

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. 10,912,081

Filing Date: May 6, 2018

Issue Date: February 2, 2021

Inventor: Xiaobo Zhang

Title: METHOD AND DEVICE USED FOR WIRELESS
COMMUNICATION IN UE AND BASE STATION

PATENT OWNER'S PRELIMINARY RESPONSE

Case No. IPR2025-00896

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LIST OF EXHIBITS

Exhibit No.	Description of Document
2001	Scheduling Order, Dkt. 40, <i>Apex Beam Techs. LLC v. Apple Inc.</i> , 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 <i>Apex Beam Techs. LLC v. Apple Inc.</i> , Case No. 6:24-cv-00223-ADA (W.D. Tex.), dated May 27, 2025
2003	Complaint, Dkt. 1, <i>Apex Beam Techs. LLC v. Apple Inc.</i> , Case No. 6:24-cv-00223-ADA (W.D. Tex. April 29, 2024)

I. INTRODUCTION

On April 28, 2025, Apple, Inc. (“Petitioner”) submitted a petition (Paper 2, “Petition” or “Pet.”) to institute *inter partes* review (“IPR”) of U.S. Patent No. 10,912,081 (APPLE-1001, the “’081 Patent”), challenging Claims 1-12 (the “Challenged Claims”). The Petition asserts that the Challenged Claims are rendered obvious by (i) U.S. Patent No. 11,039,470 to Chen et al. (APPLE-1004 or “Chen”) in view of TS 36.201 (APPLE-1024), TS 36.211 (APPLE-1025), TS 36.212 (APPLE-1026), TS 36.213 (APPLE-1027), and TS 36.331 (APPLE-1028) (collectively, “3GPP”); and (ii) Chen in view of Dahlman et al., 4G LTE-Advanced Pro and The Road to 5G (3d ed. 2016) (APPLE-1023 or “Dahlman”). Pet. at 5.

The Board should deny the Petition because, despite any purported knowledge that signals may comprise multicarrier symbols from 3GPP or Dahlman, Chen merely discloses switching beams based on parameters at a given point in time, which are only associated with the first and second parts of a message rather than time domain resources corresponding to *each* multicarrier symbol that makes up the claimed first radio signal. Therefore, the Petition is deficient with respect to Claim 1’s recited “as for any one given multicarrier symbol of the G multicarrier symbols, the multi-antenna related receiving for the given multicarrier symbol is related to the relative position of a time-domain resource occupied by the given multicarrier

symbol with respect to a first time point in time domain,” The Petition is deficient with respect to the ’081 Patent’s dependent claims and analogues to Claim 1 for the same reasons.

Accordingly, the Board should deny institution of the Petition.

II. THE ’081 PATENT

The ’081 Patent discloses and claims “transmission schemes of radio signals in wireless communication systems, and in particular to a method and a device for multi-antenna transmission.” ’081 Patent, at 1:16-20.

The ’081 Patent describes why such schemes are necessary in view of the problems of the prior art:

[T]he inventor finds through research that cross-slot beam indication would result in reduction of dynamic of beam information, increase of overhead of control signaling, reduction of dynamic of scheduling, and other problems. A UE with high processing capacity can decode the PDCCH in a short time to obtain beam information that is used for receiving the PDSCH that is in the time slot of the PDCCH, and adjust a receiving beam to receive a multicarrier symbol in which the PDSCH is located. However, the delay in PDSCH transmission caused by decoding PDCCH would result in underutilization of system resources.

In view of the above problems, the present disclosure provides a solution.

Id. at 1:49-62. Therefore, at least a couple of the benefits of determining multi-antenna related receiving depending on the “relative position of a time-domain

resource occupied by the given multicarrier symbol with respect to a first time point in time domain” in the ’081 Patent are to “avoid[] the problem of delay” between the second and first signal due to decoding and dynamic scheduling of time resources on a granular symbol-by-symbol basis:

In one embodiment, the above method is advantageous in that the delay in the receiving of the first radio signal resulted from the delay in the decoding of the second radio signal is avoided.

In one embodiment, the above method is advantageous in that, before the first time point, the PDSCH receives the multicarrier symbol of the PDSCH before the first time point using the same beam used for receiving the PDCCH, thereby avoiding the problem of the delay in PDSCH transmission resulted from the delay in PDCCH decoding.

Id., 4:27-37.

In one embodiment, the above method is advantageous in that the time-domain resource occupied by the G multicarrier symbols is configured flexibly.

Id., 3:56-58.

In one embodiment, the above method is advantageous in that the candidate scheme for the multi-antenna related receiving corresponding to the G multicarrier symbols is configured flexibly.

