

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TEXAS INSTRUMENTS INC.,

Petitioner,

v.

PARKERVISION, INC.

Patent Owner

U.S. Patent No. 9,118,528

Issue Date: August 25, 2015

Title: METHOD AND SYSTEM FOR DOWN-CONVERTING AN
ELECTROMAGNETIC SIGNAL, AND TRANSFORMS FOR SAME, AND
APERTURE RELATIONSHIPS

Inter Partes Review No. IPR2024-00936

PATENT OWNER'S REQUEST FOR DIRECTOR REVIEW

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I. INTRODUCTION

This is now the eighth time in six years that the Board has invalidated every challenged claim of a ParkerVision signal-processing patent. Each time ParkerVision addresses the Board's prior rulings, the Board finds a new path to unpatentability. The '528 patent should have been different. By the time of this proceeding, the Federal Circuit had addressed related ParkerVision patents and recognized the critical distinction between ParkerVision's energy-transfer architecture and conventional sampling systems. The '528 patent claims leverage that distinction: they require transferring energy from a carrier signal to a storage module and discharging that energy to form a down-converted signal.

The Board's Final Written Decision here is inconsistent with the Federal Circuit's ruling. The court explained that ParkerVision's inventions use "energy sampling," not conventional "voltage sampling," and that "sampling" does not occur where a circuit has continuous input and output. Yet the Board treated Tayloe—a voltage-sampling reference—as if it disclosed the claimed energy-transfer approach, and treated Razavi as capable of "sampling" despite its continuous input and output.

Worse, the decision is internally inconsistent. For priority, the Board demanded documentary precision the law does not require and that real-world inventors rarely preserve. For obviousness, it treated technological

incompatibilities as obstacles Petitioner could overcome through expert say-so, while adopting inconsistent analytical conventions for Razavi and Tayloe. The result is heightened standards for preserving ParkerVision's claims and relaxed standards for invalidating them. The Board's inconsistent analyses reflect result-driven reasoning designed to preserve the same endpoint it has reached in every ParkerVision IPR: unpatentability. Worse still, the panel went even further, outlining a path to circumvent future Federal Circuit review (FWD, 160):

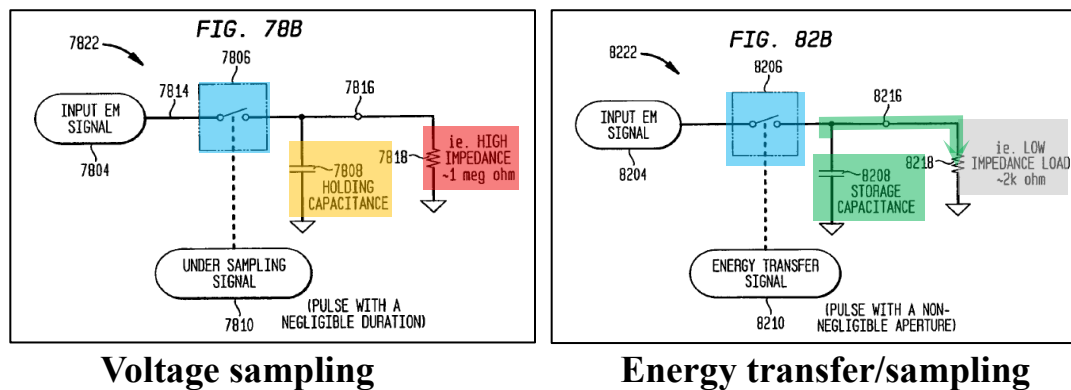
To the extent, however, that our reviewing court [i.e., Federal Circuit] determines that we erred in some respect regarding our determination as to corroboration, the record shall reflect that it is our opinion that Petitioner sufficiently shows that the exhibits challenged herein constitute inadmissible hearsay and lack proper authentication...

