

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LG ELECTRONICS INC.,
Petitioner,

v.

PANTECH CORPORATION,
Patent Owner

Case: IPR2023-01273

U.S. Patent No. 9,136,924

PATENT OWNER PRELIMINARY RESPONSE

Mail Stop **Patent Board**
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. BACKGROUND	3
A. Brief Technology Background	3
B. Overview of the '924 Patent Invention	4
C. Relevant '924 Patent Prosecution History	10
D. Summary of Petitioner's Proposed Grounds of Unpatentability and the References Cited.....	17
E. The Cited References	18
1. Overview of Sayana (Ex. 1005).....	18
2. Overview of Lee-689 (Ex. 1007).....	21
3. Overview of TS 36.213 and TS 36.211 (Exs. 1008 and 1009)	26
4. Overview of Koivisto (Ex. 1010).....	29
III. CLAIM CONSTRUCTION	31
IV. LEGAL STANDARDS FOR OBVIOUSNESS.....	32
V. DISCRETIONARY FACTORS FAVOR DENIAL OF INSTITUTION	34
A. 35 U.S.C § 325(d) Weighs in Favor of Denying Institution	35
1. The Same Or Substantially The Same Art/Arguments Were Previously Presented To The Office	36
2. Petitioner Fails To Demonstrate A Material Error By The Office.....	43
B. Application of Fintiv Factors Weighs in Favor of Denying Institution.....	44
1. The Court Has Not Stayed The Underlying Litigation Nor Has a Motion to Stay Been Filed.....	45

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

2.	The Trial Date in the District Court Action Precedes the Projected Final Written Decision Date	47
3.	The Parties Have Invested Substantial Efforts in Litigating the Grounds Presented in this Petition in the District Court Action.....	48
4.	Petitioner Fails To Offer A Sotera Stipulation And There Is Significant Overlap Between Issues Raised In The Petition And In The District Court Litigation.....	49
5.	LGE is Both Petitioner and Defendant	50
6.	Other Circumstances Also Weigh in Favor of Discretionary Denial	50
VI.	THE PETITION DOES NOT SHOW A REASONABLE likelihood OF PREVAILING WITH RESPECT TO ANY CHALLENGED CLAIM.....	52
A.	Ground 1: Petitioner Fails To Establish That Claims 17-19, 22-24, and 28 are Rendered Obvious By Sayana in view of Lee-689	52
1.	Sayana and Lee-689 does not disclose or suggest “receiving codebook restricting information including at least one of a first bit sequence to restrict at least one precoding matrix from a first precoding matrix group and a second bit sequence to restrict at least one precoding matrix from a second precoding matrix group”	53
2.	Sayana does not disclose or suggest “wherein a period of transmitting the information relating to the precoding matrix of the first precoder and a period of transmitting the information relating to the precoding matrix of the second precoder are different from each other.”	61
3.	Petitioner fails to establish that Claims 18-19, 22, 24, and 28 are Not Patentable	63
B.	Grounds 2 and 3: Petitioner Failed To Establish That Claims 17-19, 22-24, and 28 are Rendered Obvious By Sayana and TS 36.213 and/or TS 36.211	64

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

1.	Sayana and TS 36.213 and/or TS 36.211 does not disclose or suggest “receiving codebook restricting information including at least one of a first bit sequence to restrict at least one precoding matrix from a first precoding matrix group and a second bit sequence to restrict at least one precoding matrix from a second precoding matrix group”	64
2.	Sayana and TS 36.213 and/or TS 36.211 does not disclose or suggest “wherein a period of transmitting the information relating to the precoding matrix of the first precoder and a period of transmitting the information relating to the precoding matrix of the second precoder are different from each other.”	66
3.	Petitioner fails to establish that Claims 18-19, 22, 24, and 28 are Not Patentable	67
C.	Grounds 4-6: Petitioner Failed To Establish That Claims 20-21, 26-27 are Rendered Obvious By Grounds 1-3 in further view of Koivisto	67
VII.	CONCLUSION.....	68

TABLE OF AUTHORITIES

	Page(s)
Cases	
<i>Advanced Bionics</i> , IPR2019-01469, Paper 6 (PTAB Feb. 3, 2020).....	34, 36, 44
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<i>Apple Inc. v. Fintiv, Inc.</i> , IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020)	34
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<i>Cuozzo Speed Techs., LLC v. Lee</i> , 136 S. Ct. 2131 (2016).....	44
<i>Gen. Plastic Indus. Co., Ltd. v. Canon Kabushiki Kaisha</i> , IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017).....	34
<i>In re Gorman</i> , 983 F.2d 982 (Fed. Cir. 1991)	61
<i>Graham v. John Deere Co.</i> , 383 US 1 (1966).....	32
<i>Harmonic Inc. v. Avid Tech.</i> , 815 F.3d 1356 (Fed. Cir. 2016)	44
<i>Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.</i> , 821 F.3d 1359 (Fed. Cir. 2016)	33
<i>InTouch Techs., Inc. v. VGo Commc’ns, Inc.</i> , 751 F.3d 1327 (Fed. Cir. 2014)	33
<i>Ironsource Ltd. v. Digital Turbine Inc.</i> , PGR2021- 00096, Paper 14 (PTAB Jan. 6, 2022).....	37

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner’s Preliminary Response

<i>Kirsch Research and Development LLC v. DuPont de Nemours, Inc.</i> , Dkt. 269, No. 5-20-cv-00057-RWS (E.D. Tex. July 7, 2021).....	46
<i>KSR Int’l Co. v. Teleflex Inc.</i> , 550 US 398 (2007).....	32
<i>Maxell Ltd. v. Apple Inc.</i> , No. 5:19-CV-00036-RWS, 2020 U.S. Dist. LEXIS 257531 (E.D. Tex. April 27, 2020)	46
<i>Medichem, S.A. v. Rolabo, S.L.</i> , 437 F.3d 1157 (Fed. Cir. 2006)	33
<i>Nokia of America Corp. v. Alexander Soto and Walter Soto</i> , IPR2023-00681, Paper 10 (PTAB Nov. 3, 2023).....	41
<i>Sand Revolution II, LLC v. Continental Intermodal Group-Trucking LLC</i> , IPR 2019-01393, Paper 24 (PTAB June 16, 2020)	46
Statutes	
35 U.S.C. § 103(a)	32

PATENT OWNER'S EXHIBIT LIST

Exhibit No.	Description
2001	January 13, 2023 Declaration of Jamie B. Beaber (Confidential)
2002	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 1 (Complaint).
2003	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 15 (LGE SEALED Motion to Disqualify) (Confidential).
2004	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 93 (Magistrate Order Regarding LGE's Motion for Disqualification) (Confidential).
2005	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 160 (Order Regarding LGE's Motion for Disqualification) (Confidential).
2006	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 102 (SEALED Defendants' Rule 72 Objections to the Order Regarding Disqualification) (Confidential).
2007	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 103 (SEALED Pantech Objections to Order Denying DQ) (Confidential).
2008	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 111 (SEALED Pantech Response to LGE Objections to Order Denying Disqualification) (Confidential).
2009	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 113 (SEALED LGE's Opposition to Plaintiffs' Rule 72 Objections) (Confidential).

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

2010	(Reserved)
2011	November 18, 2019 Declaration of Juseong Ryu (Confidential)
2012	ABA Formal Opinion #05-436
2013	3GPP TS 36.321
2014	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 45 (Pantech’s Response to LGE’s Motion to Disqualify) (Confidential).
2015	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 54 (SEALED Reply ISO Motion to Disqualify) (Confidential).
2016	<i>Pantech Corp. v. LG Electronics Inc.</i> , Case No. 5:22-cv-00113 (E.D. Tex.), Dkt. 60 (SEALED Sur-reply ISO Response to Motion to Disqualify Mayer Brown) (Confidential).
2017	U.S. Pat. Pub. 2011/0249713 A1 (“Hammarwall”)
2018	Claim Construction Order from <i>Pantech Corp. v. LG Electronics Inc.</i> , No. 5:22-cv-00113-RWS, Dkt. 215 (E.D. Tex. Oct. 23, 2023)
2019	Scheduling Order from <i>Pantech Corp. v. LG Electronics, Inc.</i> , No. 5:22-cv-00113-RWS, Dkt. 240 (E.D. Tex., Jan. 22, 2024)
2020	Order Denying Motion to Stay from <i>Pantech Corp. v. LG Electronics Inc.</i> , No. 5:22-cv-00113-RWS, Dkt. 131 at 1 (E.D. Tex., July 19, 2023)
2021	Invalidity Contentions from <i>Pantech Corp. v. LG Electronics Inc.</i> , No. 5:22-cv-00113-RWS (E.D. Tex. April 13, 2023)

I. INTRODUCTION

Patent Owner Pantech Corporation (“Patent Owner”) respectfully requests that the United States Patent and Trademark Office (“USPTO” or the “Office”) Patent Trial and Appeal Board (“PTAB” or the “Board”) deny institution of review of claims 17-24 and 26-28 (the “challenged claims”) of U.S. Patent No. 9,136,924 (“the ’924 Patent”). Petitioner LG Electronics, Inc. (hereinafter “Petitioner” or “LGE”) failed to demonstrate that its Petition would be efficient or effective in view of prior arguments that have been considered by the Office and that will be shortly considered in a parallel district court proceeding, or that it has a reasonable likelihood of prevailing with respect to at least one challenged claim.

First, there are strong grounds for discretionary denial, both under 35 U.S.C. § 325(d) and 35 U.S.C. § 314(a). Regarding Section 325(d), the only primary reference cited by Petitioner, Sayana, was already considered by the Office, together with a small set of other substantially similar references that largely mirror the teachings of the secondary references relied upon by Petitioner. Furthermore, another reference the Examiner considered, Hammarwall, provides the same teachings as the secondary references now cited by Petitioner, and even cites on its face and within its disclosures one of those secondary references (TS 36.213) relied upon by Petitioner. In short, the merits of what Petitioner requests the Board to

consider were already closely considered by the Office, and the claims of the '924 Patent were determined to be patentable. The Board should defer to the Office's prior evaluation and deny review under § 325(d).

Regarding 35 U.S.C. § 314(a), trial in the parallel district court proceeding is scheduled for September 2024, before even a reply would be due from Petitioner (late October 2024). Further, expert discovery—covering the same combinations of references asserted by this Petition—will conclude prior to any institution decision. Petitioner has not offered any *Sotera*-type stipulation to alleviate concerns of duplicative litigation, nor is a stay likely in the district court. Accordingly, institution would not be in furtherance of an efficient alternative to district court litigation, as is the goal of *inter partes* review, but in these circumstances would merely duplicate the disputes between the parties.

Finally, the merits of the Petition are weak. For example, each Ground suffers from the demonstrable flaw that Sayana (on its own or in combination with Lee-689), does not disclose or suggest receiving a first and second bit sequence to restrict precoding matrices. As explained below, Sayana's "two-component" feedback system discloses a single precoder structure having a first and second "representation," such as an index, that together conveys a precoder matrix of one or more vectors. But the '924 Patent claims require that the device receive both a

first and second bit sequence, thus enabling the possibility that a codebook may be restricted independently with respect to each precoding matrix. None of the secondary references relied upon by Petitioner can cure this deficiency by providing both a first and second bit sequence, or are even alleged to be able to do so. Ultimately, the conclusory statements throughout the Petition, including those made by the supporting expert declaration, cannot substitute for the persuasive detail, evidentiary citations, and analysis necessary to support a showing of obviousness pursuant to 37 C.F.R. § 42.104. The references cited by Petitioner are simply insufficient to support Petitioner's burden, a problem exacerbated by the mere conclusions without support from its expert, and for this reason too the Petition should be denied.

Accordingly, for at least these reasons, the Board should deny Petitioner's request to institute *inter partes* review.

