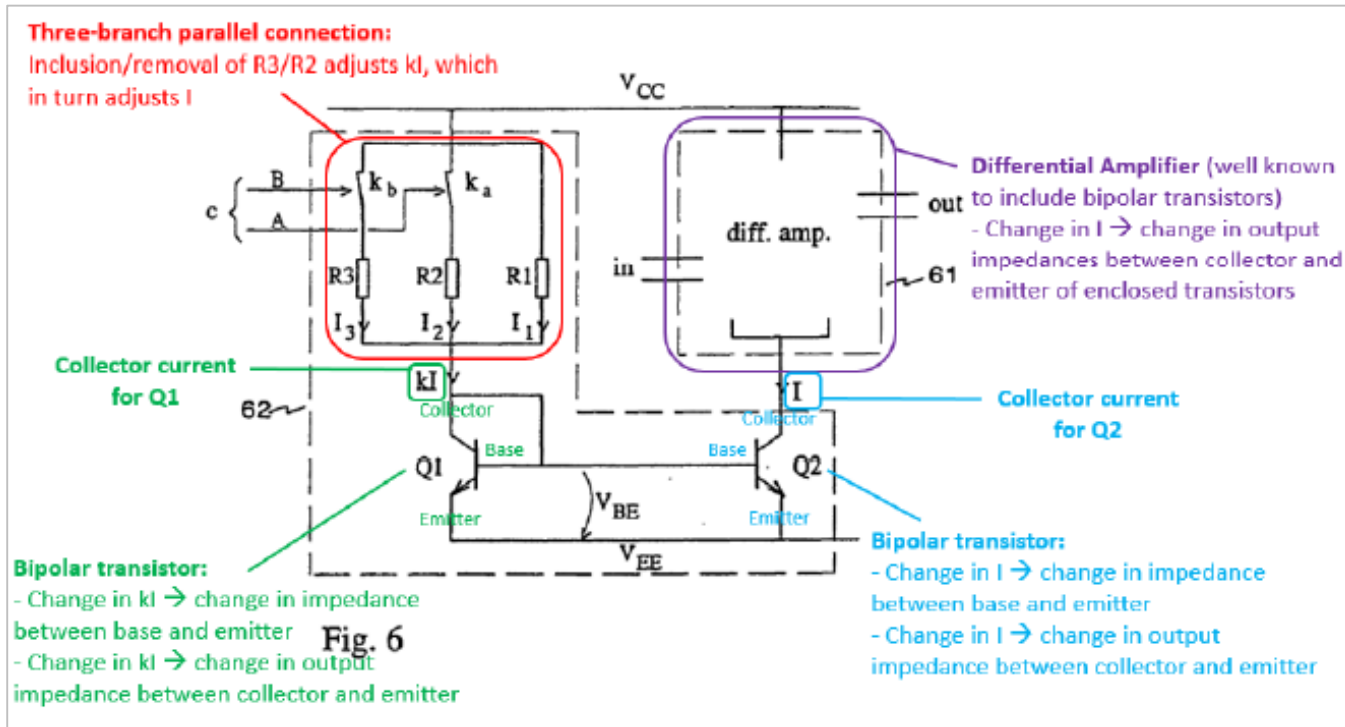
Dr. Larson admitted that resistances alone are an “impedance.”

3	Q	And looking again at the formula you
4		provided for Z, you could still calculate, you could
5		still calculate the value for Z if any of R, X sub L
6		or X sub C are zero; correct?
7	A	So I think you are asking if any one of R,
8		XL or XC is zero, could you still calculate Z, and
9		the answer to that is yes.
10	Q	Would your answer change if two of those
11		variables were zero?
12	A	No. My answer would not change if two
13		were zero.

Ex. 1018, 55:3-13

2. *Rauhala* Teaches Adjusting an “Impedance”

***Rauhala* teaches adjusting an “impedance” even under *PO*’s improper construction.**



- Again, no dispute as to how circuit of *Rauhala* FIG. 6 functions.
- Adjusting cumulative resistance (**red**) $\rightarrow$
- Adjustment of current k_I (**green**) $\rightarrow$
- Adjustment of current I (**blue**) $\rightarrow$
- Adjustment of impedances within differential amplifier (**purple**)

Paper 20 ('697 IPR), pp. 12-15; Paper 19 ('698 IPR), pp. 22-25; Paper 22 ('697 IPR), pp. 15-21; Paper 21 ('698 IPR), pp. 17-23; Ex. 1018, 92:6-10, 96:2-16; Ex. 1004, Fig. 6 (annotated)

2. *Rauhala* Teaches Adjusting an “Impedance”

Dr. Larson confirmed that *Rauhala* teaches adjusting an “impedance.”

6 Q Would the output impedance of Q1 change as
7 KI changes?
8 A I believe the answer -- yes. As KI
9 changes, the output impedance of Q1 will change as
10 well. And let me also be very precise. By the
11 output impedance of Q1, I mean the ratio of the
12 voltage at the collector and base of that transistor
13 to the collector current and base current.
14 Collector plus base current.