Id., 6:7-10.

In one embodiment, compared with traditional schemes, the present disclosure has the following advantages:

the dynamic of the multi-antenna related receiving is increased;
the overhead of control signaling is saved;
the dynamic of scheduling is increased; and
the gain of transmission is improved.

Id., 9:7-13 (emphasis added).

FIG. 7 of the '081 Patent is representative of how the invention seeks to provide the aforementioned benefit. FIG. 7 and its accompanying description in the '081 Patent specification shows (i) that the first radio signal can comprise different multi-carrier symbols and (ii) that the multi-carrier symbols can change at a “first time point” between a first receiving beam, which is the same beam that the second radio signal is sent under, and second receiving beam.

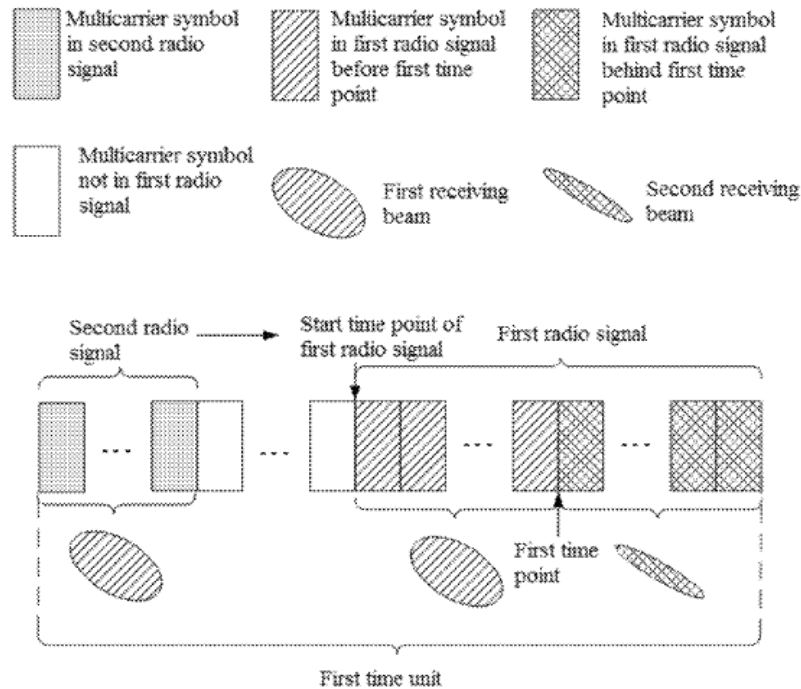


FIG. 7

Id., FIG. 7.

[B]oth the first radio signal and the second radio signal are transmitted within the first time unit, the multicarrier symbols occupied by the second radio signal are before the multicarrier symbols occupied by the first radio signal in time domain, the first receiving beam is used for receiving the second radio signal, the second radio signal indicates the start time point of the first radio signal in the first time unit, and the start time point is used for determining the time domain resource occupied by the first radio signal in the first time unit. . . .

[T]he first receiving beam is used for receiving the second radio signal and the multicarrier symbols of the first radio signal before the first time point, and the second receiving beam is used for receiving the multi-carrier symbols of the

first radio signal behind the first time point.”

Id., 18:1-18.

III. THE RELEVANT ALLEGED PRIOR ART

A. Chen

Chen “relate[s] to the field of communications technology and in particular relates to a message-decoding method, a transmitting end device, and a receiving end device.” APPLE-1012, at 1. Chen seeks to solve the technical problem of “how a receiving end device selects an appropriate receiver parameter to decode a message transmitted by a transmitting end device. *Id.*

Chen’s FIG. 4 is representative of its disclosed embodiments and illustrates a first message split into two “parts” (*e.g.*, “first part content of first message” and “second part content of first message”). Both the first and second part content of the first message are transmitted twice, first after a second message with beam indication information present, and second after a second message with beam indication information not present.

