UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,

Petitioner,

v.

APEX BEAM TECHNOLOGIES LLC,

Patent Owner.

Patent No. 11,063,727
Filing Date: April 29, 2019
Issue Date: July 13, 2021

Inventor: Xiaobo Zhang

Title: METHOD AND DEVICE IN UE AND BASE STATION FOR MULTI-ANTENNA SYSTEM

PATENT OWNER'S PRELIMINARY RESPONSE

Case No. IPR2025-00900

TABLE OF CONTENTS

Page(s)

I. INTRODUCTION 1

II. THE '727 PATENT 2

III. THE ALLEGED PRIOR ART 4

A. Park 4

B. Shin 4

IV. CLAIM CONSTRUCTION 5

V. LEVEL OF ORDINARY SKILL IN THE ART 5

VI. PETITIONER HAS NOT DEMONSTRATED A REASONABLE LIKELIHOOD OF SUCCESS FOR THE GROUNDS ADVANCED IN THE PETITION, AND THE PETITION SHOULD BE DENIED 5

A. Neither Park nor Park in View of Shin Discloses "*a second signaling*," as Required by Claim 1.1, "the second signaling is used to determine the Q2 antenna ports," as Required by Claim 1.6 8

B. Neither Park nor Park in View of Shin Discloses "*the second reference signal is transmitted in a second time resources pool, . . . the second reference signal occurs once in the second time resources pool*," as Required by Claim 1.9 11

C. Independent Claims 6, 11, and 16 Are Not Rendered Obvious by Park or Park in view of Shin 12

D. Dependent Claims 2-5, 7-10, 12-15, and 17-20 Are Not Rendered Obvious by Park or Park in view of Shin 13

VII. CONCLUSION 13

TABLE OF AUTHORITIES

Page(s)

Cases

Apple, Inc. v. Contentguard Holdings, Inc.,
IPR2015-00355, Paper 9 at 9-10 (P.T.A.B. June 26, 2015) 6

Broadcom Corp. v. Emulex Corp.,
732 F.3d 1325 (Fed. Cir. 2013) 7

Graham v. John Deere Co. of Kansas City,
383 U.S. 1 (1966) 6

Innogenetics, N.V. v. Abbott Lab'ys,
512 F.3d 1363 (Fed. Cir. 2008) 8

Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.,
821 F.3d 1359 (Fed. Cir. 2016) 7

KSR Int'l Co. v. Teleflex Inc.,
550 U.S. 398 (2007) 6

Los Angeles Biomedical Rsch. Inst. at Harbor-UCLA Med. Ctr. v. Eli Lilly & Co., 849 F.3d 1049 (Fed. Cir. 2017) 7

Pers. Web Techs., LLC v. Apple, Inc.,
848 F.3d 987 (Fed. Cir. 2017) 7

Richardson v. Suzuki Motor Co.,
868 F.2d 1226 (Fed. Cir. 1989) 6

Stratoflex, Inc. v. Aeroquip Corp.,
713 F.2d 1530 (Fed. Cir. 1983) 6

In re Van Os,
844 F.3d 1359 (Fed. Cir. 2017) 7

Verdegaal Bros., Inc. v. Union Oil Co. of Cal.,
814 F.2d 628 (Fed. Cir. 1987) 5

Statutes

35 U.S.C. § 102 5

LIST OF EXHIBITS

Exhibit No.	Description of Document
2001	Scheduling Order, Dkt. 40, *Apex Beam Techs. LLC v. Apple Inc.*, Case No. 6:24-cv-00223-ADA (W.D. Tex. June 18, 2025)
2002	Apex Beam Technologies LLC's Infringement Contentions and P.R. 3-1 and 3-2 Disclosures in *Apex Beam Techs. LLC v. Apple Inc.*, Case No. 6:24-cv-00223-ADA (W.D. Tex.), dated May 27, 2025
2003	Complaint, Dkt. 1, *Apex Beam Techs. LLC v. Apple Inc.*, Case No. 6:24-cv-00223-ADA (W.D. Tex. April 29, 2024)

