

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD, SAMSUNG ELECTRONICS
AMERICA, INC., GOOGLE LLC, and CISCO SYSTEMS, INC.,
Petitioner,

v.

XR COMMUNICATIONS LLC, d/b/a VIVATO TECHNOLOGIES,
Patent Owner.

IPR2022-00613
Patent 10,594,376 B2

Before BARBARA A. PARVIS, TERRENCE W. McMILLIN, and
JAMES J. MAYBERRY, *Administrative Patent Judges*.

MAYBERRY, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background and Summary*

Cisco Systems, Inc., Google LLC, Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc. (collectively, “Petitioner”), filed a Petition requesting *inter partes* review of claims 1–34 (the “Challenged Claims”) of U.S. Patent No. 10,594,376 B2 (Ex. 1001, the “’376 patent”). Paper 5 (“Pet.”), 1. XR Communications LLC, d/b/a Vivato Technologies (“Patent Owner”) filed a Preliminary Response to the Petition. Paper 9 (“Prelim. Resp.”). With our authorization, Petitioner filed a Preliminary Reply (Paper 10, “Prelim. Reply”) and Patent Owner filed a Preliminary Sur-reply (Paper 11, “Prelim. Sur-reply”).

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2021) (permitting the Board to institute trial on behalf of the Director). To institute an *inter partes* review, we must determine that the information presented in the Petition shows “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, upon considering the current record, we institute an *inter partes* review.

B. *Real Parties-in-Interest*

Petitioner identifies themselves as the real parties-in-interest. Pet. 86. Patent Owner identifies XR Communications LLC as the real party-in-interest. Paper 6, 2.

C. *Related Matters*

The parties each identify the following litigations as matters related to the ’376 patent: *XR Communications, LLC, dba Vivato Technologies. v.*

Aruba Networks, LLC, No. 2:21-cv-04912 (CDCA); *XR Communications, LLC, dba Vivato Technologies. v. Belkin International, Inc.*, No. 2:21-cv-04914 (CDCA); *XR Communications, LLC, dba Vivato Technologies. v. Netgear, Inc.*, No. 2:21-cv-04942 (CDCA); *XR Communications, LLC, dba Vivato Technologies. v. D-Link Systems, Inc.*, No. 8:21-cv-01063 (CDCA); *XR Communications, LLC, dba Vivato Technologies. v. Netgear, Inc.*, No. 8:21-cv-01064 (CDCA); *XR Communications, LLC, dba Vivato Technologies. v. Ubiquiti Networks, Inc.*, No. 8:21-cv-01065 (CDCA); *XR Communications, LLC, dba Vivato Technologies. v. Amazon.com, Inc., Amazon.com Services LLC, and Eero LLC*, No. 6:21-cv-0619-ADA (W.D. Tex.); *XR Communications, LLC, dba Vivato Technologies. v. ASUSTek Computer Inc.*, No. 6:21-cv-0622-ADA (W.D. Tex.); *XR Communications, LLC, dba Vivato Technologies. v. Google LLC*, No. 6:21-cv-0625-ADA (W.D. Tex.); and *XR Communications, LLC, dba Vivato Technologies. v. Samsung Electronics Co. Ltd. and Samsung Electronics America, Inc.*, No. 6:21-cv-0626-ADA (W.D. Tex.). Pet. 86–87; Paper 6, 2–3.

Patent Owner also identifies the following litigations as matters related to the '376 patent: *XR Communications, LLC, dba Vivato Technologies. v. Ruckus Wireless, Inc.*, No. 3:21-cv-04679 (NDCA); *XR Communications, LLC. v. Arris Solutions, Inc.*, No. 6:21-cv-0621 (W.D. Tex.); *XR Communications, LLC. v. Cisco Systems, Inc. et al.*, No. 6:21-cv-0623 (W.D. Tex.); and *XR Communications, LLC. v. Comcast Corporation et al.*, No. 6:21-cv-0624 (W.D. Tex.). Paper 6, 2–3.

D. The '376 Patent

The '376 patent, titled “Directed Wireless Communication,” issued March 17, 2020, from application US 15/486,245. Ex. 1001, codes (54), (45), (22). The '376 patent ultimately claims priority to a provisional application, US 60/423,660, filed on November 4, 2002. *Id.* at code (60).

The '376 patent “relates to directed wireless communication.” Ex. 1001, 1:20–21. According to the '376 patent, wired networks have high bandwidth and data rates but constrain the range of movement for devices. *Id.* at 1:25–30. The '376 patent explains that wireless networks are more accommodating for the movement of a user but have relatively low bandwidth and data rates. *Id.* at 1:35–43. The '376 patent states that many conventional wireless communication systems and networks use omni-directional antennas that transmit equally in all directions. *Id.* at 1:51–57. The '376 patent further explains that omni-directional antennas have limitations because they have limited transmission ranges and their electromagnetic interference with transmissions is unmanaged, which can cause interference with other devices operating in the same frequency band within a transmission coverage area. *Id.* at 1:60–67.

The '376 patent therefore describes directed wireless communication that uses directed communication beams emanated from an antenna assembly. Ex. 1001, 2:7–15. Figure 2, reproduced below, “illustrates an exemplary directed wireless communication system.” *Id.* at 2:24–25.

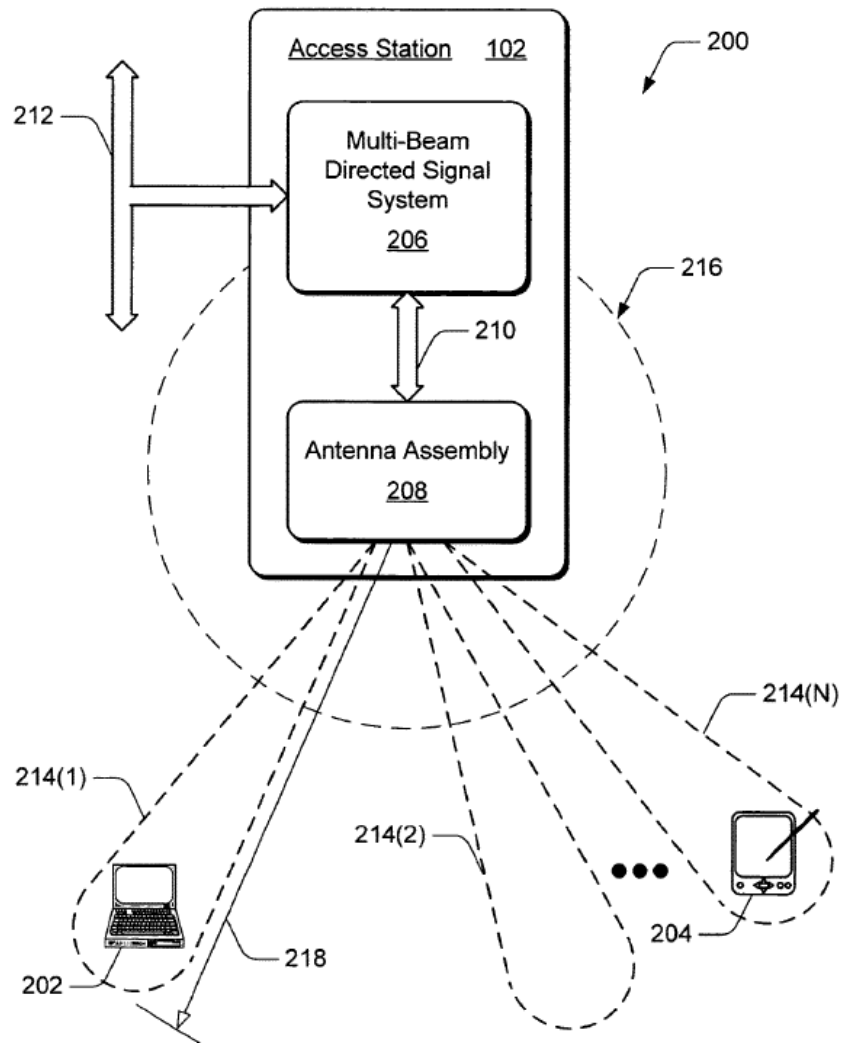


Fig. 2

As shown, “antenna assembly 208 can be implemented as two or more antennas . . . to emanate multiple directed communication beams 214(1), 214(2), . . . , 214(N).” Ex. 1001, 4:54–57. “[C]lient device 202 can communicate via directed communication beam 214(1) with a first channel of the multi-beam directed signal system 206, and client device 204 can communicate via directed communication beam[] 214(N) with a second channel of the multi-beam directed signal system 206.” *Id.* at 5:16–21.

Figure 3, reproduced below, “illustrates an exemplary communication beam array [that] can be generated with the exemplary directed wireless communication system shown in F[igure] 2.” Ex. 1001, 2:26–28.

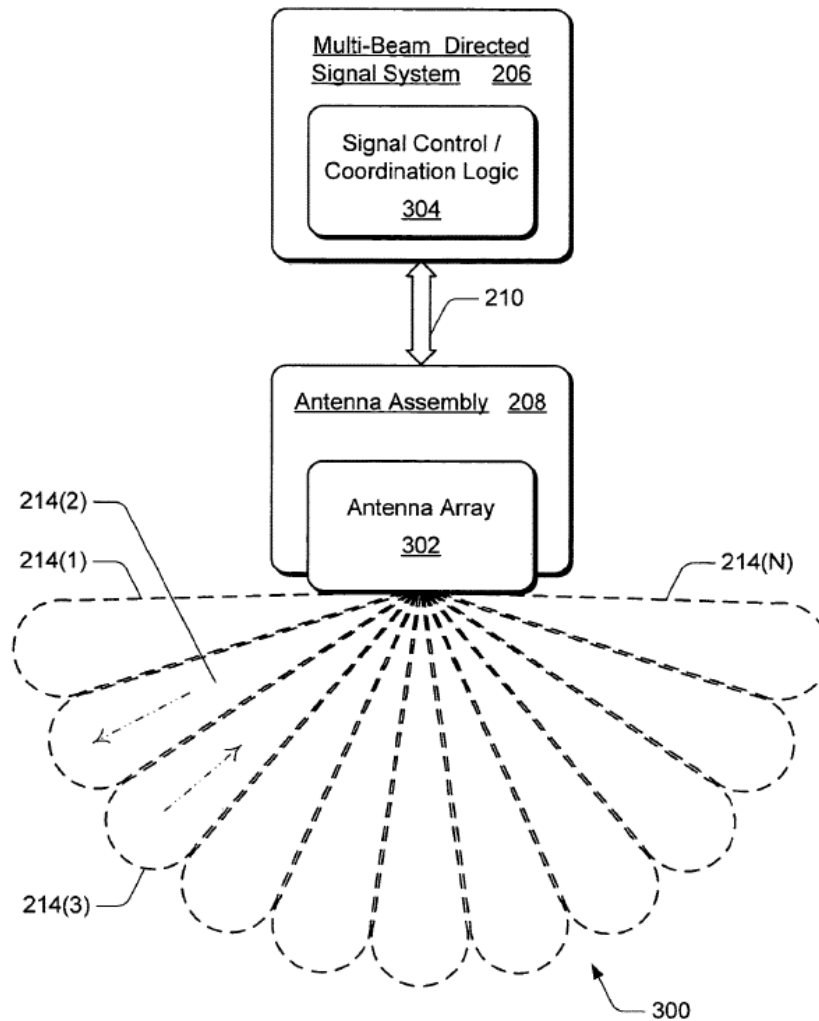


Fig. 3

Communication beam array 300 includes “directed communication beams 214(1), 214(2), . . . 214(N) that emanate from an antenna array 302 which is part of the antenna assembly 208.” *Id.* at 5:56–59. The ’376 describes this arrangement as producing “a transmission pattern that

selectively places transmission nulls and/or peaks in certain directions within an applicable coverage area.” *Id.* at 5:59–67.

