

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner

v.

THETA IP, LLC,
Patent Owner

Case No. IPR2024-00817
Patent No. 10,129,825

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

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I. INTRODUCTION

Apple Inc., (“Petitioner”) respectfully requests *inter partes* review (“IPR”) of all claims (“Challenged Claims”) of U.S. Patent No. 10,129, 825 (“’825 Patent”).

II. THE ’825 PATENT

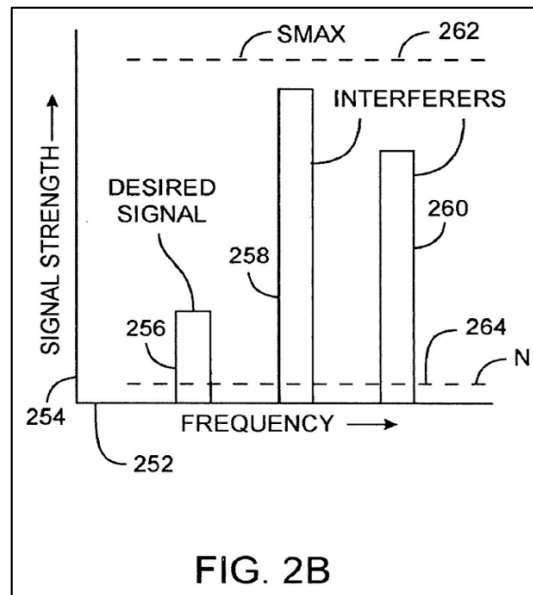
A. The ’825 Patent’s Alleged Invention

The ’825 Patent describes methods for reducing power dissipation in wireless transceivers, targeting the problem of battery drain in portable devices such as laptops and handheld devices. ’825 Patent (Ex. 1001), 1:19-33. The patent explains that prior art transceivers were designed to function properly under “worst-case operating conditions”—when the strength of a desired signal is low and the strength of interfering signals is high. *Id.*, 1:29-40. When better than worst-case conditions exist (e.g., high desired signal and/or low interferers), the alleged invention ***reduces “receiver circuit currents”***¹ . . . below what is necessary for the worst case condition[,]” ***reducing power dissipation*** and increasing battery life. *Id.*, 1:45-51.

The ’825 Patent connects the concept of power dissipation to the “dynamic range” of the receiver. *Id.*, 5:31-65. The dynamic range is defined on the upper end by the maximum signal strength that can be recovered—referred to as *S*_{max}—and on the lower end by the noise floor (*N*)—the level approaching which desired signals may be misinterpreted, causing bit-errors. *Id.*, 6:4-23. Fig. 2B below illustrates the

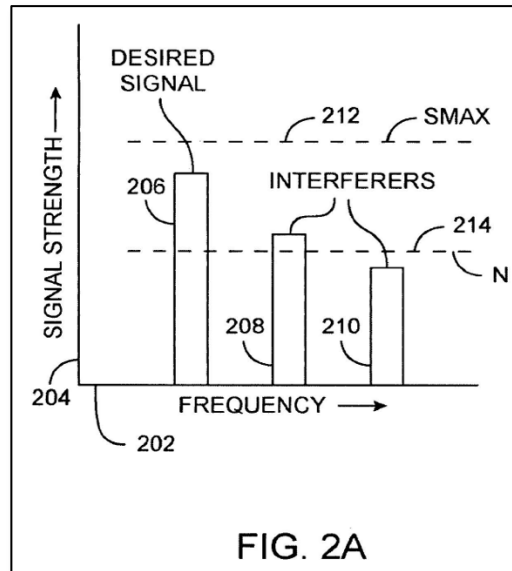
¹ All emphases added unless otherwise noted.

dynamic range required under worst-case conditions. Here, (1) the desired signal strength is low, requiring a low noise floor (N), and (2) the interferers are strong, requiring a large S_{max} ²:



Id., Fig. 2B, 5:54-65 (describing the same). Fig. 2A below illustrates the dynamic range required under better than worst-case conditions. Here, (1) the desired signal strength is high, allowing for an increased noise floor (N), and (2) the interferers are relatively weak, allowing S_{max} to be lowered without risking corruption from intermodulation distortion:

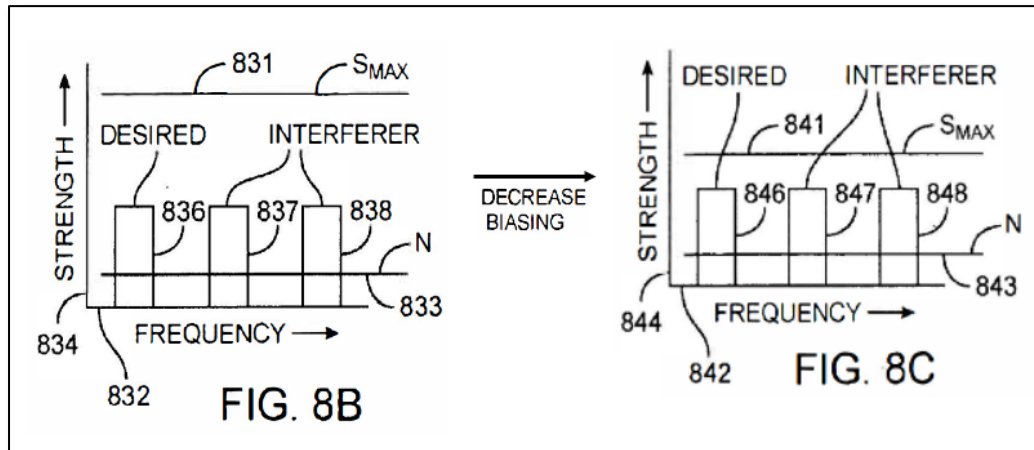
² If S_{max} falls below the strength of interferer signals, intermodulation distortion may corrupt reception of the desired signal. '825 Patent, 6:31-49, Fig. 3.



Id., Fig. 2A, 5:36-53 (describing the same).

The '825 Patent identifies three variables used to adjust the dynamic range, saving power when better than worst-case conditions are experienced: DC bias current, signal path impedance, and gain.

First, a DC bias current may be used to lower Smax, saving power when conditions permit accommodating a lower maximum signal strength. *Id.*, 6:21-23, 9:8-15. Figs. 8B and 8C illustrate saving power by decreasing bias current, which lowers Smax, when the desired signal strength and interferer signal strengths permit a lower Smax:

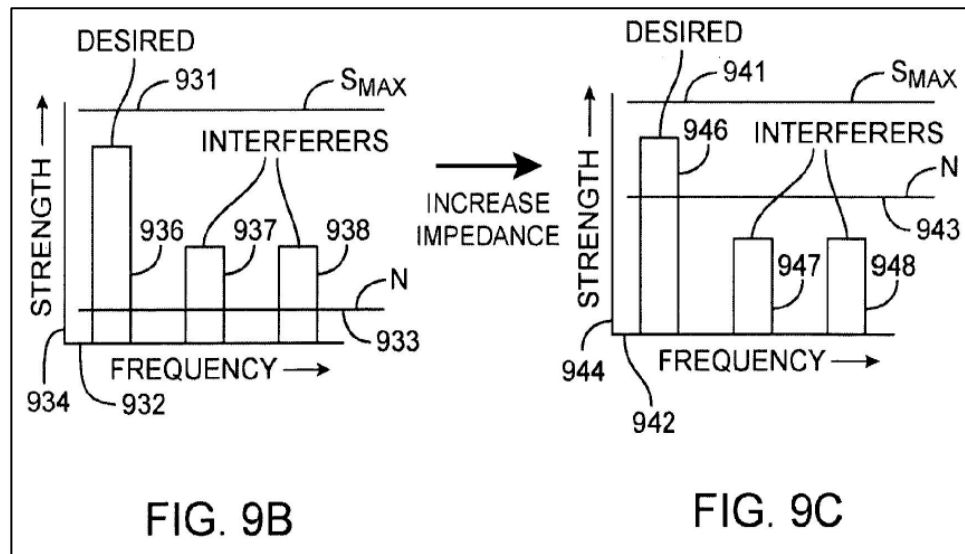


Id., Figs. 8B-8C.

Second, increasing the signal path impedance permits a lower AC drive current to be used in the RF signal path, saving power. *Id.*, 6:20-21, 7:47-62. In one example, illustrated in Fig. 6, an RC filter circuit is “scaled,” doubling the signal path impedance, which allows the “circuit’s required drive current” to be cut in half. *Id.*, 7:47-62. Although the patent does not explain *why* increasing the signal path impedance also increases the noise floor (N),³ the patent repeatedly notes that the signal path impedance can be increased to save power by lowering drive current only if conditions permit increasing the noise floor (N). *Id.*, 6:10-12 (“Circuit impedances and currents are set such that the noise floor 264 is sufficiently low for an acceptable

³ A POSITA would recognize that resistor thermal noise is often a dominant source of noise in an RC filter, so increasing the impedance by increasing the signal path resistance as taught by the ’825 Patent (’825 Patent, 7:47-55) would indeed increase the noise introduced by the filter. *Dec.* (Ex. 1003), ¶33.

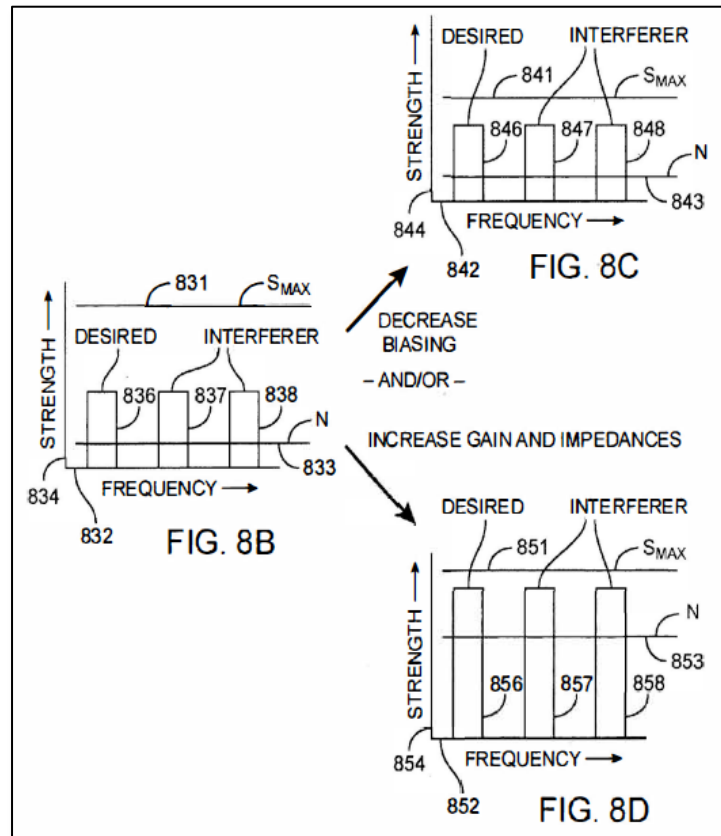
bit-error rate[.]”), 8:11-12 (“[I]mpedances are increased, which raise the noise floor.”), 9:22-26 (teaching that the noise floor is increased “by increasing one or more impedance in function block 810, such that drive currents inside that block are reduced.”). Figs. 9B and 9C illustrate saving power by increasing impedance, which increases noise floor (N), when the desired signal strength and interferer signal strengths permit such a noise floor increase:



Id., Figs. 9B-9C.

The third variable used to adjust a circuit’s dynamic range is gain. While gain does not directly correspond to power savings, it does provide a mechanism by which all signals—desired and interferers—can be increased, creating room for power savings to be realized by increasing impedance. As illustrated in Figs. 8B-8D below, when the desired signal and interferer signals are all low, power savings can be realized by (1) lowering the bias current, which lowers S_{max} , as shown in Fig.

8C, (2) increasing gain and increasing impedance, which increases noise floor (N), as shown in Fig. 8D, or (3) all three—lowering the bias current, increasing gain, and increasing impedance:



Id., Figs. 8B-8D, Fig. 12, 10:60-11:7 (explaining that a combination of all three adjustments may be used when the desired signal and interferer signals are all low).

In sum, the '825 Patent teaches saving power when signal conditions are better than worst-case by decreasing the dynamic range via (1) decreasing the DC bias current, (2) increasing signal path impedance, and/or (3) increasing gain.

B. The '825 Patent's Prosecution

The '825 patent was filed as Application No. 15/080,432 (“the '432 application”) on March 24, 2016 and is related, through a series of continuations, to U.S. Patent No. 7,010,330 (“the '330 Patent”). The '330 Patent was filed on February 23, 2004, claiming priority to Provisional Application Nos. 60/451,229 and 60/451,230, both filed March 1, 2003. For this proceeding, Petitioner applies March 1, 2003, as the priority date for the Challenged Claims.

The original submitted claims were subject to multiple office actions and significant amendments. *See, e.g., '825 Patent File History* (Ex. 1002), 90-108 (first office action), 252-66 (amendments and arguments responsive to first office action), 275-85 (supplemental amendment and argument), 292-324 (final office action). In a Request for Continued Examination (RCE) submitted on March 3, 2018, the applicant submitted entirely new claims. *Id.*, 331-37. Distinguishing the prior art advanced in earlier office actions, the applicant noted that *the newly submitted claims* are no longer “directed to the detailed circuit design” of the earlier claims, “but rather *[are] directed to when, and how . . . parameters, particularly bias and impedance, should be controlled based on the signal strength of an interferer signal and the signal strength of a desired signal.*” *Id.*, 338-40.

A Non-Final Office Action issued on April 13, 2018, rejecting the new claims on the ground of nonstatutory double patenting. *Id.* at 355-61. Applicant filed a

terminal disclaimer on June 1, 2018, and the claims were allowed with no further actions.

C. Claim Construction

In this proceeding, claims are interpreted under the same standard applied by Article III courts (i.e., the *Phillips* standard). 37 C.F.R. § 42.100(b); 83 Fed. Reg. 197 (Oct. 11, 2018); *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*). Petitioner applies the plain and ordinary meaning of all claim terms as understood by a POSITA for all terms not expressly construed below. Petitioner does not waive any argument in any litigation that claim terms in the '825 Patent are indefinite or that additional terms might need construction in a different proceeding.

The parties are disputing the correct construction of a number of terms in parallel litigation. As explained in the detailed mapping below, the Proposed Grounds satisfy either party's proposal for the disputes in the below chart:⁴

Claim Term	Theta's Constructions	Apple's Constructions
"impedance"	Plain and ordinary	Plain and ordinary meaning

⁴ *Joint Markman Statement* (Ex. 1008). Although alternative positions have been exchanged in the parallel litigation for various terms, this chart captures the current state of parties' primary positions. Further, although the Court has yet to issue a *Markman* order, in advance of the *Markman* hearing, the Court preliminarily concluded all disputed claim language should be accorded its plain and ordinary meaning.

	meaning, but if construed, should be construed as “opposition to the flow of alternating current”	
“drive current”	Plain and ordinary meaning	the current that carries a signal through a load”
“worst-case”	Plain and ordinary meaning	“desired signal strength is low and interferer signal strength is high”

The parties also dispute the meaning of “signal path.” In the parallel litigation, Apple argued that this phrase excludes the “digital signal processing” block, and Theta argued that no such exclusion is proper. *See Theta Sur-Reply* (Ex. 1009), 1-3 (arguing that the signal path “can be both analog or digital at different points in the signal path,” and as such, “is not limited to only analog components”).

For purposes of this proceeding, Petitioner proposes this Board adopt Patent Owner’s interpretation of the signal path. *See Western Digital Corporation v. SPEX Technologies, Inc.*, IPR2018-00084, Paper 14, *11 (PTAB Apr. 25, 2018); *see also General Electric v. Vestas*, IPR2018-00928, Paper 9, *16-17 (PTAB Nov. 5, 2018); *10x Genomics, Inc. v. Bio-Rad Laboratories, Inc.*, IPR2020-00086, Paper 8, *19 (PTAB Apr. 27, 2020) (finding “judicial efficiency will be enhanced by allowing Petitioner to

rely upon a claim construction that Patent Owner is relying upon in the related district court litigation to assert infringement of the challenged patent”).

D. A Person of Ordinary Skill in the Art

As of March 1, 2003, a person of ordinary skill in the art (POSITA) would have had a master’s degree in electrical engineering or the equivalent, and two or more years of experience with wireless communications devices. *Dec.*, ¶¶39-41. Additional education or experience might substitute for the above requirements. *Id.*

III. REQUIREMENTS UNDER 37 C.F.R. § 42.104

A. Standing Under 37 C.F.R. § 42.104(a)

Petitioner certifies the ’825 Patent is eligible for IPR and Petitioner is not barred or estopped from requesting IPR challenging the claims of the ’825 Patent. Petitioner is not the owner of the ’825 Patent, has not filed civil action challenging the validity of any claim of the ’825 Patent, and this Petition is filed less than one year after Petitioner was served with a complaint alleging infringement of the ’825 Patent.