I. INTRODUCTION

On April 29, 2025, Apple, Inc. ("Apple" or "Petitioner") submitted a petition (Paper 2, "Pet.") to institute *inter partes* review ("IPR") of U.S. Patent No. 11,063,727 (APPLE-1001, the "'727 Patent"), challenging claims 1-20 (the "Challenged Claims"). The Petition asserts that (i) 1-2, 5-7, 10-12, 15-17, 20 are anticipated by and/or rendered obvious in view of Park (APPLE-1005 or "Park") or Park in view of Shin (APPLE-1006 or "Shin"); (ii) Claims 3, 8, 13, and 18 are rendered obvious in view of Park and Rahman (APPLE-1007 or "Rahman") or Park in view of Shin and Rahman; and (iii) Claims 4, 9, 14, and 19 are rendered obvious in view of Park and Yu (APPLE-1008) or Park in view of Shin and Yu. Pet. at 1-2.

The Board should deny the Petition for at least two reasons. First, the Petition fails to describe how Park discloses the claimed "second signaling." Park only discloses one signaling that is a "hybrid CSI report type" instead of the two recited signalings of the '727 Patent, which afford the '727 Patent the invention of eliminating overhead in reference signals where the two signalings indicate overlap. The Petition's reliance on Shin does not remedy this deficiency.

Second, the Petition fails to provide any disclosure from Park indicating how many times Park's aperiodic reference signal is transmitted within a "single measurement subframe" (which Petitioner interprets as a time resource), and thus

fails to disclose the recited "second reference signal ***occurs once in the second time resources pool***."

Accordingly, the Board should deny institution of the Petition.

II. THE '727 PATENT

The '727 Patent discloses and claims "transmission methods and devices in wireless communication systems, and in particular to a transmission scheme and device for a wireless communication system with a great many antennas deployed at a base station side." '727 Patent, 1:16-20.

The '727 Patent describes making use of two signalings (i.e., two separate transmissions), each corresponding to control information for contemplated reference signals:

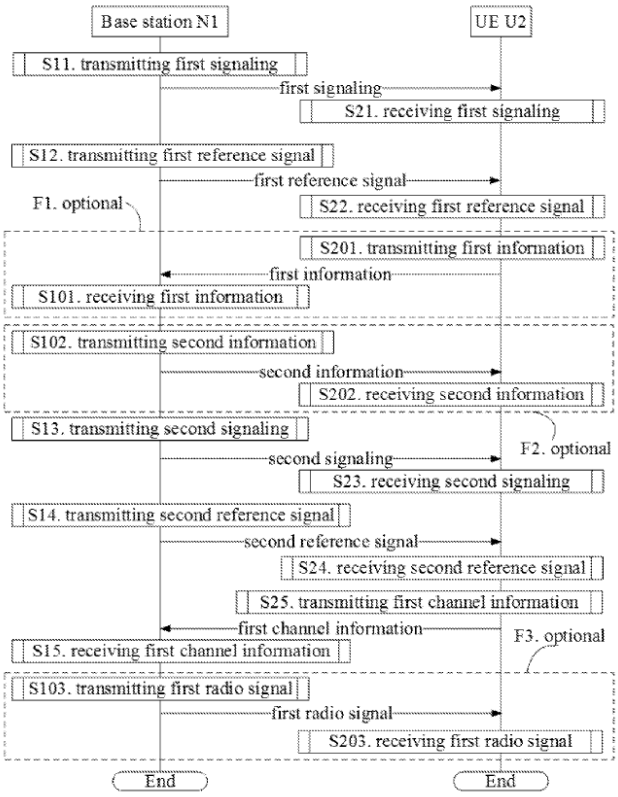

FIG. 1

'727 Patent, FIG. 1.