E. Challenged Claims

The Petition challenges claims 1–34. Pet. 1. Claims 1, 12, 22, and 32 are independent claims. Claim 1, which we reproduce below, is representative of the claimed subject matter.

1. A data-communications networking apparatus, comprising:
 - a processor configured to:
 - generate a probing signal for transmission to at least a first client device and a second client device;
 - generate a first data stream for transmission to the first client device; and
 - generate a second data stream for transmission to the second client device; and
 - a transceiver operatively coupled to the processor and configured to:
 - transmit the probing signal to at least the first client device and the second client device via a smart antenna;
 - wherein the smart antenna is operatively coupled to the transceiver and comprises a first antenna element and a second antenna element;
 - wherein one or more of the processor, the transceiver, or the smart antenna is further configured to:
 - receive a first feedback information from the first client device in response to the transmission of the probing signal;
 - receive a second feedback information from the second client device in response to the transmission of the probing signal;
 - determine where to place transmission peaks and transmission nulls within one or more spatially distributed patterns of electromagnetic signals based in part on the first and the second feedback information;

transmit the first data stream to the first client device via the one or more spatially distributed patterns of electromagnetic signals; and

transmit the second data stream to the second client device via the one or more spatially distributed patterns of electromagnetic signals;

wherein transmission of the first data stream and transmission of at least part of the second data stream occur at the same time; and

wherein the one or more spatially distributed patterns of electromagnetic signals are configured to exhibit a first transmission peak at a location of the first client device and a second transmission peak at a location of the second client device.

Ex. 1001, 32:30–33:5. Independent claims 12, 22, and 32 recites substantially the same subject matter as claim 1. *Compare id.* at 32:30–33:5, *with* 34:1–42, 35:30–36:11, 37:8–38:23; *see also* Pet. 20 (“The four independent claims have the same basic format—limitations directed to a processor and its functions, limitations directed to a transceiver and its functions, and limitations directed to functions performed in either the processor, transceiver, or a smart antenna.”). Independent claims 22 and 32 also recite the content of feedback information.¹ Independent claim 32 also recites “a memory operatively coupled to one or more of the processor or the transceiver[,], wherein a routing table is stored in the memory.” *See* Ex. 1001, 37:24–27 (the “memory” limitations of claim 32).

¹ Claim 22 recites “wherein the first feedback information comprises one or more of: a first amplitude information, a first phase information, a first routing information, or a first index to a routing table” and “wherein the second feedback information comprises one or more of: a second amplitude information, a second phase information, a second routing information, or a second index to a routing table.” Ex. 1001, 35:51–54, 57–60. Claim 32 includes nearly identical recitations. *See id.* at 37:32–35, 38:1–4.

F. Prior Art and Asserted Grounds

Petitioner asserts that the Challenged Claims are unpatentable based on two grounds:

Claims Challenged	35 U.S.C. §	References/Basis
1–9, 12–18, 22–34	103(a)	Gerlach, ² Barratt ³
10, 11, 19–21	103(a)	Gerlach, Barratt, Okamoto ⁴

Pet. 2.

Petitioner relies on the declaration testimony of Zhi Ding, Ph.D. (Ex. 1003) in support of these grounds.

The following subsections provide brief descriptions of the asserted prior art references.

1. Gerlach (Ex. 1005)

Gerlach, titled “Method for Minimizing Cross-Talk in Adaptive Transmission Antennas,” issued November 28, 1995 from an application, US 08/046,631, filed April 14, 1993. Ex. 1005, codes (54), (45), (21), (22). Gerlach “relates to methods for multiplexing signals transmitted from an antenna array to multiple receivers, and in particular to the use of feedback from the receivers to minimize cross-talk among the received signals.” Ex. 1005, 1:6–9.

Gerlach explains that wireless communication systems may use spatial multiplexing techniques in which a transmitter emits multiple information signals that are intended for spatially separated receivers.

² Gerlach et al., US 5,471,657; issued Nov. 28, 1995 (Ex. 1005, “Gerlach”).

³ Barratt et al., US 5,592,490; issued Jan. 7, 1997 (Ex. 1006, “Gerlach”).

⁴ Okamoto et al., *Evaluation of Beamforming Algorithm Effectiveness for the Smart Wireless LAN System*, VTC '98. 48th IEEE Vehicular Technology Conference, Pathway to Global Wireless Revolution (1998), pp. 1675-1679 vol.3 (Ex. 1007, “Okamoto”).

Ex. 1005, 1:13–17. Gerlach describes adjusting the amplitude and phase of a signal so its gain is maximized in the direction of its intended receiver and minimized in the directions corresponding to other receivers. *Id.* at 1:22–26. Gerlach explains that this technique relies on sufficient information about the transmission channels between the transmitting array and the receivers. *Id.* at 1:26–29. Gerlach states, however, that there can be insufficient information about the propagation environment to produce a desired beampattern. *Id.* at 32–34.

Gerlach’s Figure 1, reproduced below, depicts conventional wireless communication system 30 that includes transmitting array 12 having transmitting elements 14 and multiple receivers 16.” Ex. 1005, 2:11–14.

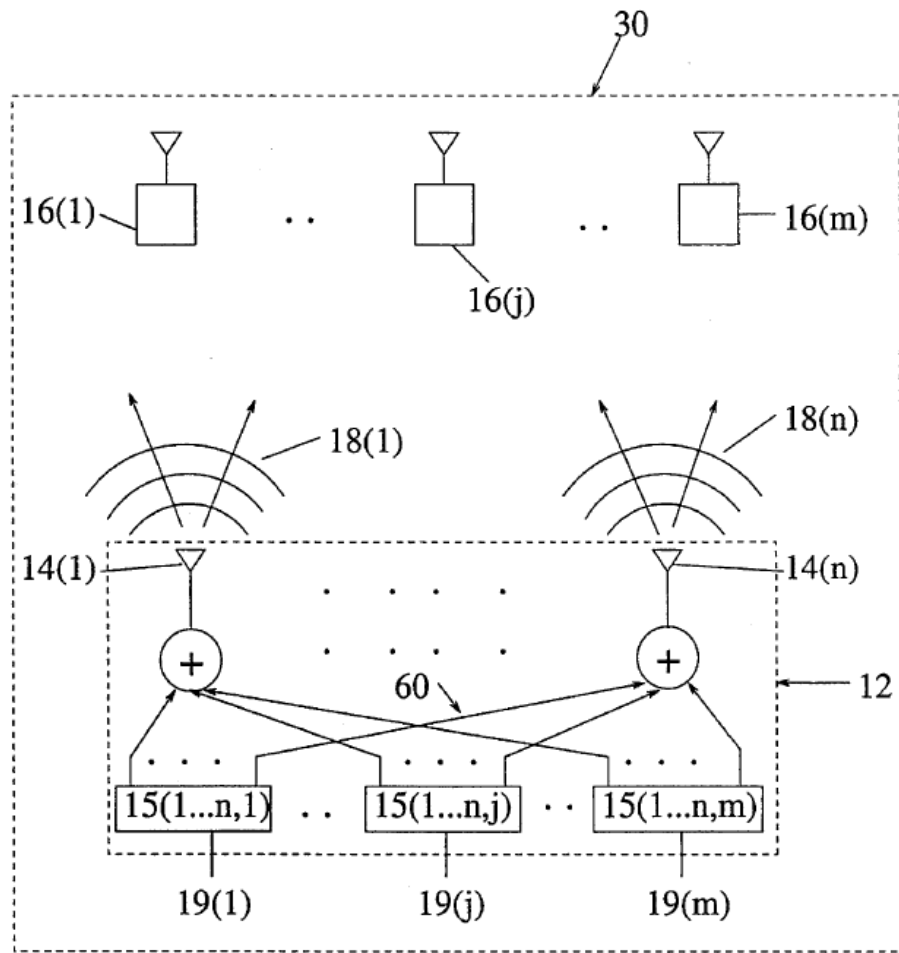


Fig.1

Gerlach explains that “transmitted signals 18(1) . . . 18(n) are generated at elements 14(1)-14(n), respectively, by applying information signals 19(1)-19(m) to elements 14(1)-14(n).” *Id.* at 2:62–65.

Gerlach’s Figure 2a, reproduced below, illustrates “a schematic representation of a beampattern (21) without feedback, having a primary lobe (23) and secondary lobes (22), as a function of angle Ψ with respect to transmitter array (12).” Ex. 1005, 2:15–18.

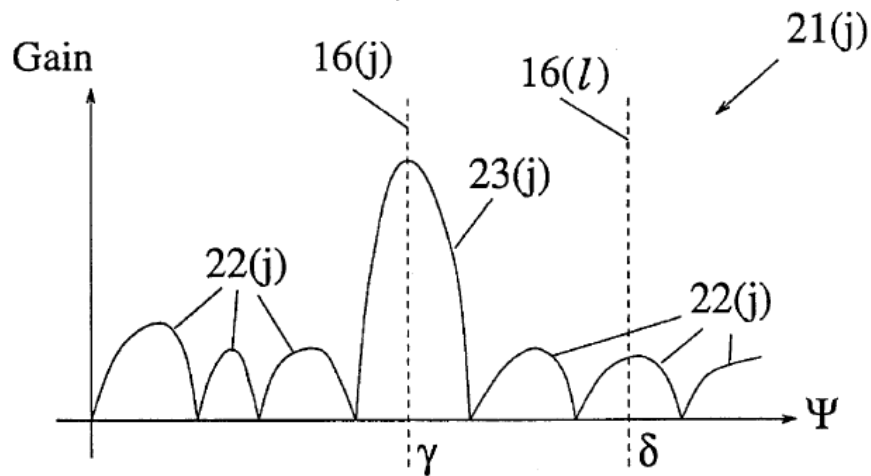


Fig. 2a

Gerlach explains that “[e]ach information signal 19 will have its own beampattern 21 generated by interference between transmission signals 18,” primary lobe 23(j) at angle γ is directed toward receiver 16(j), and side lobes 22(j) appear at other angles. *Id.* at 3:20–25. Because a receiver detects any signal 19 having a non-zero amplitude in its direction, receiver 16(1) at angle δ detects the non-zero amplitude of side lobe 22(j) at angle δ , which leads to cross-talk. *Id.* at 3:25–29.