II. BACKGROUND

A. Brief Technology Background

The '924 Patent relates to the field of wireless communications that use multiple input multiple output (MIMO), including communication systems like 3GPP, LTE 3GPP, LTE (Long Term Evolution), LTE-A (LTE Advanced), and the like. Ex. 1001, at 1:18-22, 1:27-32. As the '924 Patent explains, in these high

capacity communication systems, there is a need to transmit “high capacity, which is comparable with a wired communication network,” but also “minimize loss of information and increase transmission efficiency of the system as to enhance performance of the system.” *Id.* at 1:27-37. The ’924 Patent invention was focused on this need and providing for more effective MIMO wireless communication systems at the time of its priority date.

B. Overview of the ’924 Patent Invention

The ’924 Patent is entitled “Transmitting device and a method of communicating therewith, and receiving device and a method of communicating therewith.” See Ex. 1001. The ’924 Patent was filed on July 1, 2011, by inventor Kyoungmin Park for Pantech Co., Ltd. The ’924 Patent is a national stage entry of PCT/KR2011/004835, which claims priority to Korean Application 10-2010-0064573 filed on July 5, 2010. *Id.* The ’924 Patent granted on September 15, 2015, and is currently assigned to Pantech Inc. *Id.*

As explained by the ’924 Patent, an effective MIMO wireless communication system needs to provide, to a transmitting device, information associated with a propagation channel or information associated with a precoder or a precoding matrix appropriate for a propagation channel, to increase transmission capacity. *Id.* at 3:57-62. In this example, the former requires a large amount of feedback overhead,

whereas the latter requires a relatively small amount of feedback overhead. *Id.* at 3:62-65. The '924 Patent addresses this need by disclosing systems and methods for communications that performs precoding using a codebook restriction scheme using precoding matrixes, codebook restricting information, and precoders, such that it includes information to restrict a precoding matrix from being used as a precoding matrix of the precoders, in a corresponding codebook with respect to each layer. *Id.*, 1:41-49.

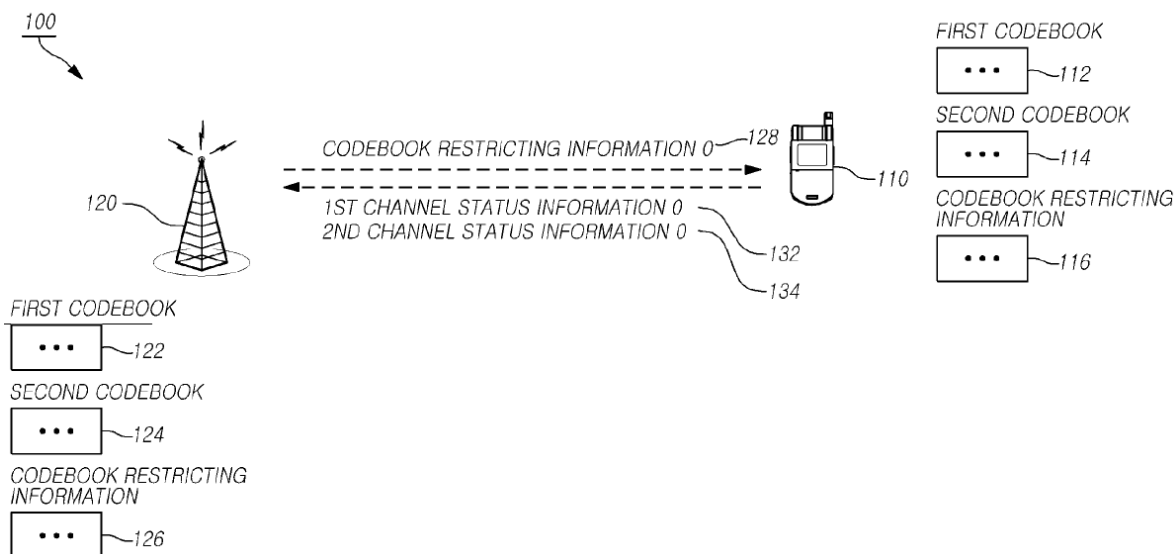
For example, to accomplish this system, the '924 Patent discloses an embodiment where each user equipment (UE) and base station stores a codebook that defines N available precoding matrices, and expresses an index or an indicator indicating an index corresponding to each precoding matrix. *Id.* at 3:66-4:3. Each UE selects a precoding matrix appropriate for a propagation channel and transmits information on the selected precoding matrix to the base station. *Id.* at 4:3-9. The base station receives the precoding matrix indices from each UE, and selects a MIMO mode or a UE or performs precoding based on the received precoding matrix indices. *Id.* As the codebook increases in size, there is an increasing need to perform codebook restriction. *See id.* at 4:10-19. One embodiment discloses a codebook restriction scheme that generates a codebook including various precoding matrices, selects a precoding matrix to be used/not used in the codebook for each

cell or each user equipment, and uses different codebooks for each cell or each user equipment based on codebook restricting information associated with a precoding matrix to be not used. *Id.* at 4:20-33

Notably, the inventors recognized that an advantageous manner to indicate whether a precoding matrix is to be used is the use of a bitmap format that designates whether each precoding matrix is to be used using bit information. *Id.* at 4:55-60. For example, a corresponding order of an available precoding matrix may be expressed to be a 1 value bit in a bitmap, and a corresponding order of an unavailable precoding matrix may be expressed to be 0, as shown in [001010010 . . . 010] for example. *Id.* at 4:60-64. In this example, the UE may report to the base station, as channel status information, the precoding matrices of a codebook restriction that restricts the use of precoding matrices. *See id.* at 4:65-5:9. Notably, this schemes also supports two precoders for when the base station uses a multistage precoder including at least two precoders, where the codebook restriction that restricts a precoding matrix is used for each precoder. *Id.* at 20-27. Thus, the disclosed codebook restriction scheme reduces feedback overhead of the channel status information and also prevent inter-cell interference in advance. *Id.* at 5:7-19.

Figure 2 of the '924 Patent illustrates an embodiment of the disclosed wireless communication system where a base station and a UE exchange codebook restricting information and channel status information in a case of codebook restriction.

FIG.2



Id. at 5:40-43; FIG. 2.

The base station includes a multistage precoder. This includes a first and second precoder. The multistage precoder stores a first codebook that expresses N first precoding matrices to be used for the first precoder and first indices indexing the first precoding matrices and a second codebook that expresses M second precoding matrices to be used for the second precoder and second indices indexing the second precoding matrices. *Id.* at 5:53-60. The base station stores a restriction book including ranks and an index corresponding to each pair of a first index and a

second index with respect to each rank, and determines a precoding matrix to be used/not used for each cell or for each UE, and may transmit, to the UE, codebook restricting information associated with the precoding matrix to not be used. *Id.* at 5:60-6:1. In this example, the codebook restricting information includes first information that restricts a precoding matrix from being used as a first precoding matrix and second information that restricts a precoding matrix from being used as a second precoding matrix in the first and second codebooks with respect to each layer. *Id.* at 6:1-7.

Notably, this codebook restriction scheme using two precoders that may operate in a manner where codebook restriction information may be independently determined, transmitted, selected, and reported. *See id.* at 11:17-24; 13:23-64; 14:50-63. As such, a codebook may be restricted independently with respect to each precoding matrix, for each rank and for each of the first precoder and the second precoder. *Id.* at 11:19-23. For example, the first information and the second information included in the codebook restricting information may be independently transmitted for each rank from the base station to the UE. *Id.* at 13:23-27. Accordingly, when restriction on a first index and a second index is independently determined and transmitted, an amount of feedback overhead of the codebook restriction may be significantly reduced. *Id.* at 13:32-35. In this manner, a scheme

that restricts both the first precoding matrix and the second precoding matrix, independently, a scheme that restricts only the first precoding matrix, and a scheme that restricts only the second precoding matrix may be selectively used. *Id.* at 13:60-64.

When the base station transmits to the UE independently, the UE may separately determine a first precoding matrix and a second precoding matrix and report 1st channel status information and 2nd channel status information. *Id.* at 14:50-61. Thus, given this independence, a feedback period or interval of the 1st channel status information and the 2nd channel status information may be different from each other. *Id.* at 14:62-63. For example, the 1st channel status information may be reported back to the base station based on a short term, and the 2nd channel status information may be reported back to the base station based on a long term; whereas a long period/long term and a short period/short term are relative terms, and the long period/long term indicates a period that is longer than the short period/short term. *Id.* at 14:3-15:3. The specification explains other embodiments where the base station and UE similarly perform independent codebook restriction. *See, e.g. id.* at 15:28-36, Fig. 6; 16:23-31, Fig. 7. Finally, the '924 Patent specifically discloses the various types of reference signals for downlink or uplink transmission that may be used with this codebook restriction scheme. *Id.* at 6:37-54.

C. Relevant '924 Patent Prosecution History

During prosecution of the application that led to the '924 Patent, the Examiner issued an office action on June 2, 2014, rejecting all independent claims and various dependent claims under 35 U.S.C. § 103(a), citing U.S. Pat. Pub. 2011/0249713 A1 (“Hammarwall”) (attached as Ex. 2017) alone and/or in view of U.S. Pat. Pub. No. 2011/0305263 A1 (“Jongren”). *See* Ex. 1002 ('924 Patent File History) at 421, 427.

3. Claims 1-4, 10-13, 18-20, 25-27 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hammarwall et al. (US 2011/0249713 A1) (Hammarwall herein after).

Id. at 421.

4. Claims 5, 7, 14, 16-17, 21, 28 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Hammarwall et al. (US 2011/0249713 A1) (Hammarwall herein after) in view of Jongren et al. (US 2011/0305263 A1) (Jongren herein after).

Id. at 427.

The Examiner relies on Hammarwall to meet the “bitmap” limitations of the claims. In support of such rejection, the Examiner specifically cites paragraph [0010] of Hammarwall for the disclosure of “wherein the first information and the second information are provided in a bitmap format” or as the Examiner described it, “bitmap-based signaling” as shown below for both the method and device claims:

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

Re Claim 3, Hammarwall discloses the method of claim 1, wherein the first information and the second information are provided in a bitmap format (bitmap-based signaling, [0010]).

...

Re Claim 12, Hammarwall discloses the device of claim 10, wherein the first information and the second information are provided in a bitmap format (bitmap-based signaling, [0010]).

...

Re Claims 19 and 26, Hammarwall discloses the method of claim 18 and the device of claim 25, wherein the first information and the second information are provided in a bitmap format (bitmap-based signaling, [0010]).

Id. at 423, 425, 426.

A copy of Paragraph [0010] of Hammarwall that was cited by the Examiner in these rejections is reproduced below:

[0010] For the LTE uplink, the use of closed-loop precoding means that the eNodeB selects precoder(s) and the transmission rank. The eNodeB may thereafter signal the selected precoder that the UE is supposed to use or alternatively apply precoding to the reference signals used for channel estimation in the UE, thus avoiding the need of explicit signaling. The eNodeB also may use certain bitmap-based signaling to indicate the particular precoders within a codebook that the UE is restricted to using, see, e.g., Section 7.2 of the 3GPP Technical Specification, TS 36.213. One disadvantage of such signaling is the use of bitmaps to indicate allowed or disallowed precoders. Codebooks with large numbers of precoders require long bitmaps, and the signaling overhead associated with transmitting long bitmaps becomes prohibitive.

Ex. 2017 (Hammarwall) at [0010]. The Examiner thus relied on Hammarwall for the premise that its disclosures of using “bitmap-based signaling to indicate the particular precoders within a codebook that the UE is restricted to using” render the bitmap limitations of the ’924 Patent claims obvious, such as the limitation “wherein the first information and the second information are provided in a bitmap format.” See Ex. 1002 at 423, 425, 426. The Examiner notably also relied on the citations of the 3GPP Technical Specification TS 36.213 in Hammarwall to reach this conclusion. *Id.*

Along with Hammarwall and Jongren, the Examiner also specifically cited both Sayana and Lee in the rejection, as shown below:

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

Notice of References Cited		Application/Control No. 13/807,706		Applicant(s)/Patent Under Reexamination PARK, KYOUNGMIN	
		Examiner KENNETH LAM		Art Unit 2631	Page 1 of 1
U.S. PATENT DOCUMENTS					
*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2011/0249713	10-2011	Hammarwall et al.	375/220
*	B	US-2011/0305263	12-2011	J+e et al.	375/219
*	C	US-2011/0034192	02-2011	Lim et al.	455/501
*	D	US-2012/0003945	01-2012	Liu et al.	455/115.1
*	E	US-2010/0322176	12-2010	Chen et al.	370/329
*	F	US-2011/0032839	02-2011	Chen et al.	370/252
*	G	US-2011/0274188	11-2011	Sayana et al.	375/260
*	H	US-2012/0127948	05-2012	Chung et al.	370/329
*	I	US-2011/0206024	08-2011	LEE et al.	370/338
*	J	US-2011/0268068	11-2011	Jian et al.	370/329
	K	US-			
	L	US-			
	M	US-			

Ex. 1002, at 435.