2 Q Let me break it into pieces. So do we
3 agree that supply current I is changed over time
4 according to the teachings of this document?
5 A Yes. The supply current I will change
6 depending on the status of switches Ka and Kb as
7 shown in this figure.
8 Q And as supply current I changes, would the
9 impedances of the transistors in the differential
10 amplifier also change?
11 MR. JOHANNINGMEIER: Objection. Scope.
12 Speculation.
13 A Yeah. As the supply current I to the
14 differential amplifier changes, that will change the
15 DC bias current through the transistors and that
16 will change their impedances.

Ex. 1018, 92:6-10, 96:2-16

2. *Rauhala* Teaches Adjusting an “Impedance”

Petitioners’ reply evidence is responsive to PO’s construction of “impedance.”

“However, under the Board's rules and consistent with the Supreme Court's decision in *SAS*, a petitioner is entitled to respond to new arguments made in a patent owner response. **The rules provide that the petitioner may ‘respond to arguments raised in the corresponding opposition, patent owner preliminary response, or patent owner response.’ 37 C.F.R. § 42.23(b).** ‘As we have regularly held, **the petitioner in an inter partes review proceeding may introduce new evidence after the petition stage if the evidence is a legitimate reply to evidence introduced by the patent owner.**’ *Apple*, 949 F.3d at 706-07 (internal quotation marks and citation omitted).”

- *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1380 (Fed. Cir. 2023)

Paper 20 ('697 IPR), pp. 4-5; Paper 19 ('698 IPR), pp. 4-5

2. *Rauhala* Teaches Adjusting an “Impedance”

PO’s attempt to further limit “impedance” must be rejected.

- PO argues for the first time in its sur-replies that the claims somehow distinguish “directly changing” impedance from “indirect, down-circuit effects.”
- PO’s argument is unsupported by record evidence.
- Neither the claims nor the specification support such a distinction.

Paper 22 ('697 IPR), pp. 17-21; Paper 21 ('698 IPR), pp. 19-23

Roadmap

Overview

- '825 and '202 Patents (*Tsividis* Patents)
- *Rauhala* Prior Art Reference

Patentability Disputes

- *Rauhala* discloses “[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 “adjusting an impedance”...“in the receiver signal path”
- *Rauhala* discloses “comparing the desired signal strength to the interferer signal strength”
- *Rauhala* discloses “increasing impedance,” which “reduces a drive current”

3. *Rauhala's* Impedance Is “In the Receiver Signal Path”

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

- receiving the wireless signal having the desired signal and the interferer signal by the receiver;
- determining the strength of the desired signal;
- determining the strength of the interferer signal;
- comparing the strength of the desired signal relative to the strength of the interferer signal; and
- based on the comparison, when the plurality of circuits are functioning at better than the worst-case condition, dynamically adjusting one or more of an impedance, a bias or a gain of one or more of the plurality of circuits in the signal path, thereby controlling power dissipation.

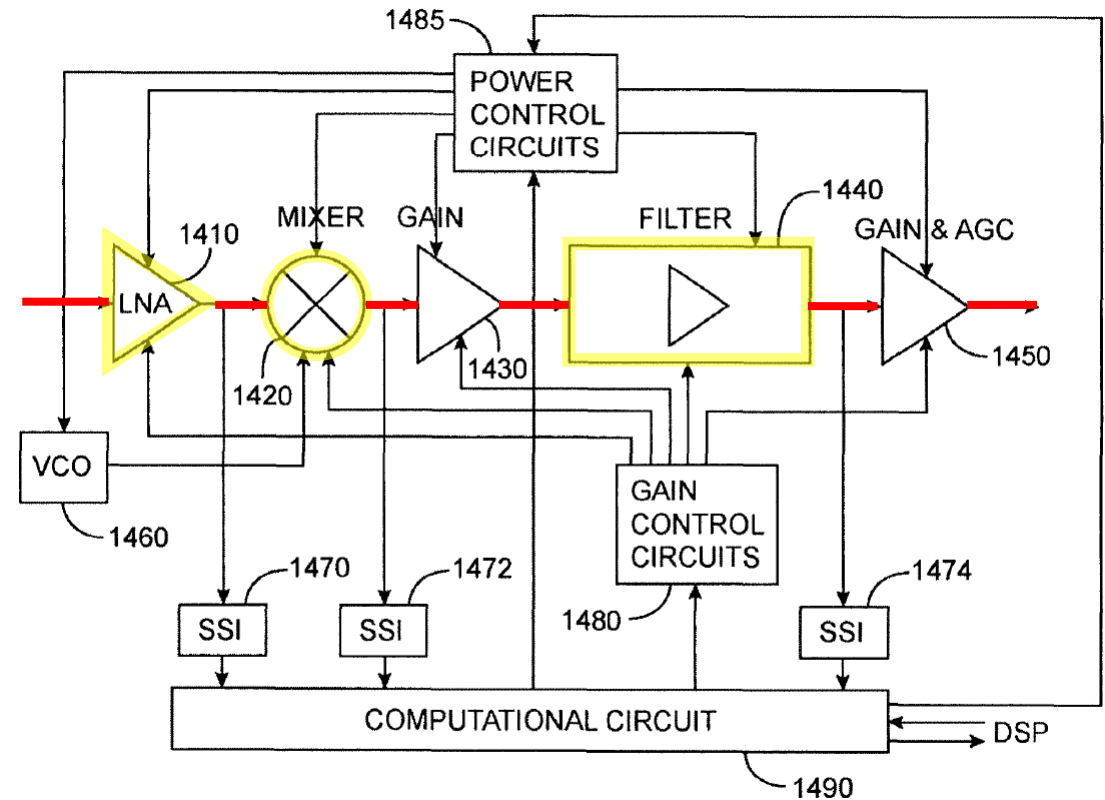


FIG. 14

Ex. 1001 ('698 IPR), claim 7, FIG. 14 (annotated)

3. *Rauhala's* Impedance Is “In the Receiver Signal Path”

Dr. Larson agreed that *Rauhala* shows a “signal path” in Figure 2.