B. Identification of Challenge Under 37 C.F.R. § 42.104(b)

Petitioner requests the Challenged Claims be found unpatentable on the following grounds:

Proposed Ground of Unpatentability	Exhibits
Ground 1: Claims 1-8 are obvious⁵ under §103(a) over “Adaptive Analog IF Signal Processor for a Wide-Band CMOS Wireless Receiver” by Behbahani et al. (“<i>Behbahani</i>”) in view of “A 2.4-GHz Low-IF Receiver for Wideband WLAN in 0.6μm CMOS – Architecture and Front-End” by Leete et al. (“<i>Leete</i>”) and in further view of “A Broad-Band Tunable CMOS Channel-Select Filter for a Low-IF Wireless Receiver by Tan et al. (“<i>Tan</i>”).	Ex. 1004 Ex. 1005 Ex. 1006

IV. OVERVIEW OF THE PRIOR ART

A. Behbahani

Behbahani published in August 2001. *Behbahani* (Ex. 1004), 1205. Petitioner’s declarant, Dr. Asad A. Abidi, is listed as a co-author on *Behbahani* and was the supervising faculty member overseeing the research underlying *Behbahani*. *Dec.*, ¶41. Dr. Abidi explains that, as indicated on the face of the article, it was made publicly available in the August 2001 IEEE Journal of Solid-State Circuits, and

⁵ In the parallel litigation, Theta contends it has evidence of secondary indicia of nonobviousness and stated that it intends to supplement the record beyond the minimal responses provided to date. Petitioner does not address those partial contentions herein, but reserves its right to fully respond to any evidence or arguments advanced in this proceeding.

therefore qualifies as prior art under 35 U.S.C. §102(b) (pre-AIA). *Id.*; *see also* *Munford Dec.* (Ex. 1010), ¶¶6-9.

Behbahani was cited on the face of the '825 Patent, but was not discussed by the Examiner during prosecution. As set forth below in Section VI, a discretionary denial under § 325(d) is not warranted on this record.

Behbahani teaches a wireless receiver that implements an “adaptive dynamic range” method to save power by decreasing the dynamic range when conditions are better than worst case:

This receiver implements *adaptive dynamic range* in the IF [Intermediate Frequency] section. ***Most wireless systems are designed for the worst case***; that is, the dynamic range is specified for the desired signal at a minimum detectable level, accompanied by the largest anticipated interferers. ***In practice, the receiver only infrequently needs this high instant DR [dynamic range]. DR is obtained at the expense of a disproportionate rise in power consumption*** An important idea here, which has also been noted elsewhere [4], is that ***providing no more than the required DR at any given time lowers the average power consumption.***

Behbahani, 1205.

Two separate adaptive techniques are combined to accomplish *Behbahani*'s goals—(1) step-based DR and (2) sliding DR. *Id.*, 1206-07. For *Behbahani*'s step-based adaptive DR, the receiver switches/steps between two scaled filters. *Id.* A

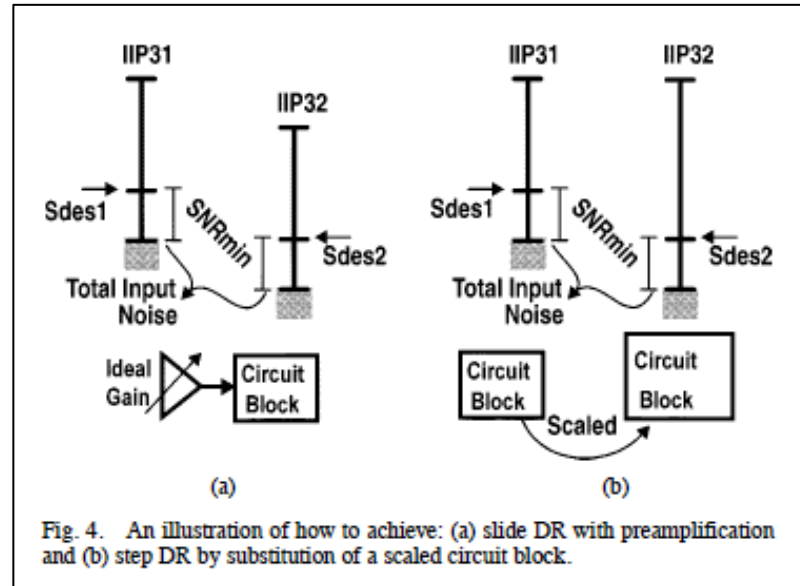
“high-power filter” is used during the range⁶ of worst-case signal conditions (i.e., low desired signal and high interferers), and a separate “low-power filter” is used for the range of conditions that are better than worst-case. *Id.* (“Since the worst-case scenario is infrequent, the low-power filter determines the average RX power consumption.”). As set forth in the proposed grounds below, switching from the high-power filter to the low-power filter satisfies both power saving mechanisms described and claimed in the Challenged Patent, (1) lowering the bias current and (2) increasing the signal path impedance, lowering the drive current.

When the low-power filter is utilized during better than worst-case conditions, *Behbahani’s* sliding DR technique uses a gain stage in advance of the low-power filter to slide a smaller DR up or down based on strengths of the received signals. *Id.*, 1206-07.

Below, Fig. 4(a) illustrates a gain stage used to slide a small DR (that results from using the low-power filter) to accommodate specific signal strength conditions,

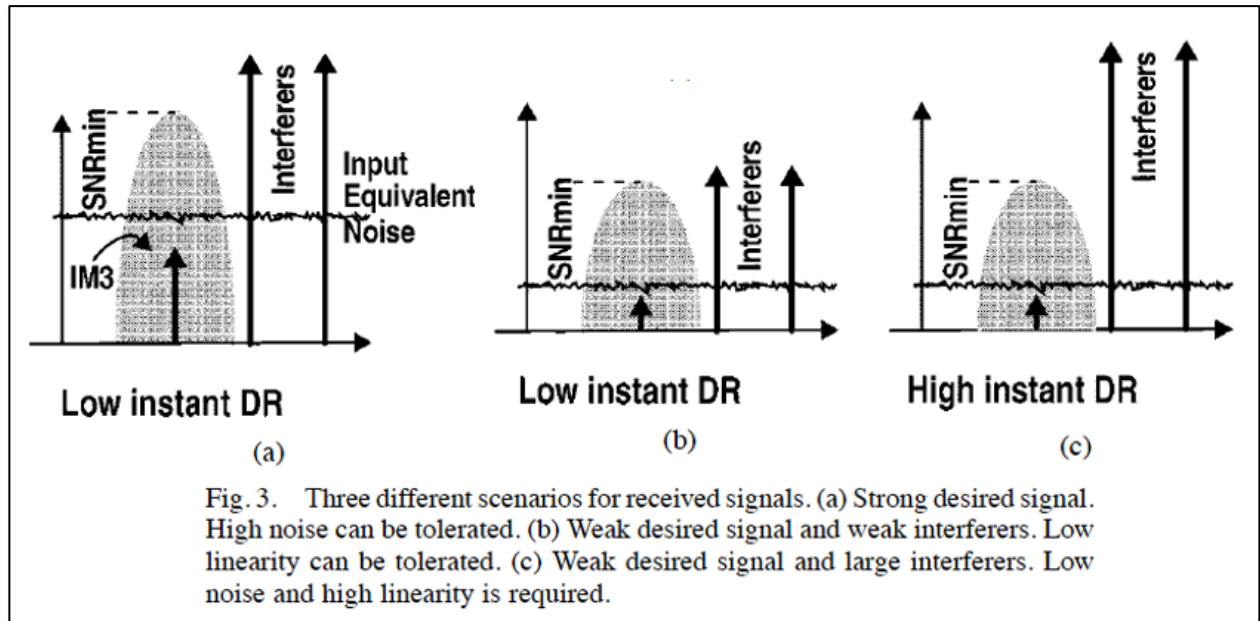
⁶ Petitioner’s declarant, Dr. Abidi, explains that worst-case conditions exist when the desired signal is very low and the interferers are very high, but notes that these “worst-case” conditions do capture a range of scenarios in which low-desired and high-interferer signals are received, rather than a single discrete “worst-case” condition. *Dec.*, 43.

and Fig. 4(b) illustrates switching from the low-power filter to high-power filter to expand the DR when worst-case conditions are encountered:



Id., 1206.

Behbahani describes three different desired and interferer signal scenarios below in Figure 3. Figs. 3(a) and Fig. (b) depict better than worst-case conditions in which “receiver dynamic range may be modest” and the gain-based sliding DR approach is sufficient. *Id.* Fig. 3(c) depicts worst-case conditions (i.e., low desired signal and high interferers), requiring the system to expand the dynamic range by switching in the high-power filter. *Id.*



Id., Fig. 3 (rearranged).

Behbahani, like the '825 Patent, discloses a wireless receiver architecture and design intended to achieve reduced power dissipation. *Compare '825 patent*, Abstract, 1:19-21, 2:41-62, 6:4-30, *with Behbahani*, Abstract, 1205. Thus, *Behbahani* is in the same field of endeavor as the '825 Patent. *Dec.*, ¶¶41-48.

Behbahani is also reasonably pertinent to certain problems addressed by the '825 Patent such as accommodating different signal conditions by dynamically adjusting dynamic range. *Compare '825 Patent*, 5:31-65, 6:4-30, *with Behbahani*, Abstract, 1205, Fig. 3; *Dec.*, ¶¶41-48. Therefore, *Behbahani* is analogous art to the '825 Patent.

B. Leete

Leete was published in December 2000. *Leete* (Ex. 1005), 1908. Petitioner's declarant, Dr. Asad A. Abidi, is listed as a co-author on *Leete* and was the supervising faculty member overseeing the research underlying *Leete*. *Dec.*, ¶49. Dr. Abidi explains that, as indicated on the face of the article, it was made publicly available in the December 2000 IEEE Journal of Solid-State Circuits, and therefore qualifies as prior art under 35 U.S.C. §102(b) (pre-AIA). *Id.*; *see also Munford Dec.*, ¶¶14-17. *Leete* was not cited or considered during prosecution of the '825 patent.

Leete is intended to be used in conjunction with *Behbahani*. Specifically, *Leete* provides details about the RF circuitry not described in *Behbahani* itself. *Behbahani*, 1205. In one example, *Leete* describes the RF front-end, including a low noise amplifier (LNA) and an RF downconverter (including mixers) that converts the RF signal to an intermediate frequency (IF). *Leete*, 1908. As discussed in the Proposed Grounds below, *Behbahani* focuses on the IF and digital portions of the receiver, effectively picking up where *Leete* leaves off. *Dec.*, ¶50.

Like the '825 Patent, *Leete* teaches a wireless receiver architecture and design intended to achieve reduced power dissipation. *Compare* '825 patent, Abstract, 1:19-21, 2:41-62, 6:4-30, *with Leete*, Introduction, 1908, Fig. 1. Thus, *Leete* is in the same field of endeavor as the '825 Patent. *Dec.*, ¶¶49-51.

Leete is also reasonably pertinent to certain problems addressed by the '825 Patent, such as accommodating a wide dynamic range, low power consumption, and minimizing noise in the components of the wireless receiver architecture. *Compare '825 Patent*, 5:31-65, 6:4-30, *with Leete*, 1908, 1910. *Dec.*, ¶¶49-51. Therefore, *Leete* is analogous art to the '825 Patent.

C. Tan

Tan published in April 2000. Petitioner's declarant, Dr. Asad A. Abidi, is listed as a co-author on *Tan* and was the supervising faculty member overseeing the research underlying *Tan*. *Dec.*, ¶52. Dr. Abidi explains that, as indicated on the face of the article, it was made publicly available in the April 2000 IEEE Journal of Solid-State Circuits, and therefore qualifies as prior art under 35 U.S.C. §102(b) (pre-AIA). *Id.*; *see also Munford Dec.*, ¶¶10-13.

Tan was cited on the face of the '825 Patent, but was not discussed by the Examiner during prosecution. As set forth below in Section VI, a discretionary denial under § 325(d) is not warranted on this record.

Behbahani cites *Tan* to describe the details of the bandpass filter used in *Behbahani*: "The details of the BPF design are presented elsewhere [7]." *Behbahani*, 1210. The citation [7] in *Behbahani* is to *Tan*. The Proposed Grounds rely upon certain details in *Tan* to explain the operation of the low-power and high-power filters in *Behbahani*.

Like the '825 Patent, *Tan* teaches a wireless receiver architecture and design intended to achieve reduced power dissipation. *Compare* '825 patent, Abstract, 1:19-21, 2:41-62, 6:4-30, with *Tan*, Introduction, 476. Thus, *Tan* is in the same field of endeavor as the '825 Patent. *Dec.*, ¶¶52-54.

Tan is also reasonably pertinent to certain problems addressed by the '825 Patent, such as accommodating a wide dynamic range, low power consumption, and minimizing noise in the components of the wireless receiver architecture. *Compare* '825 Patent, 5:31-65, 6:4-30, with *Tan*, 476. *Dec.*, ¶¶52-54. Therefore, *Tan* is analogous art to the '825 Patent.

V. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: *Behbahani* in view of *Leete* in further view of *Tan*

1. Claim 1

Claim 1(Pre): “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:”

To the extent the preamble is limiting, *Behbahani* discloses a method for power dissipation reduction in a receiver of a wireless transceiver⁷ of a battery powered portable wireless device, which results in a corresponding increase in battery life of the device.

⁷ *Behbahani*'s receiver is part of a wireless transceiver. See limitation [1(a)].

First, *Behbahani*'s focus is saving power in a wireless device, teaching that its wireless receiver implements an "adaptive dynamic range" method to save power by decreasing the dynamic range when conditions are better than worst case:

This receiver implements *adaptive dynamic range* in the IF section. *Most wireless systems are designed for the worst case*; that is, the dynamic range is specified for the desired signal at a minimum detectable level, accompanied by the largest anticipated interferers. *In practice, the receiver only infrequently needs this high instant DR [dynamic range]. DR is obtained at the expense of a disproportionate rise in power consumption* An important idea here, which has also been noted elsewhere [4], is that *providing no more than the required DR at any given time lowers the average power consumption.*

Behbahani, 1205.

Second, although *Behbahani* does not expressly state that its wireless receiver is intended for a "battery powered portable wireless device," for a number of reasons, a POSITA would have understood that the reference fairly conveys a wireless receiver intended for a battery powered portable wireless device and would have been motivated to implement the described wireless receiver in such a device. *Dec.*, ¶¶58-68. *Behbahani*'s receiver is designed for the 2.4 GHz WLAN communications. *Behbahani*, 1205 (discussing the "2.4-GHz ISM band"), 1206 (referring to the receiver as a "WLAN receiver"); *Dec.*, ¶¶60-61 (explaining that the receiver described is in fact designed for 2.4GHz WLAN (Wireless Local Area Network)

communications). Confirming this focus on 2.4 GHz WLAN communications, *Behbahani* references two other papers ([1] and [5]) that describe different aspects of the same receiver research. *Behbahani*, 1205 (noting that the image rejection issues associated with the research are “addressed in detail elsewhere [1]” and that the” basic RX architecture has been described in detail elsewhere [5]”). References [1] and [5] largely overlap in authorship with *Behbahani* and do in fact describe different aspects of the same research. *Dec.*, ¶¶61. Each of these references also indicate in their titles that the research targets 2.4 GHz WLAN communications. *Behbahani*, 1216. At the time of *Behbahani*, and today, one of the most common forms of 2.4Ghz WLAN communications is Wi-Fi. *Dec.*, ¶¶62 (explaining that Wi-Fi communications most commonly used the 2.4 GHz radio band). Although Wi-Fi transceivers were not used exclusively in battery powered mobile/portable devices, it was a dominant means of wireless communication in such devices at the time. *Dec.*, ¶¶63-64 (noting that Wi-Fi was a dominant form of high bandwidth, wireless connectivity for battery powered mobile devices such as laptops and PDAs). Confirming that *Behbahani* was in fact contemplating such mobile use for its Wi-Fi receiver, the Introduction notes that the described receiver solves problems associated with “mobile systems[.]” *Behbahani*, 1205; *Dec.*, ¶¶65-66. Further, a POSITA would have understood from *Behbahani*’s focus on power savings that battery powered mobile devices were the primary target of the disclosed receiver

technology and would have been motivated to use the technology to preserve battery life in such devices. *Dec.*, ¶¶65-66 (noting that power savings is a key consideration for battery-powered wireless devices and confirming that the research described in *Behbahani* did in fact target preserving battery life in battery powered mobile devices).

Finally, a POSITA would have understood that *Behbahani's* method for lowering the average power consumption in the receiver results in power dissipation reduction, and in a corresponding increase in battery life of the battery powered portable wireless device. *Dec.*, ¶67. Indeed, the whole point of saving power pursuant to *Behbahani's* teachings is to increase battery life of the wireless device within which the receiver is installed. *Id.*

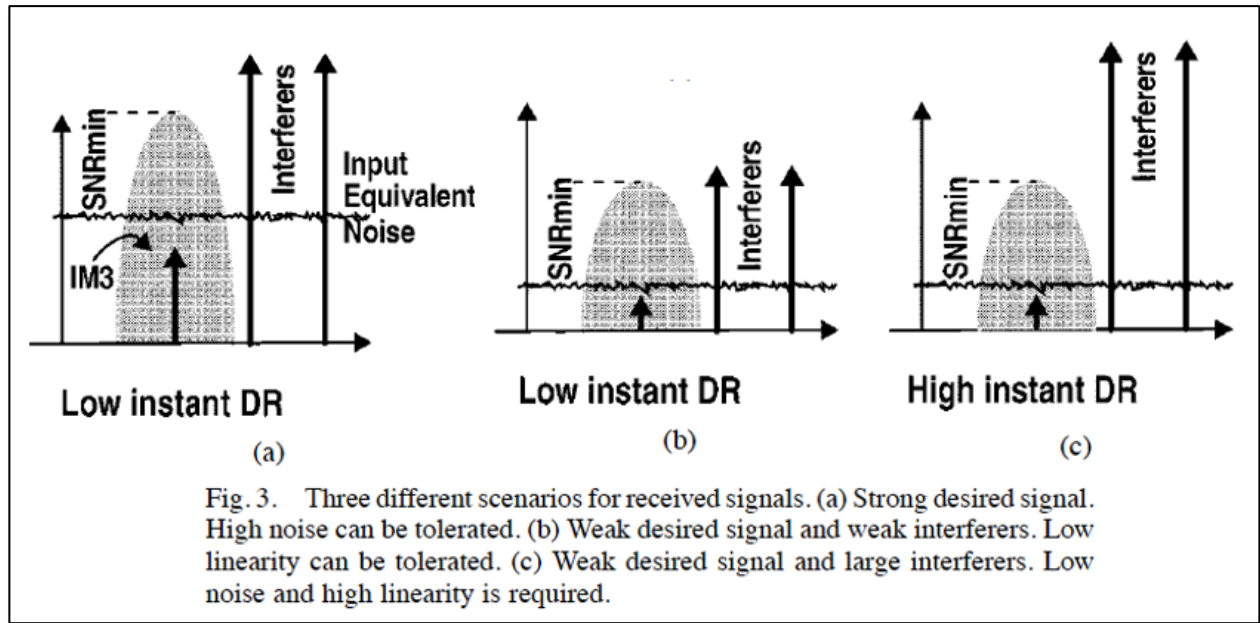
Claim 1(a): “receiving a wireless signal having a desired signal and an interferer signal, by the wireless transceiver of the battery powered portable wireless device,”

Behbahani's receiver (1) receives a wireless signal having a desired signal and an interferer signal and (2) is part of a wireless transceiver of the battery powered portable wireless device (*see* 1(Pre)).