On September 17, 2014, the Examiner further cited paragraph [0010] of Hammarwall for bitmap-based signaling to maintain its rejection of the Applicant's amended claims:

Re Claim 3, Hammarwall discloses the method of claim 1, wherein the first matrix group includes N precoding matrices (precoding matrices utilized in precoder, [0059]), and the first bit sequence is an N-bit sequence, where N is an integer (bitmap-based signaling, [0010], restriction signal M-length bit mark and one or more binary values, [0071]).

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Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

Re Claim 12, Hammarwall discloses the device of claim 10, wherein the first matrix group includes N precoding matrices (precoding matrices utilized in precoder, [0059]), and the first bit sequence is an N-bit sequence, where N is an integer (bitmap-based signaling, [0010], restriction signal M-length bit mark and one or more binary values, [0071]).

...

Re Claims 19 and 26, the combined teachings disclose the method of claim 18 and the device of claim 25, Hammarwall discloses wherein the first matrix group includes N precoding matrices (precoding matrices utilized in precoder, [0059]), and the first bit sequence is an N-bit sequence, where N is an integer (bitmap-based signaling, [0010], restriction signal M-length bit mark and one or more binary values, [0071]).

Ex. 1002, at 473, 475, 477. In this office action, the Examiner also rejected claims based on US 2011 /0034192 A 1 (Lim et al).

These rejections were then generally maintained in additional actions up and until the Applicant submitted amendments to its claims to add the additional limitations (or comparable) to all independent claims, as shown below:

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

transmitting, to a receiving device, codebook restricting information including at least one of the first bit sequence and the second bit sequence,

receiving, from the receiving device, information relating to the precoding matrix of the first precoder and information relating to the precoding matrix of the second precoder, and

wherein a period of receiving the information relating to the precoding matrix of the first precoder and a period of receiving the information relating to the precoding matrix of the second precoder are different from each other

~~wherein the precoding matrix of the first precoder is multiplied by the precoding matrix of the second precoder.~~

Ex. 1002 at 545-46.

transmitting, to a transmitting device, 1st channel status information indicating the precoding matrix of the first precoder and 2nd channel status information indicating the precoding matrix of the second precoder, the precoding matrix of the first precoder and the precoding matrix of the second precoder being selected, based on the codebook restricting information, from among precoding matrices that are not restricted,

wherein a period of transmitting the information relating to the precoding matrix of the first precoder and a period of transmitting the information relating to the precoding matrix of the second precoder are different from each other

~~wherein the precoding matrix of the first precoder is multiplied by the precoding matrix of the second precoder.~~

Ex. 1002 at 551-52.

On May 11, 2015, the Examiner allowed the claims noting the following reasons for allowance:

The following is an examiner's statement of reasons for allowance:

Claims 1 and 10 which recite the communication method of a transmitting device including a first precoder and a second precoder and the transmitting device, the prior art of record neither anticipate nor render obvious the limitation as claimed, with respect to the method comprising: determining a first bit sequence to restrict at least one precoding matrix from a first precoding matrix group, each bit of the first bit sequence corresponding to one precoding matrix of the first precoding matrix group, respectively, and the at least one precoding matrix of the first precoding matrix group being restricted from being used as a precoding matrix of the first precoder; determining a second bit sequence to restrict at least one precoding matrix from a second precoding matrix group, each bit of the second bit sequence corresponding to one precoding matrix of the second precoding matrix group, respectively, and the at least one precoding matrix of the second precoding matrix group being restricted from being used as a precoding matrix of the second precoder; and **transmitting, to a receiving device, codebook restricting information including at least one of the first bit sequence and the second bit sequence, receiving, from the receiving device, information relating to the precoding matrix of the first precoder and information relating to the precoding matrix of the second precoder, and wherein a period of receiving the information relating to the precoding matrix of the first precoder and a period of receiving the information relating to the precoding matrix of the second precoder are different from each other.**

The prior art of record, also does not teach or suggest the communication method of a receiving device in a wireless communication system and the receiver as recited in claims 18 and 25 for the similar reason listed above.

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

Ex. 1002, at 568-69.

The Examiner specifically cited the following references in the notice of allowance:

Notice of References Cited		Application/Control No. 13/807,706		Applicant(s)/Patent Under Reexamination PARK, KYOUNGMIN	
		Examiner KENNETH LAM		Art Unit 2631	Page 1 of 1

U.S. PATENT DOCUMENTS					
*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2011/0249713	10-2011	Hammarwall et al.	375/220
*	B	US-2011/0305263	12-2011	~~Jee et al.~~ Jongren et al.	375/219
*	C	US-2011/0034192	02-2011	Lim et al.	455/501
*	D	US-2012/0003945	01-2012	Liu et al.	455/115.1
*	E	US-2010/0322176	12-2010	Chen et al.	370/329
*	F	US-2011/0032839	02-2011	Chen et al.	370/252
*	G	US-2011/0274188	11-2011	Sayana et al.	375/260
*	H	US-2012/0127948	05-2012	Chung et al.	370/329
*	I	US-2011/0206024	08-2011	LEE et al.	370/338
*	J	US-2011/0268068	11-2011	Jian et al.	370/329
	K	US-			
	L	US-			
	M	US-			

Ex. 1002, at 593.

Thus, as evidenced by the prosecution history, there was careful consideration by the Office of the cited prior art prior to the issuance of the '924 Patent.

D. Summary of Petitioner's Proposed Grounds of Unpatentability and the References Cited

Petitioner contends that claims 17-24 and 26-28 would have been obvious under pre-AIA 35 U.S.C. § 103. The Petition raises these grounds of alleged obviousness based on the following references:

1. US2011/0274188 ("Sayana");

2. WO2010/050689 (“Lee-689”);
3. TS 36.213 v8.8.0 (“TS 36.213”);
4. TS 36.211 v8.8.0 (“TS 36.211”);
5. US2013/0064129 (“Koivisto”).

The Petition asserts the following grounds of alleged invalidity under 35 U.S.C. § 103:

Ground	'924 Patent Claim(s)	Primary Reference	Secondary Reference(s)
1	17-19, 22-24, 28	Sayana	Lee-689
2	17-19, 22-24, 28	Sayana	TS 36.213
3	17-19, 22-24, 28	Sayana	TS 36.213 and TS 36.211
4	20-21, 26-27	Sayana	Lee-689 and Koivisto
5	20-21, 26-27	Sayana	TS 36.213 and Koivisto
6	20-21, 26-27	Sayana	TS 36.213, TS 36.211 and Koivisto

E. The Cited References

The five references relied upon by Petitioner to challenge the patentability of claims 17-24 and 26-28 of the '924 Patent are summarized as follows:

1. Overview of Sayana (Ex. 1005)

U.S. Patent App. Pub. 2011/0274188 (“Sayana”) is entitled “Method and precoder information feedback in multi-antenna wireless communication systems”

and was published on November 10, 2011, having an earliest priority date of April 15, 2011. *See* Ex. 1005.

Sayana discusses the need for improvement to wireless communication systems at that time that exchange channel state information and beam-forming transmissions (*i.e.*, precoding information) to base stations in order to avoid mutual interference among multiple UE transmissions. *Id.* at [003]. A typical antenna configuration to achieve this, such as a cross-polarized antenna configuration, would have groups of antennas where each group is a set of correlated antennas and each group is uncorrelated with the other groups. *Id.* at [0005]. The slow changes in the correlation of such correlated antennas can be used to feedback the correlated and uncorrelated channel characteristics, *i.e.*, two components, at different rates and/or with different levels of quantization/overhead in time and frequency to reduce feedback overhead. *Id.* at [0006]. One of the components representing the correlated channel characteristics can be fed back on a wideband basis and/or slowly in time, while the other component is fed back on a subband basis and/or more frequently in time. *Id.* Sayana described this as the background context to its invention.

Sayana is directed to methods for a wireless communication device, such as a UE, to solve the supposed key challenges in the design of such two component feedback systems related to identifying the parameters used in the two components

and the construction of the final precoder matrix as a function of the two components. *Id.* at [0007]. Sayana illustrates such “efficient precoder structures” of the antenna configuration can be used to act as a function of the two components. *Id.* at [0041]. For example, one of the structures disclosed is a Kronecker based approximation of the channel covariance, such as an 8×8 long term covariance matrix corresponding to 8 antennas, as shown by FIG. 4:

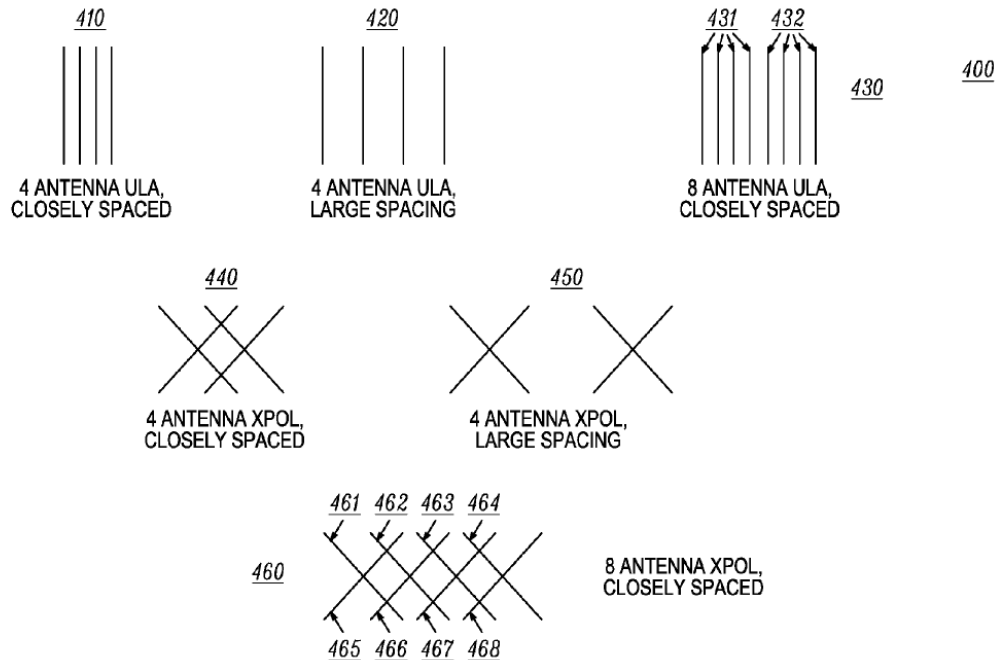


FIG. 4

Id. at Fig. 4. In this manner, such structures “allow expressing the overall precoder as a Kronecker product of two precoders.” *Id.* at [0048].

Another disclosed structure is described as a precoding operation from two subsets of antennas, where two non-overlapping subsets of antennas are weighted

by a first and a second sub-precoder matrix, respectively. *Id.* at [0054]. Each sub-precoder matrix corresponds to one or more spatial layers of data transmission, for example, the first sub-precoder is for spatial layer 1 and layer-2. *Id.* Similarly for the second-precoder, it corresponds to two spatial layers. *Id.* Finally, Sayana also discloses that its two-component feedback scheme is applicable to multiple feedback modes, including wideband or subband. *Id.* at [0093]-[0094].

Notably, Sayana is missing transmitting information for only one or another component, such as only the first or second precoding matrices. Instead, Sayana is directed to structures that can achieve its goal of acting as a function of the two components, and may represent both components simultaneously with a single structure, or through a single mathematical form.

