

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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APPLE INC.,

Petitioner,

v.

APEX BEAM TECHNOLOGIES LLC,

Patent Owner.

Patent No. 11,374,721

Filing Date: November 12, 2020

Issue Date: June 28, 2022

Inventor: Xiaobo Zhang

Title: METHOD AND DEVICE FOR WIRELESS  
COMMUNICATION

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**PATENT OWNER'S PRELIMINARY RESPONSE**

Case No. IPR2025-00901

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## I. INTRODUCTION

On April 28, 2025, Apple, Inc. (“Apple” or “Petitioner”) submitted a petition (Paper 2, “Pet.”) to institute *inter partes* review (“IPR”) of U.S. Patent No. 11,374,721 (APPLE-1001, the “’721 Patent”), challenging claims 1-20 (the “Challenged Claims”). The Petition asserts that 1-20 are rendered obvious in view of U.S. Patent Pub. No. 2017/0019930 A1 to Lee, et al. (“Lee” or APPLE-1005) in view of U.S. Patent Pub. No. 2019/0320467 A1 to Freda, et al. (“Freda” or APPLE-1006) and U.S. Patent Pub. No. 2018/0097590 A1 to Ly, et al. (“Ly” or APPLE-1007). Pet. at 1.

The Board should deny the Petition for at least two reasons. First, the Petition fails to describe how its obviousness ground discloses “the first time interval is used to determine the first wireless resource out of the J candidate wireless resources” because it relies on Freda’s “frequency-domain offset” to determine a particular CPRB among Lee’s M\*N CPRBs even though it previously relied on Freda’s “time-domain offset” to disclose the claimed “first time interval.” Even so, Freda’s frequency-domain offset does not determine a first wireless *resource* because it only indicates the “specific amount of PRBs” or the amount of resources between the transmission of a preamble and transmission of a data portion.

Second, the Petition is deficient for failing to disclose how its obviousness ground discloses “the first wireless signal is used to determine whether the second wireless signal is transmitted or not.” Specifically, Petitioner fails to account for Lee’s disclosure that Lee’s RACH preamble *does not* determine whether Lee’s RRC message is transmitted or not, because the RRC message will wait for an available CPRB.

Accordingly, the Board should deny institution of the Petition.

## **II. 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.

## **III. 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 and 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 4-5 (citations omitted).

**IV. 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 Resch. 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. Lee in View of Freda and Ly Do Not Disclose “*the first time interval is used to determine the first wireless resource out of the J candidate wireless resources*,” as Required by Claim 1.6**

Claim 1 recites “the first time interval is used to determine the first wireless resource out of the J candidate wireless resources.”

Petitioner purportedly relies on Freda’s “time-domain offset” “between (i) the starting time instant of the transmission of the random access preamble through the PRACH and (ii) the start time instant of the transmission of the RRC request message through the PUSCH” as the recited “time interval” and “Lee’s RRC request message is transmitted using a corresponding CPRB (*the first wireless resource*) that is selected from a set of M\*N CPRBs (*J candidate wireless resources*) in a CP

group.” Pet. at 45-46 (citations omitted).

Even under Petitioner’s interpretation above, the Petition is deficient because it fails to describe how Freda’s “time-domain offset” is used to determine a particular CPRB among Lee’s  $M \times N$  CPRBs. Instead, Petitioner relies on Freda’s separate “frequency-domain offset to determine a specific PRB (*the first wireless resource*) within the PRB region for transmitting the PUSCH data.” *Id.* at 47. Because Freda’s “frequency-domain offset” is not the “time-domain offset” that the selection of time resources must be determined by, the Petition is deficient on its face. Relatedly, the frequency-domain offset does not determine a first wireless *resource*. Freda’s frequency-domain offset only indicates the “specific amount of PRBs” or the amount of resources between the transmission of a preamble and transmission of a data portion. APPLE-1006, [0210] (“a first PRB of a transmission of a preamble and a first PRB of a transmission of a data portion may be offset from each other by a specific amount of PRBs.”).

The ’721 Patent identifies various embodiments of how the “first time interval” determines the “first wireless resource,” such as the time domain, frequency-domain, code domain, or airspace resource allocated to the second wireless signal:

In one embodiment, the first wireless resource comprises at least one of time domain resource, frequency domain

resource, code domain resource, and airspace resource.

'721 Patent, 4:4-6.

In one embodiment, the first time interval determines the first wireless resource out of the J candidate wireless resources by using a pre-determined mapping relationship. In one embodiment of the method for wireless communication in a user equipment, the J candidate wireless resource(s) correspond(s) to P time interval range(s); any two time interval ranges of the P time interval ranges do not overlap; the P is a positive integer; the first time interval belongs to a target time interval range; the target time interval range is a time interval range of the P time interval ranges; the target time interval range corresponds to K candidate wireless resource(s) out of the J candidate wireless resources; the first wireless resource is one of the K candidate wireless resource(s); the K is a positive integer smaller than or equal to the J.