Behbahani's wireless receiver receives a wireless signal, as claimed. *Behbahani*, 1207. (describing “measured signal levels [that] indicate how much of the **received signal** is being rejected, respectively, by the analog filter and the digital filter”). Indeed, the whole point of an RF *receiver* is to receive RF signals. *Dec.*, ¶70. Further, *Behbahani* teaches that this received signal includes a desired signal

component and interferer signals. *Behbahani*, 1205 (“Most wireless systems are designed for the worst case; that is, the dynamic range is specified for the *desired signal* at a minimum detectable level, *accompanied by* the largest anticipated *interferers*⁸.”). Indeed, *Behbahani*’s adjustable dynamic range concepts turn critically on the absolute and relative strengths of received desired and interferer signals. Fig. 3 below describes three different desired and interferer signal scenarios. Figs. 3(a) and Fig. (b) depict better than worst-case conditions in which “receiver dynamic range may be modest” and the gain-based sliding DR approach is sufficient. *Id.*, 1206. Fig. 3(c) depicts worst-case conditions (i.e., low desired signal and high interferers), requiring the system to expand the dynamic range by switching in the high-power filter. *Id.*

⁸ *Behbahani* teaches that major interferer signals originate from external devices. *Behbahani*, 1205 (“Microwave ovens emitting in the middle of the [2.4-GHz] band are often the largest interferer[.]”).



Id., Fig. 3 (rearranged).

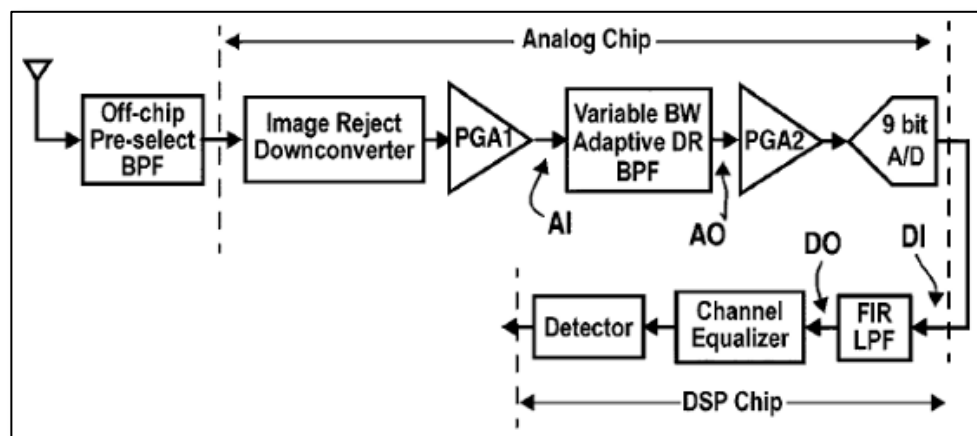
Moreover, a POSITA would have understood that *Behbahani's* receiver circuitry is in fact part of a wireless transceiver, i.e., is in a device that includes both transmission and reception functionality. *Dec.*, ¶¶56-57. Although *Behbahani* focuses on the details of receiver circuitry, *Behbahani* expressly notes that the receiver is part of a transceiver. *Behbahani*, 1207 (“This frequency-hopping **transceiver** uses many adaptive algorithms at each hop[.]”), 1208 (noting “a maximum speed of 2 m/s for the indoor mobile **transceiver**”). Accordingly, a POSITA would have understood that, although the paper focuses on the receiver circuitry, *Behbahani* does in fact teach that its receiver circuitry is intended to be used in a mobile device with a complete transceiver. *Dec.*, ¶56-57.

Claim 1(b): “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”

Behbahani in view of *Leete* discloses a method of receiving an RF signal by a wireless transceiver having a signal path comprising an amplifier, a filter, and a mixer.

***Behbahani* and *Leete* describe different aspects of the same circuit—a POSITA would have been motivated to combine their teachings.**

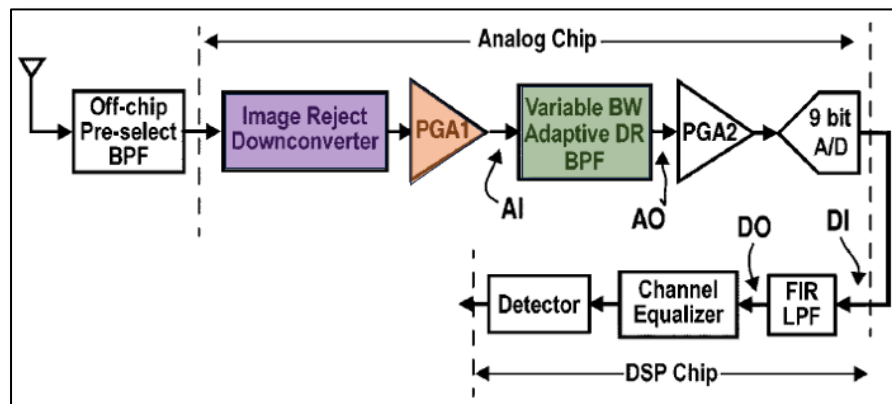
As an initial matter, the two references describe the same research, focusing on different aspects of the same receiver circuit, and were intended to be used in conjunction. *Dec.*, ¶74. Fig. 2 from *Behbahani* describes the “complete WLAN receiver” circuitry:



Behbahani, 1206. *Behbahani* explains that “the IF section is the main focus of this paper” and notes that “[t]he front-end and image-reject downconversion sections of the [receiver] are described in [5].” *Id.*, 1205. The citation “[5]” in *Behbahani* is the

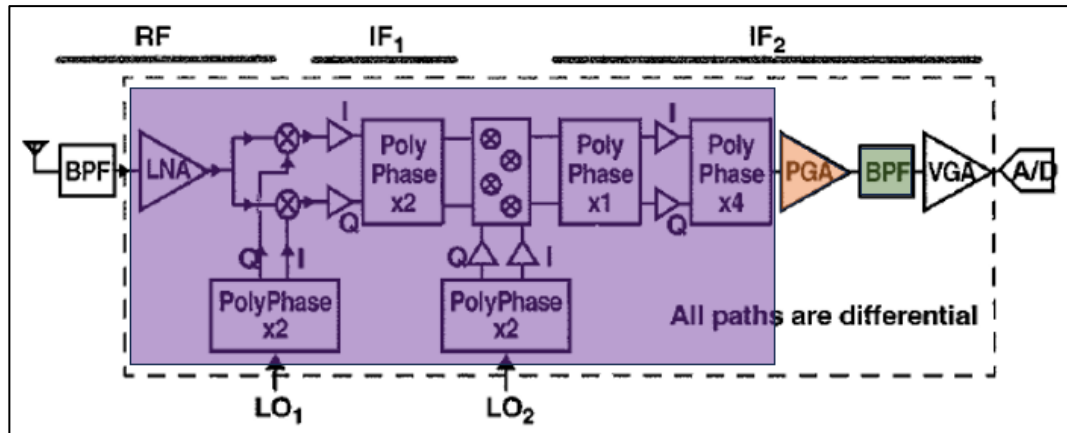
Leete article. *Leete* does in fact describe a “2.4-GHz front-end and the first downconversion section of a fully integrated low-IF receiver.” *Leete*, Abstract.

On the “analog chip” and in advance of **PGA1 (prefilter programmable gain amplifier)** and the **variable filter**, *Behbahani* represents the receiver circuitry with a single box labeled “**Image Reject Downconverter**”:



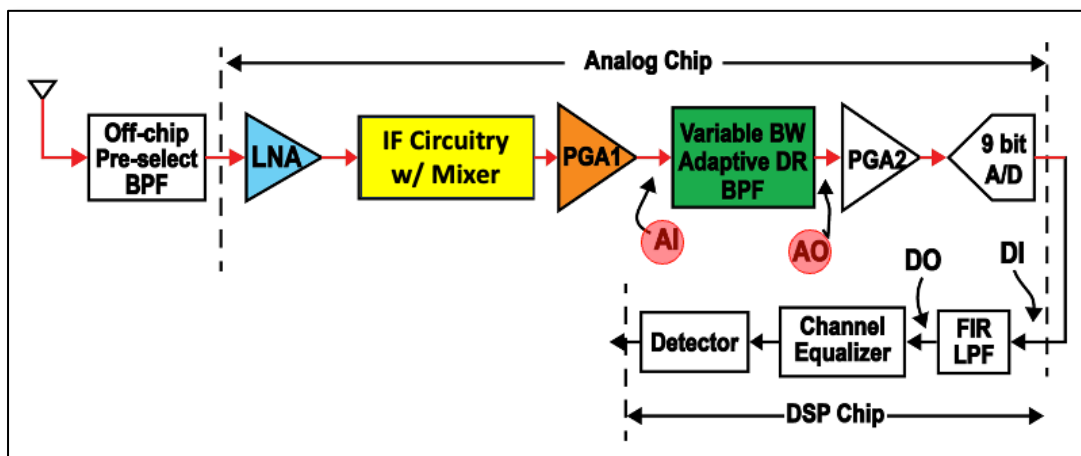
Behbahani, Fig. 2 (annotated).

As *Behbahani* notes, *Leete* provides the details of this downconverter circuitry. *Leete* teaches that the “RF front-end comprises a **low noise amplifier (LNA)** and an **RF quadrature mixer**, which downconverts the RF signal to the first IF (IF1).” *Leete*, 1908 (further noting an additional “IF mixer downconverts the *desired* signal at IF1 to a low IF2”). This detailed circuitry is depicted in *Leete*’s Fig. 1 below:



Id. at Fig. 1 (annotated).

Consistent with *Behbahani's* express intent to use the two references conjunctively, the “Image Reject Downconverter” box from *Behbahani's* Fig. 2 has been replaced with an LNA and the other IF circuitry, including the mixer stage:



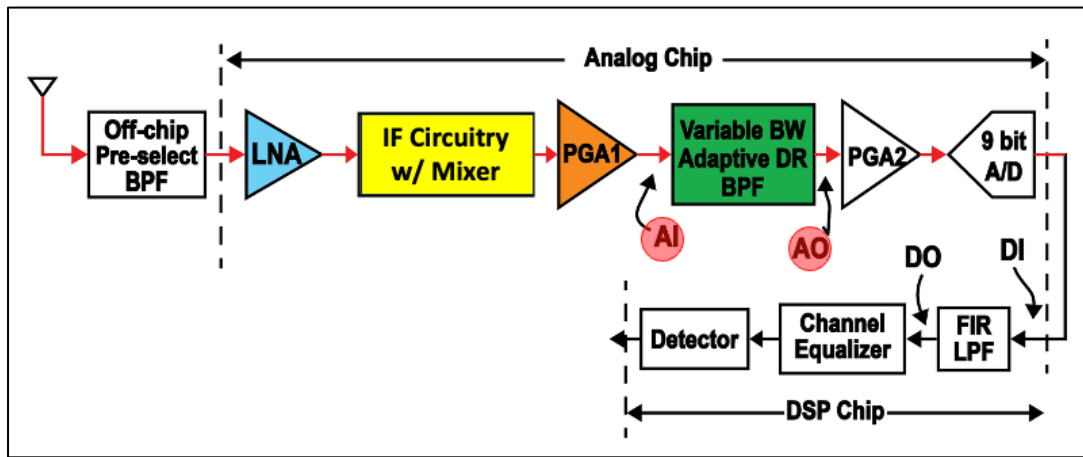
Behbahani modified by *Leete*, Figure 2 (annotated).

A POSITA would have been motivated to combine *Behbahani* and *Leete* as depicted above at least because *Behbahani* expressly motivates the combination, teaching that *Leete* provides the receiver details preceding PGA1. *Dec.*, ¶¶74-84;

Norian Corp. v. Stryker Corp., 363 F.3d 1321, 1328 (Fed. Cir. 2004) (finding a sufficient motivation to combine references where one explicitly cites the other). Further, a POSITA would have understood that placing *Leete's* LNA in *Behbahani's* circuit as proposed uses a known technique to improve a similar device in the same way. *Dec.*, ¶¶74-84 (explaining that, not only does *Leete's* circuitry improve *Behbahani's* receiver, it completes *Behbahani's* receiver, providing implementation detail not covered by *Behbahani*). As set forth above, both circuits are similar. In fact, they are describing different portions of the same receiver circuit. *Id.* (discussing a 2000 IEEE paper by the same research team that published before *Behbahani* and *Leete*, that included the same LNA-equipped figure as *Leete*, and that described both the IF stages (*Leete's* focus) and *Behbahani's* step-based and sliding DR concepts). A POSITA would have understood that benefits of an LNA in a wireless receiver include the ability to introduce gain without significant noise, improving the receiver's ability to recover a desired signal. *Id.* A POSITA would further have understood that such a benefit applies equally to *Behbahani's* Fig. 2 as it does to the more detailed version of the same receiver circuit as depicted in *Leete's* Fig. 1 and would have expected success in treating their teachings conjunctively, as the authors intended. *Id.*

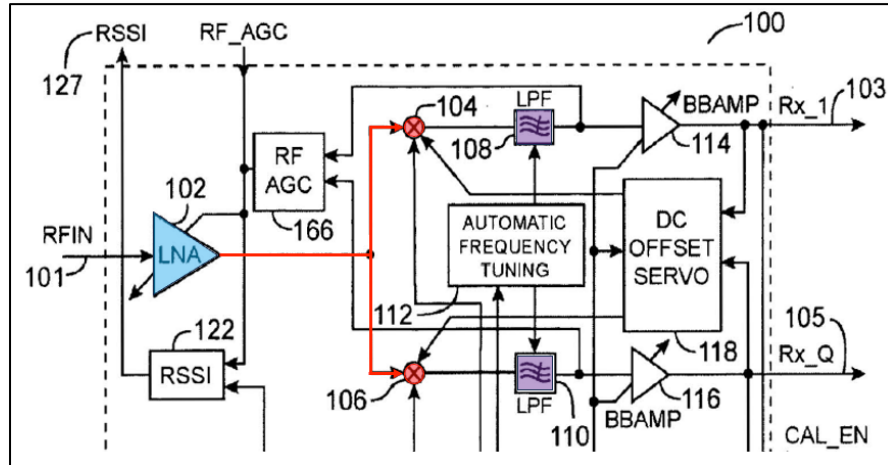
The receiver described by Behbahani and Leete includes an amplifier, mixer, and filter

Starting with the claimed amplifier, there are three distinct amplifiers, any of which satisfies this element—low-noise amplifier (LNA), programmable gain amplifier (PGA1), or PGA2. *Dec.*, ¶85 (discussing the three different amplifiers in the described receiver). Each of these amplifiers is depicted below:

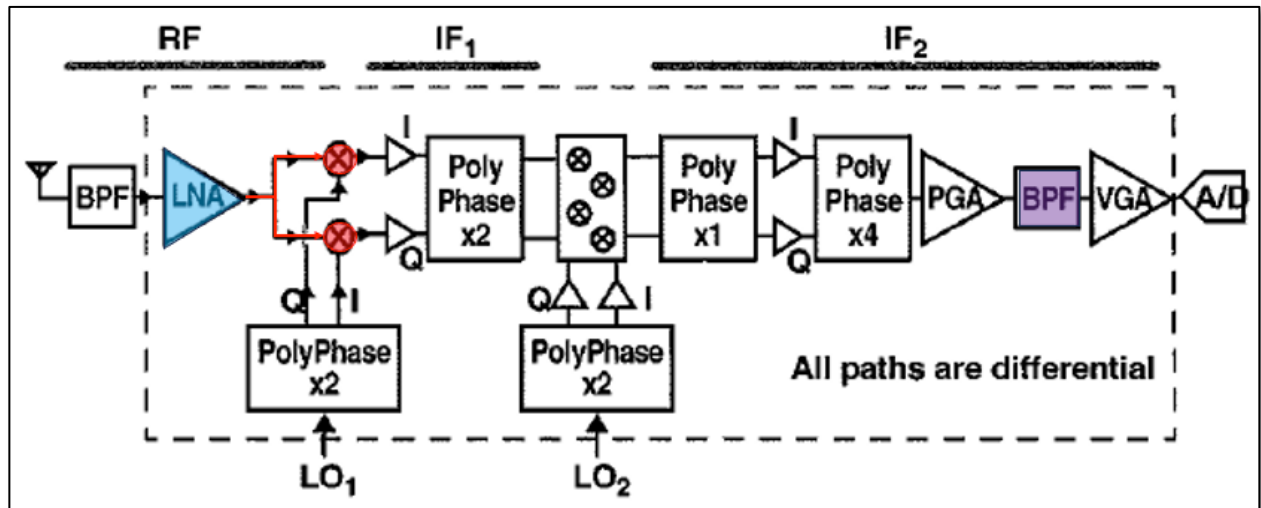


Behbahani modified by *Leete*, Figure 2 (annotated).

