UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MATSING, INC.,
Petitioner,

v.

ALL.SPACE NETWORKS LTD. f/k/a ISOTROPIC SYSTEMS, LTD.,
Patent Owner.

IPR2022-01108
Patent 10,533,947 B2

Before KARL D. EASTHOM, MICHAEL R. ZECHER, and JON M. JURGOVAN, *Administrative Patent Judges*.

EASTHOM, *Administrative Patent Judge*.

# DECISION
Granting Institution of *Inter Partes* Review
*35 U.S.C. § 314*

# I. INTRODUCTION

Matsing, Inc. ("Petitioner") filed a Petition (Paper 2, "Pet.") with the Declaration of Anthony Teillet (Ex. 1012) requesting an *inter partes* review of claims 1–19 of U.S. Patent No. 10,553,947 B2 (Ex. 1001, the "'947 patent"). All.Space Networks f/k/a Isotropic Systems, Ltd., ("Patent Owner") filed a Preliminary Response (Paper 7, "Prelim. Resp.") with the Declaration of Gabriel M. Rebeiz (Ex. 2005). *See* Paper 8 (notifying Board of Patent Owner's name change to All.Space Networks Limited).

The Board's authority to determine whether to institute an *inter partes* review is under 35 U.S.C. § 314. *See also* 37 C.F.R. § 42.4(a) (2020). To institute an *inter partes* review, the information presented in the Petition must show "a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a).

For the reasons set forth below, the information presented in the Petition establishes a reasonable likelihood that Petitioner will prevail with respect to at least one challenged claim. Accordingly, we institute an *inter partes* review of claims 1–19 of the '947 patent.

## *A. Real Party in Interest*

Petitioner identifies itself as the real party-in-interest. Pet. 2. Patent Owner identifies All.Space Networks Ltd. as the real party-in-interest. Paper 8, 1. Patent Owner "note[s] that Isotropic Systems, Ltd., recently changed its name to All.Space Networks L[td.], but the entity itself remains otherwise unchanged and the patent-at-issue remains assigned to All.Space Networks L[td.] f/k/a Isotropic Systems, Ltd." *Id.*

*B. Related Matters*

The record indicates there are no related matters. Pet. 3 (stating there are no related matters); *see generally* Prelim. Resp. (identifying no related matter).

*C. The '947 Patent*

The '947 patent generally describes "a[n] antenna system that includes a plurality of lens sets." Ex. 1001, code (57). "Each lens set includes a lens and at least one feed element." *Id.* "At least one feed element . . . align[s] with the lens" and "direct[s] a signal through the lens at a desired direction." *Id.*

Figure 2 of the '947 patent follows:

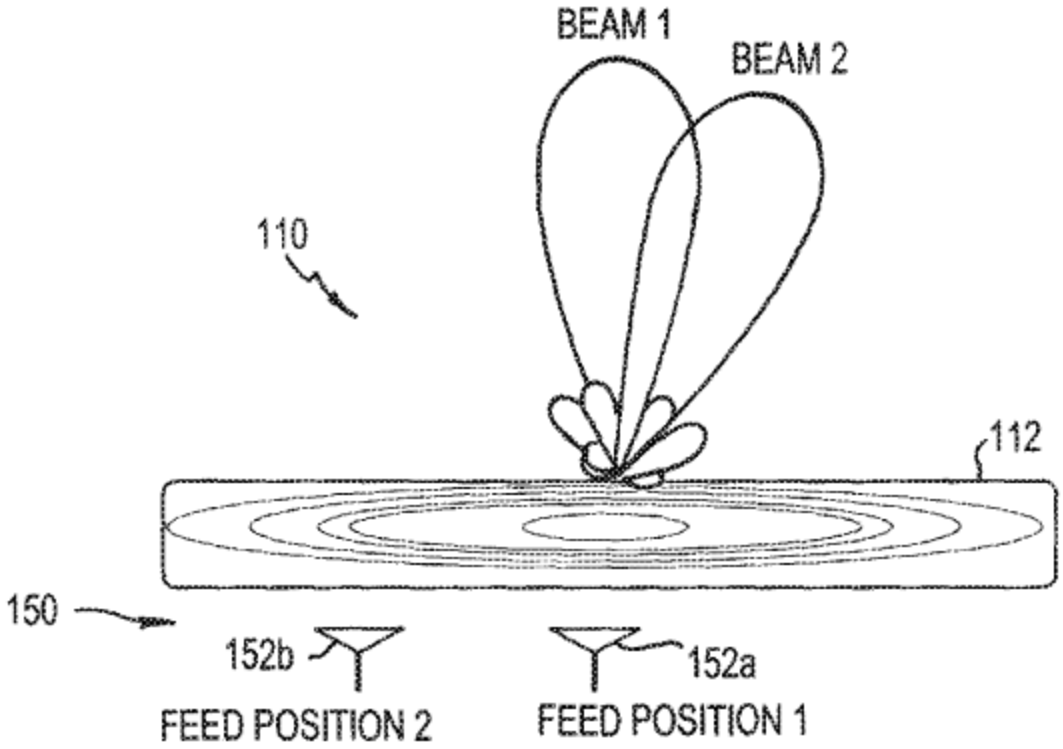


Figure 2, reproduced above, shows feeds 152a and 152b that direct electromagnetic energy through lens 112 (in lens set 110) in patterns as

represented by Beam 1 and Beam 2, respectively. Ex. 1001, 7:46–64. "Only two feed elements 152a, 152b are shown here for clarity but a typical feed cluster might have, for example, 19, 37, or more individual feeds." *Id.* at 7:47–49. "[S]electively activating one of the feed elements 152a, 152b enables the lens set 110 to generate a radiation pattern in a desired direction (i.e., to beam scan by feed selection)." *Id.* at 7:60–63. Accordingly, "the lens set 110 may operate in a wide range of angles." *Id.* at 7:63–64.

*D. Illustrative Claim*

Illustrative independent claim 1, the sole independent claim, follows:

> 1. An antenna system comprising:
> a phased array having a plurality of lens sets, each lens set including:
> a plurality of non-spherical lenses;
> a plurality of feed elements aligned with a respective one of said plurality of lenses and configured to transmit/receive a signal through said respective one of said plurality of lenses at a desired direction; and
> a selector connected to each of said plurality of feed elements of said plurality of lens sets to dynamically select a subset of said plurality of feed elements to transmit/receive the signal through said non-spherical lens.