...

In one embodiment, the J candidate wireless resources correspond to the P time interval ranges based on a pre-determined mapping relationship.

In one embodiment, two candidate wireless resources in the J candidate wireless resources correspond to one same time interval range of the P time interval ranges.

In one embodiment, any two candidate wireless resources in the J candidate wireless resources correspond to two different time interval ranges of the P time interval ranges.

In one embodiment, the J is equal to the P.

In one embodiment, the J is equal to the P, and the J candidate wireless resources are in one-to-one correspondence to the P time interval intervals.

'721 Patent, 4:42-5:7. In contrast, the Petition merely relies on the offset of start times or PRBs between preamble and data transmission times rather than any

“resource.”

Therefore, the Petition is deficient because it fails to show that Claim 1.6 is disclosed or rendered obvious by Lee in view of Freda and Ly.

**B. Lee in View of Freda and Ly Does Not Disclose “*the first wireless signal is used to determine whether the second wireless signal is transmitted or not,*” as Required by Claim 1.9**

Claim 1 recites “the first wireless signal is used to determine whether the second wireless signal is transmitted or not.” Notably, Petitioner only relies on Lee with respect to this claim limitation. Pet. at 49-51.

The Petition is deficient because the sole citation to Lee that the UE “abandons RRC message transmission to the eNB at the corresponding point in time” is misleading. Pet. at 51 (citing APPLE-1005, [0309]-[0310]). Specifically, Petitioner ignores the remainder of the quotation that explicitly states that, regardless of any RACH preamble (which Petitioner relies on as the “first wireless signal”), the RRC message transmission (which Petitioner relies on as the “second wireless signal”) may be “abandon[ed]” only at a “corresponding point in time,” but after a “back-off time, the UE [] transmits the RRC message to the eNB by using an available CPRB.”:

Thus, the UE 1 and the UE 2 transmit the RRC message to the eNB through CPRB #0 and CPRB #1 respectively, and the UE 3 abandons RRC message transmission to the eNB at the corresponding point in time (subframe) and, after the back-off time, the UE 3 transmits the RRC message to the

eNB by using an available CPRB.

APPLE-1005, [0310]. In other words, Lee discloses that Lee's RACH preamble does not definitively determine whether Lee's RRC message is transmitted or not because it will wait for an available CPRB. As a result, the Petition is deficient in view of the entire quote that Petitioner relies on.

Petitioner actually admits that Lee's disclosure of this claim limitation is merely an "implication": "In so abandoning, Lee determines that the implicated RRC messages (*second wireless signals*) are **not** transmitted, and by implication, those RRC message not abandoned have been determined by Lee to be transmitted." Pet. at 50. Such an implication should be rejected because it is founded only upon a single paragraph of Petitioner's expert declaration that contains neither support nor citations, as represented below:

147. Thus, Lee resolves to abandon some instances of RRC message (*second wireless signal*) transmission, particularly when a relatively high number of RRC messages compete for a relatively limited number of CPRBs. In so abandoning, Lee determines that the implicated RRC messages (*second wireless signals*) are **not** transmitted, and by implication, those RRC message not abandoned have been determined by Lee to be transmitted.

APPLE-1003, ¶ 147.

Therefore, the full disclosure of Lee which Petitioner relies on coupled with

Petitioner's own admission of relying on unsupported expert implications leaves the Petition deficient as to this claim limitation, and the Petition fails to show that Claim 1.9 is disclosed or rendered obvious by Lee in view of Freda and Ly.

**C. Independent Claims 6, 11, and 16 Are Not Rendered Obvious by Lee in View of Freda and Ly**

Claim 6 recites “[a] method for wireless communication in a base station” that mirrors the claim limitations of Claim 1, which recites “[a] method for wireless communication in a user equipment (UE).” 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 Lee in view of Freda and Ly render obvious Claim 6.

Claim 11 recites “[a] user equipment for wireless communication,” which is the apparatus claim of Claim 1. For at least the same reasons as Claim 1, the Petition fails to show that Lee in view of Freda and Ly render obvious Claim 11.

Independent Claim 16 recites “[a] base station device for wireless communication” that mirrors the claim limitations of Claim 11, which recites “[a] user equipment for wireless communication.” 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 Lee in view of Freda and Ly render obvious Claim 16.

**D. Dependent Claims 2-5, 7-10, 12-15, and 17-20 Are Not  
Rendered Obvious by Lee in View of Freda and Ly**

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.

**V. 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

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**CERTIFICATE OF WORD COUNT**

The undersigned hereby certifies that the portions of the above-captioned PATENT OWNER'S PRELIMINARY RESPONSE has 2,373 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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