

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

Petitioners,

v.

APEX BEAM TECHNOLOGIES, LLC,

Patent Owner.

Patent No. 10,951,271
Filing Date: June 27, 2019
Issue Date: March 16, 2021

Inventor: Xiaobo Zhang
Title: METHOD AND DEVICE FOR
MULTI-ANTENNA TRANSMISSION IN UE AND BASE STATION

PATENT OWNER'S PRELIMINARY RESPONSE

Case No. IPR2023-00571

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LIST OF EXHIBITS

Exhibit No.	Description of Document
2001	Defendants' Patent L.R. 3-3 Invalidity Contentions and Subject Matter Ineligibility Contentions, <i>Apex Beam Technologies, LLC v. Samsung Electronics Co., Ltd. et al.</i> , Case No. 2:22-cv-00188-JRG, served March 2, 2023
2002	Order Denying Motion to Stay Pending <i>Inter Partes</i> Review, Dkt. 55, <i>Apex Beam Technologies, LLC v. Samsung Electronics Co., Ltd., et al.</i> , Case No. 2:22-cv-00188-JRG (E.D. Tex. June 14, 2023)
2003	Redline Comparison of the Declaration of Apostolos Kakaes, Ph.D. (Ex. 1003) to the Petition

I. INTRODUCTION

On March 29, 2023, Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Petitioner”) submitted a petition (Paper 1, “Petition” or “Pet.”) to institute *inter partes* review (“IPR”) of U.S. Patent No. 10,951,271 (Ex. 1001, the “’271 Patent”), challenging claims 1-20 (the “Challenged Claims”). The Petition asserts that the Challenged Claims are rendered obvious by International Publication WO2016/015307 to Liu et al. (“*Liu*”) (Ex. 1006) in view of International Publication WO2016/126099 to Park et al. (“*Park*”) (Ex. 1009). Pet. at 9. However, the Board should deny the Petition for at least two reasons: (1) the Petitioner fails to identify how several elements of the Challenged Claims are rendered obvious by any combination of *Liu* and *Park*; and (2) the Board should exercise its discretion to deny the Petition under 35 U.S.C. § 314(a).

Moreover, the Board should not credit the expert testimony of Dr. Kakaes because his expert Declaration merely repeats the language of the Petition. *See generally* Ex. 2003.

II. THE ’271 PATENT

The ’271 Patent discloses and claims “a scheme for multi-antenna transmission in a wireless communication system.” ’271 Patent, at 1:18-19.

The ’271 Patent describes why such a scheme is necessary in view of the “urgent problem” of “how to use the information reported by the UE to form the best

beam to serve the UE service” where there are a limited number of beams for beam scanning and number of beams reported, as in the prior art:

[T]he base station can perform beam scanning over a period of time resources. The UE selects and reports the beam. However, due to the limitation of air interface resources, the number of beams used for beam scanning and the number of beams reported by the UE are limited. In addition, due to the uncertainty of the UE location, the beam used for beam scanning does not necessarily include the beam that best serves the UE. How to use the information reported by the UE to form the best beam to serve the UE service is an urgent problem to be solved.

Id. at 1:40-50.

The '271 Patent claims address the aforementioned problem and provide the following advantage:

[T]he advantage of the foregoing method is that the base station may obtain a proportional relationship among reception qualities corresponding to multiple beams, and may generate a more accurate serving beam for the UE according to the proportional relationship, thereby improving transmission quality.

Id. at 2:17-23.

As one example of the advantageous claims, the '271 Patent describes that a first signaling originating from a base station can, in one embodiment of the subject patent specification, comprise quasi-co-located (QCL) information. The UE uses this information to determine K antenna port groups that transmit a wireless signal:

In one embodiment, the first signaling is used to determine the co-located or QCL information.

In one embodiment, the first signaling explicitly indicates the co-located or QCL information.

In one embodiment, the first signaling implicitly indicates the co-located or QCL information.

Id., 6:44-49.

Another aspect of the claimed invention is “a first proportional sequence [that] corresponds to a ratio(ratios) among the K1 channel quality values” and one example of a channel quality value is a Reference Signal Received Power (RSRP). *Id.*, Claim 1. The '271 Patent utilizes channel quality values of RSRP that would create a proportion of one RSRP to all the other RSRPs in the K1 subset of antenna port groups to create a proportional sequence:

In one embodiment, the first proportional sequence includes K1-1 positive real number(s). The K1-1 positive real numbers is(are) a ratio(s) between the channel quality values other than the best channel quality value of the K1 channel quality values and the best channel quality value.

In one embodiment, the first proportional sequence is composed of quantized values corresponding to the K1-1 positive real number(s).

Id., 4:29-36.

In another embodiment, the '271 Patent describes that the claimed sequence consists of the proportions of one RSRP to all the other RSRPs in the K1 subset of

antenna port groups. For example, where K1 is equal to 2, the proportional sequence would consist of two values: {1 (the ratio of the first channel quality with itself), the ratio of the second channel quality and the first channel quality}:

The UE receives the first signaling to determine that K1 is equal to 2. The first antenna port group and the second antenna port group are two antenna port groups of the K antenna port groups. The first antenna port group corresponds to the first channel quality. The second antenna port group is corresponding to the second channel quality. The first channel quality is a best channel quality value of the K channel quality values. The second channel quality is a second best channel quality value of the K channel quality values. The UE reports {the first antenna port group, the second antenna port group, and the first proportional sequence} to the base station. ***The first proportional sequence is composed of 1, ratio of the second channel quality and the first channel quality.***

Id. at 24:18-31 (emphasis added).