To address this cross-talk, Gerlach describes a method of using feedback signals to optimize the directional properties of information signals that are transmitted to multiple receivers from a transmitting array. Ex. 1005, 1:48–51. The feedback signals provide information about the propagation environment of the array/receiver system and that information is used for producing information signals that minimize cross-talk. *Id.* at 1:51–56.

Gerlach’s Figure 2b, reproduced below, illustrates “a schematic representation of a beampattern (21) with feedback, having primary

lobe (23) and secondary lobes (22), as a function of angle Ψ with respect to transmitter array (12).” Ex. 1005, 2:19–22.

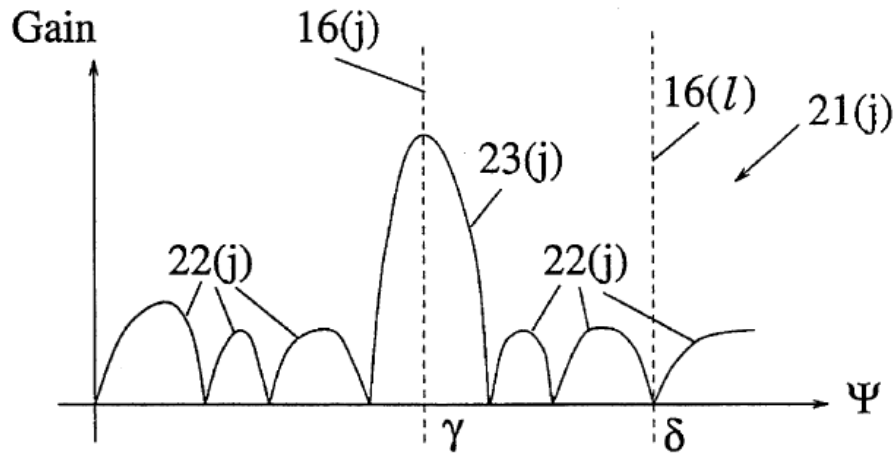


Fig. 2b

Figure 2b depicts a complimentary null beampattern 21 having “a primary lobe 23(j) with unit gain at angle γ , in the direction of intended receiver 16(j), and side lobes 22(j) with nulls in the direction of all remaining receivers 16(1).” *Id.* at 3:33–38.

2. Barratt (Ex. 1006)

Barratt is a U.S. patent titled, “Spectrally Efficient High Capacity Wireless Communication System” that issued January 7, 1997, from an application, US 08/375,848, filed January 20, 1995. Ex. 1006, codes (54), (45), (21), (22). Barratt “relates to wireless communication systems and, more particularly, to using antenna arrays and signal processing to dramatically increase the capacity and performance of wireless communication systems.” *Id.* at 1:15–18.

Barratt discloses, “[a] wireless system comprising a network of base stations for receiving uplink signals transmitted from a plurality of remote terminals and for transmitting downlink signals to the plurality of remote terminals.” Ex. 1006, code (57) (Abstract). The system includes, “a

plurality of antenna elements at each base station” and “a signal processor at each base station connected to the receiving antenna elements and to the transmitting antenna elements for determining spatial signatures.” *Id.*

We reproduce Barratt’s Figure 1, below, which “is a functional block diagram of a base station.” Ex. 1006, 5:21–22.

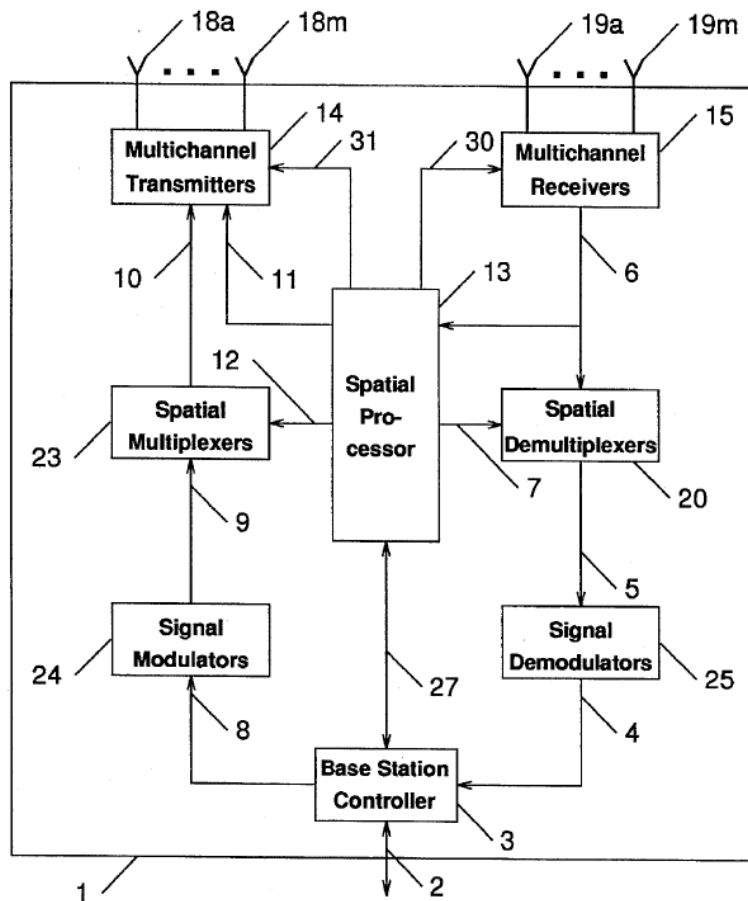


FIG. 1

Spatial processor 13 calculates a spatial signature for each remote terminal or receives a spatial signature that has been calculated by a remote terminal. *Id.* at 7:59–8:8; 11:25–34. Barratt states that “[t]he transmit spatial signature

characterizes how the remote terminal receives signals from each of the antenna array elements at the base station in a particular conventional channel.” *Id.* at 3:60–63.

3. *Okamoto (Ex. 1007)*

Okamoto is an IEEE⁵ article titled, “Evaluation of Beamforming Algorithm Effectiveness for the Smart Wireless LAN System.” Ex. 1007, 1. Okamoto explains that “[t]he Smart Wireless LAN (SWL) system integrates the Space-Division-Multiple-Access (SDMA) technique with the IEEE802.11 wireless LAN standard to enable multiple users to transmit on a wireless LAN at the same time in the same frequency band.” *Id.* Okamoto states that “[c]ertain features of 802.11 aid the implementation of an SDMA system,” such as a base station’s regularly broadcast frame that synchronizes clocks of all terminals in a local area, power control, a frame structure with contention and contention free periods, and terminal identification fields in each header.” *Id.* at 2. According to Okamoto, a SWL system using SDMA achieves “throughput multiplications by exploiting the rich spatial diversity existing among spatially separated users.” *Id.* at 1.

II. ANALYSIS OF PETITIONER’S CHALLENGES

A. *Applicable Law*

Petitioner’s asserted grounds of unpatentability are based on obviousness under 35 U.S.C. § 103.

Section 103(a) forbids issuance of a patent when “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

⁵ Institute of Electrical and Electronics Engineering, Inc. *See* Ex. 1008 ¶ 1.

obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.”

KSR Int’l Co. v. Teleflex Inc., 550 U.S. 398, 406 (2007). The question of obviousness is resolved on 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 (4) when available, objective evidence, such as commercial success, long felt but unsolved needs, and failure of others.⁶ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

“[O]bviousness must be determined in light of *all the facts*, and . . . a given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine” teachings from multiple references. *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir. 2006) (emphasis added); *see also PAR Pharm., Inc. v. TWI Pharms., Inc.*, 773 F.3d 1186, 1196 (Fed. Cir. 2014) (“The presence or absence of a motivation to combine references in an obviousness determination is a pure question of fact.”).

B. Level of Ordinary Skill in the Art

The level of skill in the art is “a prism or lens” through which we view the prior art and the claimed invention. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). Petitioner contends:

a Person of Ordinary Skill in the Art (“POSITA”) would have been familiar with wireless communications networks and equipment; had at least a working knowledge of the protocols and architectures of common wireless communications networks at the time; and had an understanding of the components and

⁶ The parties do not direct us to any objective evidence of non-obviousness at this stage of the proceeding.

subsystems within available wireless communication equipment. A POSITA would have had at least a Bachelor's degree in Electrical Engineering or a related field, and three to four years of work experience in wireless communications, or a Master's degree and at least two years of work experience in wireless communications.

Pet. 6; *see also* Ex. 1003 ¶¶ 22–24 (providing testimony agree with this characterization of the level of ordinary skill). Patent Owner adopts Petitioner's definition at this stage of the proceeding. Prelim. Resp. 7.

For the purposes of this Decision, we apply Petitioner's definition of the level of ordinary skill in the art. We determine that this definition is consistent with the prior art of record and the skill reflected in the Specification of the '376 patent, based on our review of the limited record.

C. Claim Construction

In *inter partes* reviews, we interpret a claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b). Under this standard, we construe the claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*

Petitioner states that they do “not believe it necessary for the Board to expressly construe any term for the purpose of this IPR proceeding,” and that they apply the ordinary and customary meaning as understood by one of ordinary skill in the art. Pet. 5–6.

Patent Owner asserts that Petitioner advocates for inconsistent claim constructions between this proceeding and in district court because “in the district court litigation, Petitioners argued for express constructions of various terms of the challenged claims, including ‘transmission peaks,’

‘transmission nulls,’ and ‘802.11 Standard.’” Prelim. Resp. 7–8 (citing Ex. 2001, 16–17). Patent Owner contends Petitioner’s inconsistent positions support discretionary denial.⁷ *Id.* at 8.

We determine that we need not expressly construe any claim terms to resolve the parties’ disputes on the current record. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those 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)). To the extent that the scope of any particular claim term requires discussion, however, we provide it in our assessment of the challenges, which we turn to next.

D. Ground 1: Claims 1–9, 12–18, and 22–34 as unpatentable over Gerlach and Barratt

Petitioner contends that the combined teachings of Gerlach and Barratt render obvious the subject matter of claims 1–9, 12–18, and 22–34. Pet. 2, 7–74. Patent Owner disputes Petitioner’s contentions, with respect to at least some of the limitations the independent claims. Prelim. Resp. 11–15.