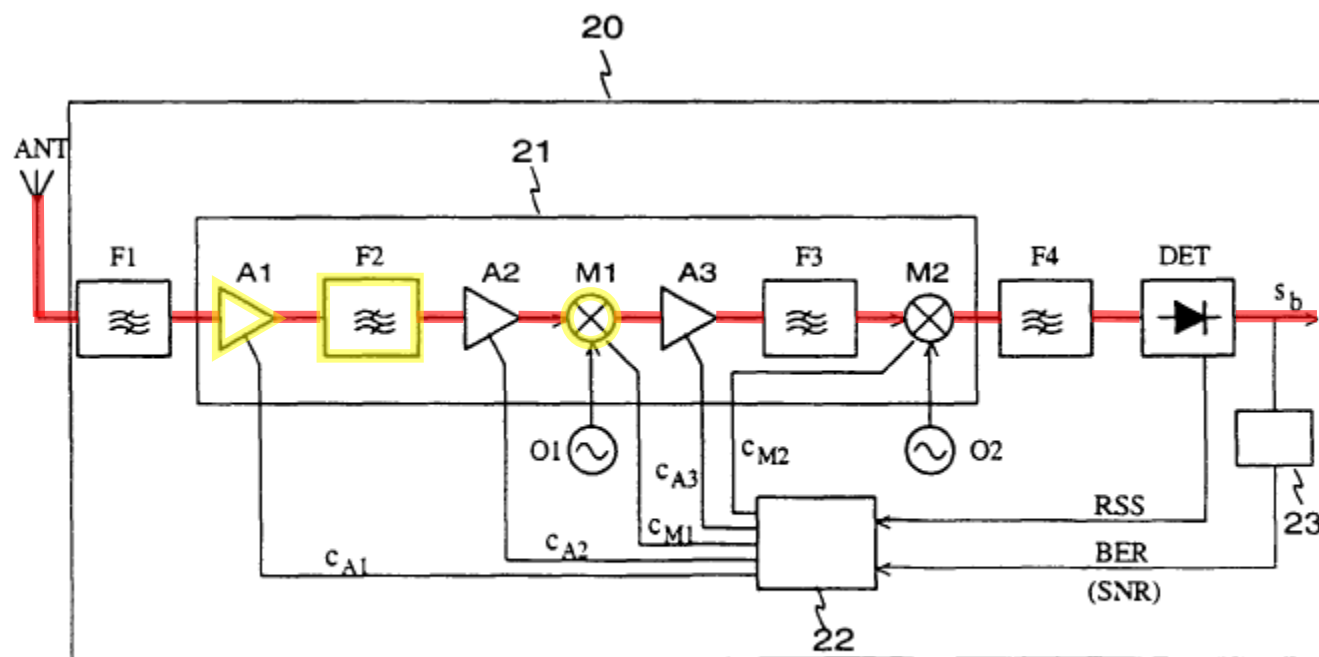


Fig. 2

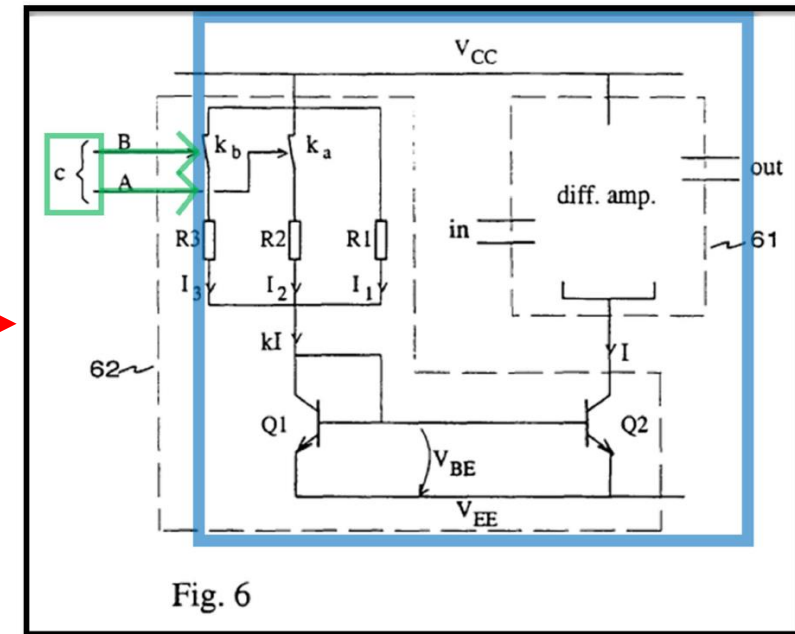
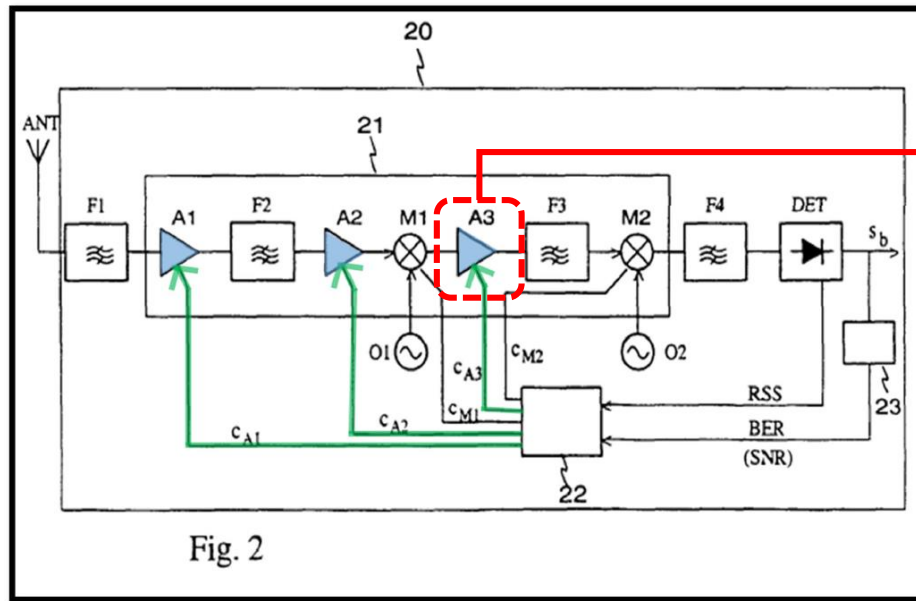
21 Q Okay. Now that collection of lines,
22 that's a signal path; correct?