In another embodiment, the '271 Patent also describes a first signaling is used to determine a target threshold, so as to compare a ratio between the second channel quality and first channel quality to the target threshold. *Id.*, Claim 1.

III. THE ALLEGED PRIOR ART

A. Liu

Liu “relates to the field of telecommunications technology and in particular to a signal transmission method and an associated device.” Ex. 1006, 1.

Despite disclosing antenna port groups generally in other contexts (*id.*, 16), *Liu* discloses that only singular antenna ports transmit wireless signals. *Liu* states as follows:

Refer to FIG. 6, which is a structural diagram of a second network device provided by an embodiment of the present invention; the second network device 2000 comprises:

a transmitting unit 21, which is for ***transmitting signals of M antenna ports*** to a first network device, where M is a positive integer.

During antenna configuration, the transmitting unit 21 transmits configuration information of M antenna ports to a first network device and ***transmits signals of M antenna ports*** to a first network device, which ***receives the signals of the M antenna ports*** transmitted by the transmitting unit 21 based on the configuration information, where M is a positive integer;

Id., 32 (emphases added). Accordingly, *Liu* discloses a one-to-one mapping of ports to signals.

Liu also explains that any first signaling in *Liu* is limited to the antenna configuration information which is used by the UE to determine ***M antenna ports***, and not antenna port groups:

During antenna configuration, the second network device transmits configuration information ***of M antenna ports*** to the first network device and ***transmits signals of the M antenna ports*** to the first network device.

Id., 23 (emphasis added), 25. *See also id.* at 32.

Additionally, *Liu* describes that “[i]n yet another implementation, the first criterion is codebook information; for example, the M antenna ports are divided into X groups, and the base station individually configures **one codebook set for each antenna port group.**” *Id.*, 21 (emphasis added). *Liu* further describes that [c]odebook information refers to information containing multiple precoding matrices that are individually configured at the base station for each antenna configuration, but **configuration** is not a base station **transmission** of a first wireless signal:

[T]he base station individually configures one codebook set for each antenna port group. The user equipment calculates the SNR based on the configured codebook set and feeds it back to the base station equipment. For example, the first group of antenna ports corresponds to antenna configuration 1, comprising antenna ports port0 and port1; the base station configures codebook set C1 for antenna configuration 1, and the precoding matrices included in C1 are W_{11} , W_{12} , W_{1n} , ..., W_{1N} ;

Id.

Liu also describes that “the user equipment . . . uses all the codebooks [] to conduct random beamforming” for those antenna configurations.

[F]or example, the user equipment at the pilot frequency of antenna configuration 1 uses all the codebooks in C1 to conduct random beamforming and obtain RSRP1; for the pilot frequency of antenna configuration 2, all the codebooks in C2 are used to conduct random beamforming and obtain RSRP2, ...; and UE feeds back

the index corresponding to the antenna configuration having the largest RSRP to the base station.

Id., 21-22.

Liu describes that, even if “each piece of configuration information correspond[ed] to the configuration of one of the antenna port groups,” the first network device of *Liu* would receive signals of M antenna ports transmitted by a second network device:

[S]tep S101: a first network device ***receives signals of M antenna ports*** transmitted by a second network device, where M is a positive integer.

During antenna configuration, a second network device transmits configuration information of M antenna ports to a first network device and transmits signals of the M antenna ports to the first network device, which receives the ***signals of the M antenna ports transmitted*** by the second network device based on the configuration information, where M is a positive integer . . .

It is possible that the second network device transmits only one piece of configuration information to the first network device, wherein the ***configuration information is the configuration information of the M antenna ports***; alternatively, that the M antenna ports are divided into multiple groups, and transmission to the first network device takes the form of ***multiple pieces of configuration information, with each piece of configuration information corresponding to the configuration of one of the antenna port groups***.

Id., 15-16 (emphases added).

Liu describes that “M antenna ports are divided into multiple groups” from

which “each piece of configuration information correspond[s] to the configuration of one of the antenna port groups.” *Id.*, 16. The only other division in *Liu* is from those individual M antenna ports into individual N antenna ports, where N is an integer less than or equal to M. *Id.*

B. Park

Park “relates to a wireless communication system and, more particularly to a method for feeding back CSI from a terminal based on a reference signal and an apparatus supporting the same.” Ex. 1009 at [1].

In one embodiment, *Park* describes that differences in RSRP can be expressed as a ratio:

Thus, the RSRP of a maximum of L antenna ports, which have an ***RSRP difference greater than a certain threshold value expressed as an RSRP ratio*** or dB scale, is reported as follows.

[Equation 13]

$$\text{RSRP}(r,m) - \max(\text{RSRP}(r,m)) > \text{Threshold}$$

...

In other words, the UE reports ***if the difference between RSRPs, expressed as an RSRP ratio*** or on a dB scale, exceeds a certain threshold value...

...

If the UE has been configured to report the RSRP of an antenna port having an RSRP within 5 dB of the antenna port with the greatest RSRP, then because antenna port 13 has the greatest RSRP of 40 dB as shown in FIG. 12, the UE reports antenna ports with an RSRP over 35 dB.

Id., [372]-[378] (emphases added). *Park* does not disclose creating a proportional

sequence of RSRP ratios with each of the other channel quality values that are not the maximum RSRP among the total channel quality values.

Park also discusses creating RSRP ratios for “a maximum of L antenna ports,” instead of RSRP ratios for a subset of the total antenna port groups. *See id.*, [372].

IV. CLAIM CONSTRUCTION

For the purposes of this Preliminary Response only, Patent Owner believes that claim construction is not required to resolve any issues. Pet. at 4.