1. Motivation to combine Gerlach and Barratt

We begin our analysis of Ground 1 with Petitioner’s contentions that a person having ordinary skill in the art would have had reason to combine the teachings of Gerlach and Barratt. *See* Pet. 19–20. First, Petitioner contends that, given the conceptual nature of Gerlach’s disclosure, a person having ordinary skill in the art would have “been motivated to find references that provide those details to develop an operational system.” *Id.* (referencing

⁷ We address discretionary denial in Section III, *infra*.

Ex. 1003 ¶ 94). Petitioner adds that a person having ordinary skill in the art would have looked to Barratt, as it describes network architecture using spatial multiplexing. *Id.*

Second, Petitioner contends that “Gerlach provides limited implementation details regarding reception of uplink signals,” and, therefore, a person having ordinary skill in the art would have “been motivated to combine Barratt’s base station architecture teachings with Gerlach to provide techniques for receiving uplink signals.” Pet. 19 (referencing Ex. 1003 ¶ 96). Third, Petitioner contends that a person having ordinary skill in the art “would have been motivated to combine Gerlach and Barratt to permit duplexing using a single antenna array, as taught by Barratt.” *Id.* (referencing Ex. 1003 ¶ 97). Petitioner explains that an artisan of ordinary skill “would have recognized that use of a single antenna array reduces equipment cost and size of the network-based apparatus.” *Id.*

Petitioner concludes that its proposed “combination merely combines prior art elements . . . according to known methods to yield predictable results.” Pet. 19 (referencing Ex. 1003 ¶ 98). Petitioner explains that a person having ordinary skill in the art would have had a reasonable expectation of success in arriving at the claimed invention, because both Gerlach’s and Barratt’s systems employ weighting to generate SDMA beampatterns, and, as such, “the elements of the combined systems perform the same basic functions,” making the resulting combination “predictable.” *Id.* at 19–20 (referencing Ex. 1003 ¶ 99).

At this stage of the proceeding, Patent Owner does not contest Petitioner’s contentions with respect to motivation to combine Gerlach and Barratt or the reasonable expectation of success of the combination.

We determine, on the current record, that Petitioner sufficiently demonstrates that a person having ordinary skill in the art would have been motivated to combine the teachings of Gerlach and Barratt, with a reasonable expectation of success in arriving at the claimed invention. We also determine, on the current record, that Petitioner’s reasoning is supported by rational underpinnings. *See KSR Int’l Co.*, 550 U.S. at 418 (stating that, to facilitate the analysis of an obviousness position, the proponent should provide “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”).

2. *Independent claim 1*

We now turn our analysis to the scope and content of the prior art and any differences between the prior art and the subject matter of independent claim 1, on a limitation-by-limitation basis.

a) *Preamble*

The preamble of claim 1 recites “[a] data-communications networking apparatus.” Ex. 1001, 32:30–31. Petitioner contends that Gerlach and Barratt, alone or in combination, teach or suggest a data communications system. Pet. 21–23 (referencing Ex. 1005, 2:39–41, 2:44–46, 2:62–67, 3:51–56, Figs. 3a, 3b; Ex. 1006, code (57) (Abstract); Ex. 1003 ¶¶ 100–104, 184–185, 201).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that Gerlach and Barratt, alone or in combination, teach or suggest the subject matter of the preamble. In view of this determination, we need not resolve, at this stage of the proceeding, whether the preamble is limiting.

Patent Owner does not dispute Petitioner’s contentions with respect to the subject matter of the preamble at this stage of the proceeding.

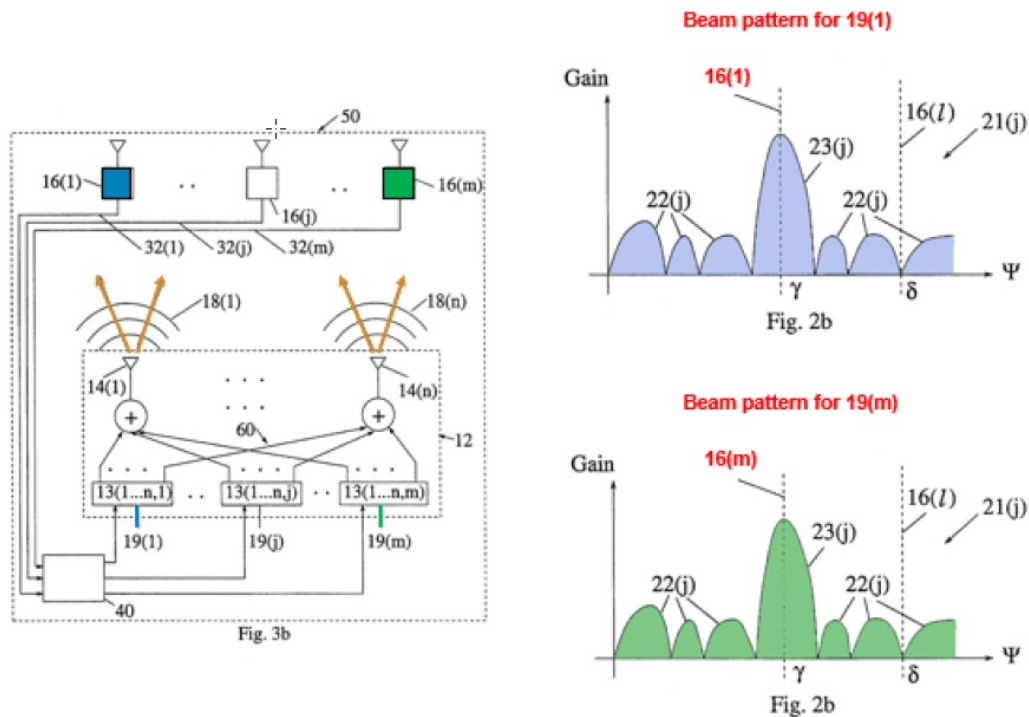
b) “processor” limitations

Claim 1 recites “a processor configured to: generate a probing signal for transmission to at least a first client device and a second client device; generate a first data stream for transmission to the first client device; and generate a second data stream for transmission to the second client device.” Ex. 1001, 32:32–38 (the “processor” limitations of claim 1). Petitioner contends that Gerlach teaches or suggests generating a probing signal for transmission to at least a first client device and a second client device, with Gerlach’s probing signal 17 corresponding to the recited probing signal. Pet. 23–25 (referencing Ex. 1005, 3:27–29, 3:43–46, 5:22–30, Figs. 1, 3a; Ex. 1003 ¶¶ 116–117). Petitioner explains that “multiple receivers 16 in communication range of transmitting array 12 . . . receive the transmitted probing signal.” *Id.* at 23; *see also id.* at 24 (presenting annotated versions of Gerlach’s Figure 3a, depicting multiple receivers (shaded in red)). Petitioner adds that each transmitting element transmits a weighted probing signal. *See id.* at 24; *see also id.* (presenting annotated versions of Gerlach’s Figure 3a, depicting multiple signals 18 from transmitting elements 14).

Petitioner also contends that Gerlach teaches or suggests generating first and second data streams for transmission to the first and second client devices, respectively. Pet. 25–27 (referencing Ex. 1005, 2:47–50, 2:62–67, Figs. 1, 2b, 3b; Ex. 1003 ¶¶ 118–123, 184–185, 201). Petitioner contends that a conventional multi-user spatial multiplexing system, such as that depicted in Gerlach’s Figure 1, implements Gerlach’s feedback technique to generate information signals. *Id.* at 25; *see also id.* n.8 (“Although

illustrating a feedback embodiment, a [person having ordinary skill in the art] would have understood Gerlach's Fig. 3b system also transmits information signals without feedback using weights 15 instead of weights 13.”); *id.* at 27 (presenting annotated versions of Gerlach's Figures 2b and 3b, including illustrating two separate beampatterns).

We reproduce Petitioner's annotated versions of Gerlach's Figures 2b and 3b, below.



Pet. 27. Figure 2b depicts “a schematic representation of a beampattern . . . with feedback, having primary lobe (23) and secondary lobes (22), as a function of angle ψ with respect to transmitter array (12).” Ex. 1005, 2:19–22. Figure 3b depicts “a schematic diagram of a wireless communication system (50) including feedback signals (32) and information signals (19).” *Id.* at 2:28–31. Petitioner annotates Figure 3b to have a blue-shaded transmitter 16(1) corresponding to signal “16(1)” and a

green-shaded transmitter 16(m) corresponding to signal “16(m).” Petitioner annotates two versions of Figure 2b, one shaded blue corresponding to a beam pattern for information signal 19(1) and one shaded green corresponding to a beam pattern for information signal 19(m). Petitioner explains that “[w]eights for signal 19(1) are selected for the propagation environment between the transmitting array and receiver 16(1) and weights for signal 19(m) are selected for the propagation environment between the transmitting array and receiver 16(m).” Pet. 26 (referencing Ex. 1003 ¶ 121).

With respect to the recited processor that is configured to perform the above actions, Petitioner contends that a person having ordinary skill in the art “would have understood that Gerlach inherently teaches or at a minimum suggests a processor in the network-based apparatus for modulating a data signal onto a carrier to generate a modulated signal.” Pet. 28 (referencing Ex. 1003 ¶ 108). Petitioner explains that a person having ordinary skill in the art “would have understood that probing signals 17 and information signals 19, provided as input to Gerlach’s transmitting array 12, are baseband modulated symbols to be multiplied with complex weights 13 and 15, respectively” and “[p]rior to 2002, it was well-known to a [person having ordinary skill in the art] that baseband modulation (i.e., bit to symbol mapping) techniques, particularly those used for wireless communication—like quadrature amplitude modulation (QAM)—were performed in software.” *Id.* (referencing Ex. 1001, 3:51–56; Ex. 1003 ¶ 107; Ex. 1029 ¶ 10; Ex. 1030 ¶¶ 14, 325; Ex. 1010, 2:37–3:17; Ex. 1011, 27:60–64, 28:25–28). Petitioner adds that “processors capable of performing signal encoding and baseband modulation were widely available

by 2002.” *Id.* (referencing Ex. 1003 ¶ 107; Ex. 1025, 1; Ex. 1027, 1; Ex. 1028, 1; Ex. 1031, 11:27–33).

Additionally, or alternatively, Petitioner relies on Barratt for teaching or suggesting the recited processor. Pet. 29 (referencing Ex. 1006, 6:55–62, 8:60–67, Fig. 1). Petitioner contends that a person having ordinary skill in the art would have found it obvious to incorporate Barratt’s processors in Gerlach’s system, as discussed above in connection with our analysis of Petitioner’s contentions directed to motivation to combine. *Id.* at 29–30 (referencing Ex. 1003 ¶¶ 111–112).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that Gerlach, alone or in combination with Barratt, teaches or suggests the “processor” limitations of claim 1. Patent Owner does not dispute Petitioner’s contentions with respect to this limitation at this stage of the proceeding.

c) “transceiver” limitations

Claim 1 also recites “a transceiver operatively coupled to the processor and configured to: transmit the probing signal to at least the first client device and the second client device via a smart antenna; wherein the smart antenna is operatively coupled to the transceiver and comprises a first antenna element and a second antenna element.” Ex. 1001, 32:39–46 (the “transceiver” limitations of claim 1).