2 A I would say yes, the signal goes from the
3 antenna through that chain that you just led me
4 through to the, to the final block which is labeled
5 DET.

Ex. 1001 ('697 IPR), FIG. 2; Ex. 1001 ('698 IPR), FIG. 2 (annotated); Ex. 1018, 25:21-26:5

3. *Rauhala's* Impedance Is “In the Receiver Signal Path”

It is undisputed that Figure 6 corresponds to any of amplifiers A1, A2, or A3.



Paper 20 ('697 IPR), pp. 16-19; Paper 19 ('698 IPR), pp. 13-16; Paper 22 ('697 IPR), pp. 21-24; Paper 21 ('698 IPR), pp. 23-26; Ex. 1004, Figs. 2, 6 (annotated)

3. *Rauhala's* Impedance Is “In the Receiver Signal Path”

Dr. Larson and Dr. Baker agree that circuit 61 of Figure 6 cannot function without circuit 62.

Dr. Larson:

21 A Right. So if you removed 62 and the line
22 the between 61 and 62 were just unconnected to

1 anything, then there would be no DC current going
2 through the differential amplifier and there would
3 be no gain.

Ex. 1018, 31:21-32:3

Dr. Baker:

37. If control circuit 62 were removed from Figure 6, the entirety of which represents any of amplifiers A1, A2, and A3 of Figure 2, as Dr. Larson alleges, current kI would no longer flow at least because control circuit 62 would be disconnected from the higher power supply voltage V_{cc} terminal. Likewise, if control circuit 62 were removed from Figure 6, the electrical conduit through which current I flows would not be connected to anything. As a result, current I would necessarily have a zero value if control circuit 62 were removed from Figure 6. Circuit 61 would perform no amplification function in the absence of control circuit 62.

Ex. 1019, ¶37

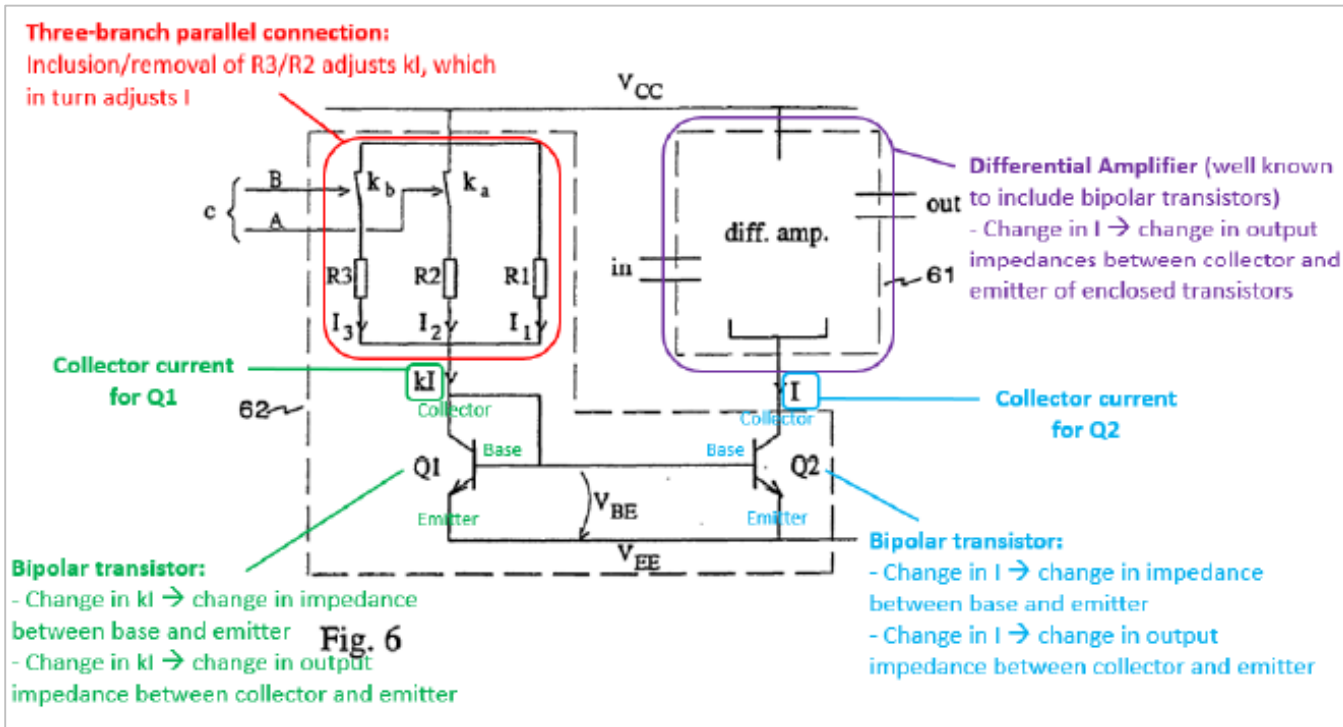
3. *Rauhala's* Impedance Is “In the Receiver Signal Path”