V. LEVEL OF ORDINARY SKILL IN THE ART

For the purposes of this Preliminary Response only, Patent Owner utilizes Petitioner’s proposed level of skill in the art: “at least a master’s degree in electrical engineering or a similar field and at least two years of experience working with telecommunications systems, including multiple-input multiple-output (‘MIMO’) technology. Additional relevant work experience can compensate for less education, and *vice versa*.” Pet. at 9 (citations omitted) (emphasis added).

VI. PETITIONER HAS NOT DEMONSTRATED A REASONABLE LIKELIHOOD OF SUCCESS FOR THE GROUNDS ADVANCED IN THE PETITION, AND THE PETITION SHOULD BE DENIED

The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art, (2) any differences between the claimed subject matter and the prior art, (3) the level of skill

in the art, and (4) so-called secondary considerations where in evidence. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966); *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question is not whether the differences themselves would have been obvious, but whether the claimed invention as a whole would have been obvious. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed. Cir. 1983).

The Board has held that a failure to identify the differences between the claimed subject matter and the prior art is fatal to an obviousness challenge. *See, Apple, Inc. v. Contentguard Holdings, Inc.*, IPR2015-00355, Decision Denying Institution of *Inter Partes* Review, Paper 9 at 9-10 (P.T.A.B. June 26, 2015) (denying institution for failure to identify the differences between the claimed subject matter and the prior art).

In arriving at an obviousness determination, the Board must sufficiently explain and support the conclusions that the prior-art references disclose all the elements recited in the Challenged Claims and a relevant, skilled artisan not only could have made, but would have been motivated to combine all the prior art references in the way the patent claims and reasonably expected success. *Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017). That is, even if all the claim elements are found across a number of references, an obviousness determination must consider whether a person of ordinary skill in the art would have

the motivation to combine those references. *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1368 (Fed. Cir. 2016); *Los Angeles Biomedical Rsch. Inst. at Harbor-UCLA Med. Ctr. v. Eli Lilly & Co.*, 849 F.3d 1049, 1067 (Fed. Cir. 2017) (vacating and remanding an obviousness determination, in part, because the Board did not make factual finding as to whether there was an apparent reason to combine all three prior art references to achieve the claimed invention and whether a person of skill in the art would have had a reasonable expectation of success from such a combination). This combinability determination, as supported by an articulated motivation to combine, requires a plausible rationale as to why those prior art references would have worked together. *Broadcom Corp. v. Emulex Corp.*, 732 F.3d 1325, 1335 (Fed. Cir. 2013). Absent some articulated rationale, a “common sense” finding is no different than the conclusory statement “would have been obvious.” *In re Van Os*, 844 F.3d 1359, 1361 (Fed. Cir. 2017). Of additional importance, “knowledge of a problem and motivation to solve it are entirely different from motivation to combine particular references. . . .” *Innogenetics, N.V. v. Abbott Lab’ys.*, 512 F.3d 1363, 1373 (Fed. Cir. 2008).

A. Claims 1-20 are Not Obvious Over Liu in Combination with Park

1. Independent Claim 1

a. Liu in Combination with Park Does Not Disclose “wherein, K antenna port groups of the base station are used to transmit the first wireless signal; the K is a positive integer greater than 1,” as Required by Claim 1

Claim 1 of the '271 Patent recites “wherein, K antenna port groups of the base station are used to transmit the first wireless signal.” *Liu* in combination with *Park* neither discloses nor renders this claim limitation obvious, as Petitioner asserts. Pet. at 16-17.¹ Petitioner only relies on *Liu* to disclose this claim limitation. *Id.*

Petitioner argues that *Liu* discloses transmission of a first wireless signal using M antenna ports. Pet. at 21. However, *Liu* does not disclose “wherein, K antenna *port groups* of the base station are used to transmit the first wireless signal.”

Despite disclosing antenna port groups generally in other contexts (Ex. 1006, 16), *Liu* makes an explicit distinction between antenna port groups and singular antenna ports and discloses only that singular antenna ports transmit the first wireless signal. *Liu* states as follows:

¹ The Petition cites the expert Declaration of Dr. Kakaes (Ex. 1003, ¶¶ 109-115) for its assertion that *Liu* in combination with *Park* renders obvious these limitations, but this portion of the Kakaes Declaration merely repeats the Petition and should, therefore, be given no weight. *See infra* Sec. VIII; Ex. 2003, ¶¶ 109-115.

Refer to FIG. 6, which is a structural diagram of a second network device provided by an embodiment of the present invention; the second network device 2000 comprises:

a transmitting unit 21, which is for *transmitting signals of M antenna ports* to a first network device, where M is a positive integer.

During antenna configuration, the transmitting unit 21 transmits configuration information of M antenna ports to a first network device and *transmits signals of M antenna ports* to a first network device, which *receives the signals of the M antenna ports* transmitted by the transmitting unit 21 based on the configuration information, where M is a positive integer;

Ex. 1006, 32 (emphases added). Accordingly, *Liu* discloses only a singular antenna port for transmitting each singular signal (*i.e.*, a one-to-one mapping of ports to signals), and *Liu* cannot be interpreted to disclose or suggest any classification of port groups to meet this limitation.

The Board should also reject Petitioner's attempt to sidestep the claimed requirements for using "*K* antenna port groups" to "transmit the first wireless signal," where "*K* is a positive integer greater than 1," on the grounds that Petitioner failed to specify where this required element of the claim is found in the prior art.

Petitioner's arguments regarding the use of only one singular antenna port or that each group may contain only one antenna are irrelevant (or at least insufficient) as to whether a certain number (*K*) of claimed antenna port groups, classified as such, are used to transmit one first wireless signal, and not individual antenna ports.