Those errors matter beyond this patent. ParkerVision is a Florida-based technology company that built an engineering operation around its signal-processing innovations, invested hundreds of millions of dollars, and employed about fifty engineers at its peak. It publicly disclosed its inventions and spent about \$20 million prosecuting its patents. Yet after doing what the patent system asks, ParkerVision is left in what has been called "a patent death squad for those patent owners who are unlucky enough to be trapped in instituted proceedings from the old regime." <https://ipwatchdog.com/2026/05/29/despite-recent-changes-ptab-remains-patent-death-squad/>. That is not the bargain Congress created. Director

Review should be granted, and the Final Written Decision should be reversed.

II. TECHNOLOGY CONTEXT

The Board's analysis repeatedly disregards fundamental distinctions between the relevant architectures, treating technologically incompatible systems as interchangeable. The '528 patent relates to technology for down-converting wireless signals. Down-conversion can be implemented in three ways. One approach samples the incoming high-frequency signal by capturing its instantaneous voltage ("voltage sampling"), while another approach (ParkerVision's "energy sampling") transfers energy from the incoming signal and uses that energy to form a down-converted signal. A third approach relies on *non*-sampling architectures to continuously translate frequency through analog mixing rather than discrete sampling. The two sampling methods are shown below:



A voltage sampling system (also called a "sample and hold" system) uses a switch (blue), a "*holding*" capacitor (orange), and a *high* impedance load (red).

EX1001, Fig. 78B. The high impedance inhibits current flow, preventing the

capacitor from discharging when the switch is open and allowing it to *hold* charge between sampling events. EX2024, ¶165. By contrast, ParkerVision's energy sampling system uses a "*storage*" capacitor (green) and a *low* impedance load (gray). EX1001, Fig. 82B. The low impedance permits current flow, allowing the capacitor to discharge (green arrow) to the load when the switch is open, thus permitting the capacitor to temporarily *store* and *transfer* energy. EX2024, ¶156. The Federal Circuit identified load impedance and discharge between samples as key distinctions between voltage sampling and energy sampling technology.

ParkerVision designed its down-converting system to perform energy sampling, rather than voltage sampling, by increasing the size of the capacitor, increasing the duration of the period that the switch is closed, and *decreasing the impedance value of the load*.

* * *

[A] reasonable jury could conclude that Weisskopf [a voltage sampler] *does not teach discharging the storage capacitor* That is because discharging the storage capacitor in Weisskopf's system may cause 'inability' of the system to successfully produce a baseband signal.... *ParkerVision, Inc. v. Qualcomm Inc.*, 621 F. App'x 1009, 1011, 1020 (Fed. Cir. 2015) (emphasis added here and throughout unless otherwise noted).

The third approach is fundamentally different from sampling. Unlike samplers, which allow current from the wireless input signal to flow through a switch, Gilbert cell technology uses current supplied by a *power source* and moves

that current continuously through the system. *See, e.g.*, EX2024, ¶¶242-253.

The Board relied on Tayloe, Macnally, and Razavi. Tayloe discloses *voltage sampling*; Macnally and Razavi disclose *non-sampling Gilbert cell* systems. These differences are dispositive. Yet the FWD minimizes or ignores them, treating distinct technologies as operating under the same principles when they do not.

III. ARGUMENT

A. The Board's interpretation is *inconsistent* with the Federal Circuit.

The challenged claims require “sampling.” ParkerVision argued that Razavi does not perform “sampling” because its circuit has a continuous input and continuous output. EX2024, ¶¶359, 364; POR, 98-99. The Board disagreed, holding that a circuit having a continuous input/output can perform “sampling.” FWD, 137. That holding is *inconsistent* with the Federal Circuit's view of the term in related ParkerVision patents: “traditional double-balanced mixers using a 50% duty cycle *do not ‘sample,’ because there is a continuous input and continuous output in those circuits.*” *ParkerVision*, 621 F. App'x 1009 at 1017. Thus, a circuit having a continuous input and output, as in Razavi, does “not ‘sample.’”