*E. Asserted Grounds of Unpatentability*

Petitioner asserts that claims 1–19 are unpatentable based on the following five grounds (Pet. 7).

| Claim(s) Challenged | 35 U.S.C § | Reference(s)/Basis |
|---|---|---|
| 1–5, 9–11, 15, 18, 19 | 103[1] | Matitsine-860,[2] Demetriadou,[3] Ebling[4] |
| 6 | 103 | Matitsine-860, Demetriadou, Ebling, Matitsine-537[5] |
| 7, 8 | 103 | Matitsine-860, Demetriadou, Ebling, Matitsine-537, Lee[6] |
| 12–14, 16 | 103 | Matitsine-860, Demetriadou, Ebling, Ray-767[7] |
| 17 | 103 | Matitsine-860, Demetriadou, Ebling, Ray-767, Turcotte-804[8] |

[1] The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) ("AIA"), amended 35 U.S.C. § 103, was effective on Mach 16, 2013. Petitioner asserts that the "earliest possible effective filing date for the '947 patent" is March 17, 2017. Pet. 4. Because this date is after the effective date of the applicable AIA amendment, the post-AIA version of § 103 applies for purposes of institution.

[2] Matitsine et al., U.S. Patent No. 9,728,860 B2, filed Dec. 3, 2015, issued Aug. 8, 2017. Ex. 1002.

[3] A. Demetriadou and Y. Hao, *Slim Luneburg Lens for Antenna Applications*, Optics Express, V. 19, No. 21, 19925 (Oct. 2011). Ex. 1003.

[4] Ebling et al., U.S. Patent No. 7,605,768 B2, issued Oct. 20, 2009. Ex. 1004.

[5] Matitsine, U.S. Patent No. 8,518,537 B2, issued Aug. 27, 2013. Ex. 1005.

[6] S.W. Lee, ANTENNA HANDBOOK, THEORY, APPLICATIONS, AND DESIGNS (1988). Ex. 1006.

[7] Ray, U.S. Patent Pub. No. 2016/0172767 A1, published June 16, 2016. Ex. 1007.

[8] Turcotte et al., U.S. Patent No. 5,856,804, issued Jan. 5, 1999. Ex. 1008.

## II. OBVIOUSNESS ANALYSIS

### *A. Level of Ordinary Skill in the Art*

Petitioner asserts the following:

> A person of ordinary skill in the art ("POSITA") is a hypothetical person who is presumed to be aware of all relevant prior art. *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc*., 807 F.2d 955, 962 (Fed. Cir. 1986). At the time that the patent application for the '947 Patent was filed, a POSITA would have had an understanding of basic antenna theory as it applies specifically to wireless communication antennas, and to further have a basic understanding of the wide variations of antenna types that have been developed over the past 50 years.

Pet. 16. Patent Owner adopts "Petitioner's proposed definition" "[f]or purposes of th[e] Preliminary Response." Prelim. Resp. 6.

Determining the level of ordinary skill in the art involves various factors, including the "type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field." *In re GPAC Inc*., 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). The prior art of record also reflects the level of ordinary skill in the art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). For purposes of this Institution Decision, we adopt the assessment offered by Petitioner as it is consistent with the '947 patent and the asserted prior art.

### *B. Claim Construction*

In *inter partes* reviews, the Board construes claims using the same claim construction standard employed in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b) (2020). Under the principles set forth by our reviewing court, the "words of a claim 'are generally given their ordinary and customary meaning,'" as would have been understood by a

person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp*., 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Vitronics Corp. v. Conceptronic, Inc*., 90 F.3d 1576, 1582 (Fed. Cir. 1996)). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc*., 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Both parties rely on the plain meaning without proposing an explicit claim construction for any claim term. Pet. 17 (citing 37 C.F.R. § 42.100(b); *Phillips*); Prelim. Resp. 6 (same). At this stage, no need exists to construe a claim term expressly to resolve the parties' disputes. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co*., 868 F.3d 1013, 1017 (Fed. Cir. 2017) ("[W]e need only construe terms 'that are in controversy, and only to the extent necessary to resolve the controversy.'" (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.,* 200 F.3d 795, 803 (Fed. Cir. 1999))).

*C. Principles of Law*

A patent claim is unpatentable under 35 U.S.C. § 103 "if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103 (2011); *accord KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 406 (2007) (quoting similar language in pre-AIA version of 35 U.S.C. § 103). The question of obviousness involves resolving the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the

claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and when in evidence (none on this preliminary record), (4) when in evidence, objective indicia of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

*D. Analysis of the Grounds*

*1. Matitsine-860, Demetriadou, and Ebling*

Petitioner asserts that claims 1–5, 9–11, 15, 18, and 19 would have been obvious under 35 U.S.C. § 103 based on the combined teachings of Matitsine-860, Demetriadou, and Ebling. Pet. 17–32.

*a) Matitsine-860 (Ex. 1002)*

Matitsine-860 relates to "[a] radio frequency antenna," with "an array of spherical lens[es]" and "mechanically movable radio frequency (RF) elements along the surface of the spherical lens to provide cellular coverage for a narrow geographical area." Ex. 1002, code (57).

Matitsine-860 defines a "spherical lens" broadly, and lists an example of a spherical lens as a "Luneburg lens":

> A spherical lens is a lens with a surface having a shape of (or substantially having a shape of) a sphere. *As defined herein, a lens with a surface that substantially conform[s] to the shape of a sphere means at least 50% (preferably at least 80%, and even more preferably at least 90%) of the surface area conforms to the shape of a sphere. Examples of spherical lenses include a spherical shell lens, the Luneburg lens*, etc. The spherical lens can include only one layer of dielectric material, or multiple layers of dielectric material. A conventional Luneburg lens is a spherically symmetric lens that has multiple layers inside the sphere with varying indices of refraction.

Ex. 1002, 4:54–65 (emphasis added).