Leete's quadrature RF mixer—with its separate I and Q paths—satisfies the claimed “mixer.” Although the Challenged Claims generically refer to a “mixer,” the '825 Patent's detailed description describes the same two-signal path quadrature mixer arrangement as *Leete*. '825 Patent, 4:18-20 (“The receiver includes a signal path formed by low-noise amplifier 102, *I and Q mixers 104 and 106*, low pass filters 108 and 110[.]”), 4:39-42 (teaching that “quadrature mixers 104 and 106 . . . down-convert the received signal”). As shown below, both *Leete* and the '825 Patent place the **quadrature mixer** (with separate I and Q paths) between an **amplifier** and **filter**:

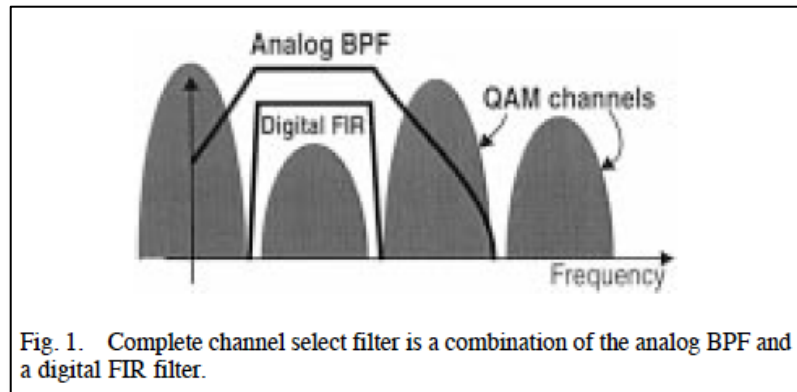


Id., Fig. 1 (annotated).



Leete, Fig. 1 (annotated). Based on the similar disclosures in the '825 Patent and in *Leete* and based on the prevalence of quadrature mixers in receivers at the time, a POSITA would have understood that *Leete*'s quadrature mixer stage satisfies the claimed "mixer." *Dec.*, ¶¶86-89.

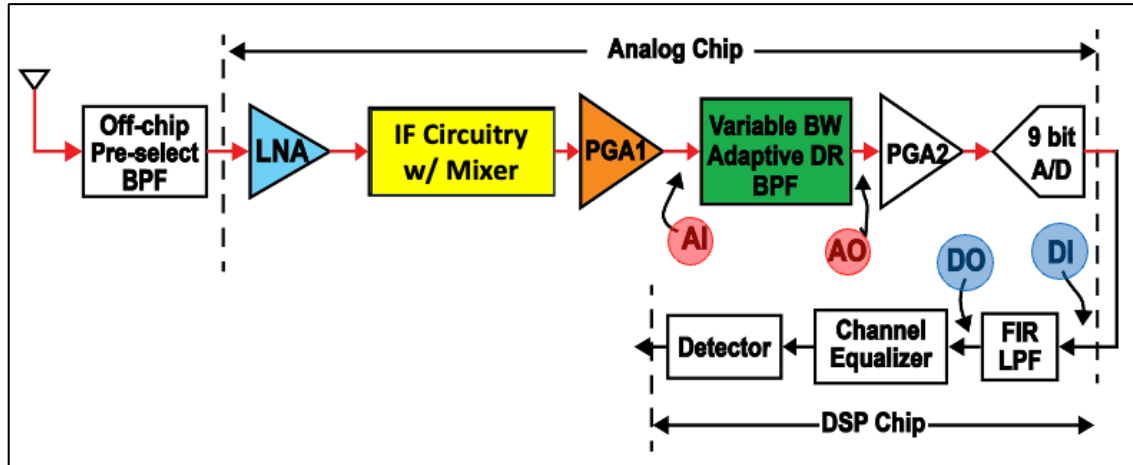
Finally, *Behbahani's* Variable BW Adaptive DR BPF satisfies the claimed “filter.” *Dec.*, ¶90. Depicted in Fig. 1 below, *Behbahani* teaches an analog bandpass filter (BPF) that “attenuates near-by channels and rejects far-away channels.”



Behbahani, Fig. 1, 1205. *Behbahani* explains that its “BPF realized by a LPF [low-pass filter] in series with HPF [high-pass filter] lowers power consumption.” *Behbahani*, 1216; *see also id.*, 1210 (describing the BPF as “[a] high-order LPF... cascaded with a low-order HPF”).

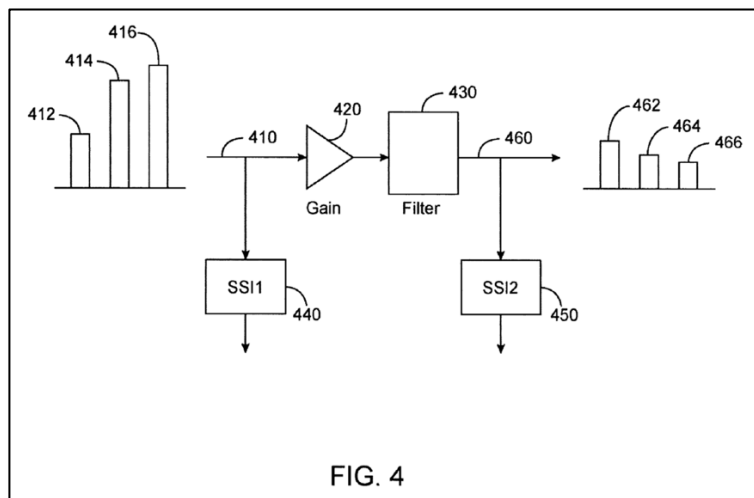
Claim 1(c): “wherein the wireless transceiver comprises a circuit for determining a signal strength of the interferer signal and a circuit for determining a signal strength of the desired signal;”

As discussed in Section II.C, Petitioner proposes the Board adopt Patent Owner’s construction of “signal path,” which broadens the phrase to include the analog and digital portions of a receiver. As set forth below, *Behbahani* teaches circuits for determining desired and interferer signal strengths, including by taking signal strength measurements at two nodes on the analog signal path—**A_I** and **A_O**—and at two nodes on the digital signal path—**D_I** and **D_O**.



Behbahani modified by *Leete*, Figure 2 (annotated).

As an initial matter, the '825 patent teaches determining the *relative* strengths of a desired signal and interferer signals, rather than absolute strengths of these signals. It does so by comparing a cumulative signal strength at a first node to a cumulative signal strength at a second node. Figure 4 below illustrates this concept.



'825 *Patent*, Figure 4. SSI1 is the “sum of desired signal 412 and interfering signals 414 and 416,” and SSI2 is the “sum of desired signal 462 and interfering signals 464

and 466.” ’825 Patent, 6:62-67. The patent explains that the combination of optional gain element 420 and filter 430 produce a gain of one for the desired signal, meaning the strength of the desired signal is identical in the SSI1 and SSI2 measurements. *Id.*, 6:67-7:3. It also explains that the interfering signal levels are reduced by filter 430. *Id.*, 7:4-8. Accordingly, if SSI2 is significantly smaller than SSI1, large interferer signals have been reduced by filter 430. *Id.* (explaining that comparing these values indicates how much of the combined signal has been filtered). From this information, the system determines what combination of “bias, impedance, and gain . . . may be optimized to reduce power dissipation.” *Id.*, 7:8-11.

Behbahani teaches a nearly identical process for determining *relative* signal strengths and using that information to employ its adaptive sliding DR and adaptive step DR techniques. Importantly, however, *Behbahani* teaches additional measurement nodes that allow the system to determine *absolute* signal strengths in addition to relative signal strengths, rendering obvious the claimed circuits. As set forth below, regardless of whether this language is interpreted to require measuring only relative signal strengths as described by the ’825 Patent or more narrowly to require measuring absolute signal strengths, *Behbahani* renders obvious this limitation.

Behbahani emphasizes the importance of measuring signal strength to its adaptive DR techniques, and notes that, like the ’825 Patent, signal power is sensed

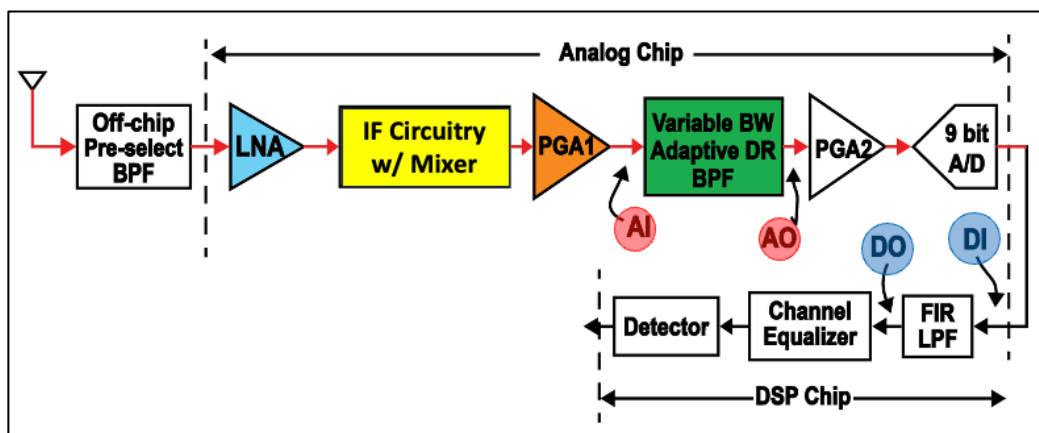
at the input and output of filters to indicate how much of the received signal is being rejected:

The algorithm to sense the input signal and determine instant DR is key.

Signal power is sensed at four points along the IF strip (Fig. 2): **input and output of the analog BPF** and **input and output of the digital channel select filter**. These measured signal levels indicate how much of the received signal is being rejected, respectively, by the analog filter and the digital filter.

Behbahani, 1207.

Behbahani teaches circuits for determining desired and interferer signal strengths, including by taking signal strength measurements at two nodes on the analog signal path— A_i and A_o —and at two nodes on the digital signal path— D_i and D_o .



Behbahani modified by *Leete*, Figure 2 (annotated).

Behbahani renders obvious calculating an absolute interferer signal strength

Like the '825 Patent, *Behbahani* teaches that the difference between signal levels measured at nodes “ A_I and A_O is a measure of the out-of-band *interferers* being rejected by the analog [filter].” *Behbahani*, 1207. The interferer signal power that remains after the *analog* filter is then calculated by comparing the difference between signal levels into and out of the *digital* filter. *Id.* (“[B]y comparing the signal level at the input and the output of the digital filter (D_I and D_O), the relative strength of the out-of-channel signal that passes through the analog filter is calculated.”). From these two sets of measurements, *Behbahani* can determine the total interferer signal strength received on the signal path. *Dec.*, ¶96 (explaining that the difference between A_I and A_O combined with the difference between D_I and D_O , accounting for gain introduced by any of the amplifiers, represents the total signal strength of the interferer signals). *Behbahani* teaches that the difference between the signal strength measured at nodes A_I and A_O and the difference between the signal strength measured at nodes D_I and D_O are used in its adaptive DR process:

If the total signal power is comparable at A_I and A_O , and at D_I and D_O , the condition is like Fig. 3(a) or (b). In both cases, the required instant DR is low. If the signal levels are significantly different at either of the above pairs of nodes (A_I and A_O and D_I and D_O) and there is a weak signal at D_O , the condition must be the one shown in Fig. 3(c).

Behbahani, 1207; *see also id.*, 1206 (explaining that the scenarios depicted in Fig. 3(a-c) determine how the sliding and step-based adaptive DR processes are implemented). Although *Behbahani* does not expressly teach calculating an absolute interferer signal strength, it does calculate an absolute desired signal strength, and a POSITA would have been motivated to similarly calculate an absolute value of the interferers. *Dec.*, ¶99. Indeed, the sliding DR process adjusts the PGA1 gain “to best accommodate the input signal conditions. *Behbahani*, 1206. A precise calculation of the interferer signal strength would benefit the sliding DR process, allowing the system to more accurately adjust the smaller DR to best accommodate input signal conditions. *Id.*

Behbahani expressly teaches calculating an absolute desired signal strength

Behbahani uses these same analog and digital signal strength measurements to determine the absolute signal strength of a ***desired signal***. First, post-analog filter gain is calculated by comparing the signal strengths measured at nodes A_O and D_I. *Behbahani*, 1207. Next, by subtracting this gain from the signal strength at D_O, *Behbahani* determines the absolute strength of the desired signal. *Id.* (noting “the desired signal . . . [i]s measured by $\text{Power}_{D_O} - \text{Gain}_{\text{Post-analog-filter}}$ ”), *Dec.*, ¶100 (explaining that D_O represents the desired signal in isolation, having had all or nearly all interferers removed by the two filters). *Behbahani* also teaches using this absolute desired signal strength in its adaptive DR process. *Behbahani*, 1207 (teaching that

significant interferer signal strength coupled with “a weak signal at D₀” indicates a situation as shown in Fig. 3(c)).

Behbahani in view of Tan renders obvious a “circuit” for measuring these signal path nodes

Although *Behbahani* does not provide details about the specific circuit used to measure signal strength, *Tan* does. *Tan*—a reference expressly referenced by *Behbahani* and intended to be used in conjunction with *Behbahani* (see Claim [1(e)])—provides an example of circuitry used to detect signals at various points in the low-pass filter signal path as a means of implementing a prefilter automatic gain control (AGC). *Tan*, 481. In this example, signal peaks are detected by current summing circuitry that is designed to “lower[] the input signal” via gain control when peak values exceed a predefined limit. *Id.* A POSITA would have been motivated to utilize *Tan*’s signal strength measurement circuitry to measure nodes A_I and A_O in *Behbahani* for a number of reasons. First, as explained with reference to limitation [1(b)] below, *Behbahani* and *Tan* describe different aspects of the same circuit, and a POSITA would have been motivated to combine their teachings at least based on *Behbahani*’s express teaching that the references are intended to be used conjunctively. *Dec.*, ¶¶101-05 (explaining that the authors intended *Behbahani*’s and *Tan*’s teachings to be used conjunctively and concluding that a POSITA would have expected success in doing so). Second, a POSITA would have understood that using *Tan*’s signal strength measurement circuits in *Behbahani*’s receiver, as proposed,

uses a known technique to improve a similar device in the same way. *Id.* *Tan*'s peak detectors provide the benefit that the circuit can be dynamically adjusted to avoid clipping the peaks in the amplifier and filter circuits, which could cause a damaging amount of distortion. *Id.* (explaining the importance of detecting the peak levels and using those peak levels to adjust gain). Finally, a POSITA would further have understood that signal strength measurement circuitry was well understood at the time and would have expected success in combining these teachings. *Dec.*, ¶¶103-05 (discussing other signal strength measurement circuits). Although the specific circuits described in *Tan* are designed to detect peak signal strength on the analog signal path (i.e., for A_I and A_O), a POSITA would have understood that comparable circuits for detecting peak signal strength on the digital signal path (i.e., for D_I and D_O) were well understood in the art and would have been motivated to use such digital peak detectors for D_I and D_O . *Dec.*, ¶105 (discussing multiple digital envelope detection circuits used in adaptive gain control systems like *Tan*'s).

Finally, although the limitation recites “a ***circuit*** for determining a signal strength of the interferer signal and a ***circuit*** for determining a signal strength of the desired signal[.]” this limitation should not be interpreted as requiring a first circuit tasked with determining a signal strength of the interferer signal and a different, second circuit tasked with determining a signal strength of the desired signal. Nothing in the '825 Patent or its claims suggests that two distinct measurement

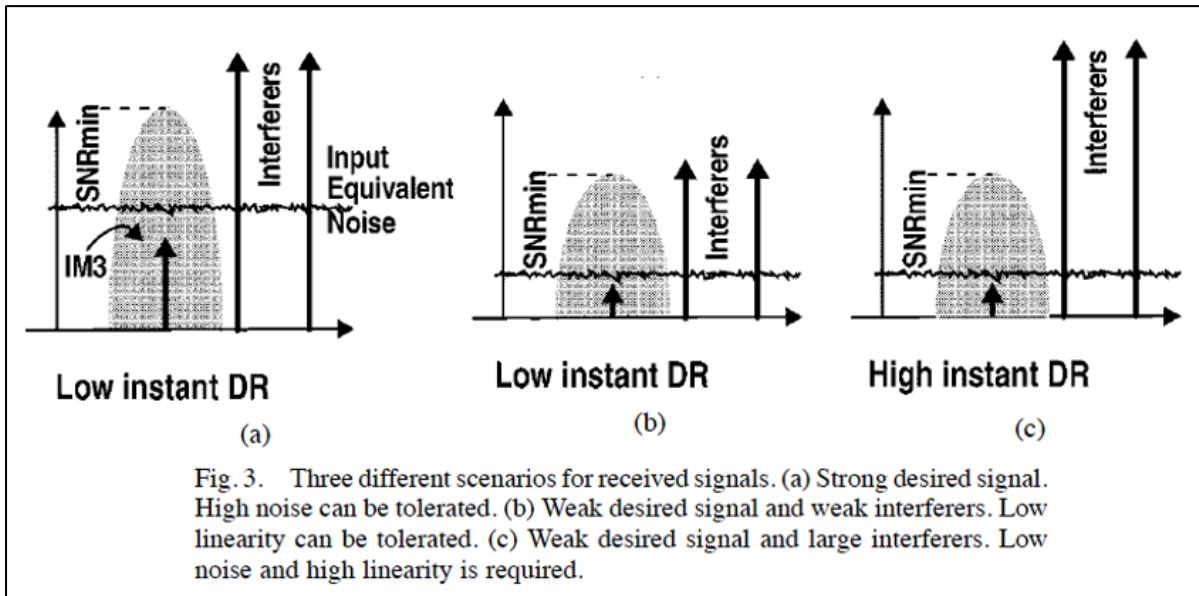
circuits are required, and there is no support for an interpretation that one circuit measures the desired signal and another, different circuit measures interferers. Indeed, as noted above, the only specific disclosure in the '825 Patent determines relative desired and interferer signal strengths, rather than absolute signal strengths as claimed. So, there is no direct support for this limitation, let alone a sufficiently clear intent to mandate two different measurement circuits, each tasked with a specific type of signal measurement.

