

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VOLKSWAGEN GROUP OF AMERICA, INC.,
Petitioner,

v.

NEO WIRELESS, LLC,
Patent Owner.

Case IPR2023-00426
Patent 8,467,366

PATENT OWNER'S PRELIMINARY RESPONSE

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2002	William P. Alberth, Jr.'s Curriculum Vitae [Alberth-CV]
2003	Carl Eklund, et al., <i>IEEE Standard 802.16: A Technical Overview of the WirelessMAN™ Air Interface for Broadband Wireless Access</i> , IEEE Communications Magazine, June 2002, at 98 [Eklund]
2004	Brian Kiernan, <i>IEEE 802.16 Mobile Wireless MAN Study Group: Call for Contributions</i> , Aug. 23, 2002, https://www.ieee802.org/16/mobile/docs/80216sgm-02_08.pdf [Kiernan]
2005	Roger B. Marks, <i>The Evolution of WirelessMAN</i> , IEEE Microwave Magazine, Aug. 2008, at 72 [Marks]

I. INTRODUCTION

This is the second Petition challenging U.S. Patent No. 8,467,366 (the “Patent”). The Board denied institution of the first petition because petitioner there failed to show even a reasonable likelihood of success. *Dell Inc. v. Neo Wireless LLC*, IPR2021-01480, Paper 11 (PTAB Mar. 16, 2022) (the “-1480 Petition”). The Petition here is even weaker as it uses inferior references and an incorrect level of ordinary skill in the art contrary to the Board’s prior findings, and fails to present a *prima facie* case of either a motivation or a reasonable expectation of success for making its proffered combinations. The Board should similarly deny this Petition.

Petitioner presents Grounds 1 and 3 to challenge the Patent’s independent claims. In Ground 1, Petitioner relies on a combination of Jeong and Suzuki, but admits that Jeong does not “expressly disclose” the claims’ “mobile station.” Pet., 25. Instead, Petitioner relies on Suzuki, arguing that it would have been obvious to “use a mobile station (as disclosed by Suzuki) in Jeong’s system or to modify Jeong’s subscriber stations to be mobile, because mobile communication systems, including mobile stations, were well-known by March 2004.” Pet., 25. Petitioner presents no legally sufficient motivation or any analysis of expectation of success for its combination. *See* Section III.A, *infra*. As will be shown, Jeong discloses a specific method for the IEEE 802.16ab standard, explaining that one of the benefits of its invention is that “there is no need to change the subcarrier allocation

algorithm for data and pilot of the current IEEE 802.16ab standard” Ex. 1008 [Jeong] 0011. As documented by the publications from the 802.16 working group and its leaders, the IEEE 802.16 family of standards did not support mobile users. Both the desirability and feasibility of modifying the standard to support mobile users were the subject of years of analysis by experts. The standard did not ultimately support mobile users until at least a year after the priority date of the Patent. Petitioner’s conclusory assertions of modifying Jeong are unsupported.

Ground 1 additionally fails to show disclosure or obviousness of the claims’ limitation that a ranging subchannel “comprises” a block of subcarriers with “power levels of subcarriers at both ends of a block are set to zero.” *See* Section III.B, *infra*. Specifically, Petitioner fails to even acknowledge Jeong’s failure to meet the limitation, let alone explain why a POSITA would have modified Jeong’s carefully defined ranging subchannels to include guard subcarriers within the subchannels as required by the claims, as opposed to Jeong’s placement of them between the subchannels.

Ground 3, the only other ground challenging the independent claims, also fails to show zero-power subcarriers for ranging subchannels. *See* Section IV., *infra*. Petitioner in this ground expressly relies on the ranging subchannels of the IEEE 802.16ab standard and argues that a POSITA would have modified the standard to add guard bands for ranging subchannels, against the standard’s

principle of operation. Pet., 69-70. Specifically, the standard chose CDMA as its multi-access techniques to allow multiple users to use the ranging frequency band. *See, e.g.*, Ex. 1012 [802.16ab] 0088 (“as a CDMA code”). As a reference book submitted by Petitioner itself explains, spreading techniques such as CDMA have well known interference resistance characteristics, resulting in their use even in the military. Ex. 1010 [Gibson] 0184, 0195. Even if spreading signals (such as CDMA) are overlaid directly on top of narrow band frequency signals such that they occupy the same time and frequency, there would not necessarily be an interference problem either for the spread CDMA signal or for the narrow band frequency signals. *Id.*, 0195. In accord, the IEEE 802.16ab standard explains that the users “are allowed to collide” on its ranging subchannels (Ex. 1012 [802.16ab] 0204), and while it discloses guard bands in other contexts (*e.g., id.*, 0175), it deliberately does not do so in connection with its ranging subchannels. Petitioner does not even acknowledge, let alone explain, any of the above in connection with its conclusory assertion that a mere POSITA would modify the standard to add guard bands against its principle of operation.

To further compound its failure to meet its burden for institution, Petitioner also relies on a level of ordinary skill in the art that is contrary to, and much higher than, the Board’s prior findings in the -1480 Petition. *See* Section II, *infra*.

For all the foregoing reasons, as further discussed in this brief, the Petition fails to meet its institution burden, and presents an even weaker case than the one already rejected by the Board in denying institution of the -1480 Petition. *See also Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1359 (Fed. Cir. 2001) (“that the patent in suit had successfully withstood previous validity challenges in other proceedings” presents “a clear case supporting the validity of the patent”); *Gillette Co. v. S.C. Johnson & Son, Inc.*, 919 F.2d 720, 723 (Fed. Cir. 1990) (“that the validity of those claims has previously been upheld in an earlier litigation is also to be given weight”).

II. THE PETITION RELIES ON A LEVEL OF ORDINARY SKILL THAT IS CONTRARY TO THE PTAB’S EXISTING, CORRECT FINDINGS.

The levels of ordinary skill in the art proposed by Petitioner and its expert, Dr. Cimini, are internally inconsistent, incorrect, and contrary to the Board’s prior findings. This reliance on an erroneously high level of skill permeates the entirety of the Petition’s analysis, reinforces the Petition’s already-evident deficiencies, and further confirms that Petitioner cannot meet its institution burden to show a reasonable likelihood of success. *Intelligent Bio-Systems*, 821 F.3d at 1369 (Petitioners must “make their case in their petition to institute.”).