- PO’s “signal path” argument rests on a single, unsupported sentence of Dr. Larson’s declaration:

63. As can be seen from the figures, the bias current setting portions of circuit 62 of Figure 6 and circuit 72 of Figure 7 are not in the signal path, which proceeds from “in” to “out” of amplifier 61 in Figure 6, and proceeds from “signal” up to “mixer out” of mixer 71 in Figure 7. *See, e.g., id.*, Fig. 7 (annotated below):

3. *Rauhala's* Impedance Is “In the Receiver Signal Path”

Even accepting PO's improper dissection of Figure 6, an impedance in PO's “signal path” is still adjusted.



- PO does not dispute that an impedance is adjusted within differential amplifier 61 (purple).
- PO does not dispute that the entire differential amplifier 61 is in the signal path.

Paper 20 ('697 IPR), pp. 12-15, 23; Paper 19 ('698 IPR), pp. 20, 22-25; Paper 22 ('697 IPR), p. 24; Paper 21 ('698 IPR), pp. 26; Ex. 1018, 92:6-10, 96:2-16; Ex. 1004, Fig. 6 (annotated)

Roadmap

Overview

- '825 and '202 Patents (*Tsividis* Patents)
- *Rauhala* Prior Art Reference

Patentability Disputes

- *Rauhala* discloses “[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 “adjusting an impedance”...“in the receiver signal path”
- *Rauhala* discloses “comparing the desired signal strength to the interferer signal strength”
- *Rauhala* discloses “increasing impedance,” which “reduces a drive current”

4. *Rauhala* Teaches “Comparing” Signal Strengths

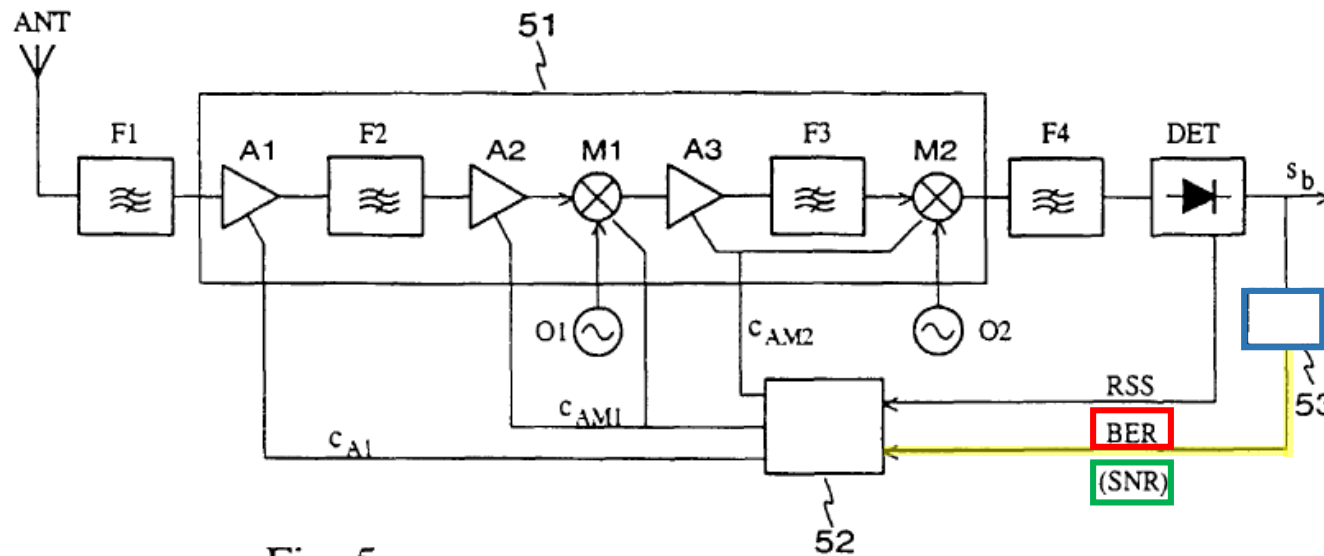


Fig. 5

- PO does not dispute that control unit 53 (blue) calculates a signal-to-noise ratio (SNR) (green) or a bit error ratio (BER) (red).
- PO does not dispute that a ratio is a comparison.