The claim language itself is explicit that “K is a positive integer *greater than 1*.” ’271 Patent, Claim 1. Therefore, even if a group comprised one antenna port, there are still multiple (greater than 1) groups transmitting the claimed first wireless signal.

Additionally, Petitioner’s reliance on “codebook sets” or “codebook information” does not meet the claimed “first wireless signal.” Pet. at 16-17 (citing Ex. 1006, 21 (“In yet another implementation, the first criterion is codebook information; for example, the M antenna ports are divided into X groups, and the base station individually configures one codebook set for each antenna port group”)). But *Liu*’s codebook sets or codebook information are not the same as the claimed first wireless signal, and Petitioner fails to sufficiently explain how or why the Board would interpret *Liu*’s codebook beyond the four corners of the *Liu* reference. Petitioner’s expert merely parrots Petitioner’s arguments, offering only conclusory testimony.

Liu describes that [c]odebook information refers to information containing multiple precoding matrices that are individually configured at the base station for each antenna configuration, but **configuration** is not a base station **transmission** of a first wireless signal:

[T]he base station individually configures one codebook set for each antenna port group. The user equipment calculates the SNR based on the configured codebook set

and feeds it back to the base station equipment. For example, the first group of antenna ports corresponds to antenna configuration 1, comprising antenna ports port0 and port1; the base station configures codebook set C1 for antenna configuration 1, and the precoding matrices included in C1 are W_{11} , W_{12} , W_{1n} , ..., W_{1N} ;

Id., 21.

Petitioner's cited section of *Liu* also describes that “*the user equipment...* uses all the codebooks [] to conduct random beamforming” for those antenna configurations, but beamforming is also not the same as transmitting the claimed first wireless signal *from the base station*.

[F]or example, the user equipment at the pilot frequency of antenna configuration 1 uses all the codebooks in C1 to conduct random beamforming and obtain RSRP1; for the pilot frequency of antenna configuration 2, all the codebooks in C2 are used to conduct random beamforming and obtain RSRP2, ...; and UE feeds back the index corresponding to the antenna configuration having the largest RSRP to the base station.

Id., 21-22.

In any case, to the extent *Liu's* codebook information is transmitted from the base station (it is not), it would be on an antenna port by antenna port basis as described above, and not collectively transmitted by multiple antenna port groups.

Therefore, *Liu* in combination with *Park* does not render obvious this claim limitation.

b. Liu in Combination with Park Does Not Disclose “the first signaling is used by the UE to determine the K antenna port groups transmitting the first wireless signal received by the UE; the K is a positive integer greater than 1,” as Required by Claim 1

Claim 1 of the '271 Patent recites “the first signaling is used by the UE to determine the K antenna port groups transmitting the first wireless signal received by the UE; the K is a positive integer greater than 1.” *Liu* in combination with *Park* neither discloses nor renders this claim limitation obvious, as Petitioner asserts. Pet. at 17-19.² Petitioner only relies on *Liu* to disclose this claim limitation. *Id.*

As noted above in Section VI.A.1.a, *Liu* does not disclose the claimed “K antenna port groups of the base station are used to transmit the first wireless signal” or “the K is a positive integer greater than 1” and therefore cannot disclose, teach, or suggest “determin[ing] the K antenna port groups transmitting the first wireless signal received by the UE.”

Similarly, Petitioner’s cited portions of *Liu* explain that any first signaling in *Liu* is limited to the antenna configuration information which is used by the UE to determine *M antenna ports*, and not antenna port groups:

² The Petition cites the expert Declaration of Dr. Kakaes (Ex. 1003, ¶¶ 113-115) for its assertion that *Liu* in combination with *Park* renders obvious these limitations, but this portion of the Kakaes Declaration merely repeats the Petition and should, therefore, be given no weight. *See infra* Sec. VIII; Ex. 2003, ¶¶ 113-115.

During antenna configuration, the second network device transmits configuration information *of M antenna ports* to the first network device and *transmits signals of the M antenna ports* to the first network device.

Ex. 1006, 23 (emphasis added), 25. *See also id.* at 32.

Liu is even more specific that, even if “each piece of configuration information correspond[ed] to the configuration of one of the antenna port groups,” the first network device of *Liu* would still only receive signals of M antenna ports transmitted by a second network device, and not antenna port groups:

[S]tep S101: a first network device *receives signals of M antenna ports* transmitted by a second network device, where M is a positive integer.

During antenna configuration, a second network device transmits configuration information of M antenna ports to a first network device and transmits signals of the M antenna ports to the first network device, which receives the *signals of the M antenna ports transmitted* by the second network device based on the configuration information, where M is a positive integer...

It is possible that the second network device transmits only one piece of configuration information to the first network device, wherein the *configuration information is the configuration information of the M antenna ports*; alternatively, that the M antenna ports are divided into multiple groups, and transmission to the first network device takes the form of *multiple pieces of configuration information, with each piece of configuration information corresponding to the configuration of one of the antenna port groups*.

Id., 15-16 (emphases added).

Liu does not disclose any of the types of information that would be indicative of disclosing the claimed first signaling. For example, the '271 Patent describes that the first signaling according to one embodiment of the subject patent specification comprises quasi-co-located (QCL) information. The UE uses this information to determine the K antenna port groups:

In one embodiment, the first signaling is used to determine the co-located or QCL information.

In one embodiment, the first signaling explicitly indicates the co-located or QCL information.

In one embodiment, the first signaling implicitly indicates the co-located or QCL information.

'271 Patent, 6:44-49. Such a description of QCL information or other forms of information in the first signaling used by the UE to determine the K antenna port groups is lacking in *Liu*, except for the inapposite “configuration information of M antenna ports” described above.