The Petition proposes that a POSITA would have “a bachelor’s degree in electrical engineering, computer engineering, computer science, or an equivalent field, *or an advanced degree in those fields, as well as* at least 3-5 years of

academic or industry experience in mobile wireless communications, or comparable industry experience.” Pet., 13.¹ Yet, this proposed level of ordinary skill is unsupported by Petitioner’s expert declaration, for it additionally requires or permits “an advanced degree” on top of the required work experience.

Specifically, Petitioner’s declarant, Dr. Cimini, proposes that the POSITA:

would have a B.S. degree in electrical engineering, computer engineering, or computer science, or an equivalent field, as well as at least 3-5 years of academic or industry experience in mobile wireless communications, or comparable industry experience. A greater amount of education, e.g., a doctorate in electrical engineering, computer engineering, computer science or an equivalent field would also qualify as a POSA for the ’366 patent in lieu of a B.S. degree. Experience could take the place of some formal training, as domain knowledge may be learned on the job. This description is approximate, and a higher level of education or skill might make up for less experience and vice versa.

Ex. 1003 [Cimini-Decl.] ¶ 42.

The Board has already found the level of ordinary skill applicable to this patent to be different from the level of ordinary skill proposed by Petitioner. In IPR2021-1480, challenging the same patent, the Board found that the proper level of ordinary skill in the art is only a “Bachelor’s degree in an academic area

¹ All emphasis added unless otherwise stated.

emphasizing electrical engineering or a similar discipline,” and only “two years of experience in the field working with, teaching, or researching wireless communication networks.” *Id.*, 7. The Board found that its finding “is consistent with the level of ordinary skill reflected in the prior art references of record.” *Id.* (citing *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001)).

Here, Dr. Cimini provides no analysis or evidence to support his departure from the Board’s previous findings and his proposed much higher level of ordinary skill in the art. His opinion, therefore, is entitled to little weight. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 15 (Aug. 24, 2022) (precedential) (rejecting an expert’s conclusory assertion); *Dionne v. Liotta*, Int. 104,333, Paper 119, 5 (PTAB Oct. 31, 2001) (*per curiam*) (informative) (rejecting “the conclusory statements of [a party’s] experts” as “evidence in support of its alleged skill level”); *Daiichi Sankyo Co., Ltd. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007) (noting that type of problems encountered in the art, art solutions to those problems, and sophistication of the technology as factors that may be considered in determining the level of ordinary skill in the art).

Moreover, the Board recently rejected an *identically proposed* level of ordinary skill in the art by the same petitioner, and the same declarant Dr. Cimini, in an IPR between the same parties and in connection with a patent in a similar field, finding that it was unsupported and inconsistent with the level of ordinary

skill reflected in the prior art of record. *Volkswagen Gp. of Am., Inc. v. NEO Wireless, LLC*, IPR2023-00086, Paper 7, 10-12 (June 16, 2023).

Furthermore, as Patent Owner’s expert, Mr. Alberth, explains,² the level of skill in the art already adopted by the Board in the 01480 case (*i.e.*, bachelor degree with two years of experience) is substantially correct:

In 2004 many of the professionals working in the wireless communications space had only a couple years of experience after having graduated with an undergraduate degree in electrical engineering or a similar discipline. Mobile communications was a fast-growing field that necessarily attracted many newcomers to the field. Certainly it was uncommon for working professionals in the field to have doctorate degrees and such advanced education would be typical of someone with more than ordinary skill in the art. For example, under Petitioner’s construction, Carl Eklund who “chaired the MAC Task Group that developed the IEEE 802.16 medium access control protocol and served as a lead MAC editor of IEEE Standard 802.16-2001” (Ex.

² Mr. Alberth has over 25 years of experience in design, development, implementation, and manufacturing of mobile phones, including serving as Motorola’s Chief Technology Officer for Motorola Mobile Devices, where he led the development of differentiating technology that was integrated into Motorola’s commercial mobile telephone products. Ex. 2001 [Alberth-Dec1.] ¶ 6. He is also a named inventor on over 100 patents. *Id.*, ¶ 9; *see also* Ex. 2002 [Alberth-CV].

2003 [Elkund] 10) would only be a person of ordinary skill since he obtained his Master's Degree in 1996, about five years prior to his role at the IEEE committee. Such a high definition of ordinary skill is clearly erroneous.

A POSITA in 2004 was typically involved in deploying and configuring wireless communication equipment to increase the reach of commercial wireless networks, increase their capacity to handle more users, and also allow for the deployment of new applications requiring more bandwidth. A POSITA would not have been required to design a wireless system from the ground up. This is because many important parameters and design choices had already been made by standards setting committees. Thus, a POSITA would have had enough knowledge of the technology to understand and deploy equipment adhering to these technical specifications but would have a very limited ability to change the fundamental specifications of the network.

Ex. 2001 [Alberth-Dec1.] ¶¶ 19-20.

Petitioner's improperly high level of ordinary skill in the art is especially relevant in light of Petitioner's proposed combinations. For example, as discussed in section III.A, *infra*, Petitioner's Ground 1 relies upon the assertion that the POSITA would have found it obvious to change the IEEE 802.16ab standard, which only supported stationary users, into a mobile standard, with a reasonable expectation of success. But it took the expert members of the 802.16 working group itself years to assess both the feasibility and desirability of such a change,

and the committee did not approve a mobile standard until at least a year after the priority date of the Patent.

As another example, as discussed in section IV, *infra*, Petitioner's Ground 2 relies upon the assertion that the POSITA would have found it obvious to change the operating principle of the IEEE 802.16ab standard, which deliberately did not provide guard bands for its ranging subchannels, based on an alleged motivation of "reducing interreference" that is not substantiated in any way and was not shared by the standard committee itself.

The proposed level of ordinary skill on which Petitioner relies is incorrectly high and unsupported by the evidence, and has already been rejected by the Board. The Board should reaffirm its existing findings as to level of ordinary skill and find that they undermine the proposed grounds of alleged unpatentability that rely upon a higher, incorrect level of skill.

III. THE JEONG-SUZUKI COMBINATIONS FAIL TO SHOW A REASONABLE LIKELIHOOD OF MEETING THE CLAIMS (GROUNDS 1 & 2, ALL CLAIMS).