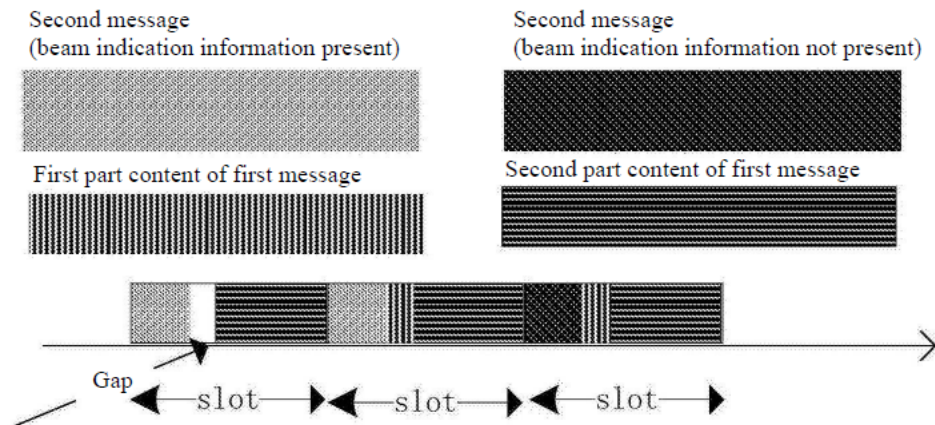


FIG. 4

Id., FIG. 4. Chen describes FIG. 4 in the context of determining whether to decode the second part content or discard the first part content of the first message in order to “improve the accuracy of receiving end device decoding”:

In this implementation, because said second message includes parameter indication information, said receiving end device uses said ***target receiver parameter indicated by said parameter indication information to decode said second part content***, wherein said transmitting end device has not yet transmitted said first part content. For example, the first slot shown in FIG. 4. It is possible in this way to ***improve the accuracy of receiving end device decoding***.

In addition, when the second message includes parameter indication information, ***it is possible to discard said first part content and use said target receiver parameter indicated by said parameter indication information to decode said second part content***. That is, it is possible to discard the first part content of the second slot shown in FIG. 4, while also being able to ***ensure performance between the transmitting end device and the receiving end device because the transmitting end device in this situation may transmit non-important information in the first part content and important information in the***

second part content. Of course, the embodiments of the present disclosure are not limited to the above; when the first message includes parameter indication information, the transmitting end device may also transmit important information in the first part content and transmit non-important information in the second part content.

In addition, when the second message includes parameter indication information, *the default receiver parameter may be used to decode said first part content, and said target receiver parameter indicated by said parameter indication information may be used to decode said second part content.* Thus, it is possible for the receiving end to precisely decode first part and second part content.

In addition, when the second message does not include parameter indication information, the default receiver parameter may be used to decode said first part content and said second part content. That is, the third slot shown in FIG. 4.

Id., 17-18 (emphases added).

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 5.

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

multiple-input multiple-output (MIMO) technology. Additional education might substitute for some of the experience, and additional substantial experience might substitute for some of the educational background.” Pet. at 32 (citations 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. Claims 1-12 Are Not Rendered Obvious by Chen in View of 3GPP or Chen in View of Dahlman

- 1. Chen in View of 3GPP and Chen in View of Dahlman Do Not Disclose Claims 1.h-1.j:** *“as for any one given multicarrier symbol of the G multicarrier symbols, the multi-antenna related receiving for the given multicarrier symbol is related to the relative position of a time-domain resource occupied by the given multicarrier symbol with respect to a first time point in time domain,” “when the time-domain resource occupied by the given multicarrier symbol is behind the first time point, the second radio signal is used for determining the multi-antenna related receiving for the*

given multicarrier symbol,” and “when the time-domain resource occupied by the given multicarrier symbol is before the first time point, the multi-antenna related receiving for the given multicarrier symbol is related to the multi-antenna related receiving for the second radio signal,” as Required by Claim 1

Claim 1 recites “as for any one given multicarrier symbol of the G multicarrier symbols, the multi-antenna related receiving for the given multicarrier symbol is related to the relative position of a time-domain resource occupied by the given multicarrier symbol with respect to a first time point in time domain,” “when the time-domain resource occupied by the given multicarrier symbol is behind the first time point, the second radio signal is used for determining the multi-antenna related receiving for the given multicarrier symbol,” and “when the time-domain resource occupied by the given multicarrier symbol is before the first time point, the multi-antenna related receiving for the given multicarrier symbol is related to the multi-antenna related receiving for the second radio signal.”

Notably, Petitioner only relies on Chen to render obvious these particular claim limitations. *See* Pet. at 47-62. Petitioner also admits that its analysis for these claim limitations under its secondary obviousness combination, Chen in view of Dahlman, is duplicative of its analysis for Chen in view of 3GPP, and therefore also only relies on the disclosure of Chen. *See id.* at 82-83.

As a preliminary matter, Chen does not mention multicarrier symbols at all in its specification, and therefore cannot disclose, teach, or suggest any of these claim limitations on its own. *See generally* Chen. Because of this deficiency, Petitioner relies on 3GPP and Dahlman for disclosing that the signals or “messages” of Chen may be comprised of multicarrier symbols. *Id.* at 41-44, 79-81.