Moreover, as the Petition recognizes, Sayana lacks details on the implementation of its communication system, including any disclosure on the implementation of how codebook restriction information would be communicated between a base station and a UE. *See* Petition at 24, 25 (citing Sayana, [0085]-[0092]). Petitioner specifically acknowledges that Sayana does not teach how to restrict codebooks. *Id.* at 25.

2. Overview of Lee-689 (Ex. 1007)

PCT Patent App. Pub. WO2010/050689 (“Lee-689”) is entitled “Method of

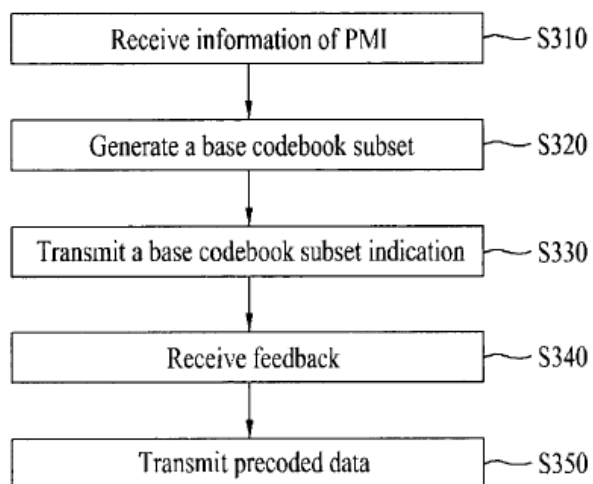
controlling interference in a wireless communication system having multiple antennas” and was published on May 6, 2010, having an earliest priority date of October 30, 2008. *See* Ex. 1007.

Lee-689 is directed to methods of improving communication by controlling interference between precoding matrices of neighbor cells in a closed-loop multiple antenna wireless communication system where a receiver transmits feedback information about channel status to a transmitter. *Id.* at 1:21-2:7, 4:6-11.

As Lee-689 explains, in such closed-loop system, a receiver selects a precoding matrix from a predetermined codebook and transmits an index of the selected precoding matrix to a transmitter. *Id.* at 3:6-9. Yet, this process may cause interference of precoding matrixes of neighbor cells. *Id.* at 3:15-19. To cure this, Lee-689 discloses methods for controlling such interference by transmitting a base codebook subset indication to receivers, such as an index of the selected base codebook subset, so that the receiver may use this information to precode data using the base codebook subset or the base codebook. *Id.* at 4:20-5:23. Thus, neighbor cells may select only certain precoding matrixes and reduce interference. In addition, Lee-689 discloses that its methods reduce overhead because base codebooks are generated previously and a transmitter may therefore transmit only an index of a base codebook subset to a receiver. *Id.* at 7:4-6. The flow chart in Figure 3 illustrates

this communication:

FIG. 3



Id. at Fig. 3.

Lee-689 explains, with reference to Figure 3, that a transmitter receives information of a first precoding matrixes index (PMI), which the neighbor cells request the transmitter to use, or information of a second precoding matrix index which, the neighbor cells request the transmitter not to use S310. *Id.* at 15:11-15. This information is sent by the receiver through the feedback channel, such as a common channel or a channel assigned to each cell. *Id.* at 15:23-16:2. The transmitter generates a base codebook subset based on the received information of PMIs. *Id.* at 16:17-21. The transmitter will then transmit a base codebook subset indication to a receiver S330. *Id.* at 17:15-20. A base codebook subset indication

represents which precoding matrixes are included in a base codebook subset or not.

Id. at 18:5-7.

With regard to the base codebook subset indication (S330), Lee-689 explains that this indication can be expressed by a single bitmap with multiple bits. *Id.* at 18:5-7. For example, if the indication bitmap is 0, base codebook subset does not include the element of a base codebook, and vice-versa (it is included) if the bitmap is 1. *Id.* at 18:5-15. Such representation may be a bitmap such as “0b10011110” where “0b0” requests the receiver to select a precoding matrix from a base codebook, and “0b1” requests the receiver to select a precoding matrix from a base codebook subset. *Id.* at 18:16-21.

Lee-689 provides an example of this behavior of the codebook indication:

A base codebook subset indication represents which precoding matrixes are included in a base codebook subset among a rank 1 base codebook or not. A base codebook subset indication can be expressed by bitmap. For example, if *i*th element of a base codebook subset indication expressed by bitmap is 0, a base codebook subset does not include *i*th element of a base codebook. And, if *i*th element of a base codebook subset indication expressed by bitmap is 1, a base codebook subset includes *i*th element of a base codebook. That is, a base codebook subset indication for a base codebook subset of equation 7 is "0b10011110".

Id. at 18:5-15.

As shown, the receiver receives this single base codebook subset indication as a single bitmap with multiple bits, such as "0b10011110" representing the precoding matrix to be selected by the receiver. Lee-689 provides an example of this selection behavior for this bitmap as performed by a receiver having two antennas:

For example, if a number of antennas is 2 and a base codebook subset indication is "0b10011110", and a codebook coordination enable is "0b1" in a single-user closed loop MIMO system, a receiver excepts $V(2, 1, 1)$, $V(2, 1, 2)$ and $V(2, 1, 7)$ from a base codebook and select a precoding matrix from the modified base codebook. Herein, $V(N_t, M_t, i)$ is i th element of a rank M_t codebook when a number of antennas is N_t .

Id. at 19:2-9. Thus, the codebook restriction is performed by the receiver based on the one base codebook subset indication bitmap.

Notably, Lee-689 does not disclose any scenario where more than one base codebook subset indication is transmitted to the receiver to perform selection of a codebook subset. Lee-689 also does not discuss any specific details as to how its receiving device would transmit first channel status information indicating a precoding matrix of a first precoder or second channel status information indicating a precoding matrix of a second precoder. It also necessarily does not discuss any information related to the period of transmitting information relating to a first or second precoding matrix or a first (or second) precoder, or any differences in such periods.

3. Overview of TS 36.213 and TS 36.211 (Exs. 1008 and 1009)

TS 36.213 and TS 36.211 are 3GPP Technical Specifications directed to the

Long Term Evolution (“LTE”) standard and Evolved Universal Terrestrial Radio Access (E-UTRA) technology related to wireless communication systems. *See* Exs. 1008 and 1009.

TS36.213 is a 3GPP Technical Specification titled “LTE; Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures” and bearing a date of September, 2009. Ex. 1008. TS 36.213 specifies and establishes the characteristics of the physical layer procedures in the FDD and TDD modes of E-UTRA. *Id.* at 6. This include describing the UE procedure for reporting channel quality indication (CQI), precoding matrix indicator (PMI), and rank indication (RI) controlled by the base station. *Id.* at 33.

TS 36.213 teaches that a UE is restricted to report PMI within a precoder codebook subset specified by a bitmap parameter *codebookSubsetRestriction* configured by higher layer signaling. *Id.* at 34. For a specific precoder codebook and associated transmission mode, the bitmap can specify all possible precoder codebook subsets from which the UE can assume the base station may be using when the UE is configured in the relevant transmission mode. *Id.* The bitmap forms the bit sequence where a bit value of zero indicates that the PMI reporting is not allowed to correspond to precoder(s) associated with the bit. *Id.* Table 7.2-1c provides an example of the association of bits in the *codebookSubSetRestriction* bitmap

parameter to precoders:

Table 7.2-1c: Association of bits in codebookSubSetRestriction bitmap to precoders in the 2 antenna port codebook of Table 6.3.4.2.3-1 in [3].

Codebook index i_c	Number of layers ν	
	1	2
0	a_0	-
1	a_1	a_4
2	a_2	a_5
3	a_3	-

Id. at 35. The bitmap forms the bit sequence $a_{A-1}, \dots, a_3, a_2, a_1, a_0$ where a bit value of zero indicates that the PMI reporting is not allowed to correspond to precoder(s) associated with the bit (*e.g.*, a_0 , a_1 , a_2 , a_3 , a_4 , or a_5).

TS 36.211 is a 3GPP Technical Specification titled “LTE; Evolved Universal Terrestrial Radio Access (EUTRA); Physical channels and modulation” and bearing a date of September, 2009. Ex. 1009. It describes the physical channels for evolved ULTRA. *Id.* at 7. TS 36.211 provides additional details to TS 36.213’s codebook restriction scheme with regard to the codebook for transmission on varying number of antenna ports. *Id.* at 53-55. For example, for transmission on two antenna ports, the codebook for transmission is as follows:

Table 6.3.4.2.3-1: Codebook for transmission on antenna ports $\{0,1\}$.

Codebook index	Number of layers ν	
	1	2
0	$\frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ 1 \end{bmatrix}$	$\frac{1}{\sqrt{2}} \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
1	$\frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ -1 \end{bmatrix}$	$\frac{1}{2} \begin{bmatrix} 1 & 1 \\ 1 & -1 \end{bmatrix}$
2	$\frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ j \end{bmatrix}$	$\frac{1}{2} \begin{bmatrix} 1 & 1 \\ j & -j \end{bmatrix}$
3	$\frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ -j \end{bmatrix}$	-

Id. at 53. Other numbers of antenna ports are also discussed. *Id.* at 53-55.

4. Overview of Koivisto (Ex. 1010)

U.S. Patent App. Pub. 2013/0064129 (“Koivisto”) is entitled “Apparatus, Method and Computer Program Product for Selecting Beam Group and Subset of Beams in Communication System” and was published on March 14, 2013, having an earliest priority date of June 1, 2010. *See* Ex. 1010.

Koivisto is directed to methods and systems for selecting a beam group and a subset of beams in a wireless communication system, such as 3GPP LTE and E-UTRAN. *Id.* at [0002]. It discloses a “double codebook” communication channel feedback structure that can be generalized to an arbitrary number of transmit antennas, describing a new codebook design and structure for dual codebook-based channel state information (“CSI”) feedback in support of downlink SU-/MU-MIMO

operation in LTE. *Id.* at [0035].

In a proposal by Koivisto for a codebook structure, its precoder matrix W_1 is handled in wideband, compressing the communication channel in the spatial dimension. Further combining (co-phasing) of the two remaining dimensions (or beams) (for cross-polarized antennas) or orthogonalization between the streams is handled through the matrix W_2 , which is applied in a frequency selective fashion at a subband level. *Id.* at [0045]. The precoder matrix W_1 is block diagonal, wherein each block includes columns of oversampled discrete Fourier transform matrices. *Id.* Careful design of both the matrices W_1 and W_2 can allow supporting both cross-polarized and uniform linear array antenna configuration with the same codebooks. *Id.* Koivisto explains that this is achieved by using four bits for the matrix W_1 and two bits for the matrix W_2 . *Id.* The four bits for the matrix W_1 essentially translates into an oversampling factor of four for discrete Fourier transform matrices in the four-antenna transmit case (e.g., corresponding to either four transmit uniform linear array configuration or to each block of four co-polarized transmit antenna elements assuming cross-polarized eight transmit antenna configuration). *Id.*

Koivisto does not discuss any specific details as to how a UE would receive codebook restricting information, or would transmit first channel status information indicating a precoding matrix of a first precoder or second channel status information

indicating a precoding matrix of a second precoder, or a related period of transmitting information. It also does not detail how the use of bit sequences or bitmaps would correspond to precoding matrix of precoding matrix groups, or otherwise.

III. CLAIM CONSTRUCTION

For purposes of this proceeding, Petitioner notes their construction proposed by the parties in the district court case, but applies a plain and ordinary meaning for all terms. Petition at 17. The prior art asserted does not disclose the claim limitations under their plain and ordinary meaning, or any other reasonable construction. For purposes of this Preliminary Response only, Patent Owner applies the constructions adopted by the District Court in its claim construction order dated October 23, 2023, that removes any doubt as to the plain and ordinary meaning of certain terms. Ex. 2018 (EDTX Claim Construction Order) at 14-15. However, under either construction, the result is the same.

The District Court construed the phrase “period of transmitting the information relating to the precoding matrix . . .” (Claims 17 and 23) as follows:

“time interval between successive transmissions of the information relating to the precoding matrix . . .,” but expressly rejecting that the “period of transmission” must be regular.