Petitioner's Grounds 1 and 2 challenge the claims based on the combination of, as relevant here, Jeong and Suzuki. They fail for two independently sufficient reasons. *First*, Petitioner fails to show disclosure or obviousness of a "mobile station," by failing to show either a motivation or a reasonable expectation of success in modifying its primary reference, Jeong, to use "a mobile station (as

disclosed by Suzuki) in Jeong’s system or to modify Jeong’s subscriber stations to be mobile,” as the Petition (at 25) proposes. *See* section III.A, *infra*. **Second**, Petitioner additionally fails to disclose or render obvious guard subcarriers that are part of the ranging subchannels as claimed. Instead, Petitioner admits that its primary reference, Jeong, assigns guard subcarriers that are in between the subchannels, and fails to show why a POSITA would modify Jeong’s alleged ranging subchannels, which are carefully and admittedly defined to exclude the alleged guard subcarriers, to instead include the guard subcarriers. *See* Section III.B, *infra*.

A. The Petition Fails To Show That The POSITA Would Have Been Motivated To Modify Jeong In View Of Suzuki To Utilize “Mobile Stations” With A Reasonable Expectation Of Success.

Claim limitation 1.3 recites a “mobile station” that is in communication with the base stations and performs various functions. Ex. 1001 [’366 Patent] 7:18 (“identifying the mobile station”). Independent claims 9, 17 and 22 recite materially corresponding limitations. *Id.*, 8:3 (“identifying a mobile station”); 8:50-51 (“identifying the mobile station”); 9:16-22 (“a first mobile station” and “a second mobile station”). Petitioner relies on its discussion of limitation 1.3 in connection with the corresponding limitations of the other independent claims. Pet., 33-34.

Petitioner alleges that Jeong alone “teaches or suggests” limitation 1.3,” but makes no effort to show why or how Jeong teaches or suggests this limitation’s “mobile stations.” Pet., 28-30. In fact, the only juncture where the Petition appears to discuss such mobility is in connection with claim 1’s preamble, not limitation 1.3. Pet., 25.³ There, Petitioner admits that “Jeong ... does not expressly disclose that the subscriber stations are ‘mobile stations,’” and argues that “Suzuki teaches this feature.” *Id.*⁴ Thus, Petitioner fails to show why Jeong alone “teaches or suggests” limitation 1.3, as the Petition alleges. Pet., 28-30. But even if the Board were to give the Petition every benefit of the doubt, and consider

³ The portion of the Petition titled “Motivation to Combine” does not address the issue of mobility at all, and exclusively addresses alleged motivation to use Suzuki’s “zero-power subcarriers” in Jeong. Pet., 22-23.

⁴ Although the Petition uses the word “expressly” when conceding that Jeong does not “expressly disclose” “mobile stations,” it nowhere provides any analysis or argument that Jeong would implicitly or inherently disclose “mobile stations” either. *See, e.g., DISH Network LLC v. Sound View Innovations LLC*, IPR2020-01276, Paper 40, 21 n.3 (PTAB Feb. 8, 2022) (finding that petition using similar language for its primary reference “necessarily” relies on its secondary reference).

Petitioner's arguments for the disclosure of a "mobile station" in connection with the preamble of claim 1 to also be silently intended to bear on limitation 1.3, they still fail.

In connection with claim 1's preamble, Petitioner argues that:

It would have been obvious use [sic] a mobile station (as disclosed by Suzuki) in Jeong's system or to modify Jeong's subscriber stations to be mobile, because mobile communication systems, including mobile stations, were well-known by March 2004.

Pet., 25. As will be discussed below, Petitioner fails to show why the POSITA either would have been motivated or had a reasonable expectation of success to "use a mobile station ... in Jeong's system or to modify Jeong's subscriber stations to be mobile." Pet., 25. Instead, the evidence, including scholarly articles, establishes that the IEEE 802.16ab standard implemented by Jeong was designed for stationary users, and could not support mobile users until at least 2005, a year after the Patent's priority date.⁵

First, Petitioner's naked assertion that a POSITA would modify Jeong's users to be mobile simply because "mobile communication systems ... were well-known" fails to meet Petitioner's burden as a matter of law. "[A] patent composed

⁵ Petitioner does not challenge the Patent's priority date of March 9, 2004.

Pet., 6.

of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007). Instead, the challenger must establish, and the Board must set forth with support in the record, “some articulated reasoning with some rational underpinning” as to why a POSITA would have combined different elements from the different references in the manner claimed. *Id.* (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)); *see, e.g., Samsung Elecs. Co. Ltd. v. KAIST IP US LLC*, IPR2017-01046, Paper 14, 7 (Jan. 22, 2018) (it is Petitioner’s burden “to explain how and why” the disparate features of the references would have been obvious to combine as claimed); *Hulu LLC v. Sound View Innovations LLC*, IPR2018-00582, Paper 34, 20-21 (PTAB Aug. 5, 2019) (informative) (rejecting Petitioner’s proposed combination because Petitioner had not “adequately supported” why it would have been “good idea” to modify references as proposed); *see also In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1072 (Fed. Cir. 2012) (“Evidence of obviousness, especially when that evidence is proffered in support of an ‘obvious-to-try’ theory, is insufficient unless it indicates that the possible options skilled artisans would have encountered were ‘finite,’ ‘small,’ or ‘easily traversed,’ and that skilled artisans would have had a reason to select the route that produced the claimed invention.”); *Samsung Elecs. Co. v. Neonode Smartphone LLC*, IPR2021-

00144, Paper 59, 40 (PTAB Dec. 15, 2022) (“Petitioner does not direct us to any design need or market pressure to solve a problem, or any particular reason that an ordinarily skilled artisan would have selected a particular strategy from [the reference] to produce the claimed invention.”) (internal quotations omitted); *KSR*, 550 U.S. at 421 (a motivation may exist where there is a “design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions.”).

Petitioner’s expert declaration is also of no help to Petitioner, because, just as in prior proceedings where it was rejected, Dr. Cimini’s declaration merely repeats the conclusory allegations of the Petition (Pet., 25) that “mobile communication systems ... were well-known ...,” without providing any reason, motivation or analysis as to why a POSITA would have had a motivation to modify Jeong to utilize mobile stations with a reasonable expectation of success. Ex. 1003 [Cimini-Decl.] ¶ 76. *Compare Volkswagen Gp. of Am., Inc. v. NEO Wireless, LLC*, IPR2023-00086, Paper 7, 29 (June 16, 2023) (denying institution; finding that “we agree with Patent Owner that Dr. Cimini’s testimony should be given little weight” on an issue when it “mirrors the same assertions advanced in the Petition” on that issue “without further substantive explanation”). Here again, Dr. Cimini’s testimony is entitled to “little weight.” *Id.*; see 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the

opinion is based is entitled to little or no weight.”); *Xerox*, IPR2022-00624, Paper 9, 15 (rejecting expert testimony that “merely repeats, *verbatim*, the conclusory assertion for which it is offered to support.”) (emphasis in original).