In *Lenovo Inc., v. Theta IP, LLC*, IPR2023-00697, Paper 10 at 17 (PTAB Oct. 23, 2023), the Board interpreted this exact language. The Board first noted that “the claim language does not expressly require that the circuits are separate, different, distinct, or otherwise state that each ‘a circuit’ is not the same circuit.” *Id.*, 12. Next, the Board concluded that the '825 Patent specification includes “only one description of” signal strength indicator measurements. *Id.*, 14 (identifying the disclosure regarding Fig. 4). Analyzing this single embodiment, the Board noted that, for the “two signal strength indicator circuits 440 and 450, the written description unambiguously discloses that each circuit determines the cumulative signal level of the desired signal and the interfering signals” and that “[n]either circuit determines only the signal strength of the interferer signals, nor does a circuit determine only the signal strength of the desired signal.” The Board then concluded that neither other claim language nor the prosecution record supports narrowly

interpreting the claims to require distinct measurement circuits. *Id.*, 15-17. Finally, the Board interpreted the limitation “as encompassing, but not requiring, the same circuit determining a signal strength of the interferer signal and determining a signal strength of the desired signal.” *Id.*, 17. As set forth above, and consistent with this construction, *Behbahani* calculates signal strength at four distinct measurement nodes and renders obvious the claimed circuits to ascertain the signal strengths of the desired and interferer signals.

Claim 1(d): “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”

Behbahani teaches that a worst-case power dissipation condition results when the signal strength of the desired signal is low (i.e., a low D_O) and the signal strength of the interferer signal is high (i.e., significantly different signal strength levels at A_I and A_O or at D_I and D_O), as depicted in Figure 3(c) below. *See Behbahani*, 1206 (“The worst-case is when the desired signal is weak but the interferers strong (Fig. 3(c)).”); *see id.*, 1207 (“If the signal levels are significantly different at . . . the above pairs of nodes (A_I and A_O . . .) and there is a weak signal at D_O , the condition must be the one shown in Fig. 3(c).”).



Id. at Fig. 3 (rearranged).

Claim 1(e): “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:”

As discussed in Section II.C, the parties have advanced competing constructions in the parallel litigation for a number of terms. The Proposed Grounds satisfy both parties’ proposals for most of these disputes, so the Board need not resolve them. For example, Petitioner proposed that “drive current” is “the current that carries a signal through a load.” Patent Owner advocated a “plain and ordinary meaning.” Additionally, Patent Owner proposed that “impedance” is “opposition to the flow of alternating current,” and Petitioner advocated a plain and ordinary meaning for that term.

As set forth below, satisfying both parties' proposals, when *Behbahani's* system switches from its high-power filter to its low-power filter, it increases the "opposition to the flow of alternating current" (i.e., impedance) in the analog signal path and results in a reduced current that carries the AC signal through a load (i.e., through the filter load). This switch to a low-power filter also reduces the DC bias current applied to the filter stage.

Although Claim 1 requires only lowering a DC bias current adjustment to save power, other Challenged Claims require lowering a DC bias current and increasing the signal path impedance to save power. *See* Ex. 1001, Claims 2, 4, and 6-8. All proposed grounds rely on *Behbahani's* scaled DR process, which satisfies both the limitations requiring increased signal path impedance and limitations requiring a reduced DC bias current. To avoid repetition, Petitioner sets forth the full theory here even though the impedance concept is not directly relevant to Claim 1.

A. The '825 Patent's Sole Inventor Admitted That *Behbahani's* Scaled Filter Approach Adjusts Signal Path Impedance Consistent With The Alleged Invention

Patent Owner cannot dispute that *Behbahani* teaches the claimed concept of adjusting signal path impedance to save power. The Challenged Patent's sole inventor has previously pointed to *Behbahani's* scaled filter approach as an example of how one might dynamically adjust impedance, and the related bias current, in the signal path to respond to changing signal strengths. Inventor Tsividis, in a January

2003 article titled, “Internally Varying Analog Circuits Minimize Power Dissipation,” described a “Dynamic Impedance Scaling” approach to save power when experiencing better than worst-case conditions. *See* Ex. 1011, 70; *Munford Dec.*, ¶¶18-21 (attesting to the public availability of this article). Dr. Tsividis’ January 2003 article concludes its discussion by pointing to *Behbahani*’s switched filter process as an exemplary means by which dynamic impedance scaling can be implemented. Ex. 1011, 70. Accordingly, the Proposed Grounds here rely on *Behbahani*’s scaled filter approach—an approach that Challenged Patent’s inventor expressly identified as an example of how one could dynamically adjust impedance to save power.

A brief discussion of the January 2003 article connects its subject matter to the Challenged Claims and highlights that Dr. Tsividis did in fact point to *Behbahani* when discussing the concept in the dynamic impedance limitations. The article explains that systems are often designed “to handle very small signals in the worst case,” providing large Usable Dynamic Ranges (UDR), which require filters with large capacitance values. *Id.* It noted that, “when the desired signal happens to be strong and no strong blocker is present[,]” “the very low noise floor of this system is unnecessary and can be allowed to increase by scaling [the capacitance] down[.]” In addition to decreasing capacitance, the article explained that “the transconductances or conductances of the filter will have to be scaled together with

[the capacitance] in order to leave the frequency response unchanged.” *Id.* The article explains that the concepts of changing a bias current and changing impedance are related as “**impedance scaling**” by “lowering capacitances and transconductances allows one to also **lower I_{BIAS}** , and thus the total power dissipation can be made small.” *Id.*; *see also id.*, 71 (“not[ing] that dynamic biasing is also encountered in the course of applying [] dynamic impedance scaling[.]”).

Increasing the resistance and decreasing capacitance in a filter circuit is the only specific example of adjusting signal path impedance discussed in the ’825 Patent. ’825 Patent, 7:47-55 (discussing Fig. 6 and its corresponding disclosure). Accordingly, a POSITA would understand that inventor Tsvidis’ description of dynamic impedance scaling in his January 2003 article aligns precisely with his disclosure of the concept of adjusting impedance, and related bias current, described and claimed in the ’825 Patent. *Dec.*, ¶¶110-15. Both proposed **increasing signal path impedance** by (1) decreasing transconductance (and increasing resistance)⁹ and

⁹ As discussed in more detail with reference to the *Tan* paper, a POSITA would have understood that decreasing transconductance in filters was generally accompanied by an increased resistance. *Dec.*, ¶¶110-15. Accordingly, a POSITA would have understood that the January 2003 article’s dynamic filter that maintains the same frequency response by **decreasing transconductance** and decreasing capacitance is analogous to the ’825 Patent’s dynamic filter that maintains the same frequency response by **increasing resistance** and decreasing capacitance. *Id.*

(2) decreasing capacitance of a filter, *allowing lower DC bias current* and *lower AC drive current* to save power.

Dr. Tsividis' January 2003 article concludes its discussion by pointing to *Behbahani's* switched filter process, which results in a change in bias current, as an exemplary means by which dynamic impedance scaling can be implemented. Ex. 1011, 70 (“One way to achieve the above scenario would be to use two filters, designed with different capacitance values, and place one or the other in service as required [34], turning the other filter off.”). Reference [34] is the same *Behbahani* reference that forms the basis of all Proposed Grounds herein. *Id.*, 72.

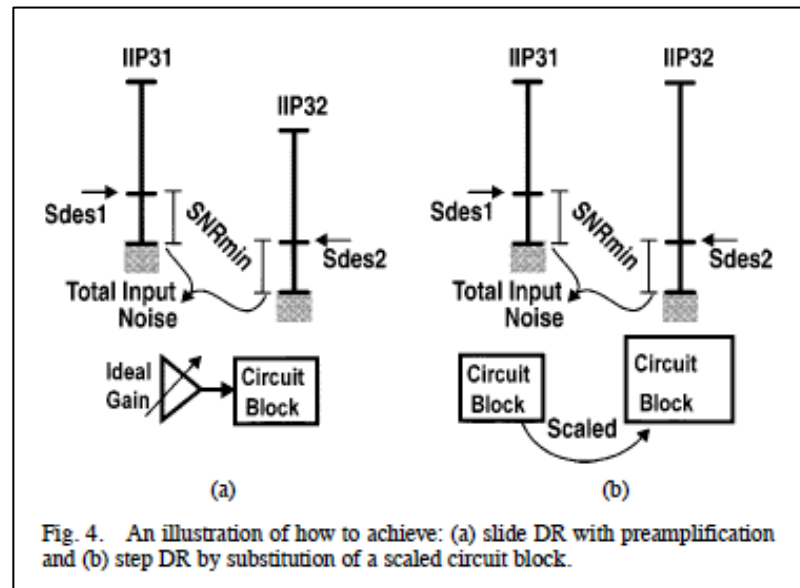
Accordingly, the Proposed Grounds here rely on *Behbahani's* scaled filter approach—an approach that Challenged Patent's inventor expressly identified as an example of how one could adjust impedance to save power. “[A] patentee's admissions about the scope and content of the prior art provide a factual foundation as to what a skilled artisan would have known at the time of invention[.]” *Qualcomm Inc. v. Apple Inc.*, 24 F.4th 1367, 1376 (Fed. Cir. 2022).

B. Switching From *Behbahani's* High-Power Filter to Low-Power Filter Increases Signal Path Impedance and Reduces DC Bias Current.

As explained above, *Behbahani* teaches a wireless receiver that implements an “adaptive dynamic range” method to save power by decreasing the dynamic range when conditions are better than worst-case. *Behbahani*, 1205. A step-based DR technique switches between two scaled filters, using “high-power filter” only during

worst-case conditions and a separate “low-power filter” for conditions that are better than worst-case. *Id.*, 1206-07.

Fig. 4(b) below illustrates switching from the low-power filter to high-power filter to expand the DR when worst-case conditions are encountered:



Id. at 1206. A POSITA would understand that switching back—from the high-power filter to the low-power filter—when conditions improve is one means through which *Behbahani's* system saves power during periods of better than worst-case conditions. *Dec.*, ¶¶117-120. Indeed, *Behbahani* expressly teaches that the high-power filter is used *only* during the infrequent periods of worst-case conditions. *Behbahani*, 1205 (“An important idea here . . . is that providing no more than the required DR at any given time lowers the average power consumption.”), 1207 (“[A] BPF dissipating low power is employed for nominal RX DR. However, in the worst-case scenario, the high-power scaled filter is switched in raising total DR. Since the

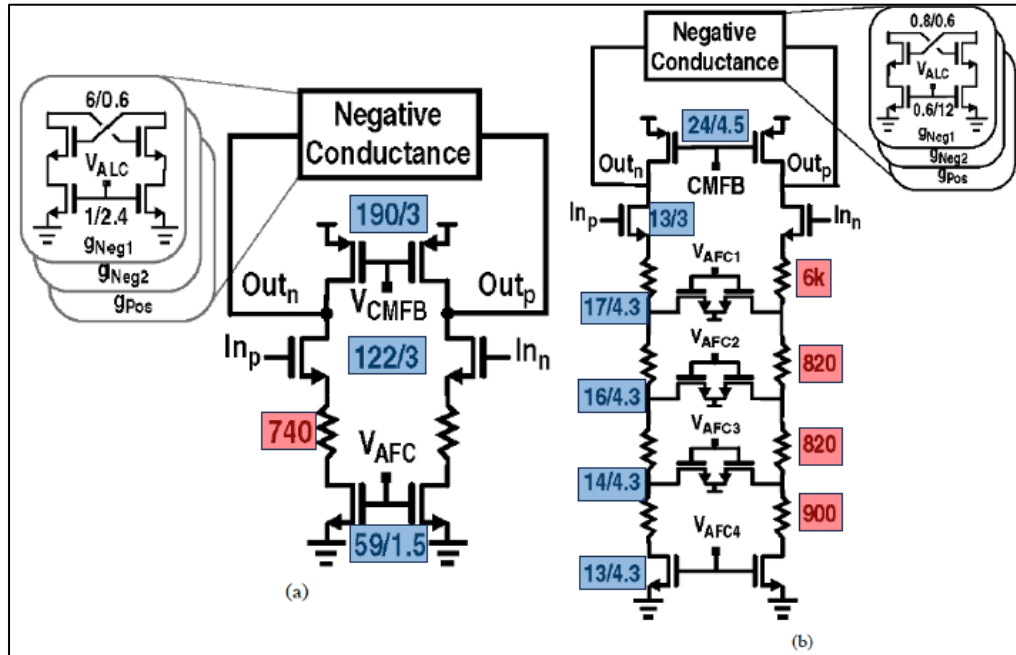
worst-case scenario is infrequent, the low-power filter determines the average RX power consumption.”); *Dec.*, ¶¶117-120 (discussing the same).

Scaling circuits was a well-known technique at the time. *Dec.*, ¶¶121-24 (discussing state of the art). As *Behbahani* explains, “[t]wo filters are implemented with the same topology, but one, scaled up to consume 10x more power, offers 10x lower mean square noise but the same linearity.” *Behbahani*, 1207. *Behbahani* provides some detail about the scaled filters, including that its high-power filter “[s]cale[s] up all the transistors[,] while “scaling down all resistors by the same factor[,]” which “*raises bias current* proportional to the scale factor[.]” *Id.*, 1206. *Behbahani* also explains that the filter input capacitance scales proportionately, noting the “filter input capacitance [] is, respectively, 0.4 and 4 pF for the low-power and the high-power versions.” *Id.*, 1208.

Tan provides additional details about the scaled filters discussed in *Behbahani*, and these additional details confirm that transitioning from the high-power to low-power filter increases signal path impedance and reduces bias current. As with the *Leete* reference, *Behbahani* and *Tan* describe different aspects of the same circuit, and a POSITA would have been motivated to combine their teachings. *Dec.*, ¶126 (explaining that the authors intended *Behbahani*’s and *Tan*’s teachings to be used conjunctively and concluding that a POSITA would have expected success in doing so, as the authors intended). *Behbahani* notes that additional

“details of the [filter] design are presented elsewhere [7].” *Behbahani*, 1210. [7] is a reference to *Tan. Id.*, 1216.

As suggested, *Tan* does in fact provide more detail on the scaled filter design used by the *Behbahani* receiver. For example, *Tan* proposes scaled G_m - C filters. *Tan*, 477. *Tan* notes that the “electrical characteristics of the G_m - C filter strongly depend on the G_m circuit.” *Id.* Examining the G_m circuit that important defines the overall filter characteristics reveals that the proposed low-power filter does in fact have lower transconductance, higher resistance, lower capacitance, and a lower bias current. *Dec.*, ¶¶127-135. Figs. 6(a) and 6(b) below illustrate how the transconductances and resistances vary together in the proposed scaled filters:



Tan, Figs. 6(a)-(b) (annotated). Annotated blue above, the transistor Width/Length ratio is directly related to transconductance, with a higher W/L ratio resulting in a

higher transconductance. *Dec.*, ¶¶127-135. In the above example, we see W/L ratios ranging between 40-60 for the low-noise (high-power) filter stage depicted in Fig. 6(a) and much smaller W/L ratios ranging between 3-5.3 for the low-power filter stage depicted in Fig. 6(b). *Id.* (identifying a more than ten times increase in transconductance with the high-power stage). Annotated red above, resistance has an inverse relationship to transconductance. For example, Fig. 6(a)'s higher transconductance is accompanied by a relatively small 740 Ohms in one leg of the circuit, while Fig. 6(b)'s lower transconductance is accompanied by a much higher 8,540 Ohms in one leg of its circuit. *Id.* A POSITA would have understood that the inverse relationship between transconductance and resistance was well known at the time. *Id.* (explaining that higher current capability of high transconductance transistors is typically paired with the low resistance to that higher current in the form of smaller resistors).

Consistent with *Behbahani's* own teachings, *Tan* describes a low-power filter that exhibits “the same frequency response and linearity” as the high-power filter, but that scales all “transconductances and capacitors in th[e] filter . . . by a factor of 10” and “consumes 10x lower power.” *Tan*, 480. *Tan* also confirms that the high-power filter utilizes a higher transconductance G_m (accompanied by lower resistance), higher capacitance, and higher bias current. *Id.*, 481; *Dec.*, ¶¶127-135

(explaining how *Tan's* teachings confirm that the signal path impedance changes when switching between scaled filters).