Therefore, *Liu* in combination with *Park* does not render obvious this claim limitation.

- c. Liu in Combination with Park Does Not Disclose “the K antenna port groups respectively correspond to K channel quality values; the K channel quality values are Reference Signal Received Powers (RSRPs) or a Signal to Interference plus Noise Ratios (SINRs); K1 antenna port groups of the K antenna port groups correspond to K1 channel quality values of the K channel quality values; a first proportional sequence corresponds to a ratio (ratios) among the K1 channel quality values,” as Required by Claim 1**

Claim 1 of the '271 Patent recites “a first proportional sequence corresponds to a ratio (ratios) among the K1 channel quality values.” *Liu* in combination with *Park* neither discloses nor renders this claim limitation obvious, as Petitioner asserts. Pet. at 22-29.³

Petitioner incorrectly asserts that *Liu* discloses this limitation through a “ratio of RSRP over the received signal strength indicator (RSSI).” Pet. at 22 (citing Ex. 1006, 21, 30-31, 16, 26). But *Liu*’s RSSI falls squarely outside of the claim language that describes “the K channel quality values are Reference Signal Received Powers (RSRPs) or a Signal to Interference plus Noise Ratios (SINRs).”

³ The Petition cites the expert Declaration of Dr. Kakaes (Ex. 1003, ¶¶ 116-138) for its assertion that *Liu* in combination with *Park* renders obvious these limitations, but this portion of the Kakaes Declaration merely repeats the Petition and should, therefore, be given no weight. *See infra* Sec. VIII; Ex. 2003, ¶¶ 116-138.

Petitioner also incorrectly states that “*Park* renders this ratio obvious because *Park* compares the RSRP of each measured antenna port group to the maximum RSRP *as an RSRP ratio* or db scale.” Pet. at 22-23 (internal quotations omitted) (citing to Ex. 1009, [370]-[373], [376]-[378]). However, Petitioner mischaracterizes the cited portion of *Park*. *Park* is merely describing that differences in RSRP can be expressed as a ratio:

Thus, the RSRP of a maximum of L antenna ports, which have an ***RSRP difference greater than a certain threshold value expressed as an RSRP ratio*** or dB scale, is reported as follows.

[Equation 13]

$RSRP(r,m) - \max(RSRP(r,m)) > \text{Threshold}$

...

In other words, the UE reports ***if the difference between RSRPs, expressed as an RSRP ratio*** or on a dB scale, exceeds a certain threshold value...

...

If the UE has been configured to report the RSRP of an antenna port having an RSRP within 5 dB of the antenna port with the greatest RSRP, then because antenna port 13 has the greatest RSRP of 40 dB as shown in FIG. 12, the UE reports antenna ports with an RSRP over 35 dB.

Ex. 1009, [372]-[378] (emphases added).

Even if *Park* described creating a ratio comparing one RSRP with the maximum RSRP, *Park* still does not disclose the claimed limitation that requires creating a proportional ***sequence*** that corresponds to a ratio (ratios) with each of the other K1 channel quality values, including those channel quality values which are

not the maximum RSRP among the total K values. The claimed language, in view of the '271 Patent specification, is clear that the embodiment utilizing channel quality values of RSRP would create a proportion of one RSRP to all the other RSRPs in the K1 subset of antenna port groups to create a proportional sequence (*i.e.*, a sequence comprising ratios between channel quality values ***other than the best channel quality value***):

In one embodiment, the first proportional sequence includes K1-1 positive real number(s). The K1-1 positive real numbers is(are) a ratio(s) between the channel quality values other than the best channel quality value of the K1 channel quality values and the best channel quality value.

In one embodiment, the first proportional sequence is composed of quantized values corresponding to the K1-1 positive real number(s).

'271 Patent, 4:29-36.

As another example in the '271 Patent that the claimed sequence consists of the proportions of one RSRP to all the other RSRPs in the K1 subset of antenna port groups, the specification describes that, where K1 is equal to 2, the proportional sequence would consist of two values: {1 (the ratio of the first channel quality with itself), the ratio of the second channel quality and the first channel quality}:

The UE receives the first signaling to determine that K1 is equal to 2. The first antenna port group and the second antenna port group are two antenna port groups of the K antenna port groups. The first antenna port group corresponds to the first channel quality. The second

antenna port group is corresponding to the second channel quality. The first channel quality is a best channel quality value of the K channel quality values. The second channel quality is a second best channel quality value of the K channel quality values. The UE reports {the first antenna port group, the second antenna port group, and the first proportional sequence} to the base station. ***The first proportional sequence is composed of 1, ratio of the second channel quality and the first channel quality.***

Id. at 24:18-31 (emphasis added).

Moreover, the description of *Park* discusses creating RSRP ratios for “a maximum of L antenna ports,” instead of RSRP ratios for a subset of antenna port groups (*e.g.*, K1 out of a K total antenna port groups), as the claim limitation requires. *See* Ex. 1009, [372].

Therefore, *Liu* in combination with *Park* does not render obvious this claim limitation.

d. Liu in Combination with Park Does Not Disclose “transmitting, by the UE, first information to the base station; the first information is used to determine the K1 antenna port groups and the first proportional sequence,” as Required by Claim 1

Claim 1 of the '271 Patent recites “transmitting, by the UE, first information to the base station; the first information is used to determine the K1 antenna port groups and the first proportional sequence.” *Liu* in combination with *Park* neither discloses nor renders this claim limitation obvious, as Petitioner asserts. Pet. at 30-

31.⁴

As noted above in Section VI.A.1.c, *Liu* alone, or in combination with *Park*, does not disclose the claimed “first proportional sequence,” and therefore cannot disclose, teach, or suggest “transmitting, by the UE, first information to the base station; the first information is used to determine the . . . first proportional sequence.”