Significantly, Petitioner’s failure to meet its burden and to provide any explanation as to why or how a POSITA would modify Jeong to use mobile stations, and whether he/she would have had a reasonable expectation of success, is not an offhand oversight regarding an insignificant issue. For there is a very good reason Jeong does not disclose or suggest mobile stations. Jeong implements the IEEE 802.16ab standard, which did not support mobile users, and ***could not*** support mobile users, until at least a year after the priority date of the Patent.

As Patent Owner’s expert, Mr. Alberth, explains, Jeong discloses a specific method based on the IEEE 802.16ab standard:

Dr. Cimini correctly observes that Jeong does not disclose mobile stations. Ex. 1003 [Cimini-Decl.] ¶ 75. This is because Jeong discloses a specific method for allocating ranging interval and sub-channel in the context of a “point-to-multipoint broadband wireless access” system based on the IEEE 802.16ab standard. Ex. 1008 [Jeong] 0003 (“***In IEEE 802.16ab***, OFDMA wireless communication system is defined such that data can be transmitted ... using a microwave frequency band between 2 GHz and 11Gz.”). Jeong explains that one of the “benefits of [its] invention” is that “there is ***no need to change the subcarrier allocation algorithm for data and pilot of the current IEEE802.16ab standard*** for data transmission and reception.” *Id.*, 0011.

In accord, Jeong repeatedly references aspects of the standard in its embodiments. For example, it explains that in its method, the ranging code is generated “by a Pseudo Random Binary Sequence (***“PRBS”***) ***generator (not shown) described in section 8.3.5.3.4.3.1 of IEEE 802.16ab/01r2*** into bit length of 159 bits.”). *Id.*, 0008; *see also id.*, (***“Since this method uses the carrier allocation method of the existing TDD mode OFDMA wireless communication system as it is,*** it is compatible with the uplink pilot and data carrier allocation method”); (***“the ranging code not only uses the existing PRBS generation code as it is”***).

As another example, Jeong first explains the two schemes by which the IEEE 802.16ab standard assigns ranging subchannels, and proceeds to propose its invention for the second scheme. First, Jeong explains, “[r]eferring to FIG. 1, two ‘sub-channels’ among the ‘sub-channels’ composed of 53 carriers are always set as ranging sub-channels” Ex. 1008 [Jeong] 0004. Jeong’s Fig. 1 then shows the two highest frequency sub-channels assigned as ranging subchannels. *Id.*, Fig. 1. IEEE 802.16ab describes the exact same arrangement for its second scheme of assigning ranging subchannels, and, in fact, IEEE 802.16ab Fig. 158 is substantively identical to Jeong’s Fig. 1. Ex. 1012 [802.16ab] 0086-0087.

Jeong then describes the second scheme of assigning ranging sub-channels, explaining that “[a]s shown in FIG. 2, a ranging signal section for controlling accurate time offset and transmission power and a signal section for data transmission are temporally separated, so that only ranging information is received in the reception interval of the ranging

signal.” Ex. 1008 [Jeong] 0004. Again, IEEE 802.16ab describes the exact same arrangement for its first scheme of assigning ranging subchannels, and, in fact, IEEE 802.16ab Fig. 157 is substantively identical to Jeong’s Fig. 2. Ex. 1012 [802.16ab] 0086-0087. IEEE 802.16ab refers to this scheme as the “TDD mode,” where TDD stands for time division duplexing. *Id.*

Jeong then explains that its method is for the TDD mode (the second option just explained) in the 2k mode of the IEEE 802.16ab standard. Ex. 1008 [Jeong] 0004 (“an object of the present invention ... reducing the ICI between the ranging signals *in the TDD mode* OFDMA wireless communication system.”); 0008 (“First, as the first embodiment, assuming a 2K mode OFDMA wireless communication system ...”); 0008-0009 (discussing other embodiments assuming the 2k mode); *see also* Ex. 1012 [802.16ab] 0200 (Table 218, 2k mode).

Ex. 2001 [Alberth-Dec1.] ¶¶ 38-42. Thus, Jeong is a specific method based on the IEEE 802.16ab standard.

But as Mr. Alberth further explains, it was well-known in the field, and to the POSITA, that the IEEE 802.16ab standard did not support mobile users. The Petition’s conclusory assertions regarding this limitation ignore a fundamental technological limitation of Jeong. As Mr. Alberth explains:

It was well-known in the field and to a POSITA that the IEEE 802.16ab standard (and its predecessors 802.16 and 802.16a) were directed exclusively at stationary systems and did not support mobile users. The title of standard itself states that it is the “Standard Air Interface *for*

Fixed Broadband Wireless Access Systems,” not for mobile systems.
Ex. 1012 [802.16ab] 0001 (Title).

This is also readily confirmed by various literature in the field, such as Ex. 2003 [Eklund], which was co-authored by Carl Eklund, chair of the MAC task group that developed the IEEE 802.16 medium access protocol, and Roger Marks, chair of the IEEE 802.16 working group on broadband wireless access. Ex. 2003 [Eklund] 107 (Biographies). Eklund provides a technical overview of the IEEE 802.16 standard. It explains that “[t]he broadband wireless access industry,” including the IEEE 802.16 standard, “provides high-rate network connections to *stationary sites*.” Ex. 2003 [Eklund] 98 (Abstract). Eklund further explains the purpose of the IEEE 802.16 standard at the time, which did not require mobile users. The IEEE 802.16 standard provided network access to buildings through exterior antennas installed on the buildings as an alternative to cable access networks to provide the last-mile connection between the buildings and the larger metropolitan network infrastructure:

As currently defined through IEEE Standard 802.16, a wireless MAN provides network access to buildings through exterior antennas communicating with central radio base stations (BSs). The wireless MAN offers an alternative to cabled access networks, such as fiber optic links, coaxial systems using cable modems, and digital subscriber line (DSL) links.