However, the Board relied on Dr. Galton's identification of alleged “sampling” in Razavi and found his testimony was “credible and persuasive.” FWD, 137. Setting aside that Dr. Galton's testimony was conclusory, it conflicts with the Federal Circuit's view of “sampling” and thus cannot support the Board's

ruling. That alone is sufficient for reversal as to Grounds 2A-B.

B. The Board's Tayloe ruling is *inconsistent* with the Federal Circuit.

Not only did the Federal Circuit distinguish between sampling and non-sampling circuits, but it also distinguished between energy sampling and voltage sampling. Specifically, it explained that “ParkerVision’s down-converting system uses a technique called ‘*energy sampling*,’ which differs from the technique of ‘*voltage sampling*,’” *ParkerVision, Inc. v. Qualcomm Inc.*, 116 F.4th 1345, 1349 (Fed. Cir. 2024); *see also* POR, 54 (informing the Board of this decision).

The challenged claims are directed to energy sampling, reciting a *sampling* aperture, *transferring energy*, *energy* storage elements, and *discharging energy*. *See, e.g.*, EX1001, claims 1, 8, 19, 26. Dr. Ricketts identified these specific claim elements as those of an energy transfer system. EX2024, ¶¶182-188; POR, 52.

Tayloe, by contrast, uses *voltage sampling*. Dr. Ricketts explained that Tayloe refers *only* to voltage. EX2024, ¶200; POR, 56; *see also* EX2023, ¶213; POR, 59-60 (explaining that, because Tayloe’s capacitors charge to a *voltage* value of an input signal, it cannot be an energy sampler). Dr. Ricketts also explained why Tayloe is a voltage sampling system (e.g., because of its use of high impedance loads, which prevent energy transfer). EX2024, ¶¶213-225, 279; POR, 59-62.

Notably, Tayloe (the author) *himself* agrees with Dr. Ricketts. In an article submitted by *Petitioner*, Mr. Tayloe explained that his technology is a type of

“sample and hold” device, which all agree is a form of voltage sampling.

Some folks have described the detector as a sample and hold device. While this is true in that the detected signal on the detector capacitor is held from one $\frac{1}{4}$ cycle sample to the next, the actual detection is not simply a sample. I think of the detector as being an integrating detector. Each input capacitor sees the incoming signal for only $\frac{1}{4}$ of an RF cycle. During this $\frac{1}{4}$ cycle, the voltage on the

EX1047, 110-111. Consistent with Dr. Ricketts's opinion, Mr. Tayloe explains that the input signal is “held” on a capacitor from sample to sample—a defining feature of voltage sampling. EX2024, ¶¶114-118. By contrast, an energy sampler does not hold charge between samples; rather, charge is discharged to a low impedance load, transferring energy to that load. *Id.*, ¶¶120-123. This distinction is undisputed. Thus, Tayloe discloses a voltage sampler, not an energy sampler. And as the Federal Circuit noted, that “differs” from ParkerVision's energy sampling.

The Board's finding that Tayloe teaches the challenged claim elements is inconsistent with the Federal Circuit's characterization of ParkerVision's down-conversion technology and thus provides a basis for reversal as to Grounds 1A-B.

C. The Board's FWD is also internally inconsistent.

The Board's ruling is also internally inconsistent. When assessing ParkerVision's antedating evidence, the Board set an extraordinarily high bar by abandoning the “rule of reason” and imposing rigid (and unachievable) evidentiary demands. Yet, when assessing obviousness, the Board imposed a low bar by abandoning disciplined analysis in favor of hindsight-driven reasoning and adopted

inconsistent approaches to defining how current flows in the prior-art systems.