Matitsine-860's Figure 1A follows:

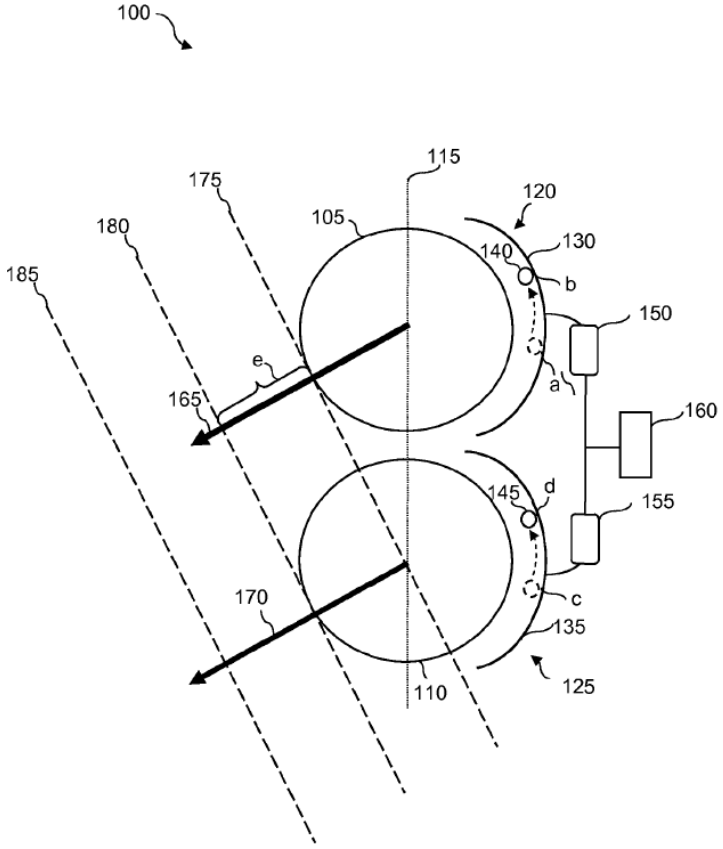


Figure 1A, reproduced above, illustrates antenna system 100 with RF radiating elements 140 and 145 movable along curved tracks 130 and 135 of adjacent surfaces of spherical lenses 105 and 110 aligned along virtual axis 115. Ex. 1002, 4:47–5:29. Matsino-860 "contemplate[s] that each element assembly can house multiple RF elements on one or more tracks." *Id.* at 5:27–28. Matsino-860 similarly states that "[m]ultiple RF elements can be placed on a single track." *Id.* at 2:17. "An RF element can include an emitter, a receiver, or a transceiver." *Id.* at 5:22–23.

Matitsine-860's Figure 3 follows:

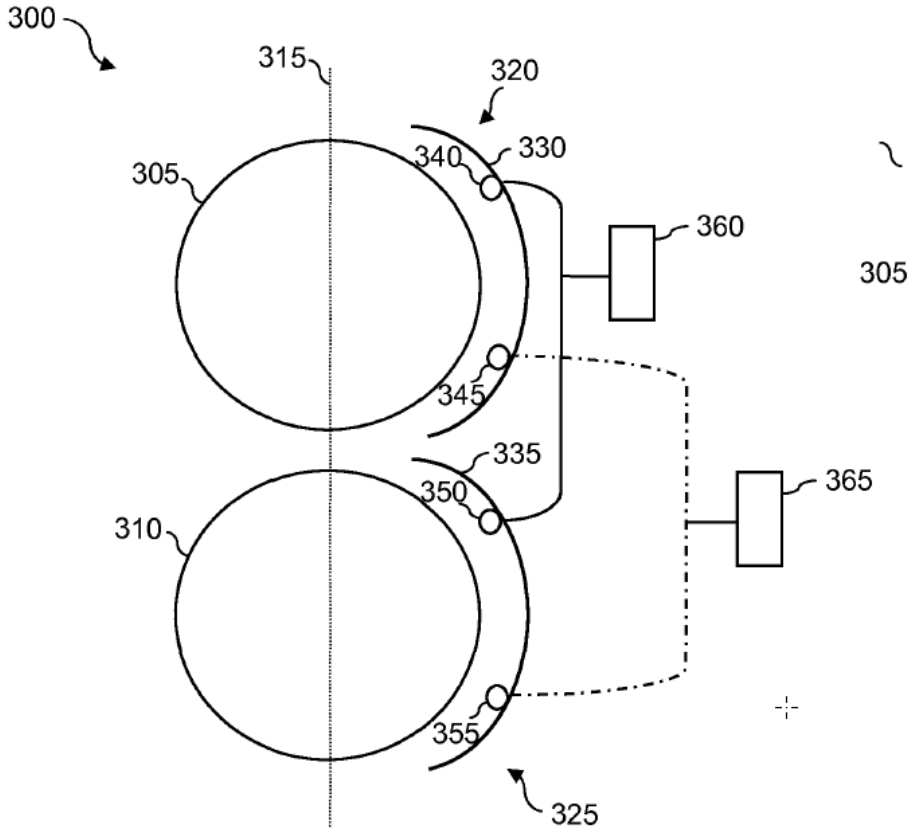


Figure 3, reproduced above, illustrates antenna system 300 with RF elements 340, 345 and 350, 355 movable along curved tracks 320 and 335 of adjacent surfaces of each lens 305 and 310, respectively. Ex. 1002, 8:1–20. Control mechanism 360, which includes a phase shifter, controls the phase and positions of RF elements 340, 350. *Id.* at 8:28–37. Similarly, control mechanism 365, which also includes a phase shifter, controls the phase and position of RF elements 345, 355. *Id.*

*b) Demetriadou (Ex. 1003)*

Demetriadou, titled "Slim Luneburg Lens for Antenna Applications," describes "a transformation that reduces the profile of the original [spherical] Luneburg lens without affecting its unique properties." Ex. 1003,

Abstract. This transformation "creates a slimmer lens," or a "'discus'-shaped lens, by 'squeezing' or 'slimming' the spherical lens." *Id.* at 19927.

Demetriadou's Figure 3a follows:

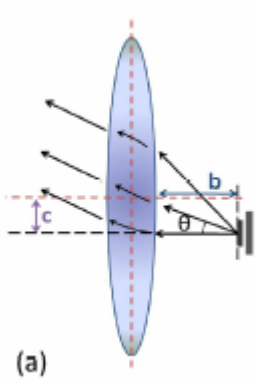


Figure 3a, reproduced above, illustrates a cross-section of Demetriadou's transformed (i.e., non-spherical) lens. Ex. 1003, 19930.

"[T]he transformed lens can be used to replace conventional antenna systems (i.e. Fabry-Perot resonant antennas) *producing a high-directivity beam with low side-lobes*. *In addition, it provides excellent steering capabilities for wide angles, maintaining the directivity and side-lobes at high and low values respectively.*" Ex. 1003, Abstract (emphasis added).