Id. at 15. Patent Owner, but not Petitioner, has applied this construction for purposes of this Preliminary Response.

To the extent Patent Owner has further objections to Petitioner’s proposed or implicit constructions, such objections are not pertinent to this Preliminary Response. Patent Owner reserves all rights to provide additional arguments relating to Petitioner’s claim construction positions if institution occurs.

IV. LEGAL STANDARDS FOR OBVIOUSNESS

A claim is not patentable if the differences between it and the prior art are such that the subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time of the invention. 35 U.S.C. § 103(a) (pre-AIA).¹ Obviousness requires assessing (1) the “level of ordinary skill in the pertinent art,” (2) the “scope and content of the prior art,” (3) the “differences between the prior art and the claims at issue,” and (4) “secondary considerations” of non-obviousness such as “commercial success, long felt but unsolved needs, failure of others, etc.” *KSR Int’l Co. v. Teleflex Inc.*, 550 US 398, 406 (2007) (quoting *Graham v. John Deere Co.*, 383 US 1, 17-18 (1966)).

¹ The pre-American Invents Act (“AIA”) statute controls here because the ’924 Patent was filed and issued prior to the AIA’s implementation.

It is Petitioner's burden "to demonstrate both 'that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.'" *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367-68 (Fed. Cir. 2016) (quotations and citations omitted). However, a petitioner must first show that all of the claimed elements are disclosed in the prior art. *See Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1164 (Fed. Cir. 2006) (considering motivation to combine and reasonable expectation of success only "if all the elements of an invention are found in a combination of prior art references").

Obviousness of a patent cannot properly be established by mere conclusory statements. Instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. A reason for combining disparate prior art references is a critical component of an obviousness analysis. The obviousness analysis should be made explicit and needs to provide an articulated reasoning with some rational underpinning to identify the reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *See InTouch Techs., Inc. v.*

VGo Commc'ns, Inc., 751 F.3d 1327, 1347 (Fed. Cir. 2014). The Petition fails under this legal standard.

V. DISCRETIONARY FACTORS FAVOR DENIAL OF INSTITUTION

The Petition should be denied pursuant to the Director's discretion to deny institution of petitions. The Petition should be denied pursuant to 35 U.S.C. § 325(d) because the Petition's primary reference for all grounds was previously considered by the Office, and its secondary references are substantially the same as the art relied on during examination. *See Advanced Bionics*, IPR2019-01469, Paper 6, 8 (PTAB Feb. 3, 2020) (precedential).

The Petition should also be denied pursuant to 35 U.S.C. § 314(a) and the factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020). The PTAB has the authority, where warranted, to exercise discretion to deny institution in view of the *Fintiv* factors particularly where, as here, the merits of the challenge are not compelling (*see infra*, Section VI). *See* "Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings With Parallel District Court Litigation," issued June 21, 2022 ("Director's Guidance").

Thus, the Petition would be neither an "effective [nor] efficient alternative" to the ongoing litigation, and would not be an efficient use of Board resources. *See Gen. Plastic Indus. Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19

at 16-17 (PTAB Sept. 6, 2017) (precedential). On these bases, the Petition should be discretionarily denied.

A. 35 U.S.C § 325(d) Weighs in Favor of Denying Institution

Petitioner's contention that the grounds raised by this Petition are not the same or substantially the same as the art and arguments raised during the '924 Patent's prosecution is contrary to the clear prosecution history.

First, Petitioner unreasonably asks that the Board completely ignore the Notice of References Cited by the examiner that shows that Petitioner's primary reference for all grounds (Sayana) was already considered during the prosecution of the '924 Patent. Second, Petitioner fails to address that the disclosures of Sayana that Petitioner relies on contain the very same teachings as the prior art (Hammarwall) that the Examiner principally relied on during multiple rejections. Finally, Petitioner ignores that its three secondary references (Lee-689, TS 36.213, and TS 36.211) and their teachings are also entirely duplicative of the teachings that were presented in Hammerwall. Thus, Part 1 of the *Advanced Bionics* framework is met.

Petitioner fails to substantively address Part 2 of *Advanced Bionics*. Instead, Petitioner merely concludes that the Office erred in a manner material to the patentability of the Claims (*see* Petition at 14-15), but does not proffer any reasons why the Examiner materially erred in their prior consideration of Sayana, and fails

to address the cumulative nature of Hammarwall, Lee-689, and the 3GPP Technical Specifications. This failure validates the appropriateness of denial under § 325(d). *Albany Int’l Corp. v. Kimberly-Clark Worldwide, Inc.*, PGR2021-00019, Paper 22, 8-9 (PTAB June 22, 2021) (denying institution because “[i]f a condition in the first part of the framework is satisfied and the petitioner fails to make a showing of material error, the Director generally will exercise discretion not to institute [] review.”).

Simply put, the Petition is a rehash of the art, rejections, arguments, and reasons for allowance extensively considered during the prosecution of the ’924 Patent, making this Petition ripe for denial under § 325(d).

1. *The Same Or Substantially The Same Art/Arguments Were Previously Presented To The Office*

The Board should deny institution under § 325(d) because the Petition argues the “same or substantially the same art previously [] presented to the Office” and fails to demonstrate “that the Office erred in a manner material to the patentability of the challenged claims.” *Advanced Bionics*, IPR2019-01469 at Paper 8. “Previously presented art includes art made of record by the Examiner, and art provided to the Office by an applicant, such as on an Information Disclosure Statement (IDS), in the prosecution history of the challenged patent.” *Id.* at 7-8. Further, the Board has construed “previously presented” in 35 U.S.C. § 325(d) to

refer to art and arguments presented to the Office *prior to* the filing of the petition at issue. *Ironsource Ltd. v. Digital Turbine Inc.*, PGR2021- 00096, Paper 14 at 52 (PTAB Jan. 6, 2022).

The overlap between the IPR-asserted references and those submitted during the '924 Patent prosecution meets the first part of the two-part *Advanced Bionics* framework, which considers the similarities and material differences between the two sets of art, the cumulative nature of the art, and the extent of the overlap between the arguments. *Becton, Dickinson & Co.*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first paragraph) (factors (a), (b), and (d)).

First, part one of the *Advanced Bionics* framework is met here at least because Sayana—Petitioner’s primary reference for all grounds—was considered (and cited) by the Examiner during the prosecution of the '924 Patent. As discussed above, Sayana was specifically cited on a “Notice of References Cited” form filed by the Examiner together with an Office Action on June 6, 2014. (Ex. 1002 at 435). And Sayana was cited again with the final Notice of Allowance on August 13, 2015, where the Examiner made corrections to entries on the Notice of References Cited, as shown below:

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

Notice of References Cited	Application/Control No. 13/807,706	Applicant(s)/Patent Under Reexamination PARK, KYOUNGMIN	
	Examiner KENNETH LAM	Art Unit 2631	Page 1 of 1

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*	D	US-2012/0003945	01-2012	Liu et al.	455/115.1
*	E	US-2010/0322176	12-2010	Chen et al.	370/329
*	F	US-2011/0032839	02-2011	Chen et al.	370/252
*	G	US-2011/0274188	11-2011	Sayana et al.	375/260
*	H	US-2012/0127948	05-2012	Chung et al.	370/329
*	I	US-2011/0206024	08-2011	LEE et al.	370/338
*	J	US-2011/0268068	11-2011	Jian et al.	370/329
	K	US-			
	L	US-			
	M	US-			

(*Id.* at 593).

Petitioner’s argument that the Examiner did not substantively consider Sayana during prosecution because “the Examiner did not substantively discuss or rely on Sayana in any rejection of the Claims” is unsupported. (Petition at 13). Not only was the art identified and listed by the Examiner on a Notice of References Cited, but Sayana was also cited together with only a small number of other references annotated by the examiner. In fact, much of the other art cited within the Examiner’s list—Hammarwall, Jongren, and Lim—was relied upon in the Examiner’s rejections, demonstrating the consideration that the Examiner gave to the cited references, and indicating that Sayana presented nothing not present in the art relied upon. (*See, e.g.*, Ex. 1002 at 421 (Hammarwall), 427 (Jongren), 471 (Lim)).

Regardless, Sayana was clearly presented to the Office, meeting Part 1 of *Advanced Bionics*, and thus requiring an analysis under Part 2.

Moreover, Part 1 is also met because Sayana is relied on by Petitioner for the same teachings already found in Hammarwall. For example, Petitioner relies on Sayana for its alleged disclosure of “the first and second precoders (e.g., ‘wideband’ and ‘subband’) from the respective codebooks for feedback to the BS.” *See* Petition at 18. Petitioner also alleges that Sayana discloses the claim requirements of [17.e] because its “first and second representations are fed back ‘at different time instances and/or periodicities’ to ‘reduce feedback overhead’ [because] some characteristics are ‘fed back on a wideband basis and/or slowly in time’ and others are ‘fed back on a subband basis and/or more frequently in time.’” *Id.* at 19; *id.* at 33-34. But these teachings are the exact same as Hammarwall’s teachings of reducing feedback overhead using wideband versus subband precoding, which were specifically relied on by the Examiner during multiple rejections, which Applicant ultimately overcame. For example, Hammarwall explains that:

In closed-loop precoding for the LTE downlink in particular, the UE transmits, based on channel measurements in the forward link (downlink), recommendations to the eNodeB of a suitable precoder to use. A single precoder that is supposed to cover a large bandwidth (**wideband precoding**) may be fed back. It also may be beneficial to

match the frequency variations of the channel and instead feed back a **frequency-selective precoding report, e.g. several precoders, one per frequency subband**. This approach is an example of the more general case of channel state information (CSI) feedback, which also encompasses feeding back entities other than precoders, to assist the eNodeB in adapting subsequent transmissions to the UE. Such other information may include channel quality indicators (CQIs) as well as a transmission rank indicator (RI).

...

More generally, **maintaining low signaling overhead** remains an important design target in wireless systems. In this regard, precoder signaling can easily consume a large portion of the available resources unless the signaling protocol is carefully designed. The structure of possible precoders and the overall design of the precoder codebook plays an important role in **keeping the signaling overhead low**. A particularly promising precoder structure involves . . . [a first precoder] capturing **wideband/long-term properties** of the channel such as correlation, while [a second precoder] targets **frequency-selective / short-term** [i.e. subband] properties of the channel.

Ex. 2017 (Hammarwall) at [0009], [0018] (emphasis added). This teaching by Hammarwall—to use one wideband precoding and a subband precoding for maintaining low signaling overhead—is precisely what Petitioner now argues is unique about Sayana—it is not. *See* Petition at 19, 33-34.

Part 1 is also met as to Petitioner's the secondary references Lee-689, TS 36.213, and TS 36.211 because their teachings are also substantially the same teachings as Hammarwall makes that were specifically discussed and cited to in various office actions for the concept of "bitmap-based signaling." *See, e.g.* Ex. 1002 at *Id.* at 423, 425, 426; *see also Nokia of America Corp. v. Alexander Soto and Walter Soto*, IPR2023-00681, Paper 10, 23 (PTAB Nov. 3, 2023) (denying institution as obviousness arguments were substantially the same as previously evaluated by the Office). Accordingly, combining secondary references for their teachings of "bitmap-based signaling," as Petitioner now does, presents substantially the same arguments already extensively considered by the Office. For example, Petitioner relies on Lee-689 as a secondary reference for "how to perform such codebook subset restriction using a 'bitmap' in which 0s/1s indicate precoding matrices to be restricted from or included in a subset for selection." Petition at 24. And alternatively, Petitioner relies on TS 36.213 (optionally with TS 36.211) disclosing that "a 'UE is restricted to report PMI ... within a precoder codebook subset specified by a bitmap parameter *codebookSubsetRestriction*.'" Petition at 54. Yet, these are substantially similar teachings of "bitmap-based signaling" disclosed by Hammarwall and previously considered by the Office, and the teachings even cite one of these "new" secondary references, TS 36.213:

For the LTE uplink, the use of closed-loop precoding means that the eNodeB selects precoder(s) and the transmission rank. The eNodeB may thereafter signal the selected precoder that the UE is supposed to use or alternatively apply precoding to the reference signals used for channel estimation in the UE, thus avoiding the need of explicit signaling. **The eNodeB also may use certain bitmap-based signaling to indicate the particular precoders within a codebook that the UE is restricted to using, see, e.g., Section 7.2 of the 3GPP Technical Specification, TS 36.213.** One disadvantage of such signaling is the use of bitmaps to indicate allowed or disallowed precoders. Codebooks with large numbers of precoders require long bitmaps, and the signaling overhead associated with transmitting long bitmaps becomes prohibitive.