Petitioner concedes that Gerlach does not depict transmitters or receivers. Pet. 32. Petitioner contends, however, that Gerlach teaches transmitting both probing and information signals. *Id.* (referencing Ex. 1005, 2:44–49, 3:51–53, Fig. 3a.). Petitioner contends that “transmitting

elements 14 in Gerlach’s network-based apparatus therefore each must include a transmitter to effectuate the transmission of signals 18 to the remote devices.” *Id.* (referencing Ex. 1003 ¶ 126). Petitioner adds that Gerlach teaches receiving feedback signals, so, similarly, Gerlach’s system must include receivers. *Id.* (referencing Ex. 1003 ¶ 126).

Petitioner contends that Barratt teaches a transceiver. Pet. 33–34 (referencing Ex. 1006, 8:38–42, 8:60–67, Fig. 1). Petitioner contends that a person having ordinary skill in the art “would have found it obvious to use Barratt’s transceiver to implement Gerlach’s transmit and receive functions for the reasons” discussed above in connection with our analysis of the motivation to combine Gerlach and Barratt. *Id.* at 34.

Petitioner contends that Gerlach teaches an antenna array. Pet. 35 (referencing Ex. 1005, 1:6–9, 2:44–49, 4:14–17, Fig. 3b). Petitioner adds that Barratt also discloses an antenna array. *Id.* at 35–36 (referencing Ex. 1006, 2030–35). Petitioner concludes that “[t]he combination of Gerlach and Barratt teaches an antenna array having “*a first antenna element and a second antenna element.*” *Id.* at 36 (referencing Ex. 1003 ¶ 134).

Petitioner contends that Gerlach discloses a smart antenna as recited in the transceiver limitations of claim 1. Pet. 36–38 (referencing Ex. 1005, 1:48–51, 2:62–3:1, 3:14–17, 3:35–39, 3:43–63, 5:4–10, 6:27–35, Fig. 3b; Ex. 1003 ¶¶ 138–139); *see id.* at 37 (providing an annotated version of Ex. 1005, Fig. 3b, showing weights applied to outgoing signals to generate beam patterns directed to a receiver).

Petitioner also contends that Gerlach teaches transmitting the recited probing signal, corresponding to probing signal 17. Pet. 39 (referencing Ex. 1006, 5:27–30). Petitioner explains that “[p]robing weight matrix W is

provided by weight computer 40 to elements of Gerlach’s “*smart antenna*” . . . and applied to the probing signal,” and “[t]he resulting signal 18 is transmitted via the transmitting elements 14.” *Id.* at 39–40 (referencing Ex. 1003 ¶ 132).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that Gerlach, in combination with Barratt, teaches or suggests the “transceiver” limitations of claim 1. Patent Owner does not dispute Petitioner’s contentions with respect to this limitation at this stage of the proceeding.

d) “feedback information” limitations

Claim 1 also recites:

wherein one or more of the processor, the transceiver, or the smart antenna is further configured to:

receive a first feedback information from the first client device in response to the transmission of the probing signal;

receive a second feedback information from the second client device in response to the transmission of the probing signal;

determine where to place transmission peaks and transmission nulls within one or more spatially distributed patterns of electromagnetic signals based in part on the first and the second feedback information.

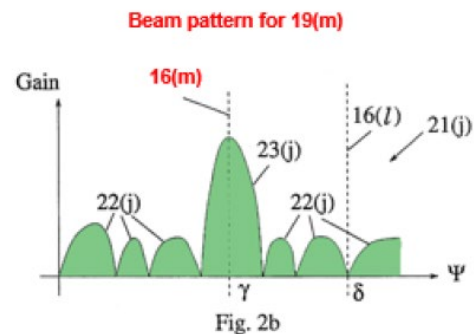
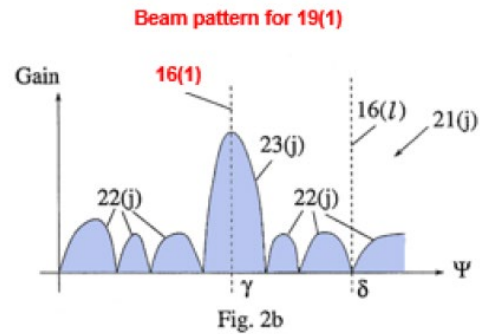
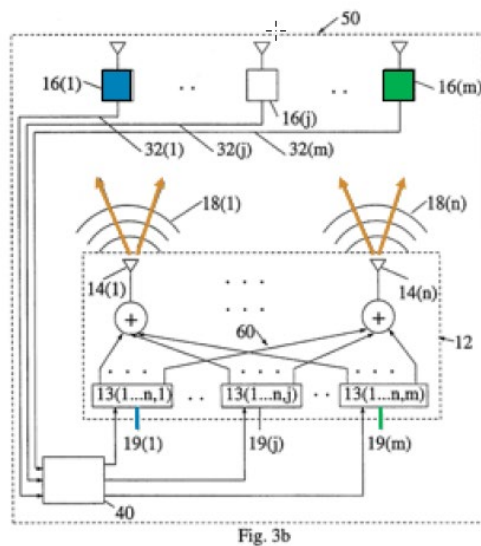
Ex. 1001, 32:47–58 (the “feedback information” limitations of claim 1).

Petitioner contends that Gerlach’s system receives first and second feedback information from the first and second client device, identifying feedback signals 32, and the information in those signals corresponds to the recited feedback information. Pet. 47 (referencing Ex. 1005, 5:4–8); *see also id.* at 47–48 (describing Gerlach’s feedback process and providing annotated

versions of Gerlach's Figure 3a, including identifying the first and second feedback signals (referencing (Ex. 1005, 5:27–30, Fig. 3a; Ex. 1003 ¶¶ 150–151), 49 (contending that a person having ordinary skill in the art “would have understood that the feedback signals are necessarily received by a receiver,” because Gerlach teaches that the feedback signals are conveyed to weight computer 40 for processing (referencing Ex. 1005, 3:45–47; Ex. 1003 ¶ 153), 49 (contending that Barratt teaches “receivers and the general process of receiving an uplink signal at the base station's antenna array” (referencing Ex. 1006, 6:63–67, 7:53–58).

Petitioner contends that “Gerlach ‘us[es] feedback signals 32 to adjust the amplitudes and phases 15 with which signals 19 are applied to transmitting elements 14 so that cross-talk is minimized.’” Pet. 54 (quoting Ex. 1005, 3:30–34). Petitioner explains that Gerlach's weight computer 40 determine the weight values to generate a complimentary null beam pattern, which includes transmission peaks and transmission nulls, with each beam pattern a spatially distributed pattern of electromagnetic signals, as recited in the claims. *Id.* (referencing Ex. 1005, 5:19–21; Ex. 1014, 33, 44; Ex. 1003 ¶ 159); *see id.* at 55 (providing an annotated version of Ex. 1005, Fig. 2b, showing a transmission peak and transmission null).

We reproduce Petitioner's annotated versions of Gerlach's Figures 2b and 3b, below.



Pet. 56. Figure 2b depicts “a schematic representation of a beampattern . . . with feedback, having primary lobe (23) and secondary lobes (22), as a function of angle ψ with respect to transmitter array (12).” Ex. 1005, 2:19–22. Figure 3b depicts “a schematic diagram of a wireless communication system (50) including feedback signals (32) and information signals (19).” *Id.* at 2:28–31. Petitioner annotates Figure 3b to have a blue-shaded transmitter 16(1) corresponding to signal “16(1)” and a green-shaded transmitter 16(m) corresponding to signal “16(m).” Petitioner annotates two versions of Figure 2b, one shaded blue corresponding to a beam pattern for information signal 19(1) and one shaded green corresponding to a beam pattern for information signal 19(m). The annotated figures are the same as those Petitioner provided in support of its contentions with respect to the processor limitations of claim 1. *See* Pet. 27.

Petitioner explains that

a null beam pattern is generated for a first information signal directed to a first receiver (e.g., signal 19(1) directed to receiver 16(1) shown in [annotated] Fig. 2b [above], top right) that has a primary lobe in the direction of the first receiver and nulls directed to other receivers. A separate null beam pattern is generated for a second information signal directed to a second receiver (e.g., signal 19(m) directed to receiver 16(m) shown in [annotated] Fig. 2b [above], bottom right) that has a primary lobe in the direction of the second receiver and nulls directed to all other receivers.

Pet. 55–56 (referencing Ding ¶ 163).

Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that Gerlach, in combination with Barratt, teaches or suggests the “feedback information” limitations of claim 1. Patent Owner does not dispute Petitioner’s contentions with respect to this limitation at this stage of the proceeding.

e) first and second data stream limitations

Claim 1 further recites:

transmit the first data stream to the first client device via the one or more spatially distributed patterns of electromagnetic signals; and

transmit the second data stream to the second client device via the one or more spatially distributed patterns of electromagnetic signals;

wherein transmission of the first data stream and transmission of at least part of the second data stream occur at the same time;

Ex. 1001, 32:59–67 (the “first and second data stream” limitations of claim 1). Petitioner contends that Gerlach teaches these limitations.

Pet. 57–61 (referencing Gerlach 1:6–9, 1:13–16, 2:47–50, 2:62–67, 3:1–3, 3:20–22, Figs. 1, 3b; Ex. 1003 ¶¶ 166–176, 184–185, 201)

Petitioner contends that Gerlach teaches “methods for multiplexing signals transmitted from an antenna array to multiple receivers.” Pet. 57 (quoting Ex. 1005, 1:6–7). Also, “[i]n a wireless communications system using spatial multiplexing techniques such as Gerlach, ‘a single transmitter **simultaneously** emits multiple information signals, each of which is intended for one of a number of spatially separated receivers.’” *Id.* (quoting Ex. 1005, 1:13–16). Petitioner adds that Gerlach’s feedback technique is part of an SDMA system. *Id.* (referencing Ex. 1003 ¶ 175); *see also* Ex. 1003 ¶¶ 48–49 (describing SDMA).

Petitioner explains that Gerlach expressly states that multiple information signals collectively excite transmitting elements 14(1) to 14(n), giving rise to signals 18 that are received at receivers 16(1) to 16(m). Pet. 57 (referencing Ex. 1005, 2:47–50). Petitioner adds that the purpose of Gerlach’s system is to minimize **cross-talk among the received signals**. *Id.* at 58 (quoting Ex. 1005, 1:8–9).