Ex. 2003 [Eklund] 98. WirelessMAN™ referenced in Eklund refers to the air interface for the IEEE 802.16, and stands for Wireless

Metropolitan Area Networks. *Accord*, Ex. 1012 [802.16ab] 0001 (Local and Metropolitan Area Networks).

Once the building was connected to the larger metropolitan network through 802.16, the individual users inside the building could access the network through other standards such as WLAN 802.11, *i.e.*, the typical Wi-Fi network. *Id.* (“In this scenario, with WirelessMAN technology bringing the network to a building, users inside the building will connect to it with conventional in-building networks such as, for data, Ethernet (IEEE Standard 802.3) or wireless LANs (IEEE Standard 802.11).”).

Ex. 2001 [Alberth-Dec1.] ¶¶ 43-43.

As Mr. Alberth further explains, it was not until 2005—a year after the priority date of the Patent—that an amended IEEE 802.16 standard could support mobile terminals after years of research and analysis by experts in the field:

The IEEE 802.16 family of standards (including 802.16ab) did not support mobile users until version 802.16e, approved in 2005. This is confirmed by, for example, another article authored by Roger Marks. Dr. Marks explains that the 802.16 working group “began a new project” to “add support for mobile terminals” in 2002. Ex. 2005 [Marks] 74. While the project “brought in a large number of participants and new technology ideas,” it was not until 2005 when the details, including feasibility and desirability, were worked out and support for mobile terminals were supported through the IEEE 802.16e amendment. *Id.*

The length of the project was, at least in part, due to the fact that both feasibility and desirability of adding mobility to the IEEE 802.16 standard were uncertain. As the “Call for Contributions” of the project noted, the working group had to “address enhancements to the IEEE 802.16a PHY/MAC to support mobile operation, including cell-to-cell and sector-to-sector handoff capability as well as other protocol and MIB support.” Ex. 2004 [Kiernan] 1. The first task of the working group was to determine if adding mobility to IEEE 802.16 was even feasible:

The initial output of the Study Group is expected to be a series of studies and analyses that would indicate *whether such a capability can be provided* within the basic confines of the 802.16a PHY/MAC, what level of mobility (pedestrian, vehicular) could be supported, and the extent of the PHY/MAC changes required to support it. It is NOT the current intent of the Study Group to develop a PAR. However, *if the technical studies indicate that 802.16a enhancement for mobile operation is feasible*, development of a PAR can be expected at some future date.

Ex. 2004 [Kiernan] 1. Note that PAR is a Project Authorization Request.

The Call for Contributions then lists more than *a dozen* bullet points of “technical issues” that needed to be addressed to add mobility to IEEE 802.16. *Id.*, 1-2. In fact, even after approving the IEEE 802.16e amendment in 2005, the working group continued its work on other

“critical issues” to support mobility, leading to IEEE 802.16f amendment in 2005 and IEEE 802.16g amendment in 2007. Ex. 2005 [Marks] 74. In short, it was not until at least 2005 that the IEEE 802.16 family of standards could support mobile users, with many of the details being worked out even later than 2005.

Ex. 2001 [Alberth-Decl.] ¶¶ 46-48. Thus, Petitioner’s naked assertion that the POSITA at the time would have found it obvious, with a reasonable expectation of success, to change the IEEE 802.16ab standard to support mobile users is unsupported at best, and contradicts the established state of the art. As Mr. Alberth summarizes based on his expertise, the POSITA would, instead, have had only a very limited ability to change such fundamental aspects of this art. *See* Ex. 2001 [Alberth-Decl.] ¶ 49 (“a POSITA would have had enough knowledge of the technology to understand and deploy equipment adhering to these technical specifications but would have a very limited ability to change the fundamental specifications of the network.”).

As Mr. Alberth further explains, beyond feasibility, even a motivation to add mobility to IEEE 802.16 was not self-evident, not least because, as has already been discussed to some extent above, the very 802.11ab technology on which Jeong is based was specifically designed in integral reliance on aspects of stationary systems that would not hold true in mobile systems:

Even if mobility could be added to the IEEE 802.16 standard by many experts in the field after years of analysis, it was not at all clear at the outset whether it was desirable to do so to begin with. First, the high frequencies used by the IEEE 802.16 standard that at least initially forced stationary systems were integral to the operation of the standard. As I explained in ¶¶ 43-46 above, IEEE 802.16 was designed as a stationary system that would operate as the last mile connection between a building and the larger metropolitan network, in lieu of using cable networks. This was possible in part because the frequency range of 802.16 was very high frequencies of 10-66 GHz (later expanded to include 2-11 GHz as well). This allowed the system to use unlicensed frequency bands, and also allowed for the very high data rates that were necessary for its intended function of connecting a business or a building to the metropolitan network. However, the high frequencies would also mean that the signal could not tolerate much, if any, non-line-of-sight propagation. In other words, at least initially, there had to be a direct line of sight between the base station and the receiving station. A mobile user that could move anywhere would present a challenge.

Additionally, directional receive antennas could be of substantial use in fixed broadband networks that use very high frequencies. While directional antennas could be installed in stationary systems, they were challenging in mobile stations, especially around the time of the Patent's invention. These reasons are why at least in its early stages, antennas operating based on the IEEE 802.16 standard were stationary and installed on building rooftops in order to receive a direct signal with

minimal multipath propagation. Ex. 2003 [Eklund] 98 (“As currently defined through IEEE Standard 802.16, a wireless MAN provides network access to buildings through exterior antennas communicating with central radio base stations (BSs).”).

The desirability of adding mobility to IEEE 802.16 was not self-evident additionally because of the existence of other standards such as the cellular system (2G, 3G) that already allowed mobile users. As the Call for Contributions by the 802.16 working group explained:

In addition to the technical issues, there are some other aspects of this effort that we need to keep in mind as we progress towards a possible PAR. *The one that comes most readily to mind is: What significant advantages or disadvantages does a mobile enhanced 802.16a air interface provide over current or planned 3G mobile networks?* Related to this is the question of liaison with other Standards Development Organizations such as T1P1, 3GPP and 3GPP2.

Ex. 2004 [Kiernan] 2.

Ex. 2001 [Alberth-Decl.] ¶¶ 50-52.