Pet., Paper 1 ('698 IPR), pp. 34-35; Paper 15 ('698 IPR), pp. 47-54; Ex. 1004, Fig. 5 (annotated)

4. *Rauhala* Teaches “Comparing” Signal Strengths

***Rauhala*’s introduction confirms that calculating SNR is the claimed “comparing.”**

Rauhala:

[0002] The quality of a signal in a radio receiver is degraded by noise and interference added to the signal on the transmission path, noise in the reception circuitry, as well as by noise and interference indirectly caused by other radio signals. The latter refers to a situation in which a signal on a neighboring channel, which momentarily is considerably stronger than the signal to be received, shifts the operating point of the high-frequency amplifier and/or mixer towards non-linearity and saturation. This degrades the signal-to-noise ratio at the amplifier output. In the mixer the increase of non-linearity will intensify intermodulation products and, thus, increase the overall noise and interference level.

Technical problem: signal quality degradation by “other radio signals”

[0006] The basic idea of the invention is as follows: A receiver monitors the signal strength on the receive channel and neighboring channels. In addition, the receiver can determine the quality of the detected signal by calculating its bit error ratio or signal-to-noise ratio. In 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. If 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. This may happen also if the bit error ratio or signal-to-noise ratio deteriorates down to a certain limit. Adjustment of the supply currents may take place in one or more steps.

Solution: use of SNR to quantify the degradation

Ex. 1004, ¶¶[0002], [0006]

4. *Rauhala* Teaches “Comparing” Signal Strengths

PO continues to assert that the “comparing” elements require more than is claimed.

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

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

determining the strength of the desired signal;

determining the strength of the interferer signal;

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

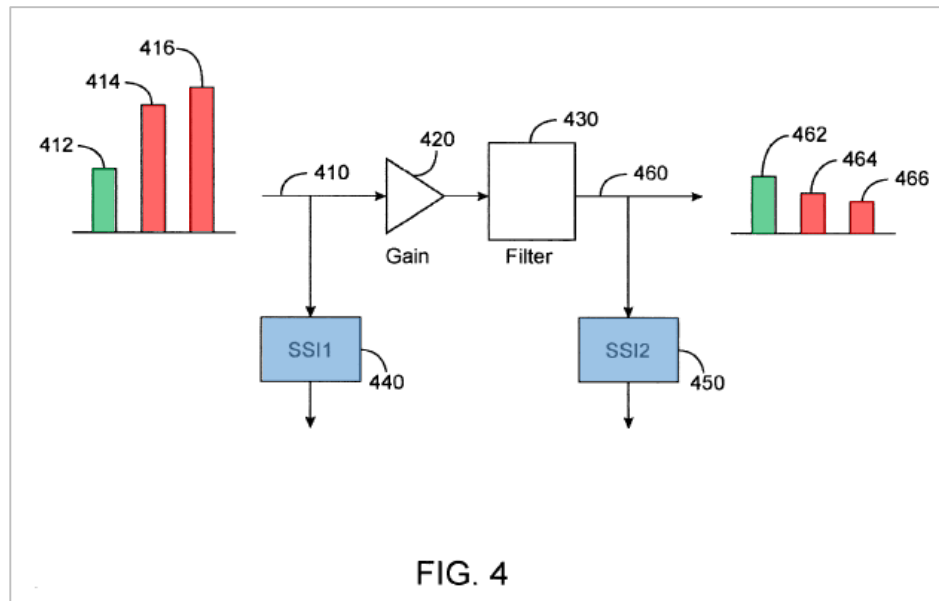
based on the comparison, when the plurality of circuits are functioning at better than the worst-case condition, dynamically adjusting one or more of an impedance, a bias or a gain of one or more of the plurality of circuits in the signal path, thereby controlling power dissipation.

Board: “The claims do not specify a particular way of comparing the strengths of the desired signals and interfering signals.”

Ex. 1001, claim 7; Paper 10 ('698 IPR), p. 24

4. *Rauhala* Teaches “Comparing” Signal Strengths

PO continues to assert that the “comparing” elements require more than is claimed.



- Specification does not actually describe the claimed “comparing”
- Signal strength indicators (blue) measure **cumulative** signal levels corresponding to sum of desired signals (green) and interferers (red)
- “The signal strength indicators 440 and 450 **do not** provide information as to the relative sizes of the desired and interfering signals.”

Ex. 1001, 6:52-7:5, FIG. 4 (annotated); Ex. 1019, ¶¶55-59

4. *Rauhala* Teaches “Comparing” Signal Strengths

Dr. Baker confirms that the “comparing” elements are not as limited as PO asserts.

59. Based on the lack of explanation in the '202 patent about how “comparing the strength of the desired signal relative to the strength of the interferer signal” would or could be accomplished, and that qualities of interferer signals can be “*deduced*,” a POSITA would not have understood the '202 patent to restrict the manner in which such “comparing” could be carried out. For example, a POSITA would not have understood the '202 patent to require direct comparison of a desired signal strength and an interferer signal strength. A POSITA also would not have understood the '202 patent to require any particular method of calculating when comparing. Further, a POSITA also would not have understood the '202 patent to exclude indirect comparisons of signal strengths and comparisons that require one or more steps of deduction.