Ex. 2017 (Hammarwall) at [0010] (emphasis added) (citing TS 36.213). As discussed above (Section II.C), these disclosures were specifically relied on by the Examiner for various claim rejections in multiple office actions. *Id.* at 423, 425, 426, 473, 475, 477. But when Applicant overcame these rejections, the Examiner correctly recognized that the teachings of Hammarwall and the 3GPP Technical Specifications do not teach all elements of the claimed invention, particularly element [17.e]. See Ex. 1002 at 545-46. Thus, Petitioner's use of Lee-689, TS 36.213, and TS 36.211 does not introduce any new arguments or art than those already considered by the Office.

Finally, Koivisto is relied upon by Petitioner but only for dependent claims. Koivisto discloses limited teachings of selecting beamforming and beam groups that were also already considered by the Office during examination with regard to Hammarwall and Jongren. *See, e.g., Ex. 1002 at 427-32.* Furthermore, because Koivisto is only relied upon for dependent claims, any teachings it provides are not pertinent to the patentability of the independent claims.

2. *Petitioner Fails To Demonstrate A Material Error By The Office*

Petitioner's perfunctory §325(d) analysis also fails to explain any alleged material error by the Office, as required under Part 2 of *Advanced Bionics*. (*See* Petition at 14-15).

As discussed above, Petitioner provides a conclusion that the art considered is not “substantially the same” but without providing any support. Petitioner specifically fails to address why the prior consideration of Sayana was erroneous, or how the cumulative nature of Hammarwall, Lee-689, and the 3GPP Technical Specifications, is not material. This lack of analysis is insufficient to meet the second part of the *Advanced Bionics* test, and denial under §325(d) is appropriate. *Albany Int’l Corp.*, PGR2021-00019, Paper 22, 8-9 (denying institution because “[i]f a condition in the first part of the framework is satisfied and the petitioner fails to

make a showing of material error, the Director generally will exercise discretion not to institute [] review.”).

Since the first part of the *Advanced Bionics* framework is satisfied, and Petitioner failed to make a showing of material error for the second part, the Director should exercise its discretion to deny review. *See Advanced Bionics*, IPR2019-01469, Paper 6, 8; *Albany Int’l Corp.*, PGR2021-00019, Paper 22, 10-11.

B. Application of *Fintiv* Factors Weighs in Favor of Denying Institution

The Board should also deny the Petition under its authority pursuant to 35 U.S.C. § 314(a). There is no requirement to institute an IPR. *See, e.g., Harmonic Inc. v. Avid Tech.*, 815 F.3d 1356, 1367 (Fed. Cir. 2016); *see also Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016); 37 C.F.R. § 42.108(a). Guidance from the Director states that the purpose of discretionary denial is to “limit unnecessary and counterproductive litigation costs” and avoid gamesmanship. *See* Memorandum on Interim Procedure for Discretionary Denial from Katherine K. Vidal, Director of the USPTO, at 1 (June 21, 2022). This guidance has also clarified the application of the so-called *Fintiv* factors to circumstances such as these, where there is a co-pending District Court Action.² *Id.*

² Here, the co-pending District Court Action is *Pantech Corp. v. LG Electronics Inc.*,

For the Grounds presented in this Petition, instituting an IPR would not be an effective or efficient alternative to litigation because, most notably, the co-pending District Court Action (1) involves the same prior art that LGE relies on here, and (2) will be complete well before a final written decision in this proceeding. When considered within a thorough analysis of the *Fintiv* factors, any slim (if any) merits of this petition fail to weigh in favor of institution. Rather, the merits of LGE's invalidity challenge are best addressed in the District Court Action, and therefore, the Board should exercise its discretion to deny institution.

1. *The Court Has Not Stayed The Underlying Litigation Nor Has a Motion to Stay Been Filed*

Regarding the first *Fintiv* factor (“whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted”), a stay has not been granted in the District Court Action, and Petitioner has not filed a motion to stay in view of this Petition. And while Petitioner has made the bare statement that it “intends to seek a stay” if this IPR is granted (*see* Petition at 15), there is no evidence that Petitioner's not-yet-made request would be granted even if made—and Petitioner has offered absolutely none.

While the Board “will not attempt to predict” how the district court will proceed in the absence of specific evidence (*Sand Revolution II, LLC v. Continental Intermodal Group-Trucking LLC*, IPR 2019-01393, Paper 24 at 7 (PTAB June 16, 2020) (informative)), it bears mentioning that the evidence indicates that a stay will not be granted. First, even if this IPR is instituted, the projected final decision will not occur until April, 2025—approximately seven months after the scheduled trial date in the District Court Action.³ In similar circumstances, this district court routinely denies motions to stay. The District Court’s decision in *Maxell Ltd. v. Apple Inc.*, No. 5:19-CV-00036-RWS, 2020 U.S. Dist. LEXIS 257531, at *7-9 (E.D. Tex. April 27, 2020), explained that a stay should not be granted because the case was filed “more than a year ago” (as would be true with this litigation) and because trial is scheduled for six months after the order (the September trial date would be even closer to any decision on institution). *See also Kirsch Research and Development LLC v. DuPont de Nemours, Inc.*, Dkt. 269, No. 5-20-cv-00057-RWS (E.D. Tex. July 7, 2021) (similar analysis following *Maxell* and noting the advanced

³ Jury trial is scheduled for September 23, 2024. *See Pantech Corp. v. LG Electronics, Inc.*, No. 5:22-cv-00113-RWS, Dkt. 240 at 2 (E.D. Tex., Jan. 22, 2024) (scheduling order attached as Exhibit 2019).

stage of litigation). Second, the District Court has already denied a different request by Petitioner to stay the litigation (for reasons unrelated to any *inter partes* review), stating that a stay “would unjustly delay the progress of the case and harm Pantech’s interests in timely resolution.” *See Pantech Corp. v. LG Electronics Inc.*, No. 5:22-cv-00113-RWS, Dkt. 131 at 1 (E.D. Tex., July 19, 2023) (attached as Ex. 2020). The Court has thus demonstrated its intent to proceed to trial in a timely manner. As such, there has been no suggestion that the trial would not occur as currently scheduled in September 2024.

As such, the evidence indicates that a stay will not be granted in the future even if Petitioner requests one, and this *Fintiv* factor weighs in favor of denial.

2. The Trial Date in the District Court Action Precedes the Projected Final Written Decision Date

Regarding the second *Fintiv* factor (“the proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision”), the projected final written decision date is late April, 2025, well after the scheduled September 23, 2024 trial date in the District Court Action. In fact, the trial date is even before any reply would be due from Petitioner (late October, 2024) and prior to the final oral hearing, should *inter partes* review be granted.

While Petitioner correctly states that the median time to trial in the Eastern District of Texas “varies between 19 and 24 months” (see Petition at 15, citing Ex.

1028), 24 months after the filing date is September 2, 2024. That is **before** the currently-scheduled trial date (meaning the current schedule is already longer than the average). Petitioner’s alternative citation to privately gathered statistics from *Docket Navigator* indicating a median time to trial of 26 both exceeds the guidance from the USPTO Director of what statistics will be considered (see Memo from Katherine K. Vidal at 9 n. 12 (June 21, 2022)) and also does not meaningfully change the analysis—November 11, 2024 (the date using these statistics) would still be many months before the projected statutory deadline for a final written decision. Regardless, the statistics about averages are irrelevant here because a trial date has been set and there has been no indication that it would move in any significant way beyond the currently scheduled date.

Accordingly, this *Fintiv* factor also weighs in favor of denial.

3. *The Parties Have Invested Substantial Efforts in Litigating the Grounds Presented in this Petition in the District Court Action*

Regarding the third *Fintiv* factor (“investment in the parallel proceeding by the court and the parties”), the parties have significantly invested in the District Court Action. For example, the parties have served and responded to discovery including making large document productions, engaged in early motion briefing, a hearing on a motion to dismiss (with related briefing and a denied motion for

reconsideration), engaged in full claim construction briefing and depositions of experts relating to claim construction, and received a claim construction order. Fact discovery has concluded.

Most notably, expert reports on invalidity are due to be served on February 21, 2024, with expert discovery on validity concluding by April 10, 2024—expert discovery will therefore be complete by the time of any institution decision. *See* Exhibit 2019 at 3. As addressed below in the context of the fourth *Fintiv* factor, the grounds of invalidity disputed by the parties in the District Court Action are the same as Petitioner presents here. Thus, the parties have already (or shortly will have) invested many of the same resources into the District Court Action that Petitioner seeks to bring into this dispute. Institution would be a waste of party and judicial resources, precisely what discretionary denial seeks to avoid. *See* Memo from Katherine K. Vidal at 1 (June 21, 2022).

This *Fintiv* factor also weighs in favor of denial.

4. *Petitioner Fails To Offer A Sotera Stipulation And There Is Significant Overlap Between Issues Raised In The Petition And In The District Court Litigation*

Regarding the fourth *Fintiv* factor (“overlap between issues raised in the petition and in the parallel proceeding”), each of the six grounds of alleged invalidity asserted in this Petition are already being litigated in the District Court Action.

Specifically, each of Sayana, Lee-689, TS 36.213, TS 36.211, and Koivisto (*i.e.*, each prior art reference at issue in this Petition) is being asserted as a basis of invalidity in the District Court Action. Ex. 2021 (LGE’s Invalidity Contentions) at 23-31. In fact, the very same combinations of the art cited by the Petition are also asserted in the District Court Action. *Id.* at 31.

Moreover, Petitioner has not offered any *Sotera*-type stipulation or made any effort to avoid duplicative proceedings.

Given that the Petition is directed toward the same claims, same grounds, same arguments, same art, and significantly overlapping evidence at issue in the parallel District Court Action, and since Petitioner has not sought to mitigate any of these concerns through a *Sotera* stipulation, this *Fintiv* factor favors denial of institution.

5. *LGE is Both Petitioner and Defendant*

Regarding the fifth *Fintiv* factor (“whether the petitioner and the defendant in the parallel proceeding are the same party”), LG Electronics Inc. is both Petitioner here and a defendant in the District Court Action. The Petition acknowledges this. *See* Petition at 3. This *Fintiv* factor thus also weighs in favor of denial.

6. *Other Circumstances Also Weigh in Favor of Discretionary Denial*

Regarding the sixth *Fintiv* factor (“other circumstances that impact the

Board's exercise of discretion, including the merits”), while petitioner avers that “[t]he merits of this Petition are compelling as shown herein” (see Petition at 16), as set forth below in Section VI, the weakness of the proposed grounds weighs strongly in favor of denial of institution.

But even if there are some merits to Petitioner’s shotgun, six-ground challenge (and there are not), “[w]here the information presented at the institution stage is merely sufficient to meet the statutory institution threshold [a reasonable likelihood of success], the PTAB has the authority, where warranted, to exercise discretion to deny institution in view of the other *Fintiv* factors.” Memo from Katherine K. Vidal at 4 (June 21, 2022). Petitioner has certainly failed to meet the higher threshold of a “compelling” unpatentability challenge, and the number of references (up to four) in some of its asserted grounds call into question how “compelling” its arguments are.

Furthermore, the sheer number of grounds asserted, six, increases substantially the duplicative litigation sought by Petitioner. Asking both the USPTO and the district court to independently consider six asserted grounds of invalidity, without any *Sotera* stipulation, surpasses any reasonable threshold of “counterproductive litigation costs” limited by the Director’s guidance on discretionary denial (not to mention gamesmanship).