As Mr. Alberth explained, supported by literature from the pioneers in the field, as of the priority date of the Patent on March 9, 2004, the IEEE 802.16 standards (including IEEE 802.16ab) did not support mobile terminals, and would not do so for at least another year. Nor was either the feasibility or desirability of adding mobility to IEEE 802.16 self-evident or certain. Thus, Petitioner’s

conclusory assertion that a POSITA would modify Jeong to “use a mobile station ... in Jeong’s system or to modify Jeong’s subscriber stations to be mobile” (Pet., 25), simply because “mobile communication systems” were “well-known,” is insufficient as a matter of law to meet Petitioner’s burden, and also contradicts the well-documented state of the art. Therefore, Petitioner has failed to show either a motivation or a reasonable expectation of success to disclose “mobile stations” in its combination.

B. The Petition Fails To Show A “Ranging Subchannel Compris[ing]” Zero Power Sub-Carriers At Both Ends Of A Block.

Grounds 1 and 2 also fail for another, independently sufficient reason: the combination is not shown to disclose or suggest that the claimed zero-power subcarriers be a part of the ranging subchannel, as required by the claims.

Claim limitation 1.5 recites that “the ranging subchannel comprises” “one block of subcarriers” and that “power levels of subcarriers at both ends of a block are set to zero.” Ex. 1001 [’366 Pat.] 7:23-26. (Independent claims 9, 17 and 22 recite corresponding limitations. *Id.*, 8:8-11 (claim 9); 8:56-59 (claim 17); 10:8-11 (claim 22).) Thus, by virtue of reciting that the “ranging subchannel comprises” the zero-power subcarriers at both ends of the block, the claims require that the zero-power subcarriers be a part of the ranging subchannel. Ex. 2001 [Alberth-Decl.] ¶ 54.

This claim requirement is disclosed in ample detail in the specification. As

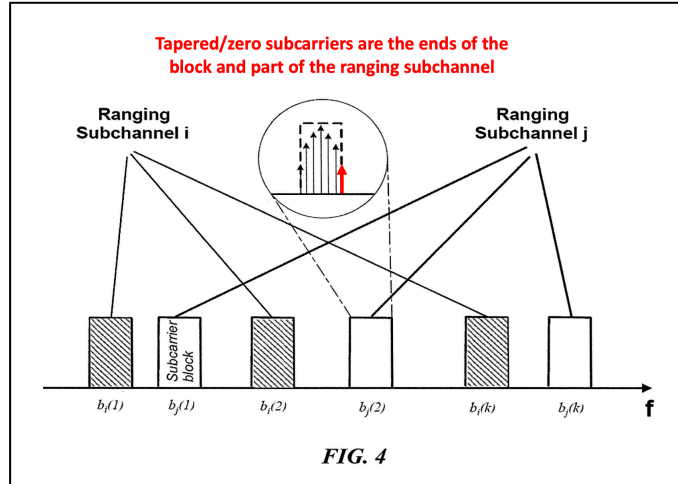
Mr. Alberth explains:

For example, Fig. 4, reproduced further below, shows three solid blocks as forming ranging subchannel j, and three hashed blocks as forming subchannel i. Ex. 1001 [’366 Pat.] 3:27-29; Fig. 4. The Patent then explains that “the power of the subcarriers towards the boundary ... of a block,” *i.e.*, within the block, is lower, and set to zero in a special case:

FIG. 4 illustrates *two ranging subchannels*, each of which is *composed of multiple blocks of subcarriers*. FIG. 4 schematically shows that the signal *power of the subcarriers towards the boundary (the lower ends and the higher ends in frequency) of a block is lower than that of the subcarriers towards the center of the block*. (In a special case, the power levels of the two subcarriers at both ends of a block are set to zero.).

Ex. 1001 [’366 Pat.] 3:27-35; *see also id.*, 4:6-13.

The Patent’s Fig. 4, reproduced below with annotations in red, also shows that the zero-power (or lower power) subcarriers “towards the boundary ... of a block” are within the block, and within the subchannel that comprises the block:



Ex. 2001 [Alberth-Dec1.] ¶¶ 55-56.

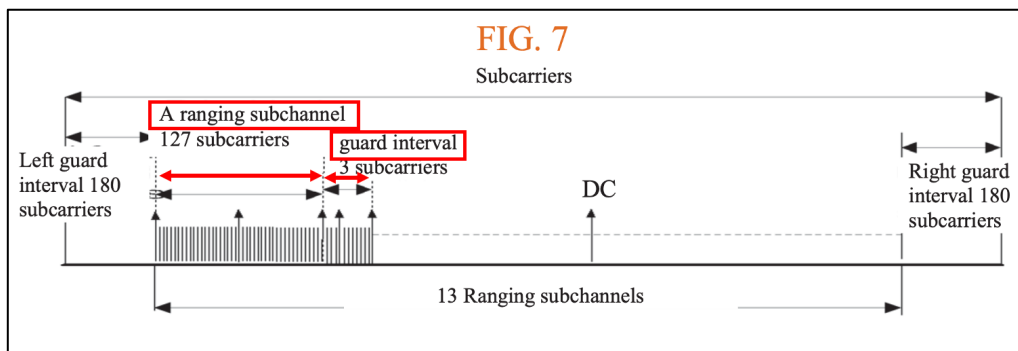
Petitioner relies on the combination of Jeong and Suzuki to argue disclosure of limitation 1.5. Pet., 30-33. However, as will be discussed below, Jeong does not disclose zero-power subcarriers that are part of the ranging subchannel, and Petitioner fails to show any motivation why a POSITA would re-define Jeong's subcarriers to meet the claims, in view of Suzuki or otherwise.

Jeong, as quoted by the Petition itself, clearly states that Jeong's guard intervals are provided *between* subchannels, and are not taught to be a part of the subchannel itself:

Another embodiment of the present invention will be described with reference to FIG. 7. When in 2K mode with 180 guard intervals on the left and right side of the ranging sub-channel structure, a ranging sub-channel consisting of 128 or 127 carriers R_{ch_m} ($m-1, \dots, 13$) is configured, and a ranging sub-channel allocation in which *a guard interval is provided between adjacent ranging sub-channels* is

presented. At this time, *the guard interval between ranging sub-channels* provide 2 subcarriers for a length of 128 ranging sub-channel and 3 sub-carriers for a length of 127.