Dr. Ding testifies that, in SDMA, “[i]n transmit beamforming, the object is to simultaneously transmit several signals so that each signal is received only by its intended mobile.” Ex. 1003 ¶ 49 (referencing Ex. 1021, 1). Dr. Ding testifies that, in such a system, “[e]ach of these information signals sent by the base ‘is multiplied by its own vector which gives its complex amplitude weighting on the antenna elements.’ ‘The information signals are transmitted simultaneously, each according to its own complex weight vector.’” Ex. 1003 ¶ 52 (referencing Ex. 1021, 2). With respect to the teachings of Gerlach, and specifically the collective excitation of transmitting elements and the goal to minimize cross-talk, Dr. Ding testifies that Gerlach teaches that its information signals are

simultaneously transmitted, including a first data stream and a second data stream. *Id.* ¶¶ 175–176.

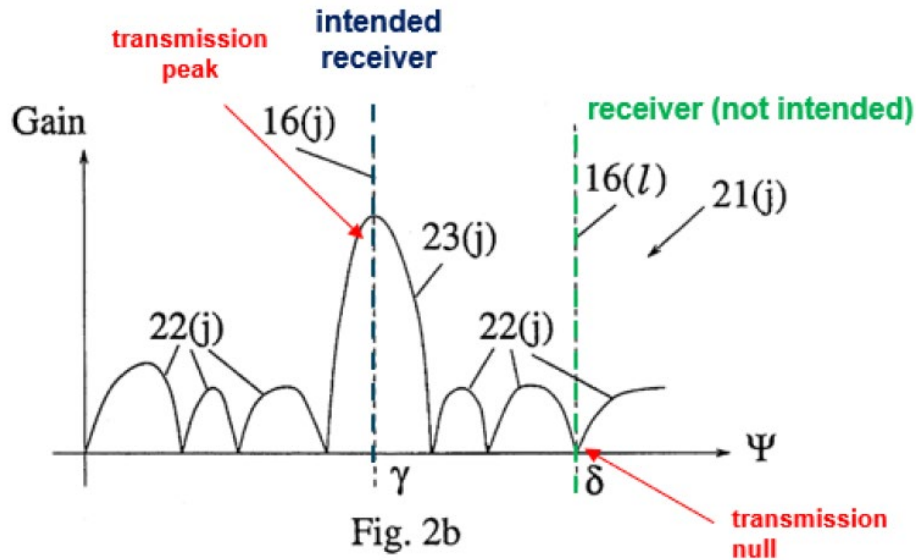
Upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient showing, at this stage of the proceeding, that Gerlach, in combination with Barratt, teaches or suggests the “first and second data streams” limitations of claim 1. Patent Owner does not dispute Petitioner’s contentions with respect to this limitation at this stage of the proceeding.⁸

f) “*patterns . . . configured to exhibit*” limitation

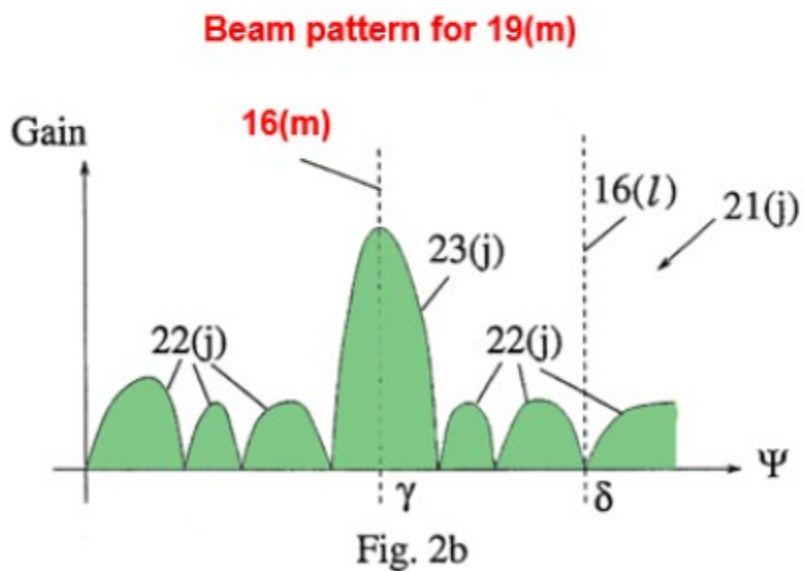
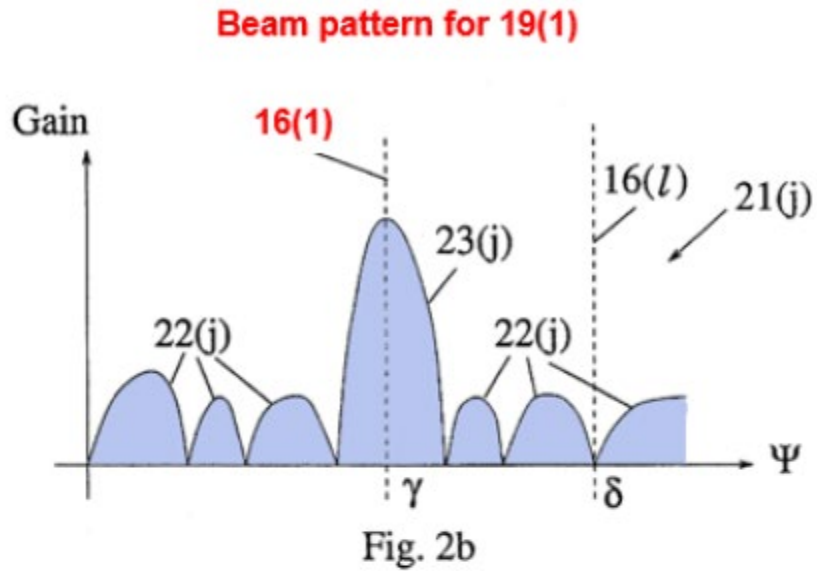
Finally, claim 1 recites “wherein the one or more spatially distributed patterns of electromagnetic signals are configured to exhibit a first transmission peak at a location of the first client device and a second transmission peak at a location of the second client device.” Ex. 1001, 33:1–5 (the “patterns” limitation of claim 1). Petitioner contends that, as explained in connection with its contentions concerning the “feedback information” limitations of claim 1, Gerlach teaches generating complimentary null beampatterns. Pet. 61 (referencing Ex. 1005, 5:36–39, Fig. 2b). Petitioner explains that “beampattern 21 for an information signal 19 *“exhibit[s] a first transmission peak at a location of the first client device” and “a transmission null” at all other receivers (i.e., “a location of a third device”).*” *Id.* (quoting Ex. 1003 ¶ 182).

⁸ Patent Owner disputes Petitioner’s contentions with respect to the “patterns” limitation of claim 1, which we turn to next. Some of Patent Owner’s arguments implicate Petitioner’s contentions with respect to the “first and second data streams” limitations of claim 1. We address these arguments in connection with our analysis of the “patterns” limitation of claim 1.

Petitioner provides an annotated version of Gerlach's Figure 2b, which we reproduce below.



Pet. 62. Figure 2b depicts “a schematic representation of a beampattern . . . with feedback, having primary lobe (23) and secondary lobes (22), as a function of angle ψ with respect to transmitter array (12).” Ex. 1005, 2:19–22. Petitioner contends that Gerlach teaches that each information signal 19 will have its own beampattern 21. *Id.* (referencing Ex. 1005, 3:20–22). Petitioner explains that each information signal 19 will have a beampattern 21 that resembles the pattern depicted in Figure 2b, with a peak (primary lobe) at the location of the intended receiver and a null at locations of non-intended receivers. *Id.* Petitioner illustrates this point by providing, once again, its annotated versions of Figure 2b from Gerlach, which we reproduce below.



Id. at 63. These two annotated versions of Figure 2b depict the beampatterns 21 for the “1” (blue) and “m” (green) information signals at the “1” and “m” receivers (the first and second clients). As seen in the annotated images, peaks are at the respective receivers and nulls are at a non-intended receiver location. *See id.*; *see also* Ex. 1003 ¶¶ 177–180 (testifying concerning the “patterns” limitation of claim 1).

Patent Owner argues that “the Petition fails to identify any beampattern 21 in Gerlach that exhibits peaks at the locations of both the first client device and the second client device.” Prelim. Resp. 11. Patent Owner argues that Petitioner admits that Gerlach discloses a first transmission peak at a first client device and nulls at other clients—not a second peak at a second client. *Id.* at 12. Patent Owner argues that, unlike the ’376 patent disclosure, “Gerlach’s Figure 2a . . . shows only a single transmission peak, placed over a single client.” *Id.* at 13.

Patent Owner argues that, to overcome this deficiency, “the Petition simply inserts a speculative guess that two or more ‘beampatterns exist when information signal 19(1) and 19(m) are transmitted simultaneously,’ and presents two copies of Figure 2b, highlighted in different colors, as a substitute for actual evidence supporting this theory.” Prelim. Resp. 14–15. Patent Owner criticizes Dr. Ding’s testimony as “reiterating the Petition’s conclusory argument in slightly different words.” *Id.* at 15 (referencing Ex. 1003 ¶ 179).

We have considered Patent Owner arguments and determine, on the current record, that they do not demonstrate a deficiency in Petitioner’s position. Petitioner plainly demonstrates that Gerlach teaches or suggests the subject matter of the “patterns” limitation of claim 1. As an initial matter, as Petitioner explains, and Patent Owner does not dispute, Gerlach describes spatial multiplexing⁹ techniques, where “a single transmitter

⁹ “Multiplex” is “[t]o interleave or simultaneously transmit two or more messages on a signal channel.” IEEE 100, “The Authoritative Dictionary of IEEE Standards Terms,” (7th ed., 2000), available at <https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4116787&tag=1> (last visited Oct. 5, 2022).

simultaneously emits multiple information signals, each of which is intended for one of a number of spatially separated receivers.” Ex. 1005, 1:13–17 (quoted at Pet. 7) (emphasis added). This system provides the backdrop for Gerlach’s disclosed technology. *See id.* at 1:48–56 (“The present invention is a method for using feedback signals (32) to optimize the directional properties of information signals (19) transmitted to multiple receivers (16) . . . [by] determin[ing] a weight matrix W for the distribution of information signals (19) among transmission elements (14) that minimizes cross-talk.”), 2:41–43 (“[A] method is disclosed for using feedback to minimize cross-talk among different transmitted signals.”), 2:53–58 (“Receivers 16 are located in distinct directions with respect to transmitting array 12, and their angular separation provides a way to multiplex information signals 19. This is a means by which information signals 19 are multiplexed in addition to other multiplexing techniques such as frequency, time, or code.”). That is, a person having ordinary skill in the art would have understood that implementing Gerlach’s system with system details taught by Barratt would result in a data communications networking apparatus that simultaneously sends data streams to at least a first and second client device. *See* Ex. 1003 ¶ 49; *see, e.g.*, Ex. 1021, 1 (“The aim of SDMA . . . [i]n transmit beamforming . . . is to simultaneously transmit several signals so that each signal is received only by its intended mobile.”); Ex. 1020, 4 (“The last stage in the development will be full *space divislon multiple access* (SDMA). This implies that more than one user can be allocated to the same physical communications channel simultaneously in the same cell, only separated by angle.”). Indeed, Gerlach’s goal is to minimize cross-talk between two

receivers, which means that two data streams are sent, intended for two different clients. *See* Ex. 1005, 2:40–43.