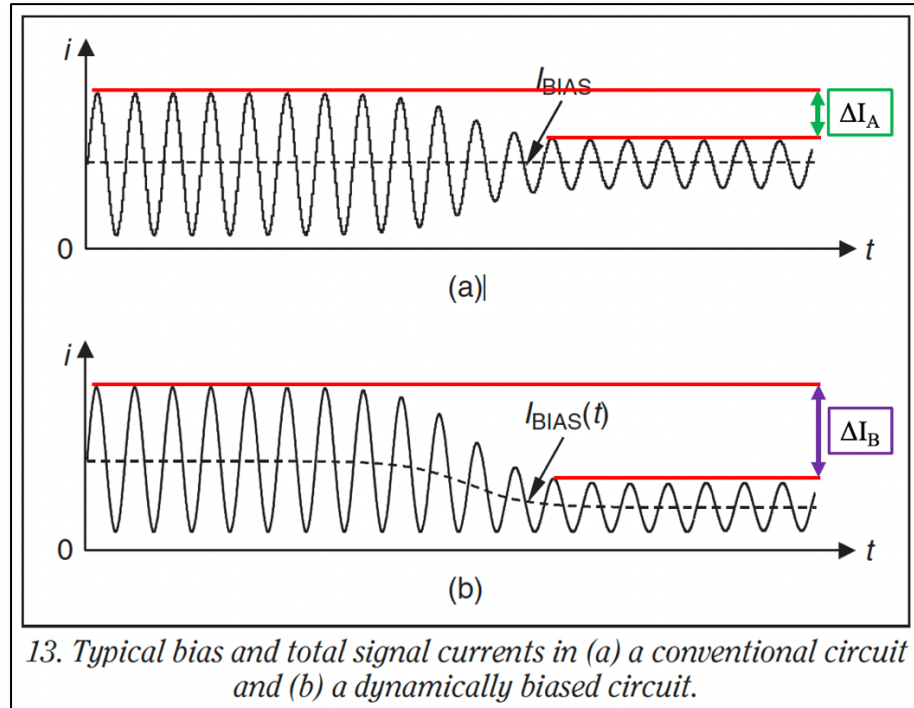
In sum, *Behbahani's* low-power filter has higher resistance (accompanying a lower transconductance), lower capacitance, and lower bias current than its high-power filter. *Dec.*, ¶135. This is precisely the arrangement disclosed in the '825 Patent and Dr. Tsividis' January 2003 paper. *Compare* '825 Patent, Fig. 6, 7:47-8:3 (describing a filter with increased resistance and decreased capacitance, which allows lower bias and drive currents) *with* Ex. 1011, 70 (describing a filter with lower capacitance and transconductances (accompanying higher resistance) that “allows one to also lower I_{BIAS} ”). A POSITA would have understood that, consistent with the '825 Patent and its inventors own publications, switching from *Behbahani's* high-power filter to its low-power filter changes (increases) an impedance and changes (reduces) the bias current of a component (i.e., the filter) in the signal path. *Dec.*, ¶135.

C. Switching From a High-Power Filter to Low-Power Filter Also Lowers the Drive Current

As noted above, the '825 Patent does not identify a mechanism through which drive current is reduced when signal path impedance is increased. Instead, the patent vaguely suggests that driving a larger signal path load impedance may *require* less current. '825 Patent, 7:52-55 (when the impedance load is doubled, “the output current required . . . is reduced by one-half”). This appears to be a reference to the

well-understood Ohm's law, which defines the relationship between current (I), resistance (R), and voltage (V)— $V=I \cdot R$. *Dec.*, ¶136. Per this relationship, if the voltage across a load is to be kept constant and the resistive load is doubled, only half the current is required to generate that constant voltage across the load. *Id.* Despite the vague references to Ohm's law, the '825 Patent never explains the mechanisms by which a drive current is reduced when a signal path impedance is increased. At best, it alludes to a relationship between bias current and drive current, without elaboration. *See, e.g.*, '825 Patent, 7:63-8:3 (noting that increasing the signal path impedance is an example “where drive currents and possibly bias currents may be reduced”), 9:60-61 (“since the drive current is reduced, one or more bias current may also be reduced”).

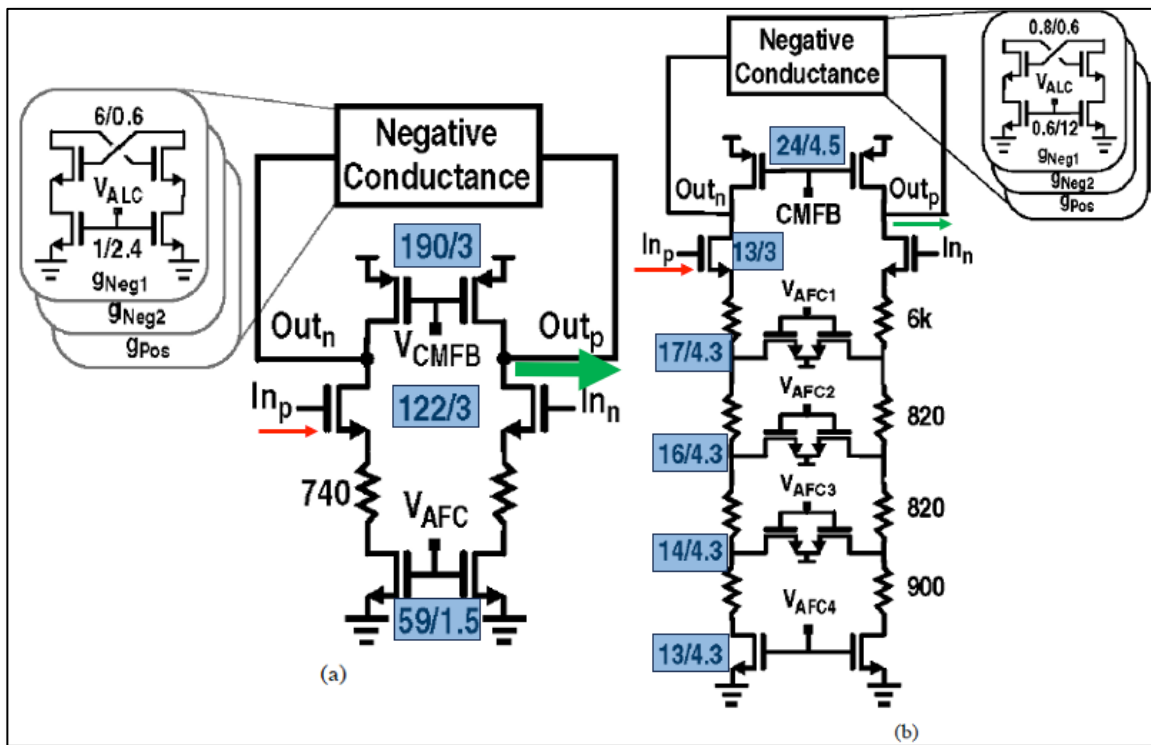
Dr. Tsividis's January 2003 article does provide a helpful example that illustrates the relationship between bias current and drive current.



Ex. 1011, 71 (annotated). As shown above, the AC drive current is a function of a DC bias current. *Dec.*, ¶137. In a conventional circuit that does not dynamically adjust the DC bias current (I_{BIAS}), small desired signals result in a total current drop ΔI_A , and the power remains unchanged, even when the signal level drops. *Id.* Power savings can be realized when the bias current $I_{BIAS}(t)$ is dynamically lowered as depicted in 13(b) above. There, lowering a DC bias $I_{BIAS}(t)$ saves power by lowering the average switching current that flows through the circuit. *Id.* (noting that the dotted line represents average power).

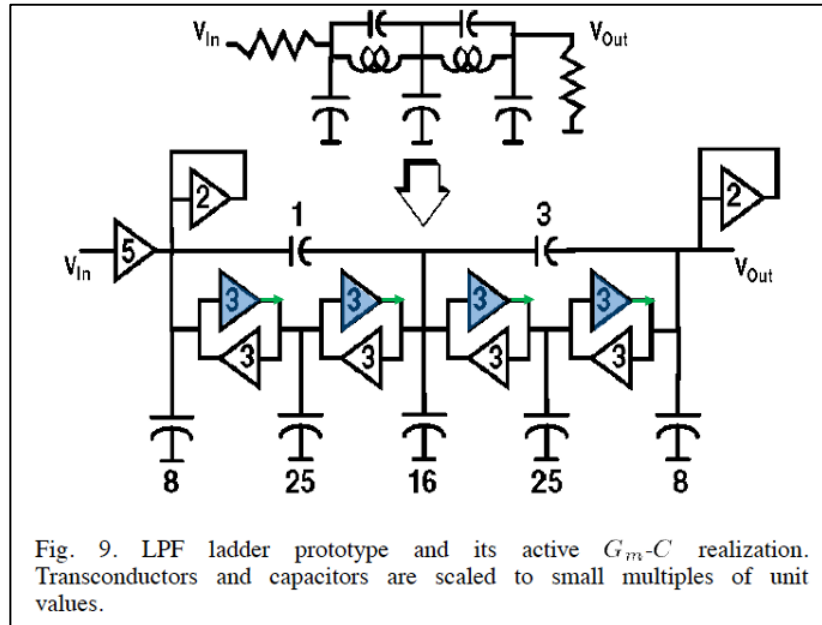
Tan's additional filter detail confirms that the low-power filter will reduce an AC drive current in addition to increasing the signal path impedance. Specifically, the lower transconductance values in the low-power filter stages will, by their

electrical characteristics, produce lower AC current in the signal path. In simple terms, transconductance is a measure of the output AC (signal) current over input AC (signal) voltage: $g_m = \Delta I_{out} / \Delta V_{in}$. *Dec.*, ¶¶112-15 (discussing the well understood concept of transconductance), ¶¶127-134. As discussed above, the transconductance of the low-power stage is more than ten times lower than the low noise (high-power) stage. Focusing on In_p and Out_p for simplicity, the below annotated Figs. 6(a)-(b) from *Tan*, shows that, for the same input voltage, the output current in the high-power filter will be much larger than the output current in the low-power filter as a result of the significantly different transconductance values:



Tan, Figs. 6(a)-(b) (annotated); *Dec.*, ¶139 (discussing the same).

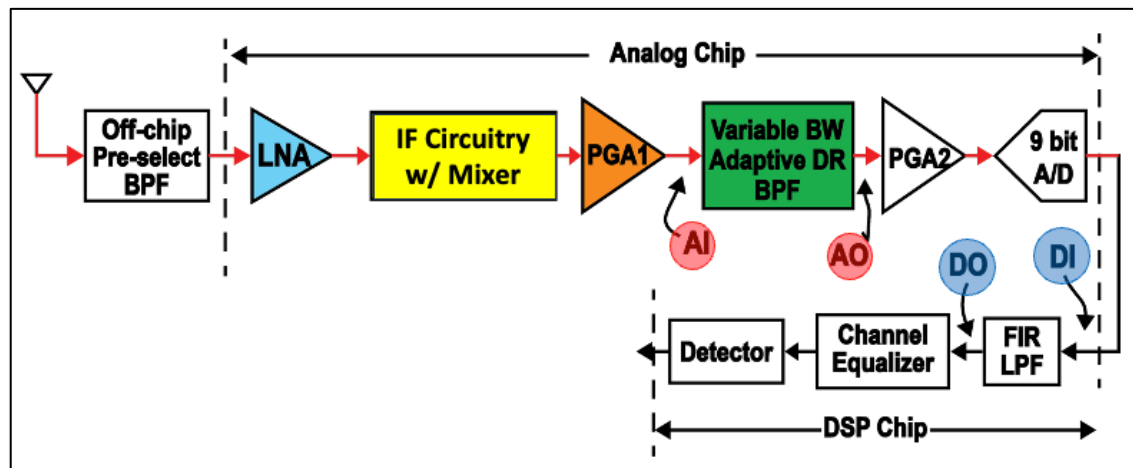
Tan's Fig. 9 depicts the full low pass G_m -C filter structure. As *Tan* explains, the filter uses pairs of transconductors in a differential negative feedback configuration (known as a gyrator) to simulate inductors in an LC ladder filter. *Tan*, 478, 480, Fig. 9. Each of the transconductors in this filter (represented by triangles in Fig. 9) includes either the circuit depicted in Fig. 6(a) (for the high-power filter) or Fig. 6(b) (for the low-power filter). *Dec.*, ¶XX. Focusing on the forward current path through the **transconductors** of the filter circuit to simplify the discussion, the **drive current** carrying the IF signal is relatively higher when the transconductors are the high-power configuration of Fig. 6(a) and relatively lower when the transconductors are the low-power configuration of Fig. 6(b):



Tan, Fig. 9 (annotated); *Dec.*, ¶139 (explaining that the higher drive current that results from the high-power transconductor's larger transconductance produces an overall larger drive current through the filter).

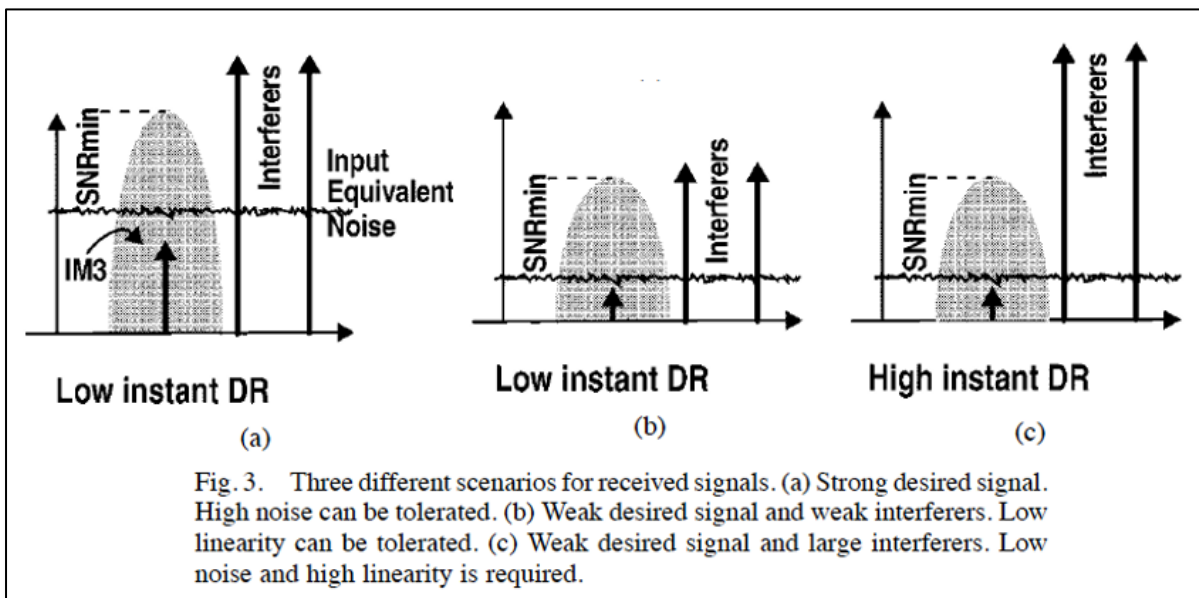
D. Behbahani Switches From a High-Power Filter to a Low-Power Filter Based on Signal Strength Measurements

As described above with reference to limitation [1(c)], *Behbahani* takes multiple signal strength measurements to ascertain desired and interferer signal conditions, including at a signal strength measured at node A_I located in the signal path (annotated in red) before the analog filter and a signal strength measured at node A_O located in the signal path after the analog filter:



Behbahani modified by *Leete*, Figure 2 (annotated). Like the '825 Patent, *Behbahani* teaches that the difference between signal levels measured at nodes " A_I and A_O is a measure of the out-of-band interferers being rejected by the analog [filter]." *Behbahani*, 1207. *Behbahani* also measures the output of the digital filter (DO), which indicates the absolute signal strength of a received desired signal. *Id.*

Behbahani explains that a weak desired signal (i.e., a low D_O) and significantly different levels at nodes A_I and A_O indicates worst case conditions as depicted in Fig. 3(c) below. *Id.* (“If the signal levels are significantly different at . . . the above pairs of nodes (A_I and A_O . . .) and there is a weak signal at D_O , the condition must be the one shown in Fig. 3(c).”).



Id., Fig. 3 (rearranged).

When such worst-case conditions are experienced, *Behbahani*'s switched DR process uses the high-power filter to expand the DR and accommodate a low desired signal and high interferers. *Id.*, 1206. And, when signal strength measurements indicate better than worst-case conditions, *Behbahani*'s system switches in the low-power filter, saving power, and implements the sliding DR process to track the desired signal strength. *Id.*; see also *Dec.*, ¶¶140-43 (confirming *Behbahani*'s use of signal strength measurements to implement sliding DR and switched DR.).

Accordingly, a POSITA would have understood that switching from the high-power filter to low-power filter is based on signal strength measurements of the desired and interferer signal strengths taken at multiple points in the receiver signal path of the wireless transceiver. *Dec.*, ¶¶140-43.

In sum, switching from *Behbahani*'s high-power filter to its low-power filter based on signal strength measurements (1) increases the signal path impedance and (2) lowers the DC bias applied to the filter stage. It also lowers the drive current—the current carrying an AC signal. *Dec.*, ¶144.

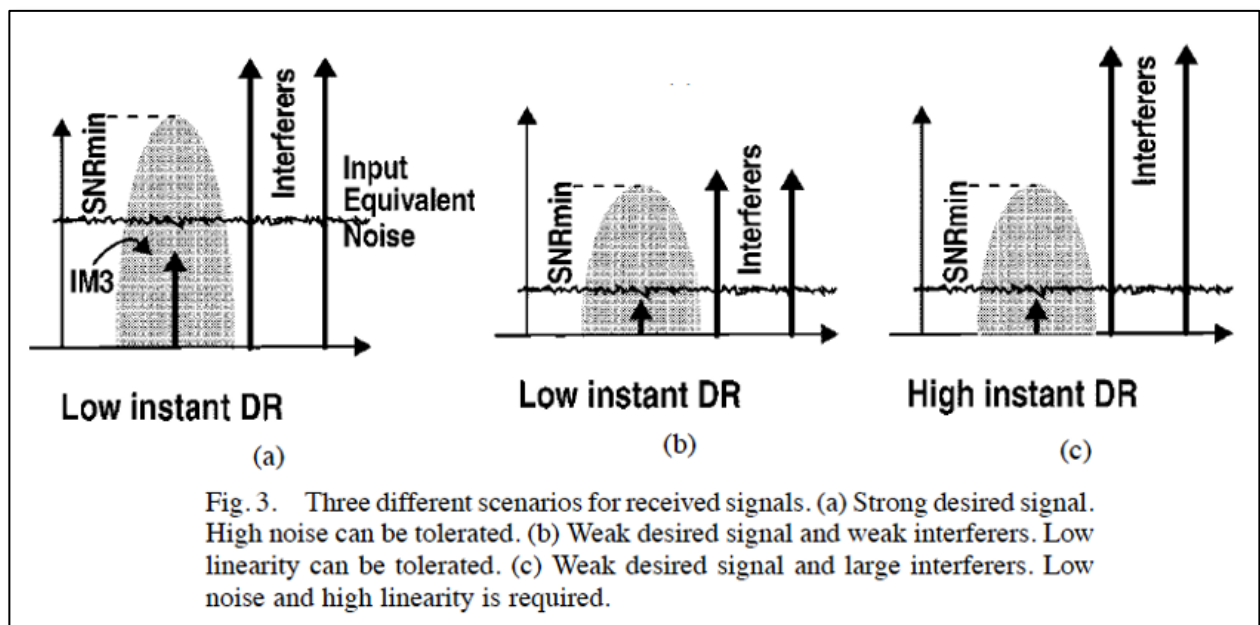
Claim 1(f): “(i) when the signal strength of the interferer signal is high and the signal strength of the desired signal is low, and the desired signal is larger than in the worst-case power dissipation condition, causing the bias current of the one or more of the plurality of circuits in the receiver 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.”