Moreover, *Liu* does not describe determining a subdivision of antenna port groups from K into K1. At most, *Liu* describes that “M antenna ports are divided into multiple groups” from which “each piece of configuration information correspond[s] to the configuration of one of the antenna port groups.” Ex. 1006, 16. The only other division in *Liu* is from those individual M antenna ports into individual N antenna ports, where N is an integer less than or equal to M. *Id.* Again, these are individual ports and not the claimed “determin[ation] of K1 antenna port groups.”

Petitioner completely ignores and does not address why there would be any motivation to combine *Liu* with *Park* to disclose this claim limitation, “the first information is used to determine the K1 antenna port groups,” where *Liu* is neither directed towards “determin[ing] the K antenna port groups transmitting the first

⁴ The Petition cites the expert Declaration of Dr. Kakaes (Ex. 1003, ¶¶ 139-143) for its assertion that *Liu* in combination with *Park* renders obvious these limitations, but this portion of the Kakaes Declaration merely repeats the Petition and should, therefore, be given no weight. *See infra* Sec. VIII; Ex. 2003, ¶¶ 139-143.

wireless signal,” as described above in Section VI.A.1.a and VI.A.1.b, or to subdivision of K antenna port groups into K1 antenna port groups. Because Petitioner fails to address motivation to combine, it fails to advance a proper showing of obviousness under 37 C.F.R. § 42.104(b). *Apotex Inc. v. Wyeth LLC*, IPR2014-00115, Paper 94, slip op. at 11 (P.T.A.B. Apr. 20, 2015) (quoting *Procter & Gamble Co. v. Teva Pharms. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009)) (“A party that petitions the Board for a determination of obviousness must show 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.’”).

Therefore, *Liu* in combination with *Park* does not render obvious this claim limitation.

2. Independent Claims 6, 11, and 16

Claim 6 of the '271 Patent recites “[a] method for multi-antenna transmission in a base station” that mirrors the claim limitations of Claim 1, which recites “[a] method for multi-antenna transmission in a user equipment.” In other words, Claim 6 discloses a method from the perspective of the base station that is in communication with the UE in Claim 1. For at least the same reasons as Claim 1, any combination of *Liu* and *Park* fails to render obvious Claim 6.

Claim 11 recites “[a] user equipment (UE) for multi-antenna transmission,” which is the apparatus claim of Claim 1. For at least the same reasons as Claim 1, any combination of *Liu* and *Park* fails to render obvious Claim 11.

Independent Claim 16 recites “[a] base station equipment for multi-antenna transmission” that mirrors the claim limitations of Claim 11, which recites “[a] user equipment (UE) for multi-antenna transmission.” In other words, Claim 16 discloses the base station equipment that is in communication with the UE in Claim 11. For at least the same reasons as Claim 11, any combination of *Liu* and *Park* fails to render obvious Claim 16.

3. Dependent Claims 2-5, 7-10, 12-15, and 17-20

Claims 2-4 are dependent on Claim 1, Claims 6-8 are dependent on Claim 5, Claim 10 is dependent on Claim 9, and Claim 12 is dependent on Claim 11. Therefore, Claims 2-5, 7-10, 12-15, and 17-20 are not rendered obvious by any combination of *Liu* and *Park* for at least the same reasons as Claims 1, 6, 11, and 16 respectively.

VII. THE PETITION SHOULD BE DENIED IN THE DISCRETION OF THE DIRECTOR UNDER 35 U.S.C. § 314(A)

Based on Petitioner’s reasons regarding § 314(a), the Board should exercise its discretion to deny this Petition.

The circumstances of the parallel District Court Litigation necessitate denial of the Petition under the Board’s precedent, as every factor considered in relation to efficiency, fairness, and the merits supports denial. *See Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11, at 6 (P.T.A.B. Mar. 20, 2020) (precedential) (considering (a) “whether the petitioner and the defendant in the parallel proceeding are the same party”; (b) “overlap between issues raised in the petition and in the parallel proceeding” (c) “proximity of the court’s trial date to the Board’s projected statutory deadline for a final written decision”; (d) “investment in the parallel proceeding by the court and the parties”; (e) “whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted”; and (f) “other circumstances that impact the Board’s exercise of discretion, including the merits.”).

As set forth below, these factors collectively demonstrate that efficiency and integrity of the AIA are best served by denying review. First, the Petitioner is the Defendant in the parallel proceeding. *See infra* Section VII.A. Second, the Challenged Claims are all at issue in the District Court Litigation, and Petitioner has raised identical arguments for invalidity there. *See infra* Section VII.B. Third, trial in the District Court Litigation is set for June 24, 2024, almost five months earlier than the projected statutory deadline for a Final Written Decision of this Petition on November 18, 2024. *See infra* Section VII.C. Fourth, the parties (and Patent Owner in particular) have invested significant resources on developing legal and factual

issues of validity and infringement in the District Court Litigation and will have invested substantially more resources before any decision on this Petition. *See infra* Section VII.D. Fifth, the Court has already denied a stay pending this Petition. *See infra* Section VII.E. Finally, no other factors favor institution. *See infra* Section VII.F.

Accordingly, the Board should exercise its discretion under § 314(a) and deny the Petition because institution of this proceeding would not be consistent with the objective of the AIA to “provide an effective and efficient alternative to district court litigation.” *NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8, at 20 (P.T.A.B. Sept. 12, 2018) (quoting *Gen. Plastic Indus. Co. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19, at 16–17 (P.T.A.B. Sept. 6, 2017) (precedential)).