The '727 Patent describes the advantage of having two separate "signalings," namely, that if there is overlap between the two signalings (in terms of shared time resources corresponding to each of periodic and aperiodic reference signals), then the aperiodic reference "do[es] not need to be transmitted, thus reducing the overhead of aperiodic downlink reference signals."

> When (part of) aperiodic downlink reference signals and (part of) periodic downlink reference signals share a same antenna port, for instance, (part of) aperiodic downlink reference signals and (part of) periodic downlink reference signals adopt same beamforming vectors to be transmitted

> from a same antenna group, the present disclosure allows jointly utilizing (part of) periodic downlink reference signals and aperiodic downlink reference signals to perform channel estimation of aperiodic downlink reference signals. With this method, aperiodic downlink reference signals which share the same antenna port(s) with periodic reference signals do not need to be transmitted, thus reducing the overhead of aperiodic downlink reference signals.

'727 Patent, 9:14-26.

III. THE ALLEGED PRIOR ART

A. Park

Park "relates to a wireless communication system and, more particularly, to a method for transmitting or receiving channel state information and an apparatus supporting the same." APPLE-1005, 1:19-22.

Park discloses a "hybrid CSI report type," namely that "[t]he present invention proposes a method of transmitting or receiving a hybrid CSI for a single CSI process." *Id.*, 35:37-38. "[A] combination of two (or more) processes of CSI reports within a single CSI process configuration may be called 'hybrid CSI.' That is, the hybrid CSI means a CSI report type including two (or more) CSI-RS configurations within a single CSI process." *Id.* at 37:31-35.

B. Shin

Shin "relates to a method and an apparatus for transmitting a reference signal, a method and an apparatus for measuring and reporting channel state information,

and a method of configuring the same." APPLE-1006, [0003].

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 3.

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: "bachelor's degree in electrical engineering, computer engineering, computer science, or a similar field, along with two years of experience designing or developing wireless networks, including long-term evolution LTE/4G or 5G new radio (NR) cellular technology. Additional education might substitute for some of the experience, and additional substantial experience might substitute for some of the educational background." Pet. at 3-4 (citation omitted).

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

Anticipation under 35 U.S.C. § 102 is a high bar to meet. A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). The identical

invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236 (Fed. Cir. 1989).

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. Neither Park nor Park in View of Shin Discloses "*a second signaling*," as Required by Claim 1.1, "the second signaling is used to determine the Q2 antenna ports," as Required by Claim 1.6

Claim 1 recites "a second signaling" and "the second signaling issued to determine the Q2 antenna ports."

The Petition is deficient for failing to describe how Park discloses the claimed "second signaling." The Petition admits that Park only discloses one signaling that is a "hybrid CSI report type." Pet. at 21. Park describes that "[t]he present invention proposes a method of transmitting or receiving a hybrid CSI for a single CSI process." APPLE-1005, 35:37-38. "[A] combination of two (or more) processes of CSI reports within a single CSI process configuration may be called 'hybrid CSI.' That is, the hybrid CSI means a CSI report type including two (or more) CSI-RS configurations within a single CSI process." *Id.* at 37:31-35. Therefore, Park describes a single signaling for two reference signal configurations. As shown below, the '727 Patent describes a first and second signaling that contemplates two separate transmissions:

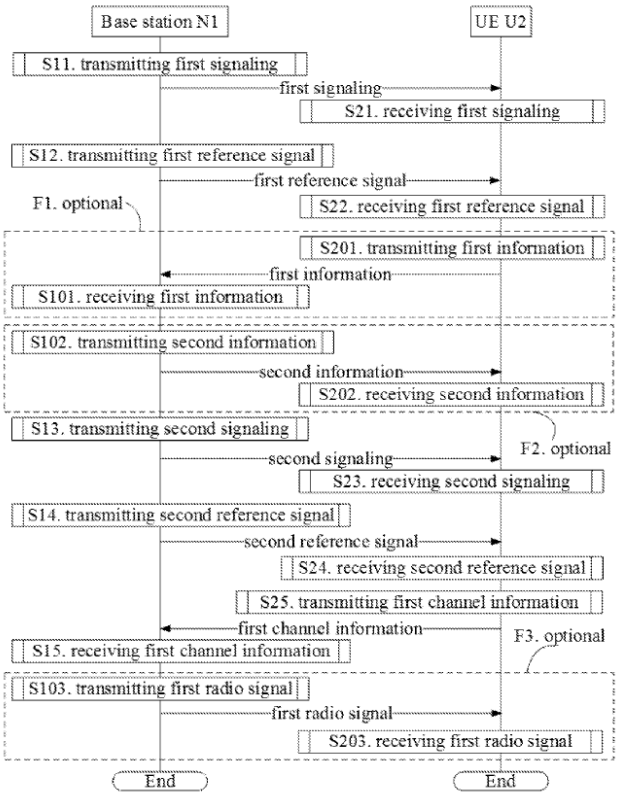

FIG. 1

'727 Patent, FIG. 1.

The '727 Patent describes the advantage of having two separate "signalings" rather than the one hybrid CSI report of Park, namely, that if there is overlap between the two signalings (in terms of shared time resources corresponding to each of periodic and aperiodic reference signals), then the aperiodic reference "do[es] not need to be transmitted, thus reducing the overhead of aperiodic downlink reference signals."

> When (part of) aperiodic downlink reference signals and (part of) periodic downlink reference signals share a same antenna port, for instance, (part of) aperiodic downlink

> reference signals and (part of) periodic downlink reference signals adopt same beamforming vectors to be transmitted from a same antenna group, the present disclosure allows jointly utilizing (part of) periodic downlink reference signals and aperiodic downlink reference signals to perform channel estimation of aperiodic downlink reference signals. With this method, aperiodic downlink reference signals which share the same antenna port(s) with periodic reference signals do not need to be transmitted, thus reducing the overhead of aperiodic downlink reference signals.

'727 Patent, 9:14-26. In contrast, having one hybrid CSI report mandates that both reference signals be transmitted, and does not possess the advantage of overhead elimination described in the '727 Patent.

Petitioner's reliance on Shin for Claim 1.6 does not remedy the Petition's deficiency with respect to a "second signaling." Rather, Petitioner only relies on Shin for disclosing a "CSI request field in the UL DCI format" that "requests the UE to report CSI on '**some of antenna ports**.'" Pet. at 60-61 (citing APPLE-1006, [0114]. Such a disclosure ignores whether there are two signalings, each corresponding to control information for a reference signal.

Therefore, the Petition is deficient because it fails to show that Claims 1.1 and 1.6 are disclosed or rendered obvious by Park or Park in view of Shin.

B. Neither Park nor Park in View of Shin Discloses "*the second reference signal is transmitted in a second time resources pool, . . . the second reference signal occurs once in the second time resources pool*," as Required by Claim 1.9

Claim 1 recites "the second reference signal is transmitted in a second time resources pool, . . . the second reference signal occurs once in the second time resources pool." Notably, Petitioner only relies on Park with respect to this claim limitation. Pet. at 38-40, 55, 59.

The Petition's only support for this claim limitation is (i) five lines of Park's disclosure that an aperiodic reference signal may be transmitted "in a single measurement subframe"; and (ii) Petitioner's expert declaration. See Pet. at 39-40 (citing APPLE-1005, 31:3-7 and APPLE-1003, ¶ 169).

First, that an aperiodic reference signal may be transmitted in a single subframe, at best, discloses a single time resource (assuming, as Petitioner does, that a subframe is a time resource) in which the aperiodic reference is transmitted. However, that disclosure is silent regarding ***how many times*** the aperiodic reference signal is transmitted within that time resource (e.g., subframe). For that reason, the Petition fails to disclose "the second reference signal ***occurs once in the second time resources pool***."