As explained above with reference to limitations [1(a)] through [1(e)] *Behbahani* teaches an “adaptive dynamic range” method of saving power by switching from a high-power to a low-power filter when conditions sufficiently improve from worst-case. This switch (1) increases signal path impedance, (2) decreases AC drive current, and (3) decreases DC bias current.

Behbahani renders obvious saving power via this switched filter process when signal conditions exist as required by limitation [1(f)(i)], i.e., when there (1) are strong interferers and (2) a relatively weak desired signal that is still stronger than worst-case. It also expressly teaches saving power via the switched filter process when signal conditions exist as required by limitation [1(f)(ii)], i.e., when both the desired and interferer signals are weak.

Behbahani describes three different desired and interferer signal scenarios below in Figure 3. Figs. 3(a) and Fig. (b) depict better than worst-case and Fig. 3(c) depicts worst-case conditions. *Behbahani*, 1206.



Id., Fig. 3 (rearranged). Fig. 3(c)'s worst-case conditions exist when the desired signal is very weak and the interferers are very strong. *Id.*, 1206. Fig. 3(a) depicts better than worst-case conditions in which the desired signal is strong and the

interferers are also strong, and Fig. 3(b) depicts better than worst-case conditions in which the desired signal is weak and the interferers are also weak. *Id.*

Behbahani explains that the high-power filter is used for worst-case conditions (Fig. 3(c)) and the low-power filter is used for all other conditions, i.e., when conditions have sufficiently improved beyond worst-case conditions. *Id.*, 1206; *Dec.*, ¶¶147-48. *Behbahani* renders obvious limitation [1(f)(i)]'s recited scenario—strong interferers and a relatively weak desired signal that is still stronger than worst-case. This recited scenario falls between the scenarios depicted in Figs. 3(a) and 3(c). Namely, high interferers as depicted in both figures, but with a desired signal that is weaker than in 3(a) and stronger than in 3(b). *Dec.*, ¶¶146-49. A POSITA would have understood and found obvious that power savings in such a situation would be realized by employing *Behbahani*'s low-power filter. *Id.* Indeed, assuming a starting point of worst-case (Fig. 3(c)), when the desired signal strength increases sufficiently above worst-case (even absent any change in the interferer signal strength), *Behbahani*'s system switches from the high-power filter to the low-power filter to save power, satisfying this limitation. *Id.* (explaining that a POSITA would have been motivated to implement *Behbahani*'s teachings such that this switch is made when the desired signal strength increases sufficiently above worst-case depicted in Fig. 3(c) and well before the desired signal has reached the relatively strong level depicted in Fig. 3(a)).

Behbahani expressly teaches limitation [1(f)(ii)]’s recited scenario—weak desired signal and weak interferers. This scenario is depicted in Fig. 3(b) and is described in relation to this figure. *Behbahani*, 1206 (noting Fig. 3(b) illustrates a “[w]eak desired signal and weak interferers”); *Dec.*, ¶150.

2. Claim 2

Claim 2(a): “The method of claim 1, 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.”

As discussed above with respect to limitation [1(e)], *Behbahani* teaches a method for switching from a high-power to low-power filter which reduces DC bias current and increases the filter impedance. And as discussed above with respect to limitation [1(e)], the impedance change comprises at least a resistor and a capacitor.

Starting with the resistor requirement, *Tan* describes a transconductance core that is key to the variable filter design in which different transconductor circuits are used for the low-power filter and for the high-power filter. *See, e.g., Tan*, 478-80, Fig. 6. As illustrated in Fig. 6, *Tan* explains that each of these transconductance cores includes resistors *Id.*; *see also Behbahani*, 1206 (explaining that its high-power filter “[s]cale[s] up all the transistors” while “**scaling down all resistors** by the same factor”). Accordingly, a POSITA would have understood that the variable filter

described by *Tan* and relied upon by Petitioner in the mapping above does in fact comprise resistors, as claimed. *Dec.*, ¶¶152-56.

Turning to the capacitor requirement, *Tan* explains that each of these transconductance cores includes capacitors *Tan*, 478-80; *see also Behbahani*, 1208 (“filter input capacitance [] is, respectively, 0.4 and 4 pF for the low-power and the high-power versions.”), *Dec.*, ¶¶57-58. Accordingly, a POSITA would have understood that the variable filter described by *Tan* and relied upon by Petitioner in the mapping above does in fact comprise capacitors, as claimed. *Dec.*, ¶¶151-58.

3. Claim 3

Claim 3(Pre)¹⁰

See limitation 1(Pre).

Claim 3(a)

See limitation 1(a).

Claim 3(b): “wherein the plurality of circuits includes an amplifier, a filter, and a mixer, and”

See limitation 1(b).

Claim 3(c)

See limitation 1(c).

Claim 3(d)

See limitation 1(d).

¹⁰ All claim language is provided in a claim appendix below.

Claim 3(e)

See limitation 1(e).

Claim 3(f)

See limitation 1(f).

4. Claim 4

Claim 4

See Claim 2.

5. Claim 5

Claim 5(Pre)

See limitation 1(Pre). Claim 5 uses slightly different language than Claim 1 to describe its claimed method for power dissipation. Namely, Claim 5 recites a “reduction in a drain on battery life[,]” and Claim 1 recites an “increase in battery life[.]” A POSITA would understand that these are immaterially different ways to describe preserving battery life by reducing power usage in a wireless receiver and that the Claim 1 mapping also satisfies Claim 5. *Dec.*, ¶167.

Claim 5(a)

See limitation 1(a).

Claim 5(b)

See limitation 1(b).

Claim 5(c)

See limitation 1(c).

Claim 5(d)

See limitation 1(d).

Claim 5(e)

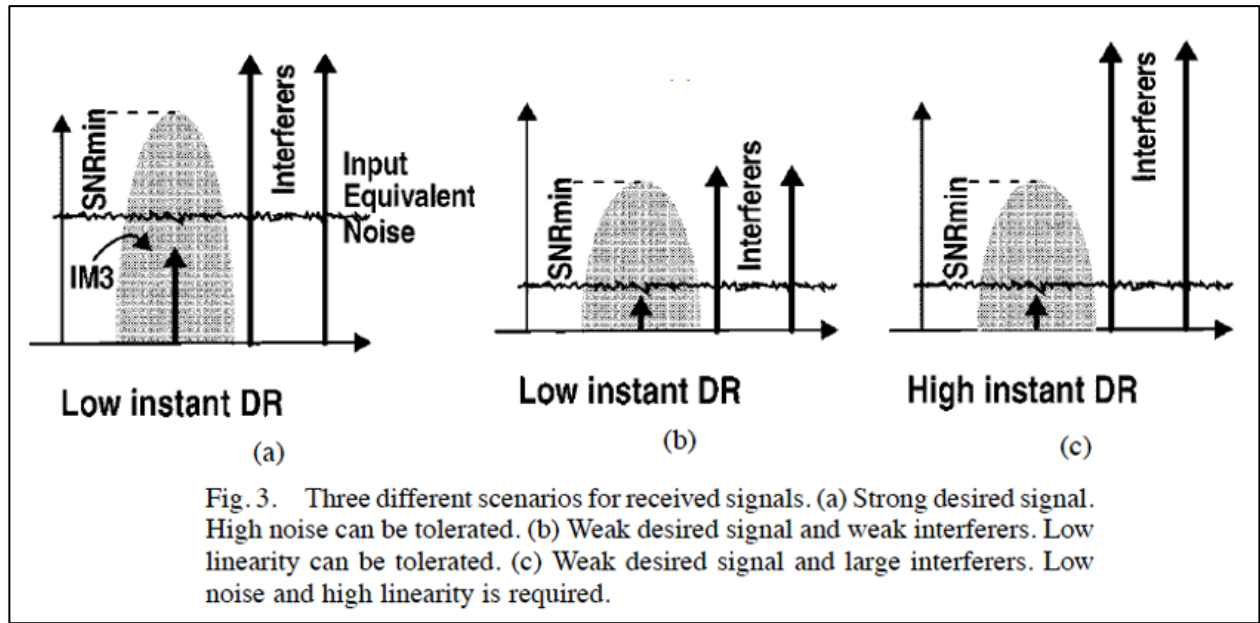
See limitation 1(e).

Claim 5(f): “(i) when the signal strength of the interferer signal is high and the signal strength of the desired signal is weak, 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;”

Limitation [5(f)(i)] is identical to limitation [1(f)(i)]. Accordingly, the mapping for limitation [1(f)(i)] is incorporated here by reference.

Claim 5(f): “(ii) when the signal strength of the interferer signal is high and the signal strength of the desired signal is high, 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;”

Limitation [5(f)(ii)] addresses a new scenario not addressed above in which power reduction is possible—high desired signal and high interferer signals. *Behbahani* describes three different desired and interferer signal scenarios below in Figure 3. Figs. 3(a) and Fig. (b) depict better than worst-case and Fig. 3(c) depicts worst-case conditions. *Behbahani*, 1206.



Id., Fig. 3 (rearranged).

Behbahani explains that the high-power filter is used for worst-case conditions (Fig. 3(c)) and the low-power filter is used for all other conditions, i.e., when conditions have sufficiently improved beyond worst-case conditions. *Id.*, 1206; *Dec.*, ¶¶174-78. *Behbahani* expressly teaches limitation [5(f)(ii)]'s recited scenario—strong desired signal and strong interferers. This scenario is depicted in Fig. 3(a) and is described in relation to this figure. *Behbahani*, 1206 (noting Fig. 3(a) illustrates a “[s]trong desired signal”); *Dec.*, ¶¶174-78 (explaining that Fig. 3(a) also depicts strong interferers and that the combination of strong desired and strong interferer signals depicted in Fig. 3(a) allows power to be saved from worst-case conditions by switching from the high-power filter to the low-power filter).

Claim 5(f): “(iii) 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; and”

Limitation [5(f)(iii)] is identical to limitation [1(f)(ii)]. Accordingly, the mapping for limitation [1(f)(ii)] is incorporated here by reference.

Claim 5(f): “(iv) when the signal strength of the interferer signal is weak and the signal strength of the desired signal is high, 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.”

As explained above with reference to limitations [1(f)], *Behbahani* explains that the high-power filter is used for worst-case conditions (Fig. 3(c)) and the low-power filter is used for all other conditions, i.e., when conditions have sufficiently improved beyond worst-case conditions. *Behbahani*, 1206; *Dec.*, ¶¶180-83. Limitation [5(f)(iv)] recites a best-case condition where the desired signal is strong and the interferers are weak. Per *Behbahani*’s adaptive DR teachings, such a scenario would save power above worst-case conditions by switching from the high-power filter to the low-power filter. *Dec.*, ¶¶180-83.

6. Claim 6

Claim 6

See Claim 2.

7. Claim 7

Claim 7(Pre)

See limitation 1(Pre).

Claim 7(a)

See limitation 1(a).

Claim 7(b)

See limitation 1(b).

Claim 7(c)

See limitation 1(c).

Claim 7(d)

See limitation 1(d).

Claim 7(e): “wherein the power dissipation reduction is achieved by causing an impedance and a bias current of one or more of the plurality of circuits in the receiver signal path of the wireless transceiver to vary as the signal strength of the interferer signal and the signal strength of the desired signal to vary according to the following:”

As explained above with respect to limitation [1(e)], and Claim 2, *Behbahani’s* switched filter method saves power when better than worst-case conditions exist by switching from a high-power filter to a low-power filter, causing (1) the filter impedance to increase and (2) the DC bias current applied to the filter to decrease.

Claim 7(f): “(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 conditions, causing the bias current of the circuit in the receiver signal path of the wireless transceiver to be reduced compared to the worst-case power dissipation condition, causing a reduction in power dissipation;”

See limitation [1(f)(i)].

Claim 7(f): “(ii) when the signal strength of the interferer signal is high and the signal strength of the desired signal is high, causing the impedance of the circuit in the receiver signal path of the wireless transceiver to be increased compared to the worst-case power dissipation condition, causing a reduction in power dissipation;”

See limitation [5(f)(ii)] (explaining that the claimed scenario is accommodated in *Behbahani* by switching from the high-power to low-power filter); see also limitation [1(e)] (explaining that switching from the high-power to low-power filter lowers DC bias current and increases the filter impedance, reducing power dissipation).

Claim 7(f): “(iii) when the signal strength of the interferer signal is low and the signal strength of the desired signal is low, causing the bias current of the circuit in the receiver signal path of the wireless transceiver to be reduced compared to the worst-case power dissipation condition, causing a reduction in power dissipation;”

See limitation [1(f)(ii)].

Claim 7(f): “(iv) when the signal strength of the interferer signal is low and the signal strength of the desired signal is high, causing the impedance of the circuit in the receiver signal path of the wireless transceiver to be increased compared to the worst-case power dissipation condition, causing a reduction in power dissipation;”

See limitation [5(f)(iv)] (explaining that the claimed scenario is accommodated in *Behbahani* by switching from the high-power to low-power filter); *see also* limitation [1(e)] (explaining that switching from the high-power to low-power filter lowers DC bias current and increases the filter impedance, reducing power dissipation).

Claim 7(g): “and wherein increasing the impedance of the circuit reduces a drive current of the circuit and reduces the associated bias current of the circuit.”

As discussed above with respect to limitation [1(e)], and Claim 2, *Behbahani*’s switched filter method saves power when better than worst-case conditions exist by switching from a high-power filter to a low-power filter, causing (1) the filter impedance to increase, (2) the DC bias current applied to the filter to decrease, and (3) the AC drive current that flows through the filter to decrease.

8. Claim 8

Claim 8(Pre)

See limitation 1(Pre).

Claim 8(a)

See limitation 1(a).

Claim 8(b)

See limitation 1(b).

Claim 8(c)

See limitation 1(c).

Claim 8(d)

See limitation 1(d).

Claim 8(e)

See limitation 7(e).

Claim 8(f)

See limitation 1(f).

Claim 8(g)

See limitation 7(g).

VI. *DISCRETION UNDER 35 U.S.C. §325(d)*

Section 325(d) provides that, in determining whether to institute a post-grant review, “the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.” The Board uses a two-part framework for evaluating arguments under § 325(d):

- (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and
- (2) if either condition of first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”). In

applying the two-part framework, the Board considers several nonexclusive factors set forth in *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, No. IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017).

The Proposed Grounds rely on *Behbahani* and *Tan*, which were cited on the face of the '825 Patent, but were not discussed by the Examiner during prosecution. The fact that neither reference was applied in a rejection weighs strongly against denying institution under § 325(d). *See CrowdStrike, Inc. v. Webroot Inc.*, IPR2023-00126, Paper 9 at 14 (PTAB May 5, 2023) (“[the Board] cannot determine the extent to which [cited reference] was evaluated during the examination because it was never used in a rejection” and because “[cited reference] was not the basis of a rejection, there is no overlap of arguments.”); *Scientific Design Co. Inc. v. Shell Oil Co.*, IPR2022-00158, Paper 7 at 24-26 (PTAB Apr. 4, 2022) (declining to exercise discretion under § 325(d) based on “credit[ing] Petitioner’s argument that although the references ‘were cited in an IDS, together with 111 references, none of them was used in any rejections, or otherwise addressed by the examiner’”); *Bowtech, Inc. v. MCP IP, LLC*, IPR2019-00379, Paper 14 at 18 (PTAB Jul. 3, 2019) (“[the Board has] consistently held that a reference that was neither applied against the claims nor discussed by the Examiner does not weigh in favor of exercising our discretion under § 325(d).”).

As highlighted by the strength of the Proposed Grounds, it is evident that the Examiner did not appreciate *Behbahani's* disclosures and how this reference in combination with *Tan* and *Leete* (not previously before the Office) render the Challenged Claims obvious. When a reference was never “substantively discussed by the Examiner[,]” “a petitioner’s showing that the challenged claims are unpatentable over the asserted prior art may itself be evidence of material error by the Office during prosecution.” *Quasar Science LLC v. Colt International Clothing, Inc. d/b/a Colt LED*, IPR2023-00611, Paper 10 at 14 (PTAB Oct. 10, 2023) (“Quasar”).

Therefore, denial under 35 U.S.C. § 325(d) is not warranted.

VII. DISCRETIONARY DENIAL IS NOT WARRANTED

A. The *General Plastic* Factors Favor Institution

The Board set forth seven factors it considers in determining whether to exercise discretion to deny a petition under § 314(a). *General Plastic Industrial Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 at 15-19 (PTAB Sept. 6, 2017) (precedential). Here, these factors weigh heavily in favor of institution.