**A. The Parallel District Court Litigation and the Petition
Involve the Same Parties**

As noted in Patent Owner’s Mandatory Notice, there exists a parallel District Court Litigation between the same parties regarding the same subject patent (the ’271 Patent). *Samsung Elecs. Co., v. Apex Beam Techs. LLC*, IPR2023-00571, Paper 5 at 3 (P.T.A.B. Apr. 19, 2023); Pet. at 65. Accordingly, this factor weighs in favor of discretionary denial.

B. The District Court Litigation Involves Substantially the Same Claims, Grounds, Arguments, and Evidence

This Petition is co-extensive with invalidity arguments that Petitioner has already raised in the District Court Litigation. Ex. 2001, at 62-64. “In at least these ways, the parallel proceedings would duplicate effort. This is an inefficient use of Board, party, and judicial resources and raises the possibility of conflicting decisions.” *Cisco Sys., Inc. v. Ramot at Tel Aviv Univ. Ltd.*, IPR2020-00122, Paper 15 at 10 (P.T.A.B. May 15, 2020). Accordingly, this fact weighs strongly in favor of discretionary denial.

For this reason, denial of institution under § 314(a) is appropriate because the Petition “includes the same or substantially the same claims, grounds, arguments, and evidence as presented in the parallel [District Court] proceeding.” *Fintiv*, IPR2020-00019, Paper 11, at 12.

C. Proximity of the District Court’s Trial Date

The proximity of the District Court Litigation’s trial date to the Board’s projected statutory deadline for a Final Written Decision strongly weighs in favor of discretionary denial.

The parties’ trial is scheduled for June 24, 2024. Ex. 1024 (Docket Control Order, Dkt. 37, *Apex Beam Techs. LLC v. Samsung Elecs. Co.*, Case No. 2:22-cv-00188-JRG (E.D. Tex. Feb. 6, 2023)). Pursuant to 35 U.S.C. §§ 314(b)(1) and

316(a)(11), the projected statutory deadline for a Final Written Decision of this Petition is November 18, 2024.⁵ As the District Court’s trial will be four months before the projected statutory deadline, this factor weighs strongly in favor of denying institution. *See Supercell Oy v. Gree, Inc.*, IPR2020-00513, Paper 11 at 10-12 (P.T.A.B. June 24, 2020) (denying institution where the jury trial was scheduled to conclude approximately ten months before the statutory deadline); *Edward LifeSciences Corp. v. Evalve, Inc.*, IPR2019-01479, Paper 7, at 6-13 (P.T.A.B. Feb. 26, 2020) (denying institution where jury trial would conclude more than nine months before a final decision would be due); *Samsung Elecs. Am., Inc. v. Uniloc 2017 LLC*, IPR2019-01218, Paper 7, at 7-10 (P.T.A.B. Jan. 7, 2020) (denying institution where jury selection was scheduled for approximately six months before trial in the Board proceeding would conclude); *Next Caller Inc. v. TrustID, Inc.*, IPR2019-00961, -00962, Paper 10, at 8-16 (P.T.A.B. Oct. 16, 2019) (denying institution where trial was scheduled to conclude “several months,” before a final decision would be due); *Cisco Sys., Inc.*, IPR2020-00122, Paper 15 at 8 (“Because the trial date is substantially earlier than the projected statutory deadline for the

⁵ Petitioner incorrectly states that “[a] FWD is anticipated in September 2024, about two months after trial ends.” Pet. at 64. Pursuant to U.S.C. § 314(b)(1), an Institution Decision is due three months after this Preliminary Response, on November 16, 2023. Pursuant to 35 U.S.C. § 316(a)(11), a Final Written Decision is due one year after an Institution Decision, on November 18, 2024 (November 16, 2024 falls on a Saturday).

Board’s final decision, this factor weighs in favor of discretionary denial.”).

Petitioner does not contest that the proximity of the trial favors denial of institution. Thus, this factor also weighs in favor of discretionary denial.

D. Significant Investment and Petitioner’s Delay in Filing the Petition

The parties’ investment in the parallel proceeding weighs in favor of discretionary denial.

In the District Court Litigation, the Court has already filed a Docket Control Order (Dkt. 37), Discovery Order (Dkt. 38), and Protective Order (Dkt. 44). Discovery is also well under way. The parties have already exchanged initial disclosures, infringement contentions pursuant to P.R. 3-1, invalidity contentions pursuant to P.R. 3-3, proposed claim terms pursuant to P.R. 4-1, and a trial date is set for June 24, 2024, which is less than a year away. Ex. 1024.

As noted above, the two references used in the Petition (*Liu* and *Park*) and Petitioner’s corresponding arguments overlap with the claims, references, arguments, and evidence in the District Court Litigation. Petitioner further fails to offer any explanation why the Board should review the same claims on the same grounds which would already have been adjudicated by the District Court based on the parties’ investment. Thus, the parties’ and the Court’s substantial investment in this proceeding weighs in favor of denial of institution under this factor.