Accordingly, the sixth *Fintiv* factor also weighs against institution.

* * *

As described above, every single one of the six *Fintiv* factors weighs against institution of this Petition. The USPTO should exercise its discretion not to institute an *inter partes* review in view of the advanced stage of the District Court Action on the same grounds, as well as the other considerations described herein.

**VI. THE PETITION DOES NOT SHOW A REASONABLE
LIKELIHOOD OF PREVAILING WITH RESPECT TO ANY
CHALLENGED CLAIM**

The Petition should be denied because it does not establish a reasonable likelihood of prevailing on any of the asserted grounds against any of the challenged claims.

**A. Ground 1: Petitioner Fails To Establish That Claims 17-19, 22-24,
and 28 are Rendered Obvious By Sayana in view of Lee-689**

Petitioner has not shown a likelihood of prevailing with respect to Ground 1 because Sayana in view of Lee-689 does not teach each and every element of Claims 17-19, 22-24, and 28. Specifically, Sayana in view of Lee-689 does not teach elements 17[a] or 17[e] (or comparable elements 23[a], and 23[e]), as required for each of these claims.

1. ***Sayana and Lee-689 does not disclose or suggest “receiving codebook restricting information including at least one of a first bit sequence to restrict at least one precoding matrix from a first precoding matrix group and a second bit sequence to restrict at least one precoding matrix from a second precoding matrix group”***

Sayana in view of Lee-689 does not teach or suggest “receiving . . . a first bit sequence to restrict at least one precoding matrix from a first precoding matrix group and a second bit sequence to restrict at least one precoding matrix from a second precoding matrix group.” ’924 Patent Claim 17[a]. It also does not teach or suggest the comparable limitation of apparatus claim 23. *See Id.* Claim 23[a].

As will be further discussed below, Sayana, whether alone or in view of Lee-689, does not teach this element because it cannot—and does not—teach or suggest restricting using two bit sequences such that:

each bit of the first bit sequence corresponding to one precoding matrix of the first precoding matrix group, respectively, the at least one precoding matrix of the first precoding matrix group being restricted from being used as a precoding matrix of a first precoder, each bit of the second bit sequence corresponding to one precoding matrix of the second precoding matrix group, respectively, and the at least one precoding matrix of the second precoding matrix group being restricted from being used as a precoding matrix of a second precoder

as required by claims 17-19 and 22. And Sayana in view of Lee-689 likewise does not teach or disclose the comparable requirements of claim element 23[a] as required by claims 23-24, and 28.

The Petition only provides conclusory allegations while citing paraphrased paragraphs in Sayana for support. (See Petition at 17-20, 32-36). Although Sayana teaches a feedback scheme that includes a first and second representation of matrixes chosen from a codebook, Sayana specifically teaches one single “precoder structure” that “together convey[s] a precoder matrix of one or more vectors.” Ex. 1005 (Sayana) at [0058]. Yet, the Petition fails to explain how such a precoder structure can communicate the claimed first precoding matrix group and second precoding matrix group codebook restricting information—it cannot.

What is specifically missing are the details of how Sayana’s “two component feedback” system allegedly particularly maps to the ’924 Patent’s two independent precoding matrix groups. For example, Petitioner argues that ‘Sayana discloses ‘two’ component precoders including ‘first’ and ‘second’ precoders that are used to form one composite precoder at the BS.” Petition at 37. For further support, Petitioner points to other sections of the Petition, which essentially parrot the same conclusory allegations but also without explaining the details of how Sayana’s “two-component feedback” system with a single “precoder structure” that “together

convey[s] a precoder matrix of one or more vectors” meets the two independent precoder limitation.

What Sayana does teach is a “two-component feedback” system and the construction of a final precoder matrix as a function of the two-components. *See* Sayana at [0007]. Sayana focuses on “efficient precoder structures” (*id.* at [0041]) and shows two exemplary structures expressing the one overall precoder as a Kronecker product of two precoders. *Id.* at [0048]. It then discusses an exemplary structure where one matrix ($v_{11} \dots v_{1r}, v_{21} \dots v_{2r}, \dots, v_{81} \dots v_{8r}$) where the first sub-precoder is the top 4 rows (1-4) and the second sub-precoder is the bottom 4 rows (5-8). *Id.* at [0054]. This precoding matrix of one or more “vectors” consists of a first sub-precoder and a second sub-precoder. *Id.* at [0055]. Sayana explains that this precoder structure “is tied to feedback method in this invention.” *Id.* at [0058]. And in this feedback scheme, the UE sends a “first representation” and “second representation” which can be just the index of the chosen matrix within a codebook. *Id.* at [0058], [0060]. This “first representation and the second representation **together convey** a precoder matrix of one or more vectors associated with one or more spatial layers.” *Id.* As such, this “two component feedback conveys the information of a precoder matrix recommended by the user to the base station.” *Id.*

Yet, the '924 Patent claimed invention requires receiving codebook restricting information (such as indexes) for two precoding matrix groups, as to “restrict at least one precoding matrix from a first precoding matrix group and . . . to restrict at least one precoding matrix from a second precoding matrix group.” This is important because, as the '924 Patent explains, it enables the possibility that “a codebook may be restricted **independently with respect to each precoding matrix.**” Ex. 1001 ('924 Pat.) at 11:21-22 (emphasis added); *see also id.* Table 5/6 reproduced below:

	(PMI ₁ PMI ₂)									
RI	(0.0)	(0.1)	(0.2)	(0.3)	(1.0)	(1.1)	...	(15.1)	(15.2)	(15.3)
1	a0	a1	a2	a3	a4	a5	...	a61	a62	a63
2	a64	a65	a66	a67	a68	a69	...	a125	a126	a127
...	...	...	...	...	...	...	...	...	...	...
8	a448	a449	a450	a451	a452	a453	...	a509	a510	a511

id. at Table 5 (labeled Table 6). In this manner, “a codebook restriction may be **independently performed on a first precoding matrix and a second precoding matrix.**” *Id.* at 11:30-45. (emphasis added).

The '924 Patent also explains that “[t]he first information and the second information included in the codebook restricting information may be independently transmitted for each rank from the base station to the UE.” *Id.* at 13:23-27. In this manner, “when restriction of a first index and a second index is independently

determined and transmitted, an amount of feedback overhead of the codebook restriction may be significantly reduced.” *Id.* at 32-35. The ’924 Patent further emphasizes this key requirement of independence between the precoding matrix groups through examples where “only the first precoding matrix may be restricted” (*id.* at 13:49-50), or “only the second precoding matrix may be restricted” (*id.* at 13:55-56). And the ’924 Patent also describes how this independence between the precoding matrixes enables “a scheme that restricts both the first precoding matrix and the second precoding matrix, independently, a scheme that restricts only the first precoding matrix, and a scheme that restricts only the second precoding matrix may be selectively used.” *Id.* at 13:60-64; 14:50-54.

On the other hand, Sayana focuses on together (not independently) conveying precoder matrix information through its single structure. And the Petition does not explain how Sayana’s “two-component feedback” scheme that, for example, expresses the one overall precoder as a Kronecker product of two precoders (*see* Sayana [0042]-[0049]) and transmits one structure where the first sub-precoder are the top rows and the second sub-precoder are the bottom rows (*id.* at [0054]), could possibly restrict the first precoding matrix and the second precoding matrix independently or restrict only the first or second precoding matrix, as required by the challenged claims. It cannot.

Moreover, combining Sayana with the “bitmap” teachings of Lee-689 (the same teachings already considered during prosecution), does nothing to address this flaw. Petitioner recognizes that Sayana does not disclose “a first bit sequence” or “second bit sequence” or “each bit of the first bit sequence corresponding to one precoding matrix of the first precoding matrix group [and] each bit of the second bit sequence corresponding to one precoding matrix of the second precoding matrix group.” (Petition at 36, 38-39). To cure this, Petitioner combines Sayana and Lee-689 to argue their combination “yield[s] a system in which a separate bitmap is used for each of Sayana’s codebooks (*e.g.*, wideband and subband) to identify precoding matrices to restrict from each respective codebook.” (Petition at 36). Yet, Lee-689 does not teach receiving codebook restricting information including a first bit sequence and a second bit sequence.

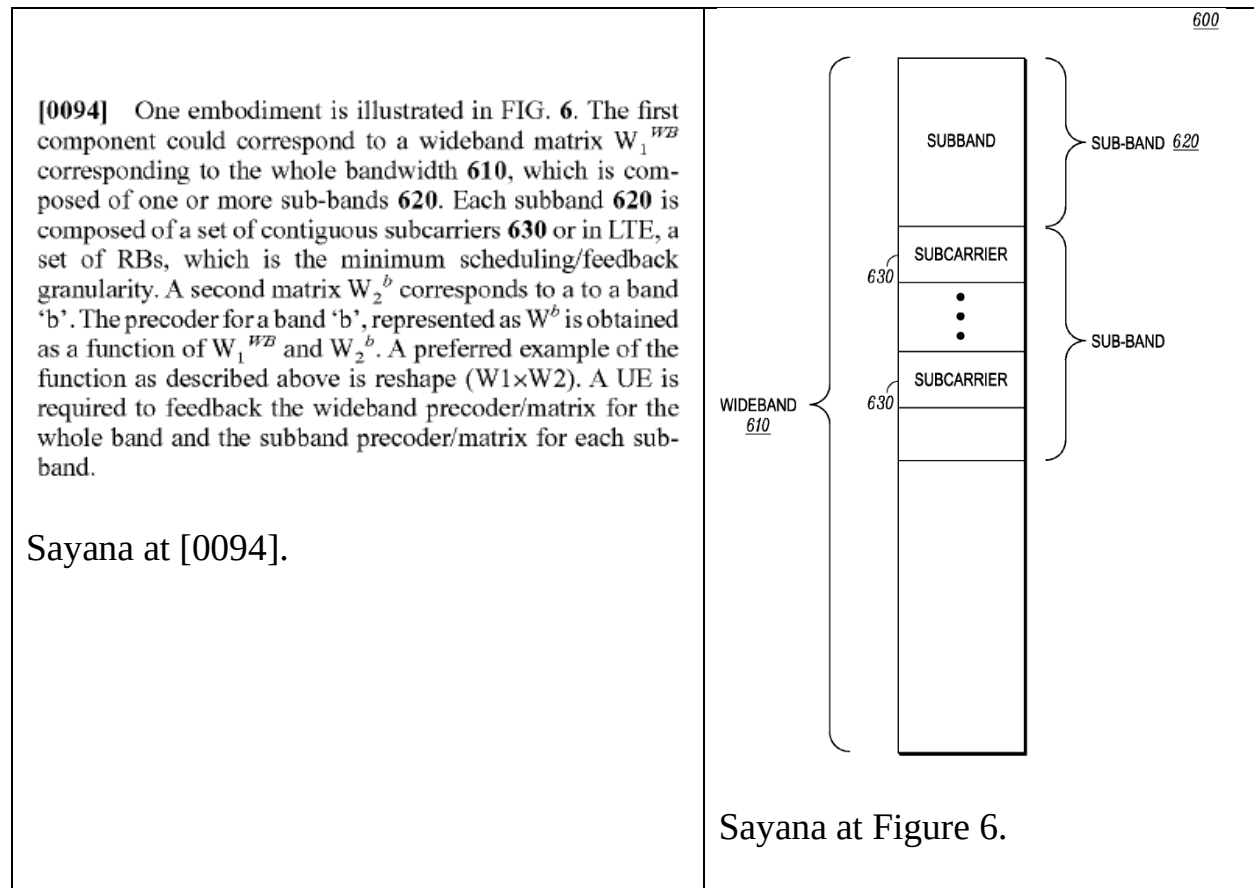
Specifically, Lee-689 does not teach “receiving codebook restricting information including at least one of a first bit sequence to restrict at least one precoding matrix from a first precoding matrix group **and a second bit sequence to restrict at least one precoding matrix from a second precoding matrix group**, each bit of the first bit sequence corresponding to one precoding matrix of the first precoding matrix group, respectively” ’924 Patent Claim 17[a], 17[b]; *see also* Claim 23[a], 23[b]. Instead, Lee-689 discloses receiving one base codebook subset

indication as a single bitmap with multiple bits, such as “0b10011110” representing the precoding matrix to be selected by the receiver. Ex. 1007 (Lee-689) at 18:5-19:9. Specifically, Lee-689 explains that its received codebook subset indication can be expressed by a single bitmap with multiple bits such that “if *i*th element of a base codebook subset indication expressed by bitmap is 0, a base codebook subset does not include *i*th element of a base codebook [and] if *i*th element of a base codebook subset indication expressed by bitmap is 1, a base codebook subset includes *i*th element of a base codebook.” *Id.* at 18:5-13. Meaning, Lee-689 operates with multiple bits, but only one single bit sequence (its bitmap), but never a first and second bit sequences. The Petition relies on this passage of Lee-689, acknowledging that only a single bitmap is disclosed. See Petition at 23, 37, 39. In summary, Lee-689 does not disclose any scenario where more than one base codebook subset indication is transmitted to the receiver to perform selection of a codebook subset.