There is one prior PTAB challenge to the '825 Patent—*Lenovo et al., v. Theta IP, LLC*, IPR2023-00697. With respect to the first five *General Plastic* factors, it weighs against a discretionary denial that Apple is not a party to any prior IPR, that this is Apple’s first IPR challenge to the '825 Patent, and that Apple did not

coordinate with Lenovo et al., in any way. *See Unified Patents, Inc. v. Certified Measurement, LLC*, IPR2018-00548, Paper 7 at 7-8 (PTAB Sept. 5, 2018) (finding that it “weighs especially heavily against a discretionary denial” when the Petitioner is not a party to any prior proceeding, and it is Petitioner’s first challenge to the challenged Patent); *see also Foursquare Labs, Inc. v. Mimzi LLC*, IPR2019-01287, Paper 11 (PTAB Jan. 14, 2020) (petitioners individually sued with no evidence of coordination weighed against denying institution); *see Alcatel-Lucent USA Inc. v. Oyster Optics, LLC*, Case IPR2017-02146, slip op. at 12 (PTAB Feb. 28, 2018) (Paper 12) (“Once resolution of factor 1 indicates that Petitioner had not previously filed a petition against the same patent, factors 2– 5 bear little relevance[.]”).

Relevant to factor (3), the Board in *General Plastic* discussed the “potential for abuse” due to “[m]ultiple, staggered petitions challenging the same patent and same claims[.]” *Gen. Plastic*, IPR2016-01357, Paper 19 at 17. The Board explained, “[t]he absence of any restrictions on follow-on petitions would allow petitioners the opportunity to strategically stage their prior art and arguments in multiple petitions, using our decisions as a roadmap, until a ground is found that results in the grant of review.” *Id.* Apple is not using the earlier proceedings as a “roadmap” here. Apple employs entirely different art, different arguments and a different expert. Apple makes no use of the art, argument, responses, or holdings in the *Lenovo* IPR to “refine” failed arguments there. *See Toshiba Am. Info. Sys., Inc. v. Walletex*

Microelectronics Ltd., IPR2018-01538, Paper 11 at 20-21 (PTAB Mar. 5, 2019)

(“apply[ing] different prior art ... based on different arguments, made by different a petitioner,” does not amount to “a roadmap in a manner unfair to Patent Owner.”); *see Google LLC v. Realtime Adaptive Streaming, LLC*, IPR2019-01036, Paper 9 at 10-12 (PTAB Nov. 13, 2019) (finding Factor Three is “neutral or slightly favors institution” when prior IPR was instituted, there was no “readily apparent ‘unfair benefit’ obtained through use of [the] Institution Decision” from the prior IPR).

As to the sixth factor, the instant petition respects the finite resources of the Board. The Petition presents non-cumulative Grounds with new art. In IPR2023-00697, *Lenovo et al.*, presented four grounds of unpatentability under 35 U.S.C. § 103(a). *Lenovo* relied on *Rauhala* and a combination of *Rauhala* and *Masaaki*. None of the references used by *Lenovo* are relied upon in this instant challenge. Petitioner presents one ground of unpatentability of the Challenged Claims in view of new art: *Behbahani* in view *Leete* and *Tan*. Petitioner’s combination is fundamentally different than the grounds raised in IPR2023-00697 and therefore presents non-cumulative art with fundamentally different disclosures.

Regarding the seventh factor, there is no readily identifiable roadblock for the Board to issue a final determination within the statutory one-year limit.

Accordingly, the Board should reach the merits of this petition, and institute review of all Challenged Claims.

B. The *Fintiv* Factors Favor Institution

Under the “*Fintiv* factors,” the Board may consider parallel litigation, including an early trial date, in determining whether to institute under 35 U.S.C. § 314(a). *NHK Spring Co., Ltd., v. Intri-Plex Technologies, Inc.*, IPR2018-00752, Paper 8 at 19–20 (PTAB Sept. 12, 2018) (precedential); *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 2–3, 6 (PTAB Mar. 20, 2020) (precedential). Per the Interim *Fintiv* Guidance (“*Fintiv Memo*”),¹¹ “the PTAB will not discretionarily deny institution of an IPR” where a petitioner proffers a *Sotera* stipulation. *Fintiv Memo*, 7. Petitioner stipulates that, if the instant IPR is instituted, it will not pursue invalidity grounds against the Challenged Claims in the parallel district court proceeding that were brought in the petition or that could have reasonably been raised in the petition. Accordingly, the Board should not discretionarily deny institution under *Fintiv*.

VIII. CONCLUSION

For the forgoing reasons, Petitioner respectfully requests *inter partes* review of the Challenged Claims.

Respectfully submitted,

By: /s/ Paul R. Hart

Paul R. Hart, Reg. No. 59,646

COUNSEL FOR PETITIONER

¹¹https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

IX. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

A. Real Parties-in-Interest Under 37 C.F.R. § 42.8(b)(1)

Petitioner is the real party-in-interest.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

The '825 Patent is presently the subject of a patent infringement lawsuit filed against Petitioner in the United States District Court for the Western District of Texas, *Theta IP, LLC v. Apple Inc.*, Case No. 6:23-cv-00314. Petitioner understands the '825 Patent has also been at issue in the following matters:

- *Lenovo et al., v. Theta IP, LLC*, IPR2023-00697, instituted.
- *Theta IP, LLC v. Motorola Mobility LLC et al.*, in the United States District Court for the Northern District of Illinois, Case No. 1:22-cv-3441.
- *Theta IP, LLC v. Samsung Electronics Co. LTD., et al.*, in the United States District Court for the Western District of Texas, Case No. 6:20-cv-00160, dismissed.

Family members of the '825 Patent have also been challenged in the following PTAB proceedings:

- U.S. Patent No. 7,010,330 challenged in *Lenovo et al., v. Theta IP, LLC*, IPR2023-00694, denied institution.
- U.S. Patent No. 10,524,202 challenged in *Lenovo et al., v. Theta IP, LLC*, IPR2023-00698, instituted.

C. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Petitioner provides the following designation and service information for lead and back-up counsel. 37 C.F.R. § 42.8(b)(3) and (b)(4).

Lead Counsel	Back-Up Counsel
Paul R. Hart, (Reg. No. 59,646) Paul.Hart@eriseip.com <u>Postal and Hand-Delivery Address:</u> ERISE IP, P.A. 717 17 th St., Suite 1400 Denver, Colorado 80202 Telephone: (913) 777-5600 Fax: (913) 777-5601	Adam P. Seitz (Reg. No. 52,206) Adam.Seitz@eriseip.com <u>Postal and Hand-Delivery Address:</u> ERISE IP, P.A. 7015 College Blvd., Suite 700 Overland Park, Kansas 66211 Telephone: (913) 777-5600 Fax: (913) 777-5601

APPENDIX OF EXHIBITS

Exhibit 1001	U.S. Patent Number 10,129,825 (the “’825 Patent”)
Exhibit 1002	File History for U.S. Patent 10,129,825 (the “’825 <i>File History</i> ”)
Exhibit 1003	Asad Abidi Declaration (“ <i>Dec.</i> ”)
Exhibit 1004	Farbod Behbahani et al., <i>Adaptive Analog IF Signal Processor for a Wide-Band CMOS Wireless Receiver</i> , 36 IEEE Journal of Solid-State Circuits 1205, (Aug. 2001) (“ <i>Behbahani</i> ”)
Exhibit 1005	Farbod Behbahani et al., <i>A 2.4-GHz Low-IF Receiver for Wideband WLAN in 0.6μm CMOS – Architecture and Front-End</i> , 35 IEEE Journal of Solid-State Circuits 1908, (Dec. 2000) (“ <i>Leete</i> ”)
Exhibit 1006	Farbod Behbahani et al., <i>A Broad-Band Tunable CMOS Channel-Select Filter for a Low-IF Wireless Receiver</i> , 35 IEEE Journal of Solid-State Circuits 476, (April 2000) (“ <i>Tan</i> ”)
Exhibit 1007	Theta IP, LLC’s Response Claim Construction Br., Dec. 08, 2023 (<i>Theta Markman Br.</i>)
Exhibit 1008	Joint Claim Construction Statement, Jan. 18, 2024 (<i>Joint Markman Statement</i>)
Exhibit 1009	Theta IP, LLC’s Sur-Reply Claim Construction Br., Jan. 16, 2024 (<i>Theta Markman Br. Sur-Reply</i>)
Exhibit 1010	<i>June A. Munford Declaration</i> (“ <i>Munford Dec.</i> ”)
Exhibit 1011	Y. Tsividis et al., <i>Internally Varying Analog Circuit Minimize Power Dissipation</i> , IEEE Circuits & Devices Magazine, Jan. 2003
Exhibit 1012	Mihai Banu & Yannis Tsividis, <i>Fully Integrated Active RC Filters in Technology</i> , 18 IEEE Journal of Solid-State Circuits 644, (Dec. 1983) (“ <i>Fully Integrated</i> ”)
Exhibit 1013	Farbod Behbahani et. al, <i>An Adaptive 2.4GHz Low-IF Receiver in 0.6μm CMOS for Wideband Wireless LAN</i> , IEEE International Solid-State Circuits Conference, 2000 (“ <i>Kishigami</i> ”).
Exhibit 1014	U.S. Patent No. 6,335,952 to Lee et al. (“ <i>Lee</i> ”)
Exhibit 1015	Reinhold Ludwig, et. al, <i>RF Circuit Design</i> , 2000, (“ <i>Ludwig</i> ”)
Exhibit 1016	“AN-844 Integrated LNA and Mixer Basics” by Texas Instruments (April 1993) (“ <i>Texas</i> ”)
Exhibit 1017	<i>Intentionally left blank</i>
Exhibit 1018	<i>Intentionally left blank</i>
Exhibit 1019	Rex Miller & Mark R. Miller, <i>Barron’s Electronics The Easy Way</i> (4 th ed.) (2002) (“ <i>Barron</i> ”)
Exhibit 1020	<i>Intentionally left blank</i>

Exhibit 1021	Thomas Byunghak Cho & Paul R. Gray, <i>A 10 b, 20 Msample/s, 35 mW Pipeline A/D Converter</i> , IEEE Journal Of Solid-State Circuits Conference 166 (Mar. 1995) (“Cho”)
Exhibit 1022	<i>Intentionally left blank</i>
Exhibit 1023	Roubik Gregorian & Gabor C. Temes, <i>Analog MOS Integrated Circuits for Signal Processing</i> (Robert A. Johnson & George Szentirmai eds., 1986) (“Gregorian”)
Exhibit 1024	John Pritiskutch & Brett Hanson, <i>UNDERSTANDING LDMOS DEVICE FUNDAMENTALS</i> , AN1226 App. Note (July 2000) (“STMicroelectronics”)
Exhibit 1025	<i>Intentionally left blank</i>
Exhibit 1026	John G. Proakis & Masoud Salehi, <i>Communications Systems Engineering</i> , (1994) (“Proakis”)
Exhibit 1027	S. Khorram et. al, <i>A CMOS Limiting Amplifier and Signal-Strength Indicator</i> , 1995 Symposium on VLSI Circuits Digest of Technical Papers, (1995) (“Khorram”)
Exhibit 1028	The Evolution of Wi-Fi Technology, IEEE Standards Association, (May 16, 2023) (“IEEE”)
Exhibit 1029	Kevin Werbach, <i>Open Spectrum The New Wireless Paradigm</i> , New America Foundation, Spectrum Series Working Paper #6 (Oct. 2002) (“Werbach”)
Exhibit 1030	Robert G. Fichman et. al, <i>Information-Rich Commerce At A Crossroads: Business and Technology Adoption Requirements</i> , (July 2002) (“Fichman”)
Exhibit 1031	U.S. Patent No. 6,480,700 to Groe et al. (“Groe”)
Exhibit 1032	Gary J. Saulnier et. al, <i>A VLSI Demodulator for Digital RF Network Applications: Theory and Results</i> , 8 IEEE Journal On Selected Areas In Communications 1500 (Oct. 1990) (“Saulnier”)
Exhibit 1033	<i>Intentionally left blank</i>
Exhibit 1034	<i>Intentionally left blank</i>
Exhibit 1035	Arthur D. Spaulding et al, <i>Optimum Reception in an Impulsive Interference Environment-Part I: Coherent Detection</i> , COM-25 IEEE Transactions on Communications 910 (Sept. 1997) (“Spaulding”)
Exhibit 1036	<i>Intentionally left blank</i>
Exhibit 1037	<i>Intentionally left blank</i>
Exhibit 1038	Marvin E. Frerking, <i>Digital Signal Processing In Communication Systems</i> , (1994) (“Frerking”)
Exhibit 1039	<i>Intentionally left blank</i>
Exhibit 1040	<i>Intentionally left blank</i>

Exhibit 1041	Jacques C. Rudell et. al, <i>Recent Developments in High Integration Multi-Standard CMOS Transceivers for Personal Communication Systems</i> , 1998 (“ <i>Rudell</i> ”)
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CLAIM LISTING APPENDIX
U.S. Patent No. 10,129, 825 for Claims 1-8

Claim Designation	Claim Language
Claim 1[P]	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:
Claim 1(a)	receiving a wireless signal having a desired signal and an interferer signal, by the wireless transceiver of the battery powered portable wireless device
Claim 1(b)	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
Claim 1(c)	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;
Claim 1(d)	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
Claim 1(e)	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:

Claim Designation	Claim Language
Claim 1(f)	(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.
Claim 2(a)	The method of claim 1, 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.
Claim 3[P]	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:
Claim 3(a)	receiving a wireless signal having a desired signal and an interferer signal, by the wireless transceiver of the battery powered portable wireless device,
Claim 3(b)	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
Claim 3(c)	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;
Claim 3(d)	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

Claim Designation	Claim Language
Claim 3(e)	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:
Claim 3(f)	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, 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.
Claim 4	The method of claim 3, 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.
Claim 5[P]	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 a drain on battery life of the battery powered portable wireless device, the method comprising:
Claim 5(a)	receiving a wireless signal having a desired signal and an interferer signal, by the wireless transceiver of the battery powered portable wireless device,
Claim 5(b)	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
Claim 5(c)	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;
Claim 5(d)	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

Claim Designation	Claim Language
Claim 5(e)	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:
Claim 5(f)	(i) when the signal strength of the interferer signal is high and the signal strength of the desired signal is weak, 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; (ii) when the signal strength of the interferer signal is high and the signal strength of the desired signal is high, 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; (iii) 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; and (iv) when the signal strength of the interferer signal is weak and the signal strength of the desired signal is high, 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.

Claim Designation	Claim Language
Claim 6	The method of claim 5, 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.
Claim 7[P]	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 a drain on battery life of the battery powered portable wireless device, the method comprising:
Claim 7(a)	receiving a wireless signal having a desired signal and an interferer signal, by the wireless transceiver of the battery powered portable wireless device,
Claim 7(b)	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
Claim 7(c)	wherein the wireless transceiver comprises a circuit for determining a signal strength of the interferer signal and a signal strength of the desired signal in the receiver signal path;
Claim 7(d)	wherein a worst-case power dissipation condition in the receiver results when the signal strength of the desired signal is low and the signal strength of the interferer signal is high; and
Claim 7(e)	wherein the power dissipation reduction is achieved by causing an impedance and a bias current of one or more of the plurality of circuits in the receiver signal path of the wireless transceiver to vary as the signal strength of the interferer signal and the signal strength of the desired signal to vary according to the following:

Claim Designation	Claim Language
Claim 7(f)	(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 conditions, causing the bias current of the circuit in the receiver signal path of the wireless transceiver to be reduced compared to the worst-case power dissipation condition, causing a reduction in power dissipation; (ii) when the signal strength of the interferer signal is high and the signal strength of the desired signal is high, causing the impedance of the circuit in the receiver signal path of the wireless transceiver to be increased compared to the worst-case power dissipation condition, causing a reduction in power dissipation; (iii) when the signal strength of the interferer signal is low and the signal strength of the desired signal is low, causing the bias current of the circuit in the receiver signal path of the wireless transceiver to be reduced compared to the worst-case power dissipation condition, causing a reduction in power dissipation; (iv) when the signal strength of the interferer signal is low and the signal strength of the desired signal is high, causing the impedance of the circuit in the receiver signal path of the wireless transceiver to be increased compared to the worst-case power dissipation condition, causing a reduction in power dissipation;
Claim 7(g)	and wherein increasing the impedance of the circuit reduces a drive current of the circuit and reduces the associated bias current of the circuit.
Claim 8[P]	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:

Claim Designation	Claim Language
Claim 8(a)	receiving a wireless signal having a desired signal and an interferer signal, by the wireless transceiver of the battery powered portable wireless device,
Claim 8(b)	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
Claim 8(c)	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;
Claim 8(d)	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
Claim 8(e)	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:
Claim 8(f)	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: (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
Claim 8(g)	(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.

CERTIFICATION OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. §42.24 that the foregoing Petition for *Inter Partes* Review, excluding any table of contents, mandatory notices under 37 C.F.R. §42.8, certificates of service or word count, or appendix of exhibits, contains 13,556 words according to the word-processing program used to prepare this document (Microsoft Word).

Dated: May 1, 2024

Respectfully submitted,

By: /s/ Paul R. Hart
Paul R. Hart, Reg. No. 59,646

COUNSEL FOR PETITIONER

CERTIFICATE OF SERVICE ON PATENT OWNER
UNDER 37 C.F.R. § 42.105(a)

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(b), the undersigned certifies that on May 1, 2024, a complete and entire copy of this Petition for *Inter Partes* Review and Exhibits were provided via Priority Mail Express to the Patent Owner by serving the correspondence address of record for the '825 patent:

WOMBLE BOND DICKINSON (US) LLP
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A complete and entire copy of this Petition for *Inter Partes* Review and Exhibits were also emailed to counsel of record in the parallel litigation:

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Respectfully submitted,

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