Second, the cited paragraph of Petitioner's expert declaration is entirely inapposite, as represented below:

> 169. Alternatively, Park discloses another option for the hybrid CSI report, where the BI/CRI can be reported separately from the CSI. APPLE-1005, 38:54-65 (describing "Option 2" where the "the UE reports only CSI (e.g., RI, PMI, CQI)" and "in BI feedback, a preferred BI (or CRI) may be reported in another report form"). In this case, the BI/CRI would be transmitted separately (***transmitting first information***), in another report form, separate from the hybrid CSI report that includes only CSI (i.e., PMI/CQI/RI) for both periodic and aperiodic CSI-RS configurations.

APPLE-1003, ¶ 169.

Therefore, Petitioner's two citations leave the Petition completely deficient as to this claim limitation and the Petition fails to show that Claim 1.9 is disclosed or rendered obvious by Park or Park in view of Shin.

C. Independent Claims 6, 11, and 16 Are Not Rendered Obvious by Park or Park in view of Shin

Claim 6 recites "[a] method in a base station device for multi-antenna transmission" that mirrors the claim limitations of Claim 1, which recites "[a] method in a User Equipment (UE) for multi-antenna transmission." 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, the Petition fails to show that Park or Park in view of Shin 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, the Petition fails to show that Park or Park in view of Shin render obvious Claim 11.

Independent Claim 16 recites "[a] base station device 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 device that is in communication with the UE in Claim 11. For at least the same reasons as Claim 11, the Petition fails to show that Park or Park in view of Shin render obvious Claim 16.

D. Dependent Claims 2-5, 7-10, 12-15, and 17-20 Are Not Rendered Obvious by Park or Park in view of Shin

Claims 2-5 are dependent on Claim 1, Claims 7-10 are dependent on Claim 6, Claims 12-15 are dependent on Claim 11, and Claims 17-20 are dependent on Claim 16. Therefore, the Petition fails to render obvious Claims 2-5, 7-10, 12-15, and 17-20 for at least the same reasons as Claims 1, 6, 11, and 16, respectively.

VII. CONCLUSION

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

Respectfully submitted,

Dated: August 18, 2025

By: /*Vincent J. Rubino, III*/

Vincent J. Rubino, III
Lead Counsel for Patent Owner
FABRICANT LLP
411 Theodore Fremd Avenue,
Suite 206 South
Rye, New York 10580
Tel. 212-257-5797
Fax. 212-257-5796

CERTIFICATE OF WORD COUNT

The undersigned hereby certifies that the portions of the above-captioned PATENT OWNER'S PRELIMINARY RESPONSE has 2,414 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.

Respectfully submitted,

August 18, 2025 By: /*Vincent J. Rubino, III* /

Vincent J. Rubino, III (Reg. No. 68,594)
Lead Counsel for Patent Owner
FABRICANT LLP
411 Theodore Fremd Avenue,
Suite 206 South
Rye, New York 10580
Tel. 212-257-5797
Fax. 212-257-5796

CERTIFICATE OF SERVICE

A copy of the foregoing PATENT OWNER'S PRELIMINARY RESPONSE has been served on Petitioner's counsel of record as follows:

Email: IPR50095-0230IP1@fr.com
W. Karl Renner
Won S. Yoon
Richard Wong
FISH & RICHARDSON P.C.
60 South Sixth Street, Suite 3200
Minneapolis, MN 55402

Attorneys for Apple Inc.

August 18, 2025

By: /*Vincent J. Rubino, III* /
Vincent J. Rubino, III (Reg. No. 68,594)
Lead Counsel for Patent Owner
FABRICANT LLP
411 Theodore Fremd Avenue,
Suite 206 South
Rye, New York 10580
Tel. 212-257-5797
Fax. 212-257-5796