*c) Ebling*

Ebling relates to a switch for a plurality of feed elements oriented around an electromagnetic (dielectric) lens. Ex. 1004, code (57), 4:10–21.

Figure 1 of Ebling follows:

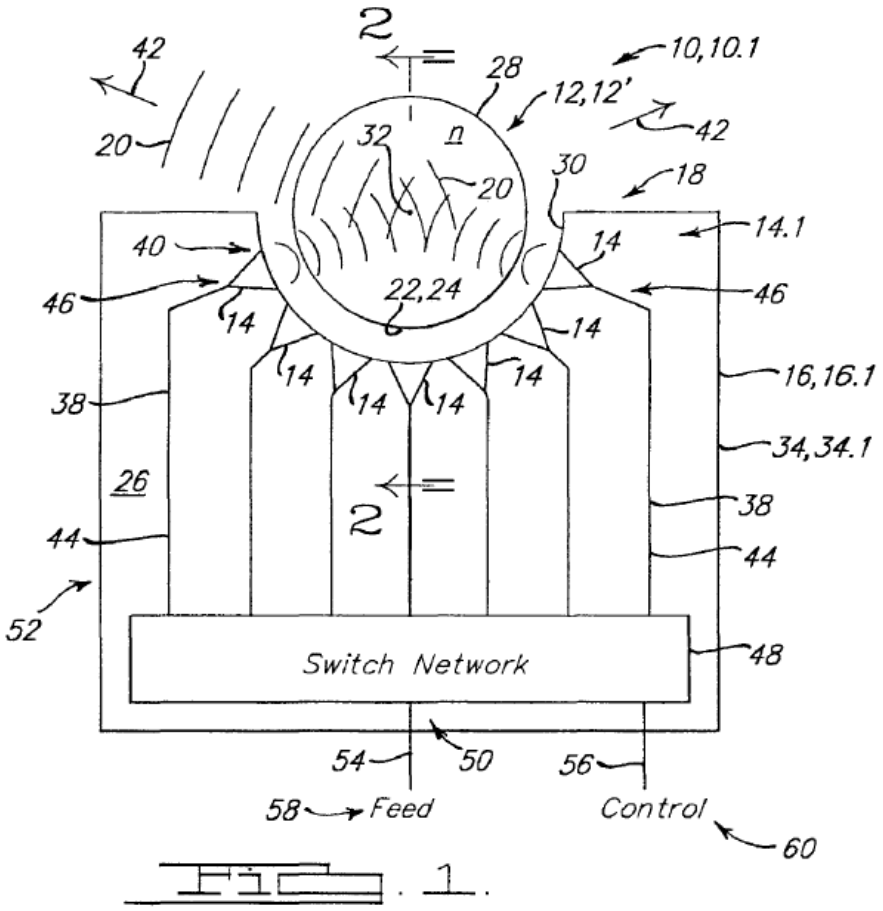


Fig. 1.

Figure 1, reproduced above, illustrates switch network 48, which switches feed signal 58 to "the associated feed port 46 of one or more antenna feed elements 14, . . . responsive to a control signal 60 applied to the control port 56." Ex. 1004, 6:27–33. "The associated beams of electromagnetic energy 20 launched by different antenna feed elements 14 propagate in different associated directions 42." *Id.* at 6:41–43. "[T]he plurality of antenna feed elements 14 are adapted to radiate or receive a corresponding plurality of beams of electromagnetic energy 20 through the at least one electromagnetic lens 12." *Id.* at 4:13–15.

> In accordance with known principles of diffraction, the shape and size of the at least one electromagnetic lens 12, the refractive

> index n thereof, and the relative position of the antenna feed elements 14 to the electromagnetic lens 12 are adapted in accordance with the radiation patterns of the antenna feed elements 14 to provide a desired pattern of radiation of the respective beams of electromagnetic energy 20 exiting the second side 28 of the at least one electromagnetic lens 12.

Ex. 1004, 4:33–42.

Although "the at least one electromagnetic lens 12 is illustrated as a spherical lens 12'," each lens "is not limited to any one particular design, and may, for example, comprise either a spherical lens, a Luneburg lens, a spherical shell lens, a hemispherical lens, an at least partially spherical lens, an at least partially spherical shell lens, an elliptical lens, a cylindrical lens, or a rotational lens." Ex. 1001, 4:41–48. Also, "[e]lectromagnetic lens 12 may be truncated for improved packaging, without significantly impacting the performance of the associated multi-beam antenna 10." *Id.* at 4:49–51

*d) Claim 1*

Claim 1 recites "[a]n antenna system comprising a phased array having a plurality of lens sets, each lens set including a plurality of non-spherical lenses." Petitioner primarily reads this limitation onto Matitsine-860's Figure 1A (*supra* § I.D.1.a) and related teachings. Pet. 17–18.

Petitioner contends that Figure 1A represents a phased array antenna with a plurality of radiating elements 140 and 145 and lenses 105 and 110. *See* Pet. 17–18 (citing Ex. 1002, 4:47–5:29, Fig. 1A; Ex. 1012 ¶ 21). Quoting Matitsine-860, Petitioner asserts that Matitsine-860's lenses 105 and 110 each have

> a surface having a shape of (or substantially having a shape of) a sphere. As defined herein, a lens with a surface that substantially conform to the shape of a sphere means at least 50% (preferably

> at least 80%, and even more preferably at least 90%) of the surface area conforms to the shape of a sphere.

Pet. 18 (quoting Ex. 1002, 4:55–60). Based on these teachings, Petitioner asserts that "Matitsine-860 teaches that as much as 50% of the lenses can comprise a non-spherical surface" (*id.*) and, therefore, Matitsine-860 "discloses use of a non-spherical lens (e.g.[,] 50% of the lens is nonspherical)" (*id.* at 20).

Matitsine-860 discloses that an example of a spherical lens is a "Luneburg lens." Ex. 1002, 4:60–61. Further addressing the "non-spherical lenses" limitation of claim 1, Petitioner alternatively asserts that it would have been obvious to substitute Matitsine-860's lenses with non-spherical lenses. Pet. 18–20. Petitioner relies on Demetriadou's teaching of transforming a spherical lens (which Demetriadou also identifies as Luneburg lens), to produce a "slim" lens. *See id.* at 18 (quoting Ex. 1003, Abstract). Petitioner further relies on Demetriadou's teaching that "[t]his slimmed, non-spherical lens 'provides excellent steering capabilities for wide angles, maintaining the directivity and side-lobes at high and low values respectively.'" *Id.* at 19 (quoting Ex. 1003, Abstract). Relying on the testimony of Mr. Teillet, Petitioner also contends that a "POSITA would find motivation to combine the nonspherical lens of Demetriadou with the lens sets of Matitsine-860, as the truncated geometry of non-spherical lens provides for a reduced implementation cost by virtue of relatively smaller lens volume." *Id.* at 19–20 (citing Ex. 1012 ¶ 22). Based on these teachings, Petitioner contends that "replacing the spherical lens in Matitsine-860 with the non-spherical lens in Demetriadou . . . would produce predictable results via the combination of familiar elements." *Id.* at 19 (citing Ex. 1012 ¶ 22).