Roadmap

Overview

- '825 and '202 Patents (*Tsividis* Patents)
- *Rauhala* Prior Art Reference

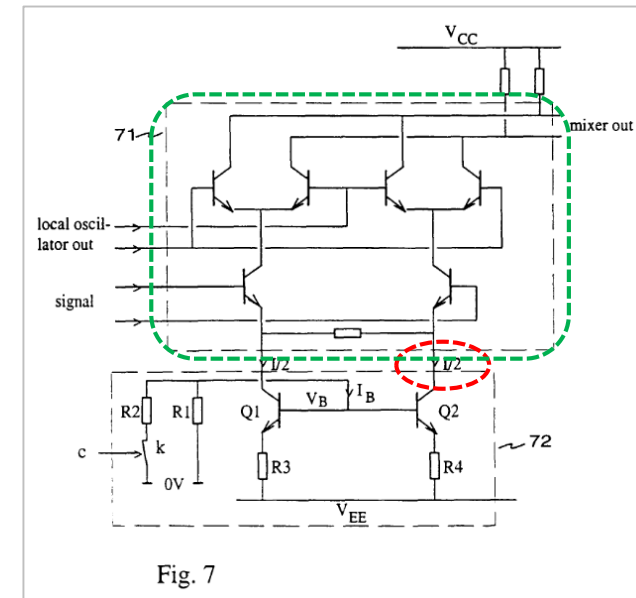
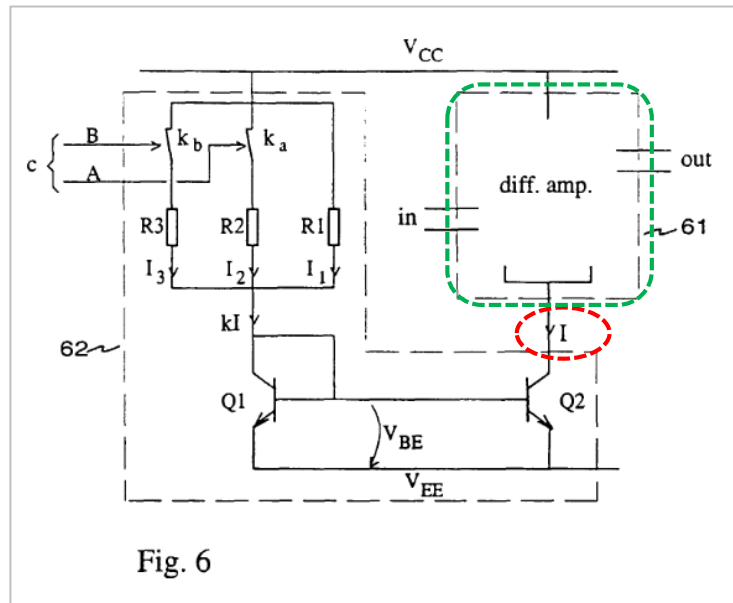
Patentability Disputes

- *Rauhala* discloses “[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 “adjusting an impedance”...“in the receiver signal path”
- *Rauhala* discloses “comparing the desired signal strength to the interferer signal strength”
- *Rauhala* discloses “increasing impedance,” which “reduces a drive current”

5. *Rauhala* discloses reducing a “drive current.”

Rauhala's circuits shown in Figures 6 and 7 include a drive current.

Drive current = current that drives a component or a load in a circuit



Pet., Paper 1 ('697 IPR), pp. 48-49; Paper 20 ('697 IPR), pp. 24-26; Ex. 1002 ('697 IPR), ¶¶81-83; Ex. 1019, ¶¶39-42; Ex. 1001 ('697 IPR), FIGS. 6-7 (annotated)

5. *Rauhala* discloses reducing a “drive current.”

PO improperly attempts to narrow “drive current” beyond what is claimed or disclosed.

- PO claims that the “’825 Patent clearly explains what a drive current is.”
- The specification never defines “drive current” or otherwise explains what it is.
- The specification only refers to “drive current” as an object acted upon—e.g., reduced.

Paper 20 (’697 IPR), p. 25; Ex. 1001 (’697 IPR)

5. *Rauhala* discloses reducing a “drive current.”

PO improperly attempts to narrow “drive current” beyond what is claimed or disclosed.

As discussed above in Section II.C, during prosecution of the parent '330 Patent, supply bias currents were distinguished from switching drive currents. EX2012, 163 (“A bias current is not the same as a switching current. ... (See for example, the pending application, Figure 6 and related discussion.)”). The '825 Patent uses “drive current” to refer to currents that drive switching signal loads.

- Claim 8 does not include the term “switching current.”
- The specification does not include any of “switching current,” “switching drive current,” or “switching signal loads.”

Paper 15 ('697 IPR), p. 55; Ex. 1001 ('697 IPR)

5. *Rauhala* discloses reducing a “drive current.”

The specification repeatedly refers to “drive currents” and “bias currents” as interrelated.