Patent Owner’s criticism that Gerlach’s Figure 2b shows only a single data stream and client is misplaced. Gerlach expressly discloses that multiple information streams are sent to multiple clients, and, as noted above, the system that employ Gerlach’s process sends information to multiple users *simultaneously*. *See* Ex. 1005, 2:40–42 (indicating that the disclosed method “minimize[s] cross-talk among different transmitting signals,” indicating that multiple information streams are transmitted and intended for multiple clients), 2:47–50 (“Information signals 19(1), 19(2) ... 19(m) excite transmitting *elements 14(1)-14(n) collectively*, giving rise to transmission *signals 18* which are detected by *receivers 16(1)-16(m)*, respectively” (emphasis added)), 2:53–58 (“Receivers 16 are located in distinct directions with respect to transmitting array 12, and their angular separation provides a way to *multiplex information signals 19*. This is a means by which information signals 19 are multiplexed in addition to other multiplexing techniques such as frequency, time, or code.”). As such, although Figure 2b shows the beampattern for one such data stream, we agree with Petitioner that Gerlach demonstrates that these beampatterns would apply to each information signal 19. *See, e.g., id.* at 3:20–22 (“Each information signal 19 will have its own beampattern 21 . . .”).

Also, even if Patent Owner’s literal reading of Gerlach is correct, we preliminarily find Petitioner’s showing to be sufficient. As Gerlach teaches, its method is meant to be employed in a multiplexed system with multiple information signals sent simultaneously to multiple receivers. Petitioner has shown sufficiently, based on the record at this early stage, that a person

having ordinary skill in the art would understand that Gerlach's Figures 2a and 2b reflect the behavior of each of the multiple information streams being transmitted. *See, e.g.,* Ex. 1003 ¶ 179 ("Multiple beampatterns, like that shown in Fig. 2b exist for the simultaneous communication of each information signal.").

To the extent that Patent Owner criticizes Petitioner's position as not identifying an obviousness theory, that is, not relying on a position that modifies Gerlach's teachings to arrive at the subject matter of the "patterns" limitation of claim 1, this criticism is misplaced. *See* Prelim. Resp. 15. We agree with Petitioner that Gerlach teaches or suggests this subject matter.

Patent Owner's criticism that Gerlach's disclosure is conceptual is also misplaced. *See* Prelim. Resp. 11. We determine, on the current record, that Gerlach's teachings are sufficient to demonstrate to a person having ordinary skill in the art that Gerlach teaches or suggests the subject matter of the "patterns" limitation. And as we have already discussed, we agree with Petitioner that a person having ordinary skill in the art would have had reason to look to Barratt for implementation details.

We also do not agree, on the current record, that Petitioner's position is "conclusory" or amounts to a "speculative guess." *See* Prelim. Resp. 14–15. As we discuss above, Petitioner's position with respect to the "patterns" limitation of claim 1 is supported by Gerlach's express teachings and what those teaching would suggest to a person having ordinary skill in the art. Petitioner's position with respect to the "patterns" limitation of claim 1 builds on its positions with respect to the other limitations of claim 1, including employing Gerlach's technique in a multiplexing system that simultaneously transmits multiple data streams to multiple clients. In

this way, Petitioner’s position with respect to the “patterns” limitation is consistent with its other positions with respect to Gerlach’s teachings.

Also, we credit Dr. Ding’s supporting testimony, which is un rebutted. Contrary to Patent Owner’s characterization, we determine, on the current record, that Dr. Ding’s testimony is not conclusory. Rather, it builds on consistent positions with respect to what Gerlach teaches and how those teachings would be understood by a person having ordinary skill in the art. *See, e.g.*, Ex. 1003 ¶¶ 33–55 (testifying about the relevant technology, including SDMA), 62–79 (testifying about Gerlach generally), ¶¶ 93–99 (testifying about why a person having ordinary skill in the art would have combined Gerlach and Barratt’s teachings), ¶¶ 100–180 (testifying about how the combined teachings of Gerlach and Barratt teach or suggest the limitations of the independent claims). We credit Dr. Ding’s testimony, in part, because it is consistent with evidence in the record, including Gerlach. *See, e.g.*, Ex. 1005 (Gerlach); Ex. 1020 (providing an overview of smart antenna technology); Ex. 1021 (discussing SDMA); Ex. 1023 (discussing, among many subjects directed to digital beamforming in wireless communications, multiple access). These exhibits, and other record evidence, along with Dr. Ding’s extensive experience, provide support for Dr. Ding’s opinions. *See, e.g.*, Ex. 1003 ¶ 20 (“All of the opinions contained in this declaration are based on the documents I reviewed and my knowledge and professional judgment.”), ¶¶ 5–17 (summarizing experience); Ex. 1004 (providing Dr. Ding’s Curriculum Vitae).

Accordingly, upon review of the information in the Petition and corresponding evidence, we determine Petitioner has made a sufficient

showing, at this stage of the proceeding, that Gerlach, in combination with Barratt, teaches or suggests the “patterns” limitation of claim 1.

g) Conclusion

For the reasons discussed above, we determine, on the current record, that the information presented in the Petition shows a reasonable likelihood that claim 1 is unpatentable under 35 U.S.C. § 103(a) over Gerlach and Barratt. Indeed we find, on the current record, that the evidence, if unrebutted in trial, demonstrates that “it is highly likely that the [P]etitioner would prevail with respect to at least one challenged claim.” *See OpenSky Industries, LLC v. VLSI Technology LLC*, IPR2021-01064, Paper 102 at 49–50 (PTAB Oct. 4, 2022).

3. Independent claims 12, 22, and 32

With the exception of the content of “feedback information” limitations recited in claims 22 and 32, and the “memory” limitations of claim 32, Petitioner combines its contentions with respect to independent claims 1, 12, 22, and 32. *See* Pet. 20; *see also*, § I.E., *supra* (providing these additional recitations). We have reviewed Petitioner’s contentions with respect to these additional limitations and determine, on the current record, that Petitioner demonstrates that the combined teachings of Gerlach and Barratt teach or suggest the subject matter. Patent Owner does not provide any arguments directed to these additional limitations, at this stage of the proceeding.

Accordingly, for the reasons presented above, including in our analysis of claim 1, we determine, on the current record, that the information presented in the Petition shows a reasonable likelihood that claims 12, 22, and 32 are unpatentable under 35 U.S.C. § 103(a) over Gerlach and Barratt.

4. *Dependent claims 2–9, 13–18, 23–31, 33, and 34*

Petitioner also contends that dependent claims 2–9, 13–18, 23–31, 33, and 34 are unpatentable as obvious over Gerlach and Barratt. Pet. 2, 64–74. As we discuss above, Petitioner has demonstrated a reasonable likelihood of success in proving that at least one claim of the '376 patent is unpatentable, and we institute on all challenges raised in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1354, 1359–60 (2018); *see also PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute to require “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”); Patent Trial and Appeal Board Consolidated Trial Practice Guide 64 (Nov. 2019) (“The Board will not institute on fewer than all claims or all challenges in a petition.”), *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated> (“CTPG”).

We have, however, reviewed Petitioner’s contentions and citations to the evidence and determine that Petitioner has made a sufficient showing, on the current record, that dependent claims 2–9, 13–18, 23–31, 33, and 34 are unpatentable under 35 U.S.C. § 103 over Gerlach and Barratt. Patent Owner does not make any arguments directed to these dependent claims, except for the arguments directed to the independent claims, which we address above in connection with our analysis of claim 1 under Ground 1. *See* Prelim. Resp. 15 (“This deficiency [with respect to claim 1, Ground 1] applies to all challenged claims under both asserted grounds.”).

E. Ground 2: Claims 10, 11, and 19–21 as unpatentable over Gerlach, Barratt, and Okamoto

Petitioner contends that the combined teachings of Gerlach, Barratt, and Okamoto render obvious the subject matter of claims 10, 11, and 19–21. Pet. 2, 74–82. We have reviewed Petitioner’s contentions and citations to the evidence and determine that Petitioner has made a sufficient showing, on the current record, that dependent claims 10, 11, and 19–21 are unpatentable under 35 U.S.C. § 103 over Gerlach, Barratt, and Okamoto. As part of this review, we determine, on the current record, that Petitioner has sufficiently demonstrated, at this stage of the proceeding, that a person having ordinary skill in the art would have had reason to combine Okamoto’s teachings of using IEEE 802.11 as part of Gerlach’s system, as modified in view of Barratt. *See* Pet. 74–82.

Patent Owner does not dispute Petitioner’s contentions at this stage of the proceeding with respect to Ground 2.

III. DISCRETIONARY DENIAL

Patent Owner requests that we exercise our discretion to not institute trial, under 35 U.S.C. § 314(a) or 35 U.S.C. § 325(d). Prelim. Resp. 15–39. We take each of these requests in turn.

A. Discretionary Denial under 35 U.S.C. § 314(a)

Institution of an *inter partes* review is discretionary. *See* 35 U.S.C. § 314(a) (authorizing institution of an *inter partes* review under particular circumstances, but not requiring institution under any circumstances); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) (“[T]he agency’s decision to deny a petition is a matter committed to the Patent

Office’s discretion.”); *SAS Inst. Inc.*, 138 S. Ct. at 1356 (“[Section] 314(a) invests the Director with discretion on the question whether to institute review” (emphasis omitted)); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016) (“[T]he PTO is permitted, but never compelled, to institute an IPR proceeding.”).

Relying on the framework from *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”), Patent Owner argues we should deny the Petition based on the district court proceedings. Prelim. Resp. 26–39. We disagree.

“[W]here the PTAB determines that the information presented at the institution stage presents a compelling unpatentability challenge, that determination alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*.” Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (“Interim Guidance”),¹⁰ 4–5. “Compelling, meritorious challenges are those in which the evidence, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence.” *Id.* at 4.