Thus, the combination of Sayana and Lee-689 cannot possibly change Sayana’s “two-component feedback” scheme that together conveys precoder matrix information through a single structure. For example, Sayana discloses that wideband and subband are simply vectors of Sayana’s two-component feedback system (Sayana at [0065]-[0066], [0070]-[0072]), or are pre-configured components where

restrictions are imposed at a wideband level or subband level. (*Id.* at [0085]-[0087]).

The latter embodiment is illustrated in Figure 6, as described and shown below:



The above disclosure and figure highlights how the wideband encompasses the subband level and thus cannot perform codebook restriction independently on a first precoding matrix and a second precoding matrix as enabled by the '924 Patent. The "bitmap" teachings of Lee-689 have no effect on this overall structure scheme disclosed by Sayana's two-component feedback system. Instead, the combination would simply yield Sayana's single structure represented as a single bitmap.

Finally, Petitioner also argues that “Sayana’s disclosures relied on herein are all interrelated and complimentary” and therefore a POSITA could apply these teachings in any fashion and reach success. (*See* Petition at 19). However, Petitioner’s cited case law is easily distinguishable because what Petitioner is arguing for here is not “combining two embodiments” but instead the creation of a new embodiment all together from the teachings of Sayana’s distinct disclosures. *Id.* But this is the kind of hindsight that is Federal Circuit has cautioned against. *In re Gorman*, 983 F.2d 982, 987 (Fed. Cir. 1991) (“It is impermissible, however, simply to engage in a hindsight reconstruction of the claimed invention, using the applicant’s structure as a template and selecting elements from the references to fill the gaps.”).

2. *Sayana does not disclose or suggest “wherein a period of transmitting the information relating to the precoding matrix of the first precoder and a period of transmitting the information relating to the precoding matrix of the second precoder are different from each other.”*

Sayana in view of Lee-689 does not teach or suggest “wherein a period of transmitting the information relating to the precoding matrix of the first precoder and a period of transmitting the information relating to the precoding matrix of the second precoder are different from each other.” ’924 Patent Claim 17[e]. It also does not teach or suggest the comparable limitation of apparatus claim 23. *See Id.* Claim 23[e].

The Petition relies solely on Sayana for its alleged disclosure of this claim element 17[e] and 23[e]. In fact, it relies on a single paragraph of Sayana that states its “first matrix may be further feedback [sic] at different time instances and/or periodicities compared to the second matrix.” Petition at 19, 43 (citing Sayana). However, not only is this misreading, it is also not enough to meet the requirements of independent claims 17 and 23 with regard to this claim element.

Sayana explains that, as known in the art, a typical cross-polarized antenna configuration achieves reduced overhead and interference because the slow changes in the correlation of cross-polarized correlated antennas can be used to feedback the correlated and uncorrelated channel characteristics, i.e., two components, at different rates and/or with different levels of quantization/overhead in time and frequency to reduce feedback overhead. Sayana at [0005]-[0006]. One of the components representing the correlated channel characteristics can be fed back on a wideband basis and/or slowly in time, while the other component is fed back on a subband basis and/or more frequently in time. *Id.* However, it is this representation of correlated channel characteristics that is fed back at different intervals of time, and not the two-component structure itself. In other words, Sayana’s “two-component feedback” precoder matrix, which is a function of the two-components, is always fed back in either wideband basis or sub-band basis as a single structure, such as, a

Kronecker product of two precoders. *Id.* at [0048]. This makes sense because, in Sayana, the information relating to the precoding matrix of the first precoder and the information relating to the precoding matrix of the second precoder and transmitted together as a product in a single structure.

Combining Sayana with Lee-689 only serves to highlight how this element is not performed. That is, as already discussed above, Petitioner's alleged combination of Sayana with Lee-689 would produce a single bit sequence—one bitmap structure—containing information regarding the precoding matrixes that may be selected. This single bitmap is fed back in both a wideband basis and sub-band basis as a single bitmap, not at different periods in time or different time intervals between successive transmissions of the information relating to the precoding matrix.

3. *Petitioner fails to establish that Claims 18-19, 22, 24, and 28 are Not Patentable*

Claims 18-19, 22 are dependent on independent Claim 17 and Claims 24 and 28 are dependent on independent Claim 23. As such, as set forth above, Petitioner has not shown that dependent Claims 18-19, 22, 24, and 28 are unpatentable under this ground.

B. Grounds 2 and 3: Petitioner Failed To Establish That Claims 17-19, 22-24, and 28 are Rendered Obvious By Sayana and TS 36.213 and/or TS 36.211

Petitioner’s second and third ground of unpatentability—alleged obviousness in view of Sayana as modified by TS 36.213 (Ground 2) and in further view of TS 36.211 (Ground 3), also does not succeed for reasons similar to Ground 1 above.

1. *Sayana and TS 36.213 and/or TS 36.211 does not disclose or suggest “receiving codebook restricting information including at least one of a first bit sequence to restrict at least one precoding matrix from a first precoding matrix group and a second bit sequence to restrict at least one precoding matrix from a second precoding matrix group”*

Similar to Ground 1, Sayana combined with TS 36.213 and/or TS 36.211 does not teach “receiving codebook restricting information including at least one of a first bit sequence to restrict at least one precoding matrix from a first precoding matrix group **and a second bit sequence to restrict at least one precoding matrix from a second precoding matrix group**, each bit of the first bit sequence corresponding to one precoding matrix of the first precoding matrix group, respectively” ’924 Patent Claim 17[a], 17[b]; *see also* Claim 23[a], 23[b]. Instead, TS 36.216 and TS 36.211 teach only that a UE may be restricted to report PMI within a precoder codebook subset specified by a single bitmap parameter *codebookSubsetRestriction* configured by higher layer signaling. Ex. 1008 (TS 36.213) at 34.

Specifically, the *codebookSubsetRestriction* bitmap forms one bit sequence where a bit value of 0 indicates that the PMI reporting is not allowed to correspond to precoder(s) associated with the bit and vice-versa. *Id.* Table 7.2-1c provides an example of the association of bits of the *codebookSubSetRestriction* bit sequence bitmap parameter to precoders:

Table 7.2-1c: Association of bits in *codebookSubSetRestriction* bitmap to precoders in the 2 antenna port codebook of Table 6.3.4.2.3-1 in [3].

Codebook index i_c	Number of layers ν	
	1	2
0	a_0	-
1	a_1	a_4
2	a_2	a_5
3	a_3	-

Id. at 35. As shown, this bitmap forms the bit sequence $a_{A_c-1}, \dots, a_3, a_2, a_1, a_0$ where a bit value of 0 indicates that the PMI reporting is not allowed to correspond to a precoder associated with the bit, and a bitmap of 1 indicates that the PMI reporting is allowed to correspond to a precoder associated with the bit. Yet, the Petition has not explained where TS 36.213 discloses a second bit sequence or bitmap. Thus, the Petition has not shown how TS 36.213 and/or TS 36.211 disclose any scenario where more than one bitmap is received by the UE or how the UE may be restricted to report PMI within a precoder codebook specified by a first and second bit sequence. Thus, this claim element cannot be met by Sayana in combination with TS 36.213 and/or TS 36.211.

Therefore, similar to Ground 1, the combination of Sayana and TS 36.213 and/or TS 36.211 does not change Sayana's "two-component feedback" scheme that together conveys precoder matrix information through a single structure. See Ground 1 above. Instead, the combination would simply yield Sayana's single structure represented as a single bitmap.

2. ***Sayana and TS 36.213 and/or TS 36.211 does not disclose or suggest "wherein a period of transmitting the information relating to the precoding matrix of the first precoder and a period of transmitting the information relating to the precoding matrix of the second precoder are different from each other."***

Sayana in view of TS 36.213 and/or TS 36.211 also does not teach or suggest "wherein a period of transmitting the information relating to the precoding matrix of the first precoder and a period of transmitting the information relating to the precoding matrix of the second precoder are different from each other." '924 Patent Claim 17[e]. It also does not teach or suggest the comparable limitation of apparatus claim 23. See *Id.* Claim 23[e].

The Petition relies solely on Sayana for its alleged disclosure of this claim element 17[e] and 23[e]. In fact, it relies on a single paragraph of Sayana that states its "first matrix may be further feedback [sic] at different time instances and/or periodicities compared to the second matrix." Petition at 19, 43 (citing Sayana). But as already discussed under Ground 1, Sayana's two-component feedback system

does not teach or suggest this requirement of transmitting at different periods in time or different time intervals between successive transmissions of the information relating to the precoding matrix. *See infra* Section VI.A.2. Thus, Ground 2 fails for the same reasons. *Id.*

3. *Petitioner fails to establish that Claims 18-19, 22, 24, and 28 are Not Patentable*

Claims 18-19, 22 are dependent on independent Claim 17 and Claims 24 and 28 are dependent on independent Claim 23. As such, as set forth above, Petitioner has not shown that dependent Claims 18-19, 22, 24, and 28 are unpatentable under this ground.

C. *Grounds 4-6: Petitioner Failed To Establish That Claims 20-21, 26-27 are Rendered Obvious By Grounds 1-3 in further view of Koivisto*

Petitioner's Grounds 4-6—alleged obviousness under Grounds 1-3 as further modified by Koivisto—does nothing to cure the deficiencies under Ground 1-3, and thus also fail to show a reasonable likelihood of success under these grounds.

The Petition relies on Koivisto for its alleged teachings of the cross-polarization features recited in claims 20-21 and 26-27. *See* Petition at 65-69. But Claims 20-21 are dependent on independent Claim 17 and Claims 26-27 are dependent on independent Claim 23. As such, as set forth above in Grounds 1-3, Petitioner has not shown that dependent Claims 20-21 and 26-27 are unpatentable

under this ground. *See infra* Sections VI.A and VI.B. Accordingly, regardless of the teachings of Koivisto or any motivations to combine, these grounds must fail as well.

VII. CONCLUSION

For the reasons set forth above, the Board should not institute *inter partes* review on any of the grounds set forth in the Petition. As Patent Owner has shown, Petitioner has not established a reasonable likelihood that the cited references render any of the challenged claims of the '924 Patent obvious.

Case IPR2023-01273
Patent No. 9,136,924
Patent Owner Preliminary Response

Dated: January 29, 2024

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Case IPR2023-01273
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Patent Owner Preliminary Response

CERTIFICATE OF SERVICE

I hereby certify that on this 29th day of January, 2024, a copy of the attached **PATENT OWNER PRELIMINARY RESPONSE** was served by electronic mail to the attorneys of record, at the following addresses:

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Case IPR2023-01273
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CERTIFICATION PURSUANT TO 37 C.F.R. § 42.24(d)

Pursuant 37 CFR 42.24(d), the undersigned certifies that this Preliminary Response complies with the type-volume limitation of 37 CFR §42.24(a). The word count application of the word processing program used to prepare this Preliminary Response indicates that the Preliminary Response contains 12,460 words, excluding the parts of the brief exempted by 37 C.F.R. § 42.24(a).

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