Excerpts of the '825 Patent's specification:

7:47-49

FIG. 6 is an example of how a circuit's impedances may be scaled to reduce **drive currents**, and, depending on the circuit configuration used, associated **bias currents** as well.

9:56-62

allowed for proper signal reception. Accordingly, one or more impedance in the function block 920 may be increased, such that the noise floor 943 rises as shown in FIG. 9C. In this way one or more of the driving currents in the function block 920 may be reduced. Similarly, since the **drive current** is reduced, one or more **bias current** may also be reduced, depending on the exact circuit configuration.

10:18-21

constant. Again, the noise floor is increased by increasing impedances in the function block 1020. This reduces the required **drive current**, and may also allow for a reduction in **bias currents**.

Claim 7

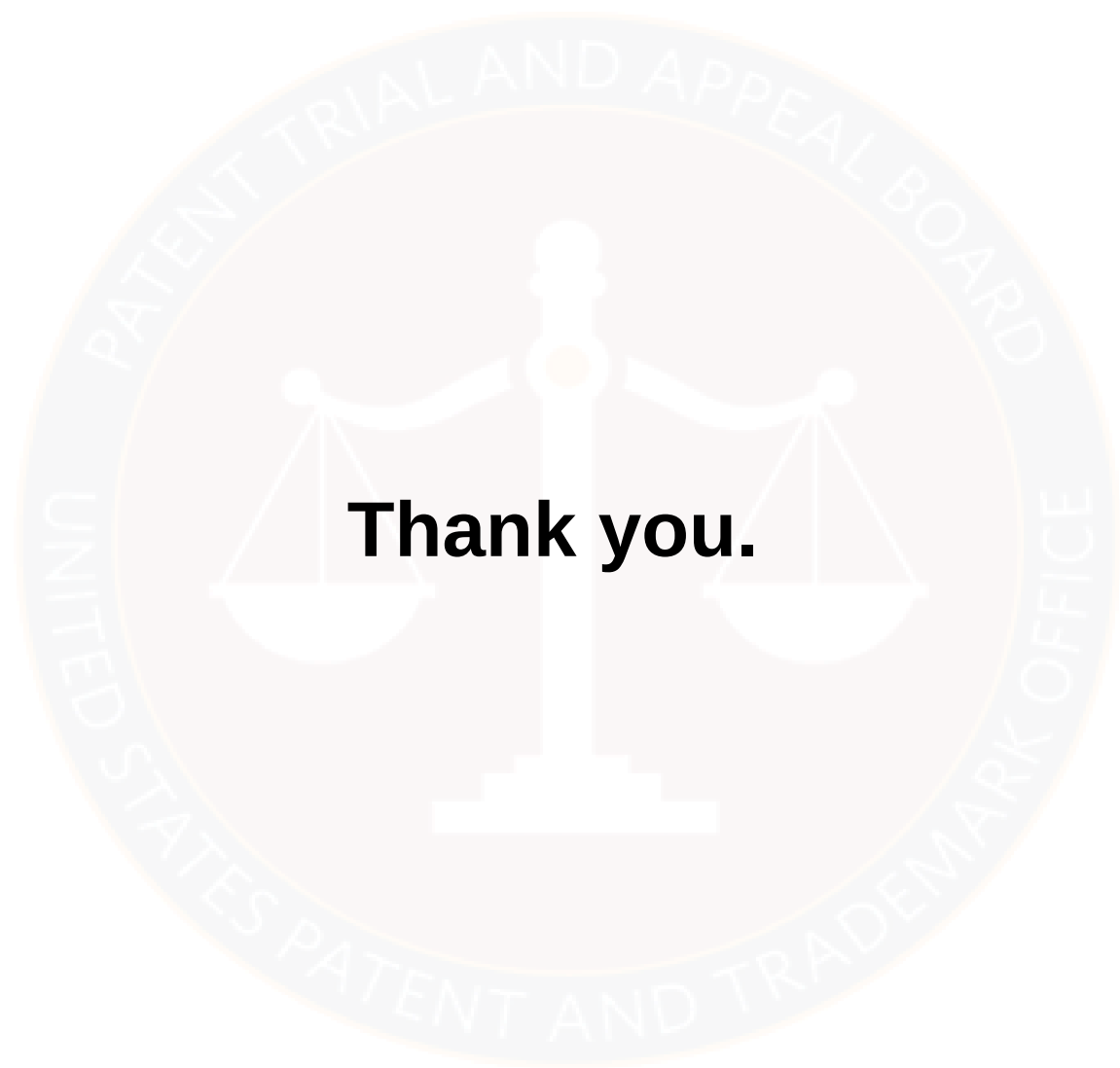
wherein increasing the impedance of the circuit reduces a **drive current** of the circuit and reduces the associated **bias current** of the circuit.

All indicate impedance can be increased to reduce bias current **as well as** drive current.

Paper 20 ('697 IPR), pp. 24-25; Ex. 1019, ¶¶67-68; Ex. 1001 ('697 IPR), 7:47-49, 9:56-62, 10:18-21; claim 7

5. *Rauhala* discloses reducing a “drive current.”

- Though not explicitly framed as a claim construction argument, PO essentially argued in its Response for a narrowing construction of “drive current.”
- To the extent the Board considers any of Petitioners’ arguments or evidence submitted with the Reply new, any such arguments or evidence were submitted to address PO’s new claim construction position.



Thank you.