Patent Owner does not challenge Petitioner's assertion that Matitsine-860 discloses a spherical lens. *See* Prelim. Resp. 18–23. On this preliminary record, Petitioner sufficiently shows that Matitsine-860 discloses the "non-spherical lenses" limitation of claim 1.

With respect to combining Matitsine-860 and Demetriadou, Patent Owner generally argues that Petitioner's obviousness showing based on Demetriadou's teachings is conclusory and lacks an articulated rationale and a reasonable expectation of success. *See* Prelim. Resp. 18–23. Patent Owner argues that Petitioner's "combination . . . would not be obvious and would, in fact, require significant redesign and modification of the system of Matitsine-860 in order to overcome the various limitations of the lens described in Demetriadou." *Id.* at 19. According to Patent Owner, "[t]he lens of Demetriadou has a limited angular range of approximately 40 degrees" and, in contrast, the current spherical lenses of Matitsine-860 have a significantly larger angular range, which enables a wider steering area." *Id.* (citing Ex. 1003, 19932, Figs. 5, 6; Ex. 2005 ¶¶ 60–63). Patent Owner also argues that "[t]o address the deficiencies and problems introduced by the inclusion of the *Demetriadou* lens, the POSITA would have to redesign the system of Matitsine-860 to adjust RF element positions and phases in order to attempt to achieve the same or similar scanning capabilities." *Id.* at 19–20 (citing Ex. 2005 ¶¶ 61–62). In addition, Patent Owner argues that "[e]ven if such a redesign were feasible, the POSITA would not expect success from the system, especially not when the current spherical lens provides improved angular ranges without the inherent problems of the Demetriadou lens, such as increased aberrations and losses and inferior off-axis performance." *Id.* at 20 (citing Ex. 2005 ¶¶ 62–65). Patent Owner also

argues that Petitioner engages in "hindsight reconstruction," because Demetriadou's thin lens "has significant failings when compared to a traditional Luneburg lens" and "is anything but common, or even readily available, for use with a system such as" Matitsine-860's system. *Id.* at 22–23 (citing Ex. 2005 ¶¶ 66–68).

Based on the preliminary record, Patent Owner's arguments do not undermine Petitioner's showing. The arguments are not commensurate in scope with the claims, because the claims do not require "improved angular ranges." *See In re Self*, 671 F.2d 1344, 1348 (CCPA 1982) ("Many of appellant's arguments fail from the outset because . . . they are not based on limitations appearing in the claims."). In addition, Patent Owner does not explain how its disclosed or claimed "nonspherical lenses" have different properties than the Demetriadou's nonspherical lenses.

Also, Patent Owner generally appears to conflate directivity with a wider steering angle. *See* Prelim. Resp. 19–20. For example, Patent Owner relies on Figures 5 and 6 of Demetriadou, but those figures merely demonstrate the high directivity of the disclosed antennas with "slim Lunenberg" lenses. *See* Ex. 1003, Figs. 5, 6. Demetriadou states that

> the most significant advantage of the slim Luneburg lens as discussed above is its steering properties. The steerable behaviour of the slim lens was examined by moving the patch antenna along the y-axis by a distance c (defined in Fig. 3(a)). It was found that the lens steered the main lobe, while it maintained high values for the directivity and low side-lobes.

Ex. 1003, 19932. In other words, the steerable high directivity of Demetriadou is an advantage, not a problem, contrary to Patent Owner's arguments. Matitsine-860 confirms that a narrow beam is advantageous, because it essentially provides more gain in a given direction: "The

spherical lens allows the output RF signal to narrow so that the resultant beam can travel a farther distance." Ex. 1002, 5:34–35.

Matitsine-860 also confirms that its system "uses an array of spherical lens[es] and mechanically movable radio frequency (RF) elements along the surface of the spherical lens to provide cellular coverage *for a narrow geographical area*." *Id.* at code (57). Also, as indicated above, both Matitsine-860 and Demetriadou teach increasing the directivity (so that the beam can travel a farther distance) by similarly moving an antenna feed relative to the lens focal point. *Compare* Ex. 1002, 6:3–20, code (57); *with*, Ex. 1003, Abstract, Figs. 3, 7–8. And contrary to Patent Owner's arguments asserting that 1) Demetriadou's lens destroys the functionality of Matitsine-860's Luneberg lens, 2) is inferior and dissimilar to it, and 3) would cause a substantial re-design of Matitsine-860's system, Demetriadou teaches that "all of the traditional properties of the original Luneburg lens are preserved," such that "the new lens can create a high-directivity beam with very low levels of side-lobes and steering capabilities for relatively wide angles." Ex. 1003, 19926–27.

Patent Owner also argues that Mr. Teillet's testimony regarding "cost reduction is wholly unsupported and cannot reasonably be used as the motivation to combine references." Prelim. Resp. 21 (citing Ex. 1012 ¶ 22; Ex. 2005 ¶¶ 49, 66, 67). Contrary to this argument, on this preliminary record, Mr. Teillet appears to draw a reasonable inference that using less material spread over a number of lenses in antenna arrays probably reduces material costs. *See* Ex. 1012 ¶ 22. Moreover, Patent Owner characterizes a publication by Matego-Secura (introduced during prosecution history) as cumulative of Demetriadou's teachings, but Matego-Secura contradicts

Patent Owner's argument. *See* Prelim. Resp. 13 (citing Ex. 2001). Specifically, Matego-Secura states that "[t]he manufacturing technique [for a thin lens] is *low-cost and easy to reproduce*." Ex. 2001, 2 (emphasis added). Finally, Petitioner relies on other reasons to combine the teachings of Matitsine-860 and Demetriadou, including that Matitsine-860's system contemplates lenses that are only partly spherical as noted above, and Demetriadou teaches that a "slimmed, non-spherical lens 'provides excellent steering capabilities for wide angles, maintaining the directivity and side-lobes at high and low values respectively.'" Pet. 18 (quoting Ex. 1003, Abstract).