1. The Board abandoned the “rule of reason.”

Regarding conception/reduction to practice (“RTP”), as set forth below, the Board threw out the “rule of reason.” *See NFC Tech., LLC v. Matal*, 871 F.3d 1367, 1372 (Fed. Cir. 2017). Rather than considering the totality of evidence, as required, the Board discounted ParkerVision’s evidence based on irrelevant technicalities. In so doing, the Board imposed a standard nearly impossible to meet.

It is undisputed that “ParkerVision developed energy sampling in 1996 and 1997, and it applied for its first patent relating to that technology in October 1998.” *ParkerVision*, 621 F. App’x at 1012. ParkerVision called its prototype “Eddie” and has maintained records relating to its Eddie chip for more than 27 years.

To antedate Tayloe (Oct. 1998) and Macnally (Sept. 1998), ParkerVision produced contemporaneous documents, all antedating these references, including: (1) a chip layout file and metadata of files depicting this layout; (2) a circuit board schematic; (3) an agreement with Boeing to test the Eddie chip/board; (4) Boeing’s test report prepared under ParkerVision’s direction; (5) press releases discussing the Eddie chip/board and Boeing’s testing; (6) a Boeing notebook reflecting that testing; (7) an agreement with a third party to manufacture the chip; (8) a circuit board layout matching the January 20, 1998 schematic; and (9) file lists and metadata showing work on Eddie. EX2010-2013, 2019-2022, 2027, and 2029.

Those documents (and their metadata) by themselves are more than sufficient to establish conception/RTP prior to Tayloe and Macnally. But ParkerVision did not stop there. ParkerVision also provided a sworn declaration from Mr. David Sorrells, former CTO and lead inventor, who had firsthand knowledge of the research, development, and testing of the '528 patent technology. EX2016, ¶¶2, 4. Based on his personal knowledge, he served as a corporate witness and provided testimony authenticating the documents. EX2016, ¶¶9, 15, 27, 29-31. The Board, however, rejected the evidence on several grounds.

a. Citing *Apator Miitors ApS v. Kamstrup A/S*, 887 F.3d 1293, 1296-97 (Fed. Cir. 2018), the Board found that Mr. Sorrells's testimony required corroboration given his status as an inventor. FWD, 54. The Board got it backwards. Mr. Sorrells's testimony was not proffered to establish conception/RTP and, thus, did not need corroboration. Rather, it was proffered solely to provide context and authenticate documents that *themselves* establish conception/RTP. As a corporate representative with firsthand knowledge about how the documents were created and stored, he was uniquely suited to provide such testimony. The Board's contrary ruling effectively creates a *per se* rule prohibiting inventor authentication.

Apator is not to the contrary. There, the inventor testified that certain documents, proffered to antedate, were attached to his emails, but "[n]one of the emails themselves indicate what was attached or what such attachment disclosed."

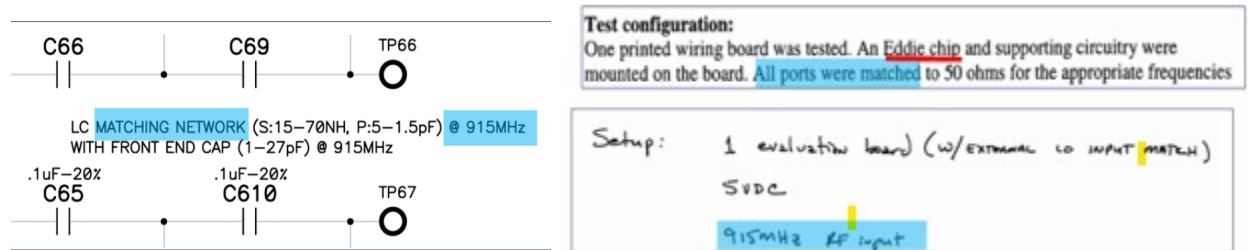
Apator, 887 F.3d at 1296. That is not the case here. Mr. Sorrells's testimony is confirmed by information *on the face of the documents themselves and their metadata*. And, having personal knowledge of the development of the technology and the creation/maintenance of the documents, Mr. Sorrells is the proper (and best) witness to authenticate the documents as business records.