Even assuming Petitioner’s use of multicarrier symbols for each of Chen’s first and second messages utilizing the teachings of 3GPP or Dahlman, the Petition is deficient because it fails to show how Chen (or 3GPP / Dahlman) discloses receiving “***any given multicarrier symbol*** [] related to the relative position of a time-domain resource occupied by the given multicarrier symbol” with respect to Petitioner’s alleged first time point, that is the point at which beams change while transmitting Chen’s “first message.”

While the Petition describes Chen’s disclosure of switching beams based on parameters at a given point in time, the Petition glosses over any disclosure in Chen of determining the time domain resource occupied by ***each*** multicarrier symbol. Such a determination is required for the subsequent claim limitations that “when the time-domain resource occupied by ***the given multicarrier symbol*** is behind the first time point, the second radio signal is used for determining the multi-antenna related receiving for the given multicarrier symbol,” and “when the time-domain resource

occupied by *the given multicarrier symbol* is before the first time point, the multi-antenna related receiving for the given multicarrier symbol is related to the multi-antenna related receiving for the second radio signal.” In other words, these claim limitations describe that the determination of whether a time domain resource is before or behind the first time point is on a symbol-by-symbol basis.

The Petition sidesteps the plain language of these claim limitations and cites to Chen, 15:64-16:47 (Pet. at 53). However, that disclosure of Chen merely describes that “when the second message includes the parameter indication information, the first part may be decoded in accordance with the default receiver parameter, and the second part may be decoded in accordance with the target receiver parameter indicated by the parameter indication information. In this way, it is able for the receiving end device to decode the first part and the second part.” APPLE-1004, at 15:64-16:3. The Petition’s reliance on Chen’s disclosure that receiver parameters indicating time domain resources are associated only on a “part” basis (i.e., first part and second part of the first message) is insufficient to render obvious Claims 1.h-1.j.

The Petition fails to account for Petitioner’s own contradiction: despite Petitioner’s reliance on 3GPP and Dahlman for the disclosure that Chen’s messages/parts may be comprised of multicarrier symbols in an LTE system, Chen decidedly taught only the broader and traditional allocation of time resources to

“parts” of the first message rather than the more granular time resource allocation to symbols. Indeed, the ’081 Patent itself describes that its invention has the “advantage” of granularity (i.e., more flexible and increased dynamic scheduling of time domain resources based on symbols):

In one embodiment, the above method is advantageous in that the time-domain resource occupied by the G multicarrier symbols is configured flexibly.

’081 Patent, 3:56-58.

In one embodiment, the above method is advantageous in that the candidate scheme for the multi-antenna related receiving corresponding to the G multicarrier symbols is configured flexibly.

Id., 6:7-10.

In one embodiment, compared with traditional schemes, the present disclosure has the following advantages:
the dynamic of the multi-antenna related receiving is increased;
the overhead of control signaling is saved;
the dynamic of scheduling is increased; and
the gain of transmission is improved.

Id., 9:7-13 (emphasis added).

Therefore, the Petition is deficient because it fails to show that claim elements 1.h-1.j are disclosed or rendered obvious by the combination of Chen in view of 3GPP or the combination of Chen in view of Dahlman.

2. Independent Claims 5, 9, and 11 Are Not Rendered Obvious by Chen in View of 3GPP or Chen in View of Dahlman

Claim 5 recites “[a] method in a base station device for wireless communication” that mirrors the claim limitations of Claim 1, which recites “[a] method in a User Equipment (UE) for wireless communication.” In other words, Claim 5 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 the combinations of Chen in view of 3GPP or Chen in view of Dahlman render obvious Claim 5.

Claim 9 recites “[a] UE 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 the combinations of Chen in view of 3GPP or Chen in view of Dahlman render obvious Claim 9.

Independent Claim 11 recites “[a] base station device for wireless communication” that mirrors the claim limitations of Claim 9, which recites “[a] UE for wireless communication.” In other words, Claim 11 discloses the base station device that is in communication with the UE in Claim 9. For at least the same reasons as Claim 9, the Petition fails to show that the combinations of Chen in view of 3GPP or Chen in view of Dahlman render obvious Claim 11.

**3. Dependent Claims 2-4, 6-8, 10, and 12 Are Not
Rendered Obvious by Chen in View of 3GPP or Chen
in View of Dahlman**

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, the Petition fails to render obvious Claims 2-4, 6-8, 10, and 12 for at least the same reasons as Claims 1, 5, 9, and 11, 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

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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 3,435 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

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