Claim 1 also recites that "each lens set include[es] . . . a plurality of feed elements aligned with a respective one of said plurality of lenses and configured to transmit/receive a signal through said respective one of said plurality of lenses at a desired direction." Ex. 1001, 19:56–57, 19:59–62. Petitioner generally reads this limitation on Matitsine-860's RF elements 140 and 145. Pet. 20 (citing Ex. 1003, Figs. 1A, 3). Petitioner explains that Matitsine-860 "discloses that '[m]ultiple RF elements can be placed on a single track' around each lens." *Id.* (quoting Ex. 1002, 2:17). Matitsine-860 supports the Petition at the cited passage, stating as follows: "Multiple RF elements can be placed on a single track. In these embodiments, the multiple RF elements on the same track can be moved independently of each other." Ex. 1002, 2:17–19. Petitioner also relies on Matitsine-860's Figure 3, which discloses multiple feed elements 340, 345 coaxially aligned around lens 305, and with multiple feed elements 350, 355 coaxially aligned around lens 310. *Id.* (citing Ex. 1002, Fig. 3).

To address the "configured to transmit/receive a signal through said respective one of said plurality of lenses at a desired direction" limitation of claim 1, Petitioner explains that Matitsine-860 teaches that "each RF element (from RF elements 140 and 145) is configured to transmit an output signal (e.g., a radio frequency signal) in the form of a beam to the atmosphere through its corresponding spherical lens." Pet. 20 (quoting Ex. 1002, 5:30–34). Also, Petitioner explains that "the RF elements 140 and 145 are configured to receive/detect incoming signals that have been focused by the lenses 105 and 110." *Id.* (quoting Ex. 1002, 5:35–38). As indicated above, Petitioner notes that Matitsine-860 generally teaches that "[m]ultiple RF elements can be placed on a single track" (which corresponds to a single lens). *See id.* at 13–14, 20. Petitioner quotes Matitsine-860 as teaching that "the control mechanism is also programmed to coordinate multiple pairs (or groups) of RF elements and to configure the phase shifter to modify a phase of the output signals transmitted from the same pair (or group) of RF elements, so that the signals would be in-phase." *Id.* at 13–14 (quoting Ex. 1002, 2:17–24) (referring to Ex. 1003, Fig. 3).

Petitioner's showing on this preliminary record regarding the "feed element" alignment limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner's showing for this limitation. *See* Prelim. Resp.

Claim 1 also recites "each lens set include[s] . . . a selector connected to each of said plurality of feed elements of said plurality of lens sets to dynamically select a subset of said plurality of feed elements to transmit/receive the signal through said non-spherical lens." To address this limitation, Petitioner contends that "Matitsine-860 discloses that the antenna

system can be programmed 'via the control mechanism' to configure the radiating elements to 'provide coverage at different geographical areas and different capacity (by having more or less RF elements covering the same geographical area) depending on demands at the time.'" Pet. 21 (quoting Ex. 1002, 6:17–20). Relatedly, Petitioner also states that "Matitsine-860 . . . discloses that radiating elements associated with different lenses can be grouped together to adjust the vertical footprint of the resultant beam ('polarized coincident radiation pattern') and provide overlapping geographical areas." *Id.* at 13 (quoting Ex. 1002, 9:1–26).

As noted above, Petitioner quotes Matitsine-860 as teaching that "the control mechanism is also programmed to coordinate multiple pairs (or groups) of RF elements and to configure the phase shifter to modify a phase of the output signals transmitted from the same pair (or group) of RF elements, so that the signals would be in-phase." Pet. 13–14 (citing Ex. 1002, 2:17–24; quoting *id.* at 2:20–24) (referring to Ex. 1003, Fig. 3). At the cited passage, Matitsine-860 also teaches that "multiple RF elements on the same track can be moved independently of each other." Ex. 1002, 2:17–24.

Petitioner contends that "while [Matitsine-860's] control mechanism provides the ability to select which geographic area the signal is transmitted/received, Matitsine-860 does not appear to teach a selector to dynamically select a subset of feed elements," which are around a single lens according to claim 1. *See* Pet. 22. Petitioner turns to Ebling as teaching such a selector. *Id.* Relying on the testimony of Mr. Teillet, Petitioner contends that Ebling's selector, "switch network 48," includes "one input (50) and multiple outputs (52)," to "switch[] among multiple outputs to

produce one output at a time," similar to the selection process of the '947 patent. *Id.* (citing Ex. 1012 ¶ 24). Petitioner notes that "Ebling . . . generally teaches a multi-beam antenna having a lens and a plurality of radiating elements *arranged about the lens.*" *Id.* at 14 (emphasis added) (quoting Ex. 1004, code (57).

Based on the combined teachings of Matitsine-860 and Ebling, including Matitsine-860's teaching about selecting a geographic area based on selecting feeds, Petitioner contends that "[i]t would have been obvious to add a switching network as taught in Ebling to the array system in Matitisine-860 in order to select subsets of radiating elements for signal transmission or reception." Pet. 22. According to Petitioner, "[t]here is no difference between a switch and a selector because a selection is done by switching." *Id.* (quoting Ex. 1012 ¶ 24). Petitioner also contends that "combining Matitsine-860, and Ebling would have been no more than combining prior art elements according to known methods to yield predictable results for a person of ordinary skill in the art." *Id.* at 23 (citing *KSR*, 550 U.S. at 416).

Based on the preliminary record, Ebling appears to support Petitioner's rationale for combining Ebling and Matitsine-860 to dynamically determine the radiation pattern of the transmission and reception based on the selected subsets of feeds. *See* Pet. 21 (asserting that Matitsine-860 teaches that selecting RF radiating elements provides "different geographic areas and different capacity"), 22 (asserting that selecting different RF elements based on the combination provides for "transmission or reception"). Ebling verifies that this rationale is "[i]n *accordance with known principles of diffraction*," in other words, "the

relative position of the antenna feed elements 14 to the electromagnetic lens 12 are adapted in accordance with the radiation patterns of the antenna feed elements 14 to provide a desired pattern of radiation of the respective beams of electromagnetic energy 20 exiting the second side 28 of the at least one electromagnetic lens 12." Ex. 1004, 4:33–42 (emphasis added).[9]

Accordingly, Petitioner's showing on this preliminary record regarding the "selector" limitation is sufficient for purposes of institution. Patent Owner does not address Petitioner's showing in this regard. *See* Prelim. Resp.