Petitioner asserts that the merits of the Petition are strong. Pet. 85–86. Patent Owner argues that the merits favor discretionary denial. Prelim. Resp. 36–38. At this stage of the proceeding, on the current record, we agree with Petitioner’s assessment. As discussed above in connection with our analysis of Ground 1, we preliminarily determine that Petitioner

¹⁰ Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

provides a compelling challenge to at least one Challenged Claim. On the current record, Patent Owner addresses only one aspect of Petitioner’s unpatentability contentions. As we discuss above in connection with our analysis of Ground 1, we determine that Patent Owner’s arguments do not identify any deficiency in Petitioner’s position. Also, based on the information in the Petition, the evidence of record, including Dr. Ding’s un rebutted testimony, which we credit, we preliminarily find that if this evidence is un rebutted in trial, “it is highly likely that the [P]etitioner would prevail with respect to at least one challenged claim.” *See OpenSky Industries, LLC*, IPR2021-01064, Paper 102 at 49–50; § II.D.2, *supra*.

Specifically, on the limited record before us, we find persuasive Petitioner’s position that a person having ordinary skill in the art would have understood from the combined teachings of Gerlach and Barratt results in a system where one or more spatially distributed patterns of electromagnetic signals are configured to exhibit a first transmission peak at a location of a first client device and a second transmission peak at a location of a second client device, and the transmission of a first data stream to the first client and transmission of at least part of a second data stream to a second client occur at the same time. *See* Pet. 61–63; *see also* § II.D.2.f, *supra* (providing our analysis of the “patterns” limitation of claim 1 and addressing Patent Owner’s arguments). As we explain in greater detail above, we credit Dr. Ding’s testimony that Gerlach’s teachings transmitting multiple different data streams simultaneously to different clients, and that, applying Gerlach’s technique would results at two data streams with separate peaks at two clients, and nulls at unintended receivers. *See* Ex. 1003 ¶¶ 174–180; *see also* § II.D.2.e–f, *supra* (providing our analysis of the “first and second data

stream” limitations of claim 1 and the “patterns” limitation of claim 1). We credit this testimony at least for the reasons that it is supported by teachings in Gerlach and other evidence of record, as well as supported by Dr. Ding’s experience.

Because Petitioner presents compelling evidence of unpatentability at this stage, we decline to exercise our discretion under § 314(a) to deny the Petition.

B. Discretionary Denial under 35 U.S.C. § 325(d)

Patent Owner asserts that we should deny the Petition under 35 U.S.C. § 325(d). Prelim. Resp. 15–25. We have discretion to deny review when “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). In that respect, § 325(d) provides that the Director may elect not to institute a proceeding if the challenge to the patent is based on matters previously presented to the Office.¹¹ *Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6 at 7 (PTAB Feb. 13, 2020) (precedential) (“*Advanced Bionics*”).

In evaluating matters under § 325(d), the Board uses the following two-part framework: (1) determining 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 the first part of the framework is satisfied, determining whether the petitioner has demonstrated that the Office erred in

¹¹ The Board institutes trial on behalf of the Director. 37 C.F.R. § 42.4(a); *Advanced Bionics*, Paper 6 at 7 n.7.

a manner material to the patentability of challenged claims. *Advanced Bionics* at 8.

In applying the two-part framework, we consider several nonexclusive factors, including:

- (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. *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) (“*Becton, Dickinson*”).

Factors (a), (b), and (d) of the *Becton, Dickinson* factors relate to whether the art or arguments presented in the Petition are the same or substantially the same as those previously presented to the Office. *Advanced Bionics* at 10. Factors (c), (e), and (f) “relate to whether the petitioner has demonstrated a material error by the Office” in its prior consideration of that art or arguments. *Id.* Only if the same or substantially the same art or

arguments were previously presented to the Office do we then consider whether petitioner has demonstrated a material error by the Office. *Id.* “[T]his framework reflects a commitment to defer to previous Office evaluations of the evidence of record unless material error is shown.” *Id.* at 9.

1. *Part One of the § 325(d) Analysis*

We first consider whether Petitioner asserts the same or substantially the same art or arguments that previously were presented to the Office. *Advanced Bionics*, Paper 6 at 8.

With respect to the similarities and material differences between the asserted art and the prior art involved during examination, Patent Owner argues that Gerlach and Barratt were identified on Information Disclosure Statements (IDSs) during the prosecution of the application that matured into the ’376 patent. Prelim. Resp. 18–20, 21–22. Patent Owner argues that “Petitioner[] do[es] not dispute that *Becton* factors (a), (b), and (d) are satisfied and so *Advanced Bionics* step one is met.” *Id.* at 22. Patent Owner argues that, “[u]nder *Advanced Bionics*, a reference need not be substantively discussed by the Examiner or form the basis of a rejection for it be considered.” *Id.* Patent Owner adds that “[i]ndeed, the test looks at whether the references were previously ‘presented’ to the PTO—not whether they were expressly discussed and distinguished.” *Id.* at 22–23.

Petitioner acknowledges that Gerlach and Barratt were identified in an IDS¹². Pet. 82–83. Petitioner explains that “Gerlach was listed as one of 155 references.” *Id.* at 83 (referencing Ex. 1002, 282–289, 1040). Petitioner adds that “[t]he Examiner signed off on the cited references, but stressed that ‘it is impractical for the examiner to review the references thoroughly with the number of references cited in this case. . . . [T]he examiner is merely acknowledging the submission and ‘consideration’ of the cited references.” *Id.* (referencing Ex. 1002, 934–935). Petitioner argues that “the Examiner never acknowledges actually considering Gerlach’s disclosure.” *Id.*

We appreciate Petitioner’s position that Gerlach was not previously presented to the Office within the *spirit* of *Advanced Bionics* and § 325(d), as the Examiner expressly stated during prosecution that “it is impractical for the examiner to review the references thoroughly with the number of references cited in this case.” Ex. 1002, 934. Indeed, the Examiner admonished the applicant by reminding the applicant of its duty of disclosure. *See id.* at 935 (stating that “an applicant’s duty of disclosure . . . is not satisfied by presenting a patent examiner with ‘a mountain of largely irrelevant [material] from which the examiner is presumed to have been able, with his experience and with adequate time, to have found the critical [material]. It ignores the real world conditions under which examiners

¹² The parties do not dispute that Okamoto was not previously before the Office. Pet. 82; Prelim. Resp. 22. Petitioner, however, relies on Okamoto for the limited teachings directed to integrating the SDMA technique with the IEEE 802.11 wireless standard, which implicates only five dependent claims of the thirty-four claims challenged in the Petition. *See* Pet. 2, 74–82. As such, although indisputably not presented to the Office, Okamoto implicates only a small subset of claims.

work.” (quoting *Rohm & Haas Co. v. Crystal Chemical Co.*, 722 F.2d 1556, 1573 (Fed. Cir. 1983)).

Because we determine, however, that the second part of the *Advanced Bionics* framework weighs against exercising our discretion to deny the Petitioner under § 325(d), we need not determine if the first part of the *Advanced Bionics* framework is satisfied on the specific facts of this case.

2. Part Two of the § 325(d) Analysis

We turn to whether Petitioner has demonstrated that the Office erred in a manner material to the patentability of at least one Challenged Claim. In analyzing this part of the *Advanced Bionics* framework, we look to factors (c), (e), and (f) of the *Becton, Dickinson* factors.

With respect to the extent to which the asserted art was evaluated during examination (factor (c)), including whether the prior art was the basis for rejection, we find that Gerlach was not the basis for a rejection, and there is no evidence in the record that the Examiner considered Gerlach in any meaningful way. *See* Ex. 1002, 934. And, as evident from our analysis of Petitioner’s unpatentability position under Ground 1, Gerlach is plainly material to patentability. *See* § II.D.2, *supra*.

With respect to whether Petitioner pointed out sufficiently how the examiner erred (factor (e)), Petitioner argues that the limitations that the Examiner identified as supporting patentability of the claims are limitations on which Petitioner relies on Gerlach. Pet. 83–84. Petitioner argues that, “to the extent the Examiner substantively reviewed Gerlach, the Examiner erred in overlooking this disclosure” in Gerlach. *Id.* at 84. Petitioner adds that Gerlach is presented as a combination with Barratt and Okamoto, and the Examiner never identified combinations with these references. *Id.*

Patent Owner responds that both Guo¹³, the reference expressly analyzed by the Examiner, and Gerlach both suffer from the same deficiency—both references do not disclose placing a second transmission peak for a second client.

We are not persuaded by Patent Owner’s contention. First, as we discuss above in connection with our analysis of Ground 1, we find, on the current record, that Gerlach discloses forming a second transmission peak for a second client. *See* § II.D.2.f, *supra*. Second, we do not agree that the record clearly reflects that the Examiner based the patentability decision on the lack of a second transmission peak in Guo. For example, the applicant argued that Guo does not disclose transmission nulls. *See* Ex. 1002, 269 (reproduced at Prelim. Resp. 17). This argument seems consistent with Guo’s teachings, which disclose a feedback process that adjusts the location of beams 20u, 20m, and 20l, based on feedback from mobile unit 12, which identifies the beam that provides the best quality signal. *See* Ex. 2002 ¶¶ 93–103. We do not discern any disclosure of how Guo positions transmission nulls, consistent with the applicant’s argument. As such, we do not find the record indicates that the Examiner distinguished the claims over Guo because Guo fails to teach a second transmission peak.

With respect to whether additional evidence and facts presented in the Petition warrant reconsideration of Gerlach (factor (f)), Petitioner argues that the Petitioner includes “detailed expert evidence which shows how the references disclose every limitation of the challenged claims, as well as the reasons that a [person having ordinary skill in the art] would pursue such a

¹³ US 2004/0014429 A1, published January 22, 2004 (Ex. 2002, “Guo”).

combination.” Pet. 84. Patent Owner responds that “Petitioner[’s] alleged ‘evidence’ from an expert are unpersuasive because they are conclusory and largely parrot the Petition.” Prelim. Resp. 25.

As we discuss above in our analysis of Ground 1, we credit Dr. Ding’s testimony, such that it does provide additional evidence that was not available to the Examiner. For example, Dr. Ding’s testimony includes opinions as to how Gerlach teaches sending peaks to multiple clients, and why a person having ordinary skill in the art would have had reason to implement Gerlach’s process using Barratt’s system.

For the reasons discussed above, we find that, to the extent that Gerlach was actually presented to the Office, the Petition demonstrates that the Office erred in not issuing an obviousness rejection over Gerlach and Barratt.

3. *Conclusion*

Based on the foregoing analysis, the factors weigh against our exercising discretion to deny the Petition under § 325(d).

IV. CONCLUSION

Based on the information presented, we determine Petitioner has established a reasonable likelihood that it would prevail with respect to at least one of the Challenged Claims. Accordingly, we institute an *inter partes* review on all challenges.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review is instituted as to claims 1–34 of U.S. Patent No. 10,594,376 B2; 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, which commences on the entry date of this Order.

IPR2022-00613
Patent 10,594,376 B2

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