E. No Stay of the Parallel District Court Litigation

There is no stay of the parallel District Court Litigation, and Petitioner's previous motion to stay the case pending *inter partes* reviews, including this *inter partes* review, was denied. Ex. 2002, Order Denying Motion to Stay Pending Inter Partes Review, Dkt. 55, *Apex Beam Techs. LLC v. Samsung Elecs. Co.*, Case No. 2:22-cv-00188-JRG (E.D. Tex. June 14, 2023). Even if the Petition was instituted and Petitioner filed a motion to stay the District Court Litigation again, prejudice, tactical disadvantage to Patent Owner, the stage of the litigation, and the lack of potential simplification would weigh strongly against such a motion. *See Lennon Image Techs., LLC v. Macy's Retail Holdings, Inc.*, 2:13-CV-00235-JRG, 2014 WL 4652117, at *1 (E.D. Tex. Sept. 18, 2014); *see Intell. Ventures II v. FedEx Corp.*, No. 2:16-cv-00980-JRG, Dkt. 141 at 4-5 (E.D. Tex. Oct. 24, 2017) ("The Court agrees that the Parties have already invested substantial effort and resources during discovery and in preparing claim construction briefing. . . . These circumstances weigh against staying this case").

Moreover, a stay would not decrease the burden on the Court and the parties since the instituted IPRs cover only 2 out of at least 13 references that Petitioner raised in the District Court Litigation for obviousness, and there exist other challenges under § 112 and § 101. Ex. 2001, at 48-49, 62-64, 74-81. *Intell. Ventures II*, No. 2:16-cv-00980-JRG, Dkt. 141 at 3-4 ("[T]he instituted IPRs only cover a

narrow slice of the invalidity arguments Defendants have raised in this case. For example, Defendants have argued that the '715 Patent is invalid under § 102 with respect to at least eight references . . . under § 103 with respect to at least twenty-six combinations . . . under § 112 [], and under § 101.”).

Accordingly, it would be unlikely for the Court to hold that a stay would streamline the litigation and this factor supports denial of institution.

F. Other Factors Favor Discretionary Denial

Petitioner does not present a strong case on the merits, further supporting denial of institution. *See supra* Section VI. Petitioner also does not identify any other factors which weigh against discretionary denial. Pet. at 63-65.

Thus, when viewing the factors together, the Petition should be denied in the Director’s discretion under 35 U.S.C. § 314(a).

VIII. PETITIONER’S COPYCAT EXPERT DECLARATION IS ENTITLED TO NO WEIGHT

“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.” 37 C.F.R. § 42.65(a). Here, the Declaration of Dr. Kakaes is almost entirely a recitation of the Petition, except for the Introduction, Qualifications Background, Materials Considered, and Legal Standards sections. *See generally* Ex. 2003. Because Dr. Kakaes provides nearly no independent analysis, aside from copying the attorney arguments in the Petition, and

does not disclose the underlying facts or data upon which his opinions are based, his opinion should be entitled to no weight. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper No. 9 (P.T.A.B. Aug. 24, 2022) (designated precedential Feb. 10, 2023, Paper 12) (denying institution and rejecting a conclusory and unsupported expert declaration that repeated portions of the Petition verbatim.).

IX. THE BOARD SHOULD REJECT ANY LATE SOTERA STIPULATION

Petitioner has not made a *Sotera*-style stipulation that “if IPR is instituted, [Petitioner] will not pursue in the District Court Litigation any ground raised or that could have been reasonably raised in an IPR” in its Petition, which weighs further in favor of discretionarily denying institution. *See Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12, 13-14 (P.T.A.B. Dec. 1, 2020) (designated Dec. 17, 2020).

The Board should not accept any late *Sotera* stipulation after this Patent Owner Preliminary Response. Petitioner has known about the related District Court Litigation against it since the case’s filing 14 months ago (June 1, 2022) and has had a docket control order for the District Court Litigation, including the trial date, for over 7 months (since February 6, 2023). Even more tellingly, Petitioner’s motion to stay the District Court Litigation was rejected on June 14, 2023, which directly related to the *Sotera* stipulation, namely, whether the invalidity grounds of the

District Court Litigation overlap with the grounds raised in this IPR proceeding. Ex. 2002. Any withholding of the *Sotera* stipulation in its Petition, filed March 29, 2023 (almost 10 months after the district court complaint and 1 month after its invalidity contentions dated March 2, 2023), after all Petitioner’s knowledge of overlapping invalidity grounds is pure gamesmanship and prejudicial to Patent Owner in this proceeding, and is inconsistent with 37 C.F.R. § 42.1(b)’s mandate to “secure the just, speedy, and inexpensive resolution of every proceeding.”

Both the Board and Director are also abundantly clear that Petitioner cannot wait until after the Board renders its Institution Decision to address the issue of *Fintiv*, the Board’s discretionary authority, and to submit a *Sotera* stipulation. *NXP USA, Inc. v Impinj, Inc.*, IPR2021-01556, Paper 12, 5-6 (P.T.A.B. Aug. 25, 2022); *see also id.*, IPR2021-01556, Paper 13, 3-4 (P.T.A.B. Sept. 7, 2022) (the Director finding “that the Board correctly determined that a stipulation, offered by a petitioner for the first time after a decision denying institution, is not a proper basis for granting rehearing of the decision on institution;” “[p]ermitting a petitioner to wait and see if the Board denies institution under *Fintiv*, and then offer such a stipulation for the first time on rehearing, frustrates these goals [of avoiding conflicting decisions] and would open the door to gamesmanship;” “*the only appropriate time for a petitioner*

to offer a stipulation related to the Fintiv factor 4 analysis is prior to the Board's decision of whether to institute review.”) (emphasis added).

X. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board deny institution of the Petition in its entirety.

Respectfully submitted,

Dated: August 16, 2023

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CERTIFICATE OF WORD COUNT

The undersigned hereby certifies that the portions of the above-captioned PATENT OWNER'S PRELIMINARY RESPONSE specified in 37 C.F.R. § 42.24 has 7,635 words in compliance with the 14,000 word limit set forth in 37 C.F.R. § 42.24. This word count was prepared using Microsoft Word for Office 365.

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August 16, 2023

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