As summarized above, for purposes of institution, the preliminary record supports Petitioner's showing. Accordingly, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention claim 1 would have been obvious over the combined teachings of Matitsine-860, Demetriadou, and Ebling.

*e. Claims 2–5, 9–11, 15, 18, and 19*

Claims 2–5, 9–11, 15, 18, and 19 depend directly from independent claim 1. Petitioner contends that these claims would have been obvious over the combined teachings of Matitsine-860, Demetriadou, and Ebling. Pet. 23–32. In support, Petitioner relies on the testimony of Mr. Teillet, and provides citations to teachings in Matitsine-860 and/or Ebling. *Id.* On this preliminary record, Petitioner sufficiently maps the added limitations of 2–5, 9–11, 15, 18, and 19 to the asserted prior art and provides sufficient reasons with a reasonable expectation of success for the combination.

[9] Similarly, Patent Owner acknowledges that a prior art patent to Collier cited during prosecution "discloses switching or throwing different switches 34 to shape a pattern" and contends that this teaching is cumulative to Ebling. *See* Prelim. Resp. 14 (citing Ex. 2004, 7:35–42).

Petitioner appears to rely on reasons to combine that are similar to those as outlined above in connection with claim 1 when relying on Ebling to teach the added limitations of particular dependent claims. *See* Pet. 23–32. Patent Owner relies on the alleged deficiencies addressed above in connection with claim 1. Prelim. Resp. 23.

For purposes of institution, the preliminary record supports Petitioner's showing. Accordingly, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention claims 2–5, 9–11, 15, 18, and 19 would have been obvious over the combined teachings of Matitsine-860, Demetriadou, and Ebling.

*2. Matitsine-860, Demetriadou, Ebling, and Matitsine-537*

Petitioner asserts that claim 6, which depends from claim 1, would have been obvious over the combined teachings of Matitsine-860, Demetriadou, Ebling, and Matitsine-537. Pet. 32–33. In support, Petitioner relies on the testimony of Mr. Teillet, and provides citations to teachings in Matitsine-860 and Matitsine-537. *Id.*

On this preliminary record, Petitioner sufficiently maps the added limitations of claim 6 to the asserted prior art and provides sufficient reasons with a reasonable expectation of success for the combination. *See id.* Patent Owner relies on the alleged deficiencies addressed above in connection with claim 1. Prelim. Resp. 23.

For purposes of institution, the preliminary record supports Petitioner's showing. Accordingly, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention claim 6 would have been obvious over the combined teachings of Matitsine-860, Demetriadou, Ebling, and Matitsine-537.

*3. Matitsine-860, Demetriadou, Ebling, Matitsine-537, and Lee (Ground 3)*

Petitioner asserts that claims 7 and 8, which depend from claim 6, would have been obvious over the combined teachings of Matitsine-860, Demetriadou, Ebling, Matitsine-537, and Lee. Pet. 33–34. In support, Petitioner relies on the testimony of Mr. Teillet, and provides citations to teachings in Matitsine-860 and Lee. *Id.*

On this preliminary record, Petitioner sufficiently maps the added limitations of claims 7 and 8 to the asserted prior art and provides sufficient reasons with a reasonable expectation of success for the combination. *See id.* Patent Owner relies on the alleged deficiencies addressed above in connection with claim 1. Prelim. Resp. 23.

For purposes of institution, the preliminary record supports Petitioner's showing. Accordingly, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention claims 7 and 8 would have been obvious over the combined teachings of Matitsine-860, Demetriadou, Ebling, and Matitsine-537.

*4. Matitsine-860, Demetriadou, Ebling, and Ray-767*

Petitioner asserts that claims 12–14, which depend directly from claim 1, and claim 16, which depends from claim 14, would have been obvious over the combined teachings of Matitsine-860, Demetriadou, Ebling, and Ray-767. Pet. 35–37. In support, Petitioner relies on the testimony of Mr. Teillet, and provides citations to teachings in Matitsine-860 and Lee. *Id.*

On this preliminary record, Petitioner sufficiently maps the added limitations of claims 12–14 and 16 to the asserted prior art and provides sufficient reasons with a reasonable expectation of success for the

combination. *See id.* Patent Owner relies on the alleged deficiencies addressed above in connection with claim 1. Prelim. Resp. 23.

For purposes of institution, the preliminary record supports Petitioner's showing. Accordingly, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention claims 7 and 8 would have been obvious over the combined teachings of Matitsine-860, Demetriadou, Ebling, and Matitsine-537.

*5. Matitsine-860, Demetriadou, Ebling, Ray-767, and Turcotte-804*

Petitioner asserts that claim 17, which depends from claim 14, would have been obvious over the combined teachings of Matitsine-860, Demetriadou, Ebling, Ray-767, and Turcotte-804. Pet. 38. In support, Petitioner relies on the testimony of Mr. Teillet, and provides citations to teachings in Matitsine-860 and Turcotte-804. *Id.*

On this preliminary record, Petitioner sufficiently maps the added limitations of claim 17 to the asserted prior art and provides sufficient reasons with a reasonable expectation of success for the combination. *See id.* Patent Owner relies on the alleged deficiencies addressed above in connection with claim 1. Prelim. Resp. 23.

For purposes of institution, the preliminary record supports Petitioner's showing. Accordingly, we determine that Petitioner shows a reasonable likelihood that it would prevail with respect to its contention claim 17 would have been obvious over the combined teachings of Matitsine-860, Demetriadou, Ebling, Matitsine-537, and Turcotte-804.

## III. 35 U.S.C. § 325(d)

Institution of *inter partes* review is discretionary. *See Harmonic Inc. v. Avid Tech., Inc*., 815 F.3d 1356, 1367 (Fed. Cir. 2016) ("[T]he [U.S. Patent and Trademark Office] is permitted, but never compelled, to institute an IPR proceeding."). Pursuant to 35 U.S.C. § 325(d), in determining whether to institute an *inter partes* review ("IPR"), "the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office." In evaluating arguments under § 325(d), the Board uses

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

*Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential) ("*Advanced Bionics*"); *see also Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17–18 (PTAB Dec. 15, 2017) (precedential as to Section III.C.5, first paragraph) (listing factors to consider in evaluating the applicability of § 325(d)) ("*Becton Dickinson*").