b. The Board also got hung up on the documents' naming conventions, finding insufficient evidence to connect the chip layout file to the name "Eddie." FWD, 53. That misses the point. The chip/files' name is irrelevant—the documents describe the same chip (regardless of name). Even so, the Board ignores that "*Eddie\Triquint_GDS_Files*" is itself a file path for the chip layout. EX2016, ¶9. Contemporaneous press releases likewise refer to Eddie. EXS2019-2020. And Mr. Sorrells explained, based on both personal knowledge and corroborating documents, that Eddie was the project at the relevant time. EX2016, ¶¶5-24. Thus, there was more than enough evidence connecting the documents to the Eddie chip.

c. Finally, the Board found there was insufficient evidence that the chip/board in the documents was what Boeing tested. FWD, 53-54. It acknowledged *all* file versions predate Tayloe and Macnally, yet concluded that the multiple versions created uncertainty as to which Boeing tested. *Id.*, 54. Again, the Board ignored the totality of the evidence establishing the chips were the same.

For example, the face of the board schematics (EX2011) specifies an input

configuration with “matching network” and a precise input frequency of 915MHz; that exact *same* setup is described in the Boeing report as Eddie (EX2010, 1, 5, 7):



Likewise, connections on the chip layout directly correspond to connections on the circuit board schematic, demonstrating the Eddie chip was on the board. Compare EX2012 to EX2011. This evidence conclusively establishes that what Boeing tested was indeed the Eddie chip that ParkerVision developed back in 1997. As the Federal Circuit explained, the ultimate inquiry is “whether the inventor’s story is credible.” *NFC Tech.* 871 F.3d at 1372 (internal citations omitted). Here, the Board committed the same error identified in *NFC* by elevating isolated uncertainties over the totality of the documentary evidence corroborating Mr. Sorrells’s account. There is no need for additional corroborating evidence. To hold otherwise is fundamentally inconsistent with the “rule of reason” and imposes an impossible evidentiary standard nearly three decades after the fact.

The Board went even further, stating that even if the Federal Circuit disagrees, the Board will nevertheless find that all ParkerVision documents are hearsay and lack authentication. FWD, 160. The Board said this despite Mr.

Sorrells (ParkerVision's corporate representative) laying the foundation for authenticity and the business record exception to hearsay. *See* EX2016, ¶¶9, 15, 27, 29, 31. This underscores that the Board's analysis was outcome driven.

2. The Board destroyed the principle of operation of Tayloe and Razavi when combining them with Macnally.

The Board's heightened approach to conception/RTP is inconsistent with its lenient obviousness approach, which embraces a hindsight-driven analysis.

Starting with the Tayloe grounds: as explained above, and as Petitioner conceded, at least part of Tayloe's load is *high* impedance. EX1066, ¶17. This confirms Tayloe has attributes of a voltage sampler. Recognizing it could not prove invalidity with Tayloe alone, Petitioner instead relied on the Tayloe-Macnally combination, attempting to modify a voltage sampler by importing Macnally's low impedance load into Tayloe. But that combination destroys Tayloe's principle of operation. EX2024, ¶¶339-343. That both references perform down-conversion does not supply a rationale to combine them, just as gasoline and water would not be mixed in a gas tank merely because they are both liquids.

Other than hindsight, there is no reason for a POSITA to incorporate Macnally's low impedance load into Tayloe. Petitioner scoured the art for that feature, extracted it from Macnally (an undisputed, *different non-sampling* Gilbert system, EX2024, ¶338), and used it to construct a system that more closely

resembles ParkerVision's technology. The Board erred in endorsing this approach, effectively treating the prior art in the entire field of down-conversion as a grab-bag of components that can be freely mixed and matched. That is improper.

Rather than addressing the impedance mismatch between Tayloe and Macnally, the Board dismissed it as immaterial since impedance is unclaimed. FWD, 90. That misses the point. "Unclaimed factors relevant to the feasibility of creating a useful claimed invention can impact the motivation to combine analysis if a skilled artisan would reasonably consider them." *Natera, Inc. v. NeoGenomics Labs., Inc.*, 106 F.4th 1369, 1378 (Fed. Cir. 2024). Here, the impedance mismatch destroys both references' principle of operation, defeating a motivation to combine. EX2024, ¶¶318-355. While Dr. Galton provided contrary testimony, conclusory expert opinions do not defeat concrete evidence of technological incompatibility.

The same problem exists for the Razavi grounds. Razavi discloses a high-impedance amplifier, which Dr. Galton does not dispute. With high impedance connected to the output of the transistors, Razavi could not perform the claimed operation. So Petitioner combined Razavi with Macnally. Petitioner relies on Figure 4(a) of Razavi below to do so. But Razavi specifically teaches not to use Figure 4(a). Instead, Razavi teaches using the configurations shown in Figures 4(b) and 4(c) where a high impedance load (amplifier) is connected to the output of the transistors. It is undisputed that the Razavi/Macnally combination does not satisfy

the challenged claims when configured that way. Razavi is explicit: “the present design is intended for permutations in Figs. 4(b) and 4(c).” EX1017, 1. The Board cannot disregard that teaching simply because Figure 4(a) *also* appears in the reference.

3. The Board analyzed Razavi and Tayloe under polar opposite theories.

The Board's inconsistent approach continued in its treatment of Tayloe and Razavi. The Board used different frameworks depending on which one supported unpatentability. That is not a reasoned application of the art; it is a moving target.

The challenged claims require transferring energy from the carrier signal as “an output of [the] switch” and storing “the transferred energy from the modulated carrier signal” in an energy storage element. Determining whether those limitations are met requires analyzing the circuit. There are two conventions for analyzing a circuit: (1) “conventional current” and (2) electron flow. Sur-reply, 38. The two are *opposites. Id.* Whereas conventional current flows in one direction, electrons flow in the opposite direction. EX1066, ¶130. Dr. Galton admitted this distinction and noted that the conventional current approach is industry standard. *See* EX1066, ¶106 (“we should distinguish [1] conventional current ([which can be thought of as] the movement of positive charges), which is used in electric network theory, and [2] electron current.”). Notably, Dr. Galton also admitted that the '528 patent is

written using the conventional current framework. EX2042, 61:16-62:2; 59:21-60:9.

ParkerVision argued that, when analyzing Razavi from the perspective of conventional current, current from the input signal never passes through the switch as required by the claims. POR, 67 (citing EX2024, ¶242), 98 (citing EX2024, ¶359). Unable to rebut this point, Petitioner advanced a *new* theory that Razavi should be analyzed using *electron flow* rather than conventional current. Reply, 32.

ParkerVision argued that this new theory was wrong and should be excluded. Sur-Reply, 37-41. Yet the Board adopted the theory and simply accepted Dr. Galton's new electron-flow analysis of Razavi. FWD, 136. Although the Board acknowledged that electron flow and conventional current are *opposite* frameworks *id.*, it nevertheless abandoned the industry-standard framework—and the one used in the '528 patent—in favor of Petitioner's new electron-flow theory.

That alone is improper. It gets worse. When addressing Tayloe, the Board reverted to the conventional current framework it rejected for Razavi, without explaining why one framework should govern Razavi but not Tayloe. The Board credited Dr. Galton's testimony without addressing ParkerVision's evidence or explaining why the framework should change from one reference to the next. FWD, 90, 108-109, 137. The Board should not be able to pick and choose between opposite frameworks depending on which yields a finding of unpatentability.

IPR2024-00936 (U.S. Patent No. 9,118,528)
Patent Owner's Request for Director Review

Dated: June 22, 2026

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