Ex. 1008 [Jeong] 0008 (quoted by Pet., 31). That Jeong's guard intervals are provided between adjacent sub-channels, and are not defined as a part of the sub-channels, is clearly demonstrated in Jeong's Fig. 7, which is reproduced below with red annotations, and which is also relied upon by the Petition (Pet., 32):



Jeong goes on to expressly confirm that the sizes of both its subchannel and the ranging code are the same, at 127 subcarriers:

The ranging code used here is a gold code, and *the length of the ranging code is 127, which is the length of one ranging subchannel.*

Ex. 1008 [Jeong] 0009. Because the ranging code spans the entire size of the ranging subchannel, the subchannel does not and cannot include the zero-power guard subcarriers. Ex. 2001 [Alberth-Decl.] ¶¶ 57-59.

Thus, because Jeong expressly defines its ranging sub-channels as excluding the guard subcarriers, it fails to disclose the claimed ranging subchannel that “comprises” the zero-power subcarriers at both ends of the block.

In an apparent admission of the above, Petitioner makes a conclusory assertion that:

Alternatively, to the extent “block of subcarriers” is interpreted to include the guard subcarriers at both ends, Jeong’s 127 subcarrier ranging sub-channel plus one or more guard subcarriers on each end is a “block of subcarriers.”

Pet., 31 (emphasis omitted). As explained below, this conclusory assertion does not meet the claims even if it is credited; but it also fails to meet Petitioner’s burden as to why a POSITA would re-define Jeong’s carefully defined ranging sub-channels.

Petitioner’s conclusory “[a]lternative” argument quoted above seems to assume that whether the ranging subchannel “comprises” the zero-power subcarriers as claimed is simply a question of drawing a box around what constitutes “a block of subcarriers.” But that ignores the fact that the claim requires that the zero-power subcarriers be a part of the defined ranging sub-channel. *See supra* (citing Ex. 1001 [’366 Pat.], 3:27-35, 4:6-13, Fig. 4, cl. 1). Thus, even if one were to consider “Jeong’s 127 subcarrier ranging sub-channel plus one or more guard subcarriers on each end” as a “block of subcarriers” (Pet.,

31), it does not change the fact that Jeong's definition of its sub-channels excludes the guard sub-carriers and, therefore, the guard subcarrier portion of this newly defined "block" would fall *outside of* Jeong's ranging subchannel. Ex. 2001 [Alberth-Decl.] ¶¶ 60-61.

As Mr. Alberth explains, this distinction is directly material to the questions at issue about whether the invention is obvious:

As I explained above, Jeong carefully defines its subchannels, and that definition excludes the guard subcarriers between the subchannels. *Id.*, 0008-0009; Fig. 7. In contrast, as I also explained above, the '366 Patent defines potential zero-subchannels to be a part of the ranging subchannel. Ex. 1001 ['366 Pat.] 3:27-39, 4:6-13, Fig. 4. This distinction is material, and the Patent's approach has recognized benefits.

One example of the benefits of the disclosed and claimed requirement that the guard bands be part of the defined ranging subchannel is that the ranging subchannel can be dynamically moved around the frequency band without requiring the other subcarriers outside of the subchannel be re-configured to include guard bands. This is because the ranging subchannel already includes its guard bands within it to limit interference vis-à-vis its surroundings, and thus can be moved around dynamically without interference with its surrounding frequencies, and therefore without any need to modify the surrounding subcarriers. To the contrary, in Jeong, any alteration of the ranging subchannel location would also require altering the types of subcarriers

that would fall outside of the ranging subchannel both at the ranging subchannels original and new locations. The former guard subcarriers would need to be converted to some other use or left unused as a wasted resource, and subcarriers surrounding the new location of the ranging subchannel would need to be converted from other use to guard bands. Converting the surrounding subcarriers to guard bands can precipitate a further reconfiguration of even more subcarriers that were previously grouped for use with the surrounding subcarriers that are now used as guard bands. For example, the surrounding subcarriers now converted into a guard band may have been previously used as data subcarriers that were allocated as part of a data subchannel with other data subcarriers. By reassigning the surrounding data subcarriers as guard subcarriers, the data subchannel with fewer remaining data subcarriers may not be able to sustain the same throughput as originally configured. As such, additional subcarriers may need to be reallocated to said data subchannel to maintain its intended operation. However, when working with limited subcarriers as in any practical system, these additional subcarriers may need to be taken from yet another subchannel. Thus, a cascade effect may be experienced wherein the entire channel comprising the full ensemble of subcarriers may need to be overhauled to support a ranging subchannel as so designed by Jeong. On the other hand, such an overhaul of the channel is avoided when the zero-power subcarriers at both ends of the block are a part of the ranging subchannel itself, as claimed in the '366 patent. In short, substantial channel reconfiguration is necessary for dynamically reconfiguring Jeong's ranging subchannels.

The ‘366 patent describes the importance of being able to dynamically shape the ranging signal through its location within the frequency band. In one exemplary embodiment, the specification describes moving the ranging subchannel around the frequency band to minimize redundancy in the co-sampling function, resulting in a ranging signal with a narrow main peak and low sidelobes. Ex. 1001 [’366 Pat.] 4:49-5:9; Fig. 8. Without the guard bands defined as part of the subchannel itself, when a block within the subchannel is moved, the subcarriers adjoining the block at its new location would need to be altered to become guard bands, and shaping the ranging signal in the manner described in this embodiment would require several iterations of manually changing the subcarrier functions in and around each ranging block.

As another example, the Patent explains that the zero-power subcarriers being defined as a part of the subchannels allows the zero-power subcarriers to be zero only in “a special case,” and otherwise be simply tapered to a value above zero or not tapered at all. *Id.*, 3:29-34, 4:8-11. This is not possible in Jeong, where the guard bands are not part of the ranging subchannel and would need to have a fixed value (likely zero).

Ex. 2001 [Alberth-Decl.] ¶¶ 62-65.

Petitioner’s reliance on its secondary reference, Suzuki, fails to provide a reason to modify Jeong’s carefully defined subchannels.