The *Becton Dickinson* factors follow:

> (a) the similarities and material differences between the asserted art and the prior art involved during examination;
>
> (b) the cumulative nature of the asserted art and the prior art evaluated during examination;
>
> (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;

> (d) the extent of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art;
>
> (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and
>
> (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.

*Id.*; *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide (Nov. 2019), *available at* https://www.uspto.gov/TrialPracticeGuideConsolidated, 62–63. *Advanced Bionics* explains that *Becton Dickinson* factors (a), (b), and (d) relate to the first part, and *Becton Dickinson* factors (c), (e), and (f) relate to the second part. *Advanced Bionics*, Paper 6 at 9–11.

As indicated above, "[i]f the 'same or substantially the same prior art or arguments previously were presented to the Office,' then the Board's decisions generally have required a showing that the Office erred in evaluating the art or arguments." *Advanced Bionics*, Paper 6 at 8–10 (quoting § 325(d); citing *Becton Dickinson*, Paper 8 at 24).

Patent Owner generally asserts that "Petitioner primarily relies on subject matter that was effectively considered by the Examiner during examination of the '947 Patent." Prelim. Resp. 12. In particular, Patent Owner contends that the Examiner relies on "the '706 Publication" (Ex. 1009, ("Matitsine")), which "is a continuation of Matitsine-860." *Id.* at 13. After noting that Petitioner combines Demetriadou, Ebling, and Matitsine-860, Patent Owner contends that Demetriadou "adds nothing relevant to" Matitsine-860, and Demetriadou and Ebling are cumulative of references the Examiner considered during prosecution. *See id.* at 13–14.

Specifically, with respect to the "non-spherical lens" limitation of claim 1, Patent Owner asserts that "the alleged teachings of *Demetriadou* are also disclosed and cited within [a paper by Mateo-Segura], which was in turn cited [on an Information Disclosure Statement (IDS)] and considered by the Examiner during prosecution of the '947 Patent." Prelim. Resp. 13 (citing "*Flat Luneburg Lens via Transformation Optics for Directive Antenna Applications*," Carolina Mateo-Segura, et al., IEEE Transactions of Antennas and Propagation, Vol. 62, No. 4, April 2014; Ex. 2002; Ex. 2003, 1953, reference [22]). According to Patent Owner, Mateo-Segura, like Demetriadou, relates to "reducing a thickness of a Luneburg [l]ens." *Id.* at 13–14.

With respect to the "selector" limitation of claim 1, Patent Owner argues that Ebling is cumulative of Collier (Ex. 2004), which "was cited during prosecution of the '947" patent, because Collier "also discloses switching or throwing different switches 34 to shape a pattern." Prelim. Resp. 14 (citing Ex. 2004, 7:35–42).

Even if Patent Owner is correct that Demetriadou is cumulative of Mateo-Segura and assuming that the Office considered the latter because it is listed on an IDS, Petitioner shows the Office erred in a manner material to the patentability of the challenged claims. Petitioner shows that, during prosecution, "the Applicant amended claim 1 to include 1) 'a plurality of non-spherical lenses,' and 2) 'a selector connected to each of said plurality of feed elements of said plurality of lens sets.'" Pet. 11 (citing Ex. 1010, 2). As Petitioner argues, "[c]ritically, the examiner failed to consider whether these limitations would have been obvious over Matitsine-860 in view of other material prior art available to a person of ordinary skill in the art." *Id.*

Regarding the "non-spherical lenses" limitation of claim 1, as discussed above, Petitioner shows that Matitsine-860 discloses non-spherical lenses, and Patent Owner does not dispute this showing on this preliminary record. *See* Pet. 18 (citing Ex. 1002, 4:55–85); Prelim. Resp. 18–23. In addition, Petitioner shows that Demetriadou teaches a "slim lens" or "'discus' shaped lens," produced "by 'squeezing' or 'slimming' [a] spherical lens." *Id.* (quoting Ex. 1003, Abstract, 19927). Petitioner also provides reasons supported by factual underpinnings to combine Demetriadou's teachings with those of Matitsine-860, as discussed above. *See Advanced Bionics,* Paper 6 at 9–11 & n.10 (reasoning that *Becton Dickinson* factor (f), "additional evidence and facts presented in the petition," and *Becton Dickinson* factor (e), the extent the Petition shows error, inform the material error inquiry). Therefore, even if Demetriadou is cumulative of Mateo-Segura, Petitioner shows that the Office overlooked or misapprehended any alleged cumulative teachings as represented by the non-spherical lenses as described in Matitsine-860 and Demetriadou, thereby satisfying the second part of the two-part framework of *Advanced Bionics.*

With respect to the "selector" limitation of claim 1, even if Patent Owner is correct that Collier "discloses switching or throwing different switches 34 to shape a pattern," this, without more, does not show that Ebling is cumulative to Collier. *See* Prelim. Resp. 14 (citing Ex. 2004, 7:35–42). Although Patent Owner's characterization of Collier appears correct as indicated above (*supra* note 9), Ebling teaches a switch to select from *multiple feeds arranged around each lens* to form a radiation pattern, a feature that the applicant argued is a patentable feature over Matitsine during prosecution. *See* Ex. 1010, 5 (arguing that "Matitsine does not teach a

selector in communication *with the plurality of feed elements of each lens*, as required by amended claim 1" (emphasis added)); Pet. 14, 22; Ex. 1004, code (57), 6:27–33, Fig. 1. Therefore, Ebling is not cumulative of Collier under the first part of the two-part framework of *Advanced Bionics*.

For the foregoing reasons, we decline to exercise our discretion under § 325(d) to deny institution.

## IV. CONCLUSION

For the foregoing reasons, we determine that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail in showing at least one of claims 1–19 of the '947 patent is unpatentable under 35 U.S.C. § 103.

## V. ORDER

Accordingly, it is

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review is hereby instituted as to claims 1–19 of the '947 patent on all the grounds set forth in the Petition; and,

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

For PETITIONER:

Robert Fish
Joseph Andelin
FISH IP LAW LLP
rfish@fishiplaw.com
jandelin@fishiplaw.com

For PATENT OWNER:

Jason Lohr
Gurtej Singh
Joe Grdinovac
Helen Y. Trac
HOGAN LOVELLS US LLP
jason.lohr@hoganlovells.com
tej.singh@hoganlovells.com
joe.grdinovac@hoganlovells.com
helen.trac@hoganlovells.com