

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
SAMSUNG ELECTRONICS AMERICA, INC.
Petitioner,

v.

MASSIVELY BROADBAND LLC,
Patent Owner.

CASE: IPR2025-01587
Patent 8,593,358

PATENT OWNER'S PRELIMINARY RESPONSE

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I. INTRODUCTION

MASSIVELY BROADBAND LLC (“Patent Owner”) submits this Patent Owner Preliminary Response pursuant to 37 C.F.R. § 42.107(a) to the *Inter Partes* Review petition (“Petition” or “Pet.”) filed by Samsung Electronics Co., Ltd. and Samsung Electronics America, LLC (“Petitioner”) for all thirty-one (31) claims (the “Challenged Claims”) of Patent 8,593,358 (“’358 Patent”). The Board should deny institution because the Petition fails, on every asserted ground, to establish a reasonable likelihood that any Challenged Claim is unpatentable.

The Petition should be denied for two independent and fundamental reasons. **First**, Petitioner fails to show that the asserted prior art teaches all the elements of any of the independent claims. The asserted references describe very different architectures—fixed-geometry multi-feed antennas (Wen), capacitively-loaded dipoles with inductor-capacitor (“LC”) adjustments confined to the antenna elements themselves (Poilasne), semiconductor RF building blocks (Govind), and a dual-resonant PIFA which also uses adjustments confined to the antenna elements themselves (Rubinshteyn). None of these references, however, discloses the claim-specific structures and relationships required by the independent claims of the ’358 Patent. For independent claims 1, 25, and 28, the cited art does not disclose an antenna tuner of any kind. For independent claims 8 and 14, the asserted combinations lack a multiband transmitter, receiver or transceiver, as well

as lacking an antenna tuner associated with such a multiband radio component.

For independent claim 19, the references do not teach the required antenna array, do not show that any single antenna element operates in multiple claimed bands, and do not meet either alternative of the “whereby” clause requiring component-level multiband operation.

Second, even when setting the missing elements aside, the Petition still fails to articulate a reasoned motivation to combine the cited references in the ways required by the asserted grounds, and thus Petitioner fails to show that any Challenged Claim is unpatentable. For Ground I and II, Petitioner offers no explanation for why a POSITA would alter Wen’s fixed multi-feed architecture using Poilasne’s multi-element, capacitively-loaded dipole structures. For Ground II, Petitioner’s reasoning relates only to substituting Govind’s multiband transceiver into Wen, without saying anything about adding Poilasne to the combination. For Ground IV, Petitioner provides independent rationales for the combination of Rubinshteyn and Wen and the combination of Rubinshteyn and Poilasne, but Petitioner never explains why a POSITA would pursue both modifications as a single, three-reference combination. Across all asserted grounds, Petitioner’s motivations reduce to general background observations, design-trend statements, and assertions of analogousness or expected success, none of which amounts to an articulated reasoning with a rational underpinning.

Because the asserted references fail to disclose multiple required claim elements, and because the Petition provides no well-reasoned basis for combining the cited references in the manners proposed, Petitioner has not shown a reasonable likelihood of prevailing on any challenged claim. Petitioner, therefore, has not met its burden under 35 U.S.C. § 314(a) and the Board should deny institution accordingly.

II. STATEMENT OF THE PRECISE RELIEF REQUESTED

Patent Owner requests that the Board deny institution of the Petition with respect to all the Challenged Claims (claims 1-31) and all asserted grounds.

III. BACKGROUND

A. Summary of the '358 Patent

The '358 Patent addresses a fundamental challenge in the design of compact wireless devices—supporting an increasing number of wireless frequency bands without requiring an impractical number of discrete antennas. The '358 Patent explains that then-contemporary wireless devices such as laptops, cellphones, and other portable equipment typically require multiple separate antennas, each designed to operate at a specific frequency band such as cellular, Bluetooth, and Wi-Fi. EX1001, 1:25-30. This need for numerous band-specific antennas creates significant mechanical and design challenges, as manufacturers must route feedlines and connections between various transmitter, receiver, and transceiver circuits and the antennas that must be mounted or housed within increasingly

compact device enclosures. *Id.*, 1:30-40, 4:62-5:2. As the number of wireless standards proliferates, the patent recognizes that portable devices may need to support ten or more distinct frequency bands, exacerbating the need for multiple antennas and compounding mechanical, spatial, and performance challenges. *Id.*, 1:43-55.

The '358 Patent provides a different and more flexible approach: a tunable antenna system whose operating band can be electronically adjusted—either actively or passively—under control of onboard circuitry. Rather than dedicating separate antennas to separate bands, the invention allows a single antenna structure to be tuned—actively or passively—and shared with feed systems among multiple transmitters, receivers, or transceivers that operate in different frequency bands. *Id.*, 3:61-67, 5:24-39. In certain embodiments, the system even supports simultaneous multiband operation, enabling concurrent transmission or reception across multiple bands without switching between them. *Id.*, 4:12-20, 6:28-38.

The patent discloses several embodiments illustrating this architecture. In one group of embodiments (Figs. 2–3), multiple single-band transceivers are each connected to a respective tuner whose characteristics can be electronically adjusted; a controller coordinates the tuning so that the multiband antenna can operate at the desired band for a particular transceiver. Depending on the configuration and level of isolation, the system can support either time-multiplexed

or simultaneous operation across multiple bands. In another embodiment (Fig. 4), a combined multiband transceiver communicates through a multiband tuner to the multiband antenna, enabling flexible multiband operation. As shown in Fig. 5, the multiband transceiver can communicate through a multiband tuner that matches the multiband antenna to different frequency bands, including the ability to handle multiple bands concurrently.

The '358 Patent contains 31 claims, including independent claims 1, 8, 14, 19, 25 and 28. Claims 1-18 are directed to a wireless device; claims 19-24 are directed to a wireless portable device; claims 25-27 are directed to a wireless device component; and claims 28-31 are directed to a wireless communication system.

B. Priority

The '358 Patent application was filed December 13, 2012 and claims priority as a continuation of Patent 8,350,763 (EX2038), which claims priority to a provisional application (Ser. No. 61/088,829) filed August 14, 2008. EX1001, field codes (63)-(64). The pre-AIA versions of 35 U.S.C. §§ 102-103 apply. Pub. L. No. 112-29, § 3(n), 125 Stat. 284, 293 (2011).

C. Level of Ordinary Skill

For purposes of this Preliminary Response, Patent Owner accepts the skill level proposed by Petitioner for a person of ordinary skill in the art ("POSITA").

Petitioner’s proposed POSITA is a person having a “at least a Bachelor’s degree in electrical engineering, computer engineering, physics, or a related field, and at least two years of experience working with design and integration of RF circuits and antennas for wireless communication devices,” where “[m]ore education can substitute for practical experience and vice versa.” Pet., 4-5. Patent Owner reserves the right to address or refine the level of ordinary skill at a later stage of this proceeding or in any parallel litigation, should the POSITA’s skill level become relevant.

D. Parallel Proceedings

The ’358 Patent, along with other patents owned by Patent Owner, is involved in parallel district court proceedings between Petitioner and Patent Owner. *See* Paper 8 (Patent Owner updated mandatory notice); Paper 9 (Patent Owner request for discretionary denial).

In related *inter partes* review proceedings involving various patents (the “Asserted Patents”) asserted in the parallel district court litigation, Petitioner claims that Petitioner has “full access” to the inventor’s “research ... in return” for the parties’ “multi-decade collaboration.” *See Samsung Elecs. Co. v. MASSIVELY BROADBAND LLC*, IPR2025-01595, Paper 10, 5 (PTAB Jan. 6, 2026); *Samsung Elecs. Co. v. MASSIVELY BROADBAND LLC*, IPR2025-01564, Paper 12, 5 (PTAB Jan. 6, 2026); *Samsung Elecs. Co. v. MASSIVELY BROADBAND LLC*,

IPR2025-01565, Paper 11, 4 (PTAB Jan. 7, 2026); *Samsung Elecs. Co. v. MASSIVELY BROADBAND LLC*, IPR2025-01594, Paper 10, 5 (PTAB Jan. 8, 2026); *Samsung Elecs. Co. v. MASSIVELY BROADBAND LLC*, IPR2026-00035, Paper 10, 4-5 (PTAB Jan. 16, 2026); *Samsung Elecs. Co. v. MASSIVELY BROADBAND LLC*, IPR2026-00032, Paper 11, 3 (PTAB Jan. 16, 2026); *Samsung Elecs. Co. v. MASSIVELY BROADBAND LLC*, IPR2025-01563, Paper 10, 6-7 (PTAB Jan. 16, 2026); *Samsung Elecs. Co. v. MASSIVELY BROADBAND LLC*, IPR2025-01605, Paper 11, 5 (PTAB Jan. 22, 2026). Without substantiation, Petitioner attempts to imply that it has rights to the patents, and further attempts to imply that Petitioner, through NYU Wireless, invested in the work that led to Prof. Rappaport's Asserted Patents. *Id.* Petitioner, however, ***does not, and cannot, provide any support for those erroneous suggestions.*** Specifically, Petitioner claims that it made "investments in the accused technology," i.e. its own products, citing to an interview with Prof. Rappaport regarding industry involvement in NYU Wireless. Fatal to Petitioner's argument, however, is the fact that the '358 Patent does not arise from any work at NYU Wireless, and further, the '358 Patent specification predates the creation of that research center entirely. Petitioner's involvement at NYU Wireless was not until 2012 and could not form the basis for any implied rights to Prof. Rappaport's prior work. To the best of Patent Owner's knowledge, Petitioner has produced ***no such evidence*** to support its position in the

IPR and in the parallel district court proceedings, and has no intellectual property rights to the '358 Patent or any other Asserted Patent involved in these IPRs or the parallel litigation.

Relatedly, Petitioner contends that the inventor's published research constituted "prior art available for use," such that the Petitioner "did not infringe" the inventor's patents and that Patent Owner would not enforce the patents. *See, e.g., Samsung Elecs.*, IPR2026-00032, Paper 11, 4; *Samsung Elecs.*, IPR2026-00035, Paper 10, 5; *Samsung Elecs.*, IPR2025-01563, Paper 10, 7; *Samsung Elecs.*, IPR2025-01605, Paper 11, 6. Petitioner, however, has not shown that it practices any such prior art. Nor does Petitioner rely upon any of the inventor's publications in any asserted ground of unpatentability in its IPRs. Absent any showing that Petitioner actually implemented the alleged prior art, Petitioner's assertions regarding non-infringement or non-enforcement are unsupported. Also fatal to Petitioner's assertions, Petitioner has not identified any course of dealing, agreement, or customer-supplier relationship between the parties that could plausibly support any understanding or perception that Patent Owner would refrain from enforcing Patent Owner's patents.

Petitioner also references its own involvement in "relevant" standard-setting efforts, without explaining which efforts are "relevant" or why that participation matters here. By citation to that same interview with Prof. Rappaport, Petitioner

erroneously attempts to imply Prof. Rappaport was a member of the same standard-setting organizations as Petitioner. This claim is not supported by Petitioner's citation, which says only that Prof. Rappaport's work writ large "influenced" standards bodies – not that Prof. Rappaport was a member, contributed any intellectual property, or had any obligation to do so. Indeed, Petitioner *offered no evidence* (i) describing a relationship between any of the patents and any applicable technical standard; (ii) that Prof. Rappaport or Patent Owner participated in any development of any applicable technical standard for the patents (they did not), or (iii) that Prof. Rappaport or Patent Owner had any obligation to disclose the patents to any standard-setting body or to Petitioner. *Id.* Nothing in the Petition for the '358 Patent relies on any technical standard for a basis for invalidity of any Challenged Claim, and nothing in this proceeding, one way or another, will determine if the '358 Patent or the other eleven Asserted Patents are subject to some technical standard. Thus, denial of institution is warranted, as instituting this proceeding would add substantial, unnecessary work for the Board (e.g., analyzing validity of claims not asserted in the litigation) while failing to resolve any of Petitioner's unsubstantiated issues that are unrelated to validity and most appropriately adjudicated in the district court proceeding.

E. Claim Construction

Patent Owner agrees with Petitioner that, for purposes of this Preliminary

Response, all claim terms should be given their plain and ordinary meaning as understood by a POSITA.

To the extent any dispute exists regarding the meaning of a claim term, such dispute does not provide a basis for institution. The Petition fails under the claim terms' plain and ordinary meanings, and Patent Owner reserves the right to address claim construction post-institution if necessary.

F. The Asserted Grounds

1. Summary of Asserted Grounds

Petitioner asserts that the Challenged Claims are unpatentable under the following asserted grounds:

Ground	Basis	Reference(s)	Claims
I	§103	Wen alone or in view of Poilasne	1-7, 25-31
II	§103	Wen in view of Poilasne and Govind	8-21, 23-24
III	§103	Wen in view of Poilasne, Govind, and Vlahos	22
IV	§103	Rubinshteyn in view of Wen and Poilasne	1-7, 25-31
V	§103	Rubinshteyn in view of Poilasne	8-21, 23
VI	§103	Rubinshteyn in view of Poilasne and Vlahos	22

2. Prior Art Relied Upon for Asserted Grounds

a. Wen (EX1004)

Wen discloses a single, fixed-geometry, multi-feed antenna that supports operation at multiple frequencies by providing multiple spatially separated feed points, each associated with a different operating band. EX1004, ¶[0027]. The antenna can be “substantially linear” or, as shown in Wen’s Fig. 2, can be a patch antenna. *Id.*, ¶[0033]. Multiple single-band RF transceivers, each hardwired to its own feed point, may share this antenna and, in some embodiments, may even operate “at the same time.” *Id.*, ¶[0027], Fig. 1. Each operating band is achieved not through any type of electrical tuning, but through the static physical layout of the antenna, including slots, leg lengths, and feed-point placement. *Id.*, ¶¶[0027]-[0035], Fig. 2. Wen does not disclose any tuner, tunable element, impedance-matching network, or controller-adjusted mechanism capable of run-time adjustments to enable a single antenna to be used by multiple radios to operate on one or more frequency bands, including simultaneously, through tuner and control circuitry. Rather, the resonant behavior of the antenna is fixed by its physical structure at fabrication. Wen’s “controller” merely selects which transceivers are active; Wen’s system does not perform antenna tuning. *Id.*, ¶[0039].

b. Rubinshteyn (EX1006)

Rubinshteyn discloses a planar inverted-F antenna (PIFA) incorporating a

low-band element and a high-band element that are simultaneously resonant at two different frequencies. EX1006, ¶¶[0016], [0022]–[0023]. This enables a wireless device (e.g., a cellular handset) to operate simultaneously at two frequencies as set by the geometry of the PIFA. *Id.*, ¶[0016]. To provide additional tuning of the antenna structure within the two operating bands, Rubinshteyn connects tunable components—implemented with PIN-diode-switched capacitors or similar reactances—fixed to the low-band and high-band antenna elements themselves, allowing the respective center frequencies of the antenna elements to be electronically shifted. *Id.*, ¶¶[0026]–[0036]; Fig. 4. A processor or controller adjusts the tunable components fixed on the antenna structure to select new frequency pairs. *Id.*, ¶[0028]. Rubinshteyn focuses on the antenna structure and its tunable components fixed on the antenna elements themselves, where the tunable components are inherently limited to simply tuning the antenna elements themselves, within two frequency bands in a pair-wise fashion (one low band and one high band center frequency) and has no teaching regarding how to match the antenna to transmitter and receiver architectures. Furthermore, Rubinshteyn offers no description of whether the associated transmitter, receiver, or transceiver circuitry is single-band or multiband. The RF front end is shown generically as a “transmitter,” “receiver,” and “duplexer” (Fig. 1) without any teaching that Rubinshteyn’s “transmitter,” “receiver,” and “duplexer” operate across multiple

frequency bands or are capable of multiband or concurrent multiband operation. Although Rubinshteyn teaches an antenna that through physical construction may resonate simultaneously at two frequencies, Rubinshteyn does not disclose or suggest a “multiband transmitter,” “multiband receiver,” or “multiband transceiver,” nor any circuitry capable of matching the antenna to transmitters and receivers for concurrent multi-frequency operation. Further, Rubinshteyn does not teach how a multiband radio would deal with the pair-wise frequency limitation, and further does not teach tuning circuits that are coupled to feedlines for multiple radios.

Importantly, Rubinshteyn’s tuning is directed to electrically altering the antenna elements, themselves, over a small range of in-band frequencies for resonance, and not directed to any matching network coupled between a multiband radio and an antenna that can be adjusted at run-time to satisfy the matching requirements of all radios at once. The disclosed PIN-diode-switched capacitors of Rubinshteyn selectively adjust matching conditions associated with fixed antenna elements to shift their center frequencies by a small amount within a single band of operation. *Id.*, ¶¶[0026]–[0036]. Rubinshteyn does not describe dynamically changing the matching characteristics of the antenna to a plurality of radios. At most, Rubinshteyn teaches a particular form of discrete in-band antenna tuning for a single radio that uses a duplexer, where such tuning is solely based on

the electronic tuning of antenna elements, not the tunable-antenna architectures claimed in the '358 Patent.

c. Govind (EX1008)

Govind describes semiconductor-integrated RF components, including on-chip inductors, capacitors, filters, and matching networks intended to improve RF performance and reduce size in integrated circuits. EX1008, 2:8-20. In certain embodiments, Govind discusses antenna coupling concepts, including single-band and multiband antennas, and architectures that can support multiband and even simultaneous multiband operation through reuse and routing of RF front-end components. *Id.*, 17:18–62, Fig. 15. Govind, however, focuses on RF system integration, signal routing, and reuse of passive components, not on tuning the antenna for use, let alone simultaneous use, by multiple radios through tuner and control circuitry under run-time control. Nor does Govind disclose tuning the antenna for use by multiband radios or multiband operation. Govind contemplates selecting among fixed frequency bands or switching between antenna paths to access different bands, but does not disclose run-time adjustments to enable a single antenna to be used by multiple radios to operate on one or more frequency bands, including simultaneously, through tuner and controller circuitry. At most, Govind describes multiband operation through architectural selection or switching among fixed bands, which is fundamentally different from the tunable-antenna

systems claimed in the '358 Patent.

d. Vlahos (EX1013)

Vlahos concerns receiver architecture for multiband radiotelephones and teaches techniques for reducing the number of mixers used in multiband receivers. EX1013, Abstract, 1:47-66. Vlahos describes antenna circuitry and fixed matching networks designed to accommodate specific, predefined frequency bands such as GSM 900, DCS 1800, and PCS 1900. *Id.* Vlahos focuses on receiver-side signal routing, combination filters, mixer design, and impedance matching tailored to the above-identified bands. Vlahos addresses multiband operation, but does so by providing separate, fixed matching paths for each band rather than by tuning. *Id.*, 4:10-45. Instead, the antenna matching in Vlahos is predetermined and static, selected for specific bands at design time.

e. Poilasne (EX1009)

Poilasne discloses a capacitively-loaded magnetic dipole antenna structure whose geometry can be altered using embedded control elements such as switches, FETs, or MEMS devices to vary resonant frequency or impedance. EX1009, ¶¶[0007], [0046]–[0048], [0051]. Poilasne describes antenna “portions” (capacitive, inductive, feed areas) and embodiments where multiple dipole structures may be positioned near each other (e.g., Figs. 9A, 9B, 11), but these are used for beam-switching, beam-steering, polarization diversity, or reducing

coupling—not for multi-band antenna operation. *Id.*, ¶¶[0042], [0060]–[0067].

Although Poilasne states that the antenna can “cover multiple frequency bands” (¶[0038]), the control elements only create incremental shifts in the resonant frequency of a single dipole structure. Poilasne does not disclose an antenna that operates in multiple distinct communication bands, nor an antenna that simultaneously operates in multiple such bands. As in Rubinshteyn, the control elements in Poilasne—the embedded switches, FETs, or MEMS devices—operate entirely within the antenna structure itself, perturbing only the radiator’s local LC characteristics. *Id.*, ¶¶[0007], [0046]–[0048], [0056]. As a result, Poilasne does not disclose any tuner or matching network between a radio and the antenna, nor any run-time matching mechanism capable of serving multiple radios or multiple bands.

IV. THE PETITION FAILS TO ESTABLISH A REASONABLE LIKELIHOOD OF SUCCESS ON A SINGLE CLAIM

The Board should deny institution of the IPR because Petitioner has failed to establish a likelihood that Petitioner will succeed in showing that any Challenged Claim is unpatentable under any asserted ground. 35 U.S.C. § 314(a).

A. The Asserted Grounds Fail to Teach or Suggest All Elements of the Challenged Claims

The IPR should not be instituted because Petitioner’s asserted grounds fail to teach or suggest all the elements of the Challenged Claims. 37 C.F.R.

§ 42.104(b)(4) (“The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon”).

1. Independent Claims 1, 25 and 28 of the '358 Patent

a. Ground I: Obviousness Based on Wen Alone or in view of Poilasne

Petitioner’s challenges to independent claims 1, 25 and 28 under Ground 1 fail for a fundamental reason: neither Wen nor Poilasne disclose a tunable antenna as recited in claims 1, 25 and 28. Claims 1, 25 and 28 of the '358 Patent requires that the antenna itself be tunable, either through active tuning or through passive tuning elements that are electronically selected or interconnected. Wen and Poilasne satisfy neither alternative.

i. Wen

Wen’s common-antenna architecture does not meet any of the tunability requirements of claims 1, 25 and 28 because Wen’s operating bands are fixed by design-time physical geometry, not adjusted through electronic control at run time. Wen describes “a common antenna . . . having a plurality of spaced apart signal feed points thereon” shared by multiple single-band transceivers, and a controller that “selectively operat[es] at least some of the wireless RF transceivers to use the common antenna at a same time.” EX1004, ¶[0027]. Each supported frequency band arises from the static physical layout of the antenna—its slots, leg widths and lengths, and the positions of its feed points—which “may be . . . selected to tune

the desired operating frequencies” only at fabrication. *Id.*, ¶¶[0035]–[0036].

Wen’s figures likewise depict feed ports pre-assigned to specific bands (*e.g.*, 900 MHz/1800 MHz/5 GHz for one feed; 2.45 GHz for another; 2.1/5.2/5.8 GHz for a third; 1.54 GHz for a fourth). *Id.*, ¶¶[0039]–[0040], Figs. 2-18.

Wen does not disclose a tuner, any tunable reactance, any active or passive matching network under electronic control, or any circuitry configured to alter the resonant behavior of the antenna at run time. Wen’s controller merely determines which radios—and thus which fixed feed points—are active. Wen’s controller does not control any antenna-side components to change frequency response. *Id.*, ¶[0031]. Although Wen’s background references prior work involving MEMS-switch-based reconfiguration (*id.*, ¶[0005]), Wen itself does not implement any electronically adjustable elements. Wen simply discloses concurrent shared use of a static, multi-feed patch antenna, not a tunable antenna.

The fact that Wen does not disclose a tunable antenna is fatal to both of Petitioner’s asserted theories. Petitioner first asserts anticipation based on the passive-tuning prong of claim 1, arguing that Wen discloses passive elements for tuning its antenna. Pet., 19. But because Wen’s frequency bands are fixed by physical structure and not electronically adjustable at run time, Wen cannot satisfy the passive-tuning alternative of claims 1, 25, and 28.

Petitioner also asserts that Wen discloses the “actively tuned antenna”

alternative of claims 1, 25, and 28. Pet., 20-21. That assertion fails because Wen does not disclose any tuning mechanism at all. Wen contains no tunable elements—no electronically adjustable reactances, no adjustable matching circuitry, and no components whose electrical characteristics change at run time under controller direction. Wen’s controller simply selects which of several fixed single-band transceivers is active at a given moment, each of which is hard-wired to a feed point that supports only its predetermined operating band. EX1004 ¶¶ [0027]–[0040]. Selecting among different transceivers connected to different fixed antenna ports does not alter the electrical properties of the antenna or adapt the antenna for different operating bands; it merely switches between radios operating in the bands dictated by the fixed geometry of the antenna.

Finally, although Petitioner and Dr. Mahon invoke “plain and ordinary meaning” for all claim terms (Pet., 5; EX1003, ¶54), neither identifies the plain and ordinary meaning of “actively tuned antenna” in the context of claim 1, where a “plurality” of radios (transmitters, receivers, or transceivers) use a single antenna. Nor does Petitioner or its expert cite any intrinsic or extrinsic evidence supporting the unstated interpretation on which their analysis relies. The intrinsic evidence of the ’358 Patent makes clear that an “actively tuned antenna” requires electronic adjustment that transforms the electrical properties of an antenna for use by multiple radios at run time through tunable elements—not mere selection among

fixed feed points. EX1001, 4:1-20, 5:30-44, 6:23-38, 9:53-65. Petitioner’s attempt to equate Wen’s transceiver selection with antenna tuning is unsupported and contrary to the claim language and specification.

ii. Poilasne

Petitioner’s fallback to Poilasne fares no better. Poilasne does not disclose a tunable antenna as required by independent claims 1, 25, and 28—neither under the active-tuning prong nor under the passive-tuning-with-electronic-selection prong of the claims.

(a) Poilasne does not disclose “active tuning”

Petitioner asserts that Poilasne discloses the “active tuning” alternative of independent claims 1, 25 and 28. Pet., 21. Petitioner is incorrect. The control elements in Poilasne are embedded reactive devices, such as switches, MEMS devices, or FETs, placed within specific geometric regions of a single capacitively-loaded magnetic dipole (CLMD) structure. EX1009, ¶¶[0046]–[0048], [0055]–[0056]. The control elements of Poilasne produce only small, localized adjustments to the LC characteristics of that single dipole. *Id.*, ¶¶[0046]–[0048]. The resulting frequency shifts occur only within a narrow range around the existing resonance of the same CLMD radiator. *Id.*, ¶¶[0055]–[0056].

Poilasne contains no disclosure of any mechanism for modifying an antenna so that it can be used by multiple radios or for multiple, distinct frequency bands.

Nothing in Poilasne describes any run-time changes directed by a controller to adapt an antenna for different radios or different frequency bands, nor any change in impedance, isolation, or other electrical characteristics that would enable such operation. Poilasne likewise provides no disclosure of simultaneous multiband operation, band-specific tuning for different radios, or any system that coordinates adjustments across multiple bands or components.

In short, Poilasne's reactive elements do not transform the antenna to support operation across multiple radios or frequency bands. Poilasne's reactive elements merely allow minor, localized perturbations to the resonance of a single dipole structure and therefore do not disclose the claimed active tuning.

(b) Poilasne does not disclose passive tuning.

The passive-tuning alternative requires passive elements whose selection or interconnection occurs "using electronic control." EX1001, 10:35. In the '358 Patent, these passive elements must be tunable or selectable to adapt the antenna for different radios/bands at run time.

Poilasne discloses nothing close to the passive elements of the '358 Patent. The only "passive" structures in Poilasne are the fixed conductive portions of the CLMD antenna (top/middle/bottom portions; capacitive/inductive/feed areas). EX1009, ¶[0007]. These portions are static geometry, and like Rubinshteyn, the passive structures are found on the antenna itself, and not coupled between the

antenna and the multiple radios as taught in the '358 Patent. Poilasne does not disclose electronic selection or interconnection of passive elements to tune the antenna for multi-radio or multi-band use. Petitioner attempts to satisfy the passive-tuning prong by pointing to Poilasne's active control elements, arguing that the switch "electrically couple[s]" antenna portions (Pet., 21), but those devices are expressly active—not passive tuning elements selected or interconnected using electronic control as required by the claims. EX1009, ¶¶[0046]–[0048].

- (c) Poilasne does not disclose tunability sufficient to allow an antenna to operate in "a plurality of different bands"

Independent claims 1, 25 and 28 of the '358 Patent require an antenna that is used by multiple transmitters/receivers/transceivers operating in different frequency bands. Poilasne does not disclose any mechanism that enables an antenna to tune across different frequency bands for different radios. Its control elements merely create local changes to the LC characteristics of a single capacitively-loaded dipole. EX1009, ¶¶[0046]–[0048], [0055]–[0056]. Poilasne never teaches tuning the antenna to support different frequency bands at run time, nor tuning to accommodate different radios.

b. Ground IV: Obviousness (Rubinshteyn, Wen and Poilasne)

Independent claims 1, 25 and 28 each recite “a plurality of transmitters, receivers, or transceivers that operate in [or at] one or more frequency bands.” Under ordinary English grammar and Federal Circuit precedent, “a plurality of X” means more than one X of the same type. *SIMO Holdings Inc. v. Hong Kong uCloudlink Network Tech. Ltd.*, 983 F.3d 1367, 1376-78 (Fed. Cir. 2021) (interpreting “a plurality” of items in a conjunctive list as a plurality of each item in the conjunctive list, not a mixture of single different items drawn from the list). Thus, contrary to Petitioner’s assertions (Pet. 55-56; EX1003, ¶¶213-18), Rubinshteyn’s single transmitter and single transceiver do not constitute “a plurality of transmitters, receivers, or transceivers,” as recited in claims 1, 25 and 28.

Petitioner alternatively asserts that it would have been obvious to modify Rubinshteyn based on Wen to use a plurality of transceivers. Pet. 57. Petitioner, however, never explains how Wen’s plurality of single-band transceivers could be used to “modify” Rubinshteyn’s radio architecture. Rubinshteyn is built around a single multiband transmitter and a single multiband receiver feeding a single shared RF port through a duplexer. EX1006, ¶[0022], Fig. 1. Wen, contrarily, requires multiple physically distinct feed points, each driven by its own single-

band transceiver hard-wired to a fixed frequency. EX1004, ¶[0027], Fig. 1.

Petitioner fails to explain how a POSITA would integrate, substitute, or retrofit Wen's single-band, multi-feed architecture into Rubinshteyn without discarding the multiband RF chain and redesigning the device around multiple independent single-band radios. That omission is fatal. *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380-81 (Fed. Cir. 2016) (petitioner bears burden of proof and Board must base its decision on argument advanced by party).

Rubinshteyn and Wen solve different problems with fundamentally incompatible architectures: Rubinshteyn enables multiband operation through a single RF chain and shared feed, while Wen uses multiple single-band radios tied to multiple feed points. Petitioner has not shown how Wen's multiple-single-band radio architecture can be applied to Rubinshteyn's single-RF-chain/shared-feed architecture.

2. Independent Claims 8 and 14 of '358 Patent

a. Ground II: Obviousness (Wen, Poilasne and Govind)

Claims 8 and 14 both recite (i) "at least one multiband transmitter, receiver or transceiver" and (ii) a "tuner associated with said at least one multiband transmitter, receiver, or transceiver." Petitioner's Ground II combination fails to disclose or suggest both elements.

i. Ground II Combination Fails to Disclose or
Suggest the “Tuner” of Claims 8 and 14

Petitioner relies on Poilasne solely as disclosing the “tuner associated with” a multiband radio in claims 8 and 14. Pet., 23-24, 36, 38 (limitations 4[a], 8[c], 14[c]). Petitioner’s reliance on Poilasne is misplaced.

Poilasne discloses no transmitter, no receiver, and no transceiver—multiband or otherwise—and therefore cannot disclose a “tuner associated with” any such radio component. The only tuning mechanisms described in Poilasne are control elements embedded within the antenna’s own structural regions (e.g., in capacitive or inductive areas or within stubs), which locally adjust the antenna’s internal LC characteristics. EX1009, ¶¶[0046]–[0048], [0055]–[0056]. These embedded control elements are not tuners “associated with” a radio component; they are internal antenna elements, not circuits connected to or interacting with any transmitter, receiver, or transceiver, as the claims require.

Nor do Wen or Govind supply the missing tuner. Wen discloses multiple single-band radios with no tuner at all. Wen relies on a fixed-geometry, multi-feed antenna, in which each feed point is hardwired to a corresponding transceiver and each supported frequency band is determined at design time by the physical layout of the antenna. EX1004, ¶¶[0035]–[0040]. Wen’s controller merely selects which transceiver is active and does not transform the frequency response or impedance

of the antenna for use by one or more radios at run time. *Id.*, ¶[0031]. Wen discloses no structure or circuitry—active or passive—that could function as a tuner, nor any mechanism for electronically controlled tuning of the antenna.

Govind does not disclose any tuner, and Petitioner does not assert that it does. Petitioner relies on Govind only for the multiband radio component of claims 8 and 14. Pet., 35, 38 (limitations 8[b], 14[b]).

ii. Gound II Combination Fails to Disclose or Suggest the “Multiband” Transmitter, Receiver, or Transceiver

Petitioner relies solely on Govind as disclosing a multiband receiver. Pet., 35, 38 (limitations 8[b], 14[b]). Govind discloses “multiband, multimode integrated RF transceiver topologies” (EX1008, 2:8–13, 2:21–31), but Govind does not disclose or suggest integrating a multiband transceiver into an architecture like Wen’s, which relies on multiple single-band transceivers, each hardwired to a distinct feed point and selected by a controller. The Petition does not explain how a Govind-style multiband transceiver would operate within Wen’s controller-driven transceiver-selection scheme, or how the substitution of Govind’s multiband transceiver could be made into Wen without discarding Wen’s disclosed operating principle. Additionally, Govind provides no guidance on how Govind’s transceiver could be integrated into a system like Wen’s.

Moreover, Govind does not disclose or suggest a multiband tuner associated

with a multiband transceiver as required by claims 8 and 14. Govind also does not disclose any mechanism for controlling antenna tuning across multiple bands in conjunction with a multiband transceiver. Petitioner does not explain how Wen's architecture would be modified to accommodate a multiband transceiver, how the transceiver would interact with the antenna, or how the claimed multiband tuning functionality would be achieved.

Accordingly, the proposed combination relies on the existence of multiband transceivers in the abstract, rather than on any teaching or suggestion in the cited references explaining how Wen would be modified to incorporate such a transceiver. That is insufficient to disclose or suggest the claimed "multiband transmitter, receiver, or transceiver."

iii. Failure to Teach Both Elements Is Dispositive

The failure of the prior art to teach or suggest even one element of independent claims 8 and 14 is dispositive. Here, the asserted combination fails to teach or suggest both a tuner and a multiband transmitter, receiver, or transceiver. Wen lacks both a tuner and a multiband transceiver; Poilasne does not disclose a tuner or multiband radio at all; and Govind's multiband transceiver is not integrated with a multiband tuner or with Wen's architecture. Petitioner, therefore, fails to show that independent claims 8 and 14 would have been obvious under Ground II.

b. Ground V: Obviousness (Rubinshteyn and Poilasne)

Both independent claims 8 and 14 require (1) a multiband radio component (“at least one multiband transmitter, receiver or transceiver”), and (2) a tuner associated with that multiband component. Claim 8 also requires a controller for controlling tuning of the tuner to a plurality of bands. Claim 14 further requires that the tuner matches a multiband antenna to the multiband component in a plurality of bands simultaneously. Petitioner fails to show that the Rubinshteyn-Poilasne combination teaches or suggests the claim elements.

i. Claim 8

Claim 8 requires: (1) at least one multiband transmitter, receiver, or transceiver; (2) a tuner associated with that multiband radio component; and (3) a controller for controlling tuning of that tuner across multiple bands. Petitioner fails to show that the Rubinshteyn-Poilasne combination discloses or suggests any of these elements.

Rubinshteyn does not describe a multiband transmitter, receiver, or transceiver. Rubinshteyn’s Figure 1 shows a single transmitter and a single receiver connected through a duplexer to a single RF port of a tunable PIFA. EX1006, ¶ [0022]. The duplexer merely separates the transmit and receive paths; it does not create, imply, or support multi-band radio chains. All frequency agility in Rubinshteyn arises from antenna-side tunable components—PIN-diode-switched

capacitors and inductors—fixed on the antenna element themselves, where the tunable component change the antenna’s resonant frequencies. EX1006, ¶¶ [0028]–[0036]. Rubinshteyn discloses no multi-band local oscillator (LO) generation, no broadband or concurrent power amplifier or low-noise amplifier (PA/LNA) paths, and no radio-side architecture capable of operating in multiple bands. The fact that Rubinshteyn’s antenna can be tuned to different frequencies does not transform Rubinshteyn’s transmitter or receiver into “multiband” components as claim 8 requires.

Because Rubinshteyn lacks a multiband radio, the requirement of claim 8 of “a tuner associated with said at least one multiband transmitter, receiver, or transceiver” necessarily fails. But even apart from that, neither Rubinshteyn nor Poilasne discloses a tuner associated with any radio component. Rubinshteyn’s tuning components are embedded in the antenna structure and adjust antenna reactance. Poilasne’s “control elements” likewise reside in the antenna to vary its impedance or resonant behavior. EX1009, ¶¶ [0007], [0046]–[0048], [0051]–[0056]. None of these antenna-side circuits is a tuner associated with a radio component, much less a multiband radio component.

Claim 8 further requires a controller for controlling tuning of the tuner. Because Rubinshteyn and Poilasne both disclose only antenna-embedded switching, not a radio-associated tuner, there is no structure for a controller to

“control” tuning in the manner the claim requires. The controller in Rubinshteyn controls the antenna’s PIN-diode network, not a tuner associated with any multiband transmitter, receiver, or transceiver. EX1006, ¶¶ [0028], [0034]–[0036]. That is different from the limitations recited in claim 8.

Poilasne’s disclosures of an antenna array and antenna-side control do not cure the absence of a multiband radio and a radio-associated tuner as recited in claim 8. Because these elements are missing from the asserted combination, Ground V fails as to independent claim 8.

ii. Claim 14

Claim 14 similarly requires (1) a multiband transmitter, receiver, or transceiver; (2) a tuner associated with that multiband radio; and (3) a tuner that matches the multiband antenna to the multiband radio in a plurality of different bands simultaneously. Petitioner has failed to show that the Rubinshteyn-Poilasne combination satisfies any part of this claimed architecture.

As explained above for claim 8, Rubinshteyn does not disclose a multiband radio component. Rubinshteyn’s single transmitter and single receiver feed a single RF input through a duplexer, and Rubinshteyn attributes all multiband behavior to antenna-level tuning. EX1006, ¶ [0016], ¶ [0022], ¶¶ [0028]–[0036]. Poilasne discloses no radios at all. The “multiband transmitter, receiver or transceiver” required by claim 14 is therefore absent from the Rubinshteyn-

Poilasne combination.

Claim 14 also requires a tuner associated with the multiband radio. Neither Rubinshteyn nor Poilasne discloses any tuner associated with a radio component, much less a multiband radio component. In both Rubinshteyn and Poilasne, tuning elements are part of the antenna structure, not part of the radio, and the tuning elements in Rubinshteyn and Poilasne operate by reconfiguring the antenna, not by matching a multiband radio to a multiband antenna. A tuner “associated with” a multiband radio component as recited in claim 14 is therefore not met in the Rubinshteyn-Poilasne combination.

Even if a broad reading of “associated with” could sweep in antenna-side elements—an interpretation that contradicts the claim language—the Rubinshteyn-Poilasne combination still fails to teach or suggest the express requirement of claim 14 that the tuner match the multiband antenna to the multiband radio “in a plurality of different bands simultaneously.” Neither Rubinshteyn nor Poilasne discloses or suggests any mechanism for simultaneous multi-band matching at the radio–antenna interface. Rubinshteyn teaches that the antenna can be resonant at two frequencies (EX1006, ¶¶[0016], [0022]), but Rubinshteyn does not teach or suggest a circuit that concurrently matches the impedance seen by a radio in multiple bands. Poilasne’s statement that an antenna array may “cover multiple frequency bands ... at the same time” (EX1009, ¶ [0038]) describes antenna-level

coverage, not a tuner performing multi-band simultaneous impedance matching. Petitioner identifies no multi-band matching topology, no concurrent match architecture, and no handling of cross-band coupling that such simultaneous matching would require.

Finally, Petitioner offers no reasoned motivation to convert Rubinshteyn's antenna-embedded tuning into a radio-associated tuner, much less to elevate it to a simultaneous multi-band matching device, as claim 14 requires. Pet., 71; EX1003, ¶¶287-88. That absence of a rationale that underpins the combination of Rubinshteyn and Poilasne is independently fatal to Petitioner's theories for claim 14.

Because the asserted Rubinshteyn-Poilasne combination lacks a multiband radio, lacks a tuner associated with such a multiband radio, and lacks the simultaneous multiband matching required by claim 14, Ground V fails as to claim 14.

3. Independent Claim 19 of the '358 Patent

a. Ground II: Obviousness (Wen, Poilasne and Govind)

Claim 19 requires (i) one or more antennas forming an antenna array, (ii) with at least one of the antennas "radiating or receiving electromagnetic energy at a plurality of particular frequency bands," and (iii) one or more radio components (e.g., a transmitter, receiver or transceiver) connected to said at least

one antenna, (iv) whereby either (a) at least one radio component operates simultaneously in two or more bands, or (b) two or more components operate at two or more bands. Petitioner fails to show that the Ground II references teach or suggest these claim elements.

i. Wen and Poilasne do not disclose the antenna array

Wen discloses a single multi-feed antenna, not “one or more antennas forming an antenna array.” EX1004, ¶¶[0031], [0039]–[0040]. A single radiator with multiple feed points is not an array. Poilasne discloses beam-switchable arrays with embedded structural control elements (e.g., in capacitive or inductive regions). EX1009, ¶¶[0046]–[0048], [0055]–[0056]. But Petitioner identifies no disclosure in either Wen or Poilasne where a single antenna element of that array itself “radiates or receives ... at a plurality of particular frequency bands,” as claim 19 expressly requires for “at least one” antenna. Poilasne’s reference to covering “multiple frequency bands ... at the same time” (*id.*, ¶[0038]) refers to array-level band coverage, not a single antenna operating at multiple bands.

Petitioner also never shows how Wen’s radios would connect to the same “at least one” multiband antenna in Poilasne’s array, as limitation 19[b] requires.

ii. Petitioner fails to establish the required connection between the radio and the multiband antenna array

Limitation 19[b] requires that the radio component be connected to “said at

least one” antenna—i.e., the same antenna identified in 19[a] (an antenna that (i) is part of an array and (ii) operates at a plurality of bands). Petitioner instead relies on: Wen for the radio-to-antenna connection (but only to Wen’s single multi-feed antenna); and Poilasne for the array (but without explaining how Wen’s radios would connect to Poilasne’s array element that purportedly satisfies 19[a]). Pet., 40.

Petitioner thus never establishes the required structural connection between Wen’s radios and the specific multiband array antenna of 19[a].

iii. Petitioner fails both alternatives of the 19[c] “whereby” clause

Petitioner asserts that Wen “discloses” option the second option of the whereby clause of limitation 19[c] and that Wen in combination with Govind “renders obvious” the first option. Pet., 41. Petitioner fails to demonstrate both assertions.

Under **Option Two** of limitation 19[c], each of the “two or more components” transmit or receive at two or more frequency bands. Wen’s transceivers, however, are single-band, hardwired to different feed points, and operate in only one band each. EX1004, ¶¶[0031], [0039]. Operating in different single bands does not satisfy “operating ... at two or more” bands. Petitioner’s reading rewrites the claim to require only that the set of components cover two or

more bands, which is not what the claim states. Accordingly, Wen does not disclose Option Two.

Further, Wen in combination with Govind do not render obvious **Option One** of limitation 19[c], where a radio component operates “simultaneously” in multiple frequency bands. Petitioner’s assertion that Wen “renders obvious” Option One when combined with Govind fails for multiple reasons:

- Govind discloses selectable multiband circuits, not a transceiver that simultaneously transmits or receives in multiple bands. EX1008.
- Wen’s architecture is fundamentally incompatible with a multiband-simultaneous transceiver. Wen depends on multiple single-band radios tied to different feed points of a fixed-geometry antenna. Replacing that design with a single multiband-simultaneous radio would contradict Wen’s operating principle.
- Petitioner provides no tuning, matching, or isolation mechanism enabling simultaneous multi-band operation on the claimed antenna connection path.

Petitioner’s conclusory assertion (Pet., 41; EX1003, ¶172) cannot supply the missing teaching or motivation.

iv. No reasoned motivation to combine

Petitioner provides no explanation for why a POSITA would (i) replace

Wen's single multi-feed radiator with Poilasne's beam-switchable array,
(ii) connect Wen's radios to the same multiband array antenna of 19[a], and
(iii) further substitute a Govind transceiver to achieve simultaneous multi-band component-level operation. These are system-level redesigns supported only by conclusory expert statements. Pet., 32-34, 41; EX1003, ¶¶135-41, 172.

v. Conclusion

Because Petitioner's Ground II combination fails to show (1) the antenna array and multiband "at least one" antenna, (2) the required antenna-component connection, and (3) either alternative of the 19[c] "whereby" clause, Petitioner has not demonstrated a reasonable likelihood of prevailing on claim 19.

b. Ground V: Obviousness (Rubinshteyn and Poilasne)

The "whereby" clause of limitation 19[c] of claim 19 has two options: Option One, at least one component simultaneously transmits or receives in two or more of the bands; and Option Two, two or more components transmit or receive in two or more of the bands. Petitioner argues Rubinshteyn satisfies both options (Pet., 73-74), but Rubinshteyn discloses neither.

i. Rubinshteyn does not disclose Option One

Rubinshteyn does not disclose a radio component (a transmitter, receiver, or transceiver) that simultaneously transmits or receives in multiple ("two or more") frequency bands. Rubinshteyn's multiband behavior is entirely on the antenna

side, achieved by PIN-diode-switched capacitors and inductors that adjust the resonance of the antenna's low-band and high-band elements. EX1006, ¶¶[0026]–[0036]. The associated radio circuitry in Rubinshteyn is depicted generically as a single transmitter and a single receiver connected through a duplexer to one RF port. *Id.*, ¶[0022], Fig. 1. Rubinshteyn does not state or suggest that either the transmitter or receiver can operate in more than one band, let alone simultaneously. Rubin's multiband behavior arises entirely from the antenna's dual-resonant characteristics (*id.*, ¶¶ [0022]–[0023]) and not from any radio component. Nothing in Rubinshteyn suggests that either the transmitter or the receiver itself operates in more than one band—let alone in two or more bands simultaneously.

ii. Rubinshteyn does not disclose Option Two

Option Two requires that each of “two or more components” (for example, the transmitter and receiver) transmit or receive in two or more of the bands. Neither Rubinshteyn's transmitter nor Rubinshteyn's receiver operates in more than one band. Both are single-band components. EX1006 Fig. 1; ¶[0022]. Each component in Rubinshteyn relies entirely on the antenna's tunable elements to change the frequency at which the antenna resonates. *Id.*, ¶¶[0022]–[0023], [0028]. Nothing in Rubinshteyn suggests that either Rubinshteyn's transmitter or receiver itself operates across multiple bands. Because neither operates across multiple bands, Rubinshteyn, therefore, fails to disclose two components that operate at

across multiple bands, as Option Two of limitation 19[c] requires.

iii. Petitioner’s “simultaneous via the duplexer” theory mischaracterizes Rubinshteyn

Petitioner further asserts that Rubinshteyn allows the transmitter and receiver to “use the antenna at different frequency bands simultaneously via the duplexer.” Pet., 74. Petitioner’s assertion misreads Rubinshteyn. Rubinshteyn’s duplexer is a conventional transmit/receive separator operating at a single band, not a circuit capable of splitting or routing different frequency bands simultaneously to different components. EX1006, ¶[0022], Fig. 1. Rubinshteyn does not disclose or suggest multi-band routing circuitry, mechanisms for concurrent band-specific paths, or support for the idea that Rubinshteyn’s transmitter or receiver could each operate in more than one band at a time. Petitioner’s argument conflates the dual-resonant behavior of the antenna in Rubinshteyn with component-level multiband operation, which Rubinshteyn does not disclose.

iv. Poilasne does not cure Rubinshteyn’s deficiencies

Poilasne describes multi-element dipole arrays and embedded control elements for adjusting local LC properties. EX1009. Poilasne, however, does not disclose any radio components at all—single-band, multiband, or simultaneous-multiband. Therefore, Poilasne cannot supply the missing requirements of limitation 19[c].

Poilasne cannot convert Rubinshteyn's single-band transmitter and single-band receiver into components that each operate at "two or more bands." Nor does Poilasne disclose any tuning, matching, or isolation architecture capable of supporting simultaneous multiband operation at a radio component like Rubinshteyn's transmitter and receiver.

Thus, the combination fails both prongs of limitation 19[c].

4. Dependent Claims of the '358 Patent

Petitioner premises its grounds for the dependent claims of the '358 Patent on Petitioner's theories for its independent claims of the '358 Patent. Because Petitioner fails to show that the independent claims of the '358 Patent are invalid under any asserted theory, Petitioner necessarily fails to show that the dependent claims of the '358 Patent are invalid. *Hartness Int'l Inc. v. Simplimatic Eng'g Co.*, 819 F.2d 1100, 1108 (Fed. Cir. 1987) (if an independent claim is nonobvious, a dependent claim is necessarily nonobvious and novel).

B. The Petition Fails to Articulate Well-Reasoned Rational Underpinnings for Motivating the Combinations of the Independent Claims under Grounds I, II, IV, and V

1. Applicable Legal Standard

To institute on an obviousness ground based on a combination of references, Petitioner must demonstrate a reasonable likelihood that Petitioner would prevail by articulating a reasoned rationale underpinning the proposed combination.

Kahn, 441 F.3d at 988; *Dish Network L.L.C. v. TQ Beta, LLC*, IPR2015-01791, Paper 30, 19 (PTAB Jan. 30, 2017). A petition must do more than identify prior art elements and assert that they could be combined. A petition must explain why a POSITA would have been motivated to combine the references in the manner proposed. *In re Magnum*, 829 F.3d at 1378-81. Conclusory assertions, general design goals, or labels such as “simple substitution” or “obvious to try” do not suffice. *See, e.g., TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1358-59 (Fed. Cir. 2019) (“Conclusory expert testimony does not qualify as substantial evidence.”); *Arendi S.A.R.L. v. Apple, Inc.*, 832 F.3d 1355, 1362 (Fed. Cir. 2016) (“[R]eferences to ‘common sense’ . . . cannot be used as a wholesale substitute for reasoned analysis and evidentiary support[.]”); *In re Nuvasive*, 842 F.3d 1376, 1383 (Fed. Cir. 2016) (conclusory statements alone are insufficient articulations of motivation to combine); *Hunting Titan, Inc. v. DynaEnergetics Europe GmbH*, PGR2020-00080, Paper 7, 11 (PTAB Feb. 12, 2021) (petitioner’s reliance “on generalized statements that such [obviousness] combinations would, for instances, be ‘predictable,’ ‘simple substitution,’ application of ‘known techniques,’ and ‘obvious to try’” insufficient to meet burden to justify institution). Petitioner must explain why and how a POSITA would have combined the references in the manner asserted, with a reasonable expectation of success. *Procter & Gamble Co. v. Teva Pharm. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009). Expert testimony

may support such a showing, but only if the expert testimony provides independent technical reasoning and does more than merely repeat the Petitioner's conclusions. *See InTouch Techs., Inc. v. VGO Commc'ns, Inc.*, 751 F.3d 1327, 1349-52 (Fed. Cir. 2014).

2. Ground I: Wen and Poilasne, Applicable to Independent Claims 1, 25 and 28

Petitioner offers, for the Ground I, three theories of motivation to combine Wen's multi-feed patch antenna with Poilasne's capacitively-loaded dipole arrays and associated control elements. Pet., 9-11. None satisfies *KSR*'s requirement for an "articulated reasoning with rational underpinning." Each rests on generalized statements untethered to Wen's disclosed design, and none explains why a POSITA would modify Wen in the manner proposed, rather than simply asserting that modification is possible.¹

a. Petitioner's Reliance on Poilasne's General Statements About Antenna Arrays Is Conclusory

Petitioner first argues that Poilasne "provides express motivations to utilize antenna arrays in wireless devices." Pet., 9. Petitioner cited ¶[0005] of Poilasne

¹ A fourth argument merely addresses a POSITA's likelihood of success, Pet., 11, which is distinct from, and not a substitute for, a motivation to combine. *See Eli Lilly & Co. v. Teva Pharm. Int'l GMBH*, 8 F.4th 1331, 1344 (Fed. Cir. 2021).

for this assertion, but Poilasne’s ¶[0005] consists of broad, background observations about the evolution of wireless devices, including possible future needs such as beam switching, beam steering, or polarization diversity. EX1009, ¶[0005]. The industry-level generalities identified by ¶[0005] of Poilasne, however, are not tied to any problem identified in Wen, nor do they explain why Wen’s expressly disclosed single-antenna, multi-feed architecture would prompt a POSITA to introduce a multi-element dipole array into Wen.

To that end, Petitioner’s argument does not identify: (i) any deficiency in Wen that Poilasne’s dipole arrays purportedly solve; (ii) any design constraint in Wen that would lead a POSITA to replace its patch antenna with an array; or (iii) any reason a POSITA would abandon Wen’s core architectural approach in favor of Poilasne’s array. Because Petitioner identifies no Wen-specific problem and no reason a POSITA would apply Poilasne’s array teachings to Wen’s architecture, this asserted motivation is conclusory and lacks the required rational underpinning.

b. Petitioner’s “Control Elements for Tuning” Rationale Is Unsupported

Petitioner next asserts that Poilasne “provides express motivations to utilize control elements to tune the antenna.” Pet., 10. Poilasne’s discussion of active tuning, however, relates to Poilasne’s capacitively-loaded dipole structures, not to

Wen’s architecture. Wen does *not* disclose any tuning mechanism at all: it has no tuners, no adjustable impedance elements, and no active or passive tuning components. Wen simply uses multiple RF transceivers connected to different feed points, each operating in a fixed frequency band. EX1004, ¶¶[0027]–[0040].

Petitioner does not explain why a POSITA would add Poilasne’s control elements—designed for a completely different dipole configuration—to Wen’s multi-feed patch antenna. Nor does Petitioner identify any problem in Wen that Poilasne’s tuning components would solve in Wen. Consequently, this asserted motivation from Petitioner is purely conclusory and lacks the required articulated reasoning with rational underpinning.

c. Petitioner’s “Analogous Art” Argument Is Not a
Motivation to Combine

Petitioner’s third argument is that Wen and Poilasne are analogous art, and therefore a POSITA would have been motivated to combine them. Pet., 11. This bare assertion, however, does not supply a motivation to combine. Whether references are analogous art is a threshold inquiry that determines whether a reference may be considered at all under § 103. *LKQ Corp. v. GM Global Tech. Operations LLC*, 102 F.4th 1280, 1303 (Fed. Cir. 2024) (Lourie, J. concurring) (“[T]he analogous art test is not a test for obviousness. It is a gateway. Determining whether art is analogous is determining what may properly be

considered in an obviousness inquiry, not part of the test for what would have been considered obvious. It is a threshold for qualifying art, not an indicator or obviousness.”). The fact that a reference is analogous art does not provide the required explanation for why a POSITA would combine references, nor does that fact provide a rational underpinning for modifying one reference in view of another.

Whether Wen and Poilasne are analogous art does not itself provide any explanation for why a POSITA would incorporate Poilasne’s multi-element, tuned dipoles into Wen’s single-antenna, multi-feed device. Petitioner identifies no connection between analogousness and any specific design change relevant to Wen. Nor does Petitioner identify how analogousness would lead a POSITA to replace or alter Wen’s disclosed architecture.

3. Ground II: Wen, Poilasne and Govind, Applicable to Independent Claims 8, 14 and 19

Ground II incorporates Govind in addition to the Wen–Poilasne combination of Ground I. The Petition, however, offers no new motivation for combining Wen and Poilasne for Ground II. Pet., 32-34. Instead, each of Petitioner’s asserted rationales for Ground II relate only to replacing Wen’s multiple transceivers with a multiband transceiver as taught by Govind. *Id.* These arguments—regarding the availability of multiband transceivers, Wen’s discussion of device size, Govind’s

discussion of component reduction, and the supposed benefits of multiband transceivers—address only the *Wen plus Govind* aspect of the combination. Petitioner’s Ground II rationales, therefore, fail to address, as it did for Ground I, why a POSITA would first modify Wen’s single-antenna, multi-feed architecture using Poilasne’s multi-element, capacitively loaded dipole structures or control-element tuning.

Because Petitioner has not articulated any reason to combine Wen and Poilasne in the first instance, its arguments for adding Govind cannot cure the foundational absence of a motivation to combine Poilasne to Wen.

4. Ground IV: Rubinshteyn, Wen and Poilasne, Applicable to Independent Claims 1, 25 and 28

Ground IV combines Rubinshteyn with both Wen and Poilasne. Petitioner, however, fails to articulate any reason a POSITA would combine all three references together. Petitioner instead offers two independent sets of rationales: one for adding Wen’s plurality of transceivers to Rubinshteyn, and another for adding Poilasne’s multi-element dipole arrays and control-element tuning to Rubinshteyn. Pet., 48-51. Consistent with the foundational defects in Grounds I and II, Petitioner never explains for Ground IV (i) why a POSITA would incorporate both Wen and Poilasne into Rubinshteyn as part of a single combination or (ii) how the disparate architectural modifications purportedly

suggested by Wen and Poilasne would fit together in Rubinshteyn.

a. Petitioner’s Rationales for Adding Wen to Rubinshteyn
Do Not Address Poilasne or Provide a Reason to
Combine All Three References

Petitioner’s first group of motivation arguments for Ground IV concerns adding a plurality of transceivers, allegedly taught by Wen, to Rubinshteyn’s single-transmitter/single-receiver device. Pet., 48-49. Petitioner’s arguments—regarding the existence of single-band and multiband transceivers, the idea that a POSITA might choose between them, and the notion that transceiver substitution is a “simple” choice—address only a combination of Rubinshteyn and Wen.

Petitioner’s first group of motivation arguments do not address adding Poilasne or why a POSITA would integrate Poilasne’s fundamentally different antenna architecture and active tuning components into Rubinshteyn.

Thus, even if Petitioner had articulated some rationale to combine Rubinshteyn and Wen (and Patent Owner does not concede that it did), these arguments do not supply the missing explanation for why Poilasne would be added as well.

b. Petitioner’s Rationales for Adding Poilasne to
Rubinshteyn Do Not Address Wen or Explain the
Combined Three-Reference Modification

Petitioner next asserts that a POSITA “would have further been motivated to modify Rubinshteyn to use an antenna array and control elements in view of

Poilasne....” Pet., 50. However, Petitioner’s rationales, including Poilasne’s background statements about beam steering, switching, and diversity, and Poilasne’s discussion of tuning, relate only to a Rubinshteyn-plus-Poilasne combination. Petitioner’s rationales do not explain why a POSITA would modify Rubinshteyn in view of Poilasne *in addition to applying* Wen’s multi-feed, multi-transceiver patch-antenna teachings. Petitioner never articulates: (i) any design problem in Rubinshteyn that would simultaneously motivate both (a) replacing Rubinshteyn’s single-transmitter/single-receiver architecture to use Wen’s multiple transceivers and (b) redesigning Rubinshteyn’s antenna system to use Poilasne’s multi-element dipole array antenna; (ii) any coherent reason why a POSITA would incorporate Poilasne’s multi-element dipole arrays or control-element tuning once Rubinshteyn had already been modified in the direction of Wen; or (iii) any explanation of how these two independent architectural overhauls would work together or why a POSITA would pursue them as a combined design path.

Petition simply presents two separate combinations and then asserts that a POSITA would perform both. That is precisely the type of unsupported, conclusory reasoning the Board rejects under *KSR*.

c. Petitioner's Analogous-Art Assertion Is Not a Motivation to Combine

Petitioner again argues that Rubinshteyn, Wen, and Poilasne are “analogous art” (Pet. 51), but analogousness is not a motivation to combine. *See LKQ Corp.*, 102 F.4th at 1303. The fact that the references might qualify as analogous does not explain why a POSITA would alter Rubinshteyn's disclosed architecture using both Wen and Poilasne. Nor does Petitioner explain how the alleged analogousness of the references provides any rational underpinning for combining these separate modifications into a single system.

d. Ground IV Fails Because Petitioner Offers No Motivation to Combine the References

For Ground IV, Petitioner supplies rationales that point separately toward (i) a combination of Rubinshteyn and Wen and (ii) a combination of Rubinshteyn and Poilasne. Petitioner, however, never explains why a POSITA would combine all three references. Without that critical link, Petitioner has not carried its burden to articulate a motivation to combine the asserted references. *See In re Kotzab*, 217 F.3d 1365, 1370 (Fed. Cir. 2000) (“to establish obviousness based on a combination of the elements disclosed in the prior art, there must be some motivation, suggestion or teaching of the desirability of making the *specific combination* that was made by the” patentee) (emphasis added). As a result, Ground IV lacks the required articulated reasoning with a rational underpinning.

5. Testimony of Petitioner’s Expert is Entitled to Little, or No, Weight

The declaration of Dr. Mahon (EX1003), Petitioner’s expert witness, does not add any substantive reasoning to bridge the gaps in Petitioner’s motivation-to-combine analysis. Dr. Mahon merely parrots the allegations of the Petition as his own opinions. *Compare* Pet., 9-11 to EX1003, ¶¶65-71 (alleged motivations to combine for Ground I); Pet., 32-34 to EX1003, ¶¶135-141 (alleged motivations to combine for Ground II); and Pet., 48-52 to EX1003, ¶¶196-204 (alleged motivations to combine for Ground IV). 37 C.F.R. §42.65 (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”); *InTouch Techs.*, 751 F.3d at 1349-52 (); *TQ Delta*, 942 F.3d at 1358-59 (“Conclusory expert testimony does not qualify as substantial evidence.”); *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 15 (PTAB Aug. 24, 2022) (precedential) (Board giving “little weight” to an expert declaration that merely repeated, verbatim, conclusory assertions of the petition without citing additional supporting evidence or providing technical reasoning).

6. Dependent Claims

Because Petitioner has not established a motivation to combine sufficient to render any independent claim obvious, Petitioner also has not met its burden to show that claims depending from the independent claims of the ’358 Patent would have been obvious. *Hartness Int’l*, 819 F.2d at 1108.

V. CONCLUSION

For the foregoing reasons, the Board should not institute *inter partes* review.

Dated: January 26, 2026

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**CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME
LIMITATION, TYPEFACE REQUIREMENTS, AND TYPE STYLE
REQUIREMENTS**

1. This Patent Owner Preliminary Response complies with the type-volume limitation of 14,000 words, comprising **10,152** words, as counted using the Microsoft Word software that was used to prepare this paper, excluding the parts exempted by 37 C.F.R. § 42.24(a), (b).

2. This Patent Owner Preliminary Response complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft Word 2016 in 14-point Times New Roman.

Date: January 26, 2026

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CERTIFICATION OF SERVICE

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