First, the Petition does not even argue that the POSITA would change Jeong’s subcarrier definition in view of Suzuki; instead, Petitioner argues that the POSITA would “use zero-power subcarriers” as disclosed in Suzuki “***in the guard***

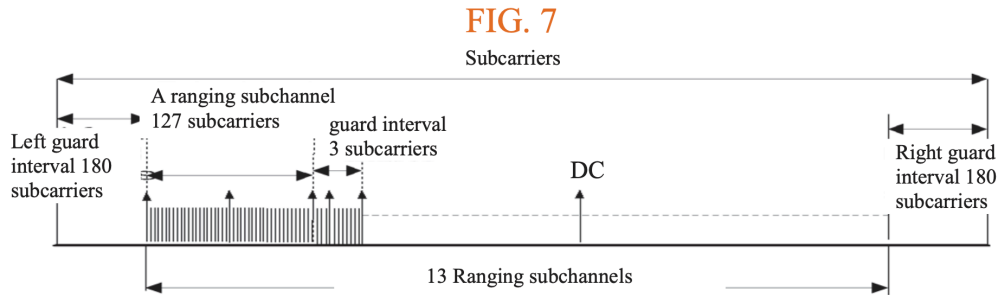
intervals of the ranging sub-channel allocation methods disclosed by Jeong.”

Pet., 23, 33. However, regardless of whether the subcarriers “in the guard intervals of the ranging subchannel[s]” of Jeong have a power of zero, they are not part of the ranging subchannel, as explained above. Therefore, even if it had a motivation and expectation of success, the combination with Suzuki as proposed by Petitioner does not remedy Jeong’s shortcoming.

Second, Petitioner asserts that Jeong “does not describe the details of the guard subcarriers, which would have led a POSA to Suzuki’s zero-power subcarriers.” Pet., 23; *see also id.*, 32-33 (similar). But this premise is incorrect. Jeong clearly discloses the locations of its guard subcarriers where it believes they are desired. Thus, Jeong is not, as Petitioner suggests, indifferent to their locations: rather, Jeong clearly states that it has located them in the way that does not meet the claims. And Petitioner offers no reason why the POSITA would have been motivated to modify them from Jeong’s preferred and specified locations. As Mr. Alberth explains:

For example, in the context of Jeong’s Fig. 7, relied upon by Petitioner (Pet., 31), Jeong explains that “[w]hen in 2k mode with **180 guard intervals on the left and right side of the ranging sub-channel structure**,” each “ranging sub-channel has a length of 127,” and “**a guard interval with a length 3 [exists] between the ranging sub-channels**” is provided. Ex. 1008 [Jeong] 0008. As also demonstrated in Jeong’s Fig. 7 reproduced below, Jeong clearly shows that guard

intervals of length 180 sub-carriers exist at the two ends of the entire sub-channel structure, and guard intervals of length 3 sub-carriers exist between each sub-channel of length 127:



Ex. 2001 [Alberth-Decl.] ¶ 66. Thus, there is no lack of “details of the guard subcarriers” in Jeong to have “led” the POSITA to Suzuki. Jeong does provide complete details, and it simply does not structure its system similar to the claims.

Finally, Petitioner proffers that a POSITA would implement Suzuki in Jeong to “prevent interference.” Pet., 23, 33. However, as explained in detail above, Jeong already does disclose its own guard intervals; it just does not disclose them as a part of the subchannel. Ex. 2001 [Alberth-Decl.] ¶ 68. There is no evidence in the record that the guard intervals would have provided better interference protection if they were a part of the subchannel as opposed to between the subchannels. Petitioner does not identify any shortcoming in Jeong, or any benefit from modifying Jeong, or any other reason why a POSITA would modify Jeong in view of Suzuki. *Compare R.J. Reynolds Vapor Co. v. Fontem Holdings I B.V.*, IPR2016-01692, Paper 45, 26 (PTAB Mar. 2, 2018) (“Because [the first reference]

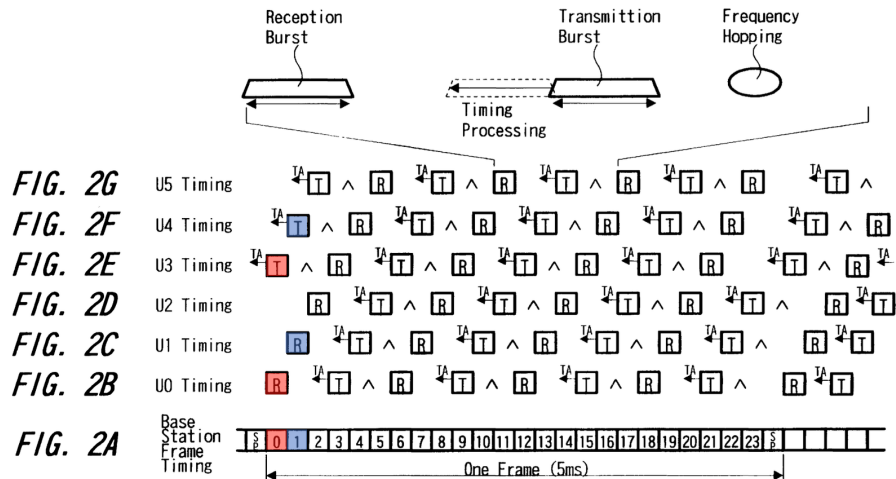
already discloses a reliable means for transporting liquid from a liquid supply to a heating element, we do not find that [a POSITA] would have been motivated to use the technique of [the second reference] to improve [the first]”); *Norman Int’l, Inc. v. Hunter Douglas, Inc.*, IPR2014-00282, Paper 8, 16 (PTAB June 20, 2014) (“Petitioner has not explained adequately why a [POSITA] would have had a reason to modify Todd’s device to include Strahm’s one-way brake mechanism in the manner required by [the] challenged claims ... because Todd’s device already includes brake/clutch mechanism 28”). Importantly, nor does Petitioner offer any art teaching of this modification or of any well-established advantage of such a modification.

More fundamentally, even if Suzuki may structure guard bands in a particular way, Petitioner has failed to show that Suzuki’s structure has any relevance to Jeong. Jeong is an OFDMA system. Ex. 1008 [Jeong] 001. Unlike Jeong, Petitioner has not shown that Suzuki is even an OFDMA system—a critical difference especially in light of Petitioner’s proffered motivation of “reducing interference.” Instead, Suzuki describes its multiple access technique as TDMA, Time Division Multiple Access.

Specifically, Suzuki explains that in its embodiment of Fig. 2, “the cell station communicates simultaneously with a plurality of the portable stations.” Ex. 1009 [Suzuki] 3:31-35. Suzuki then proceeds to describe its multi-access

technique, concluding that “[a]ccordingly such an arrangement as is shown in FIGS. 2A to 2G, six ***TDMA (Time Division Multiple Access)*** in which the six portable stations are coupled to one band slot can be performed.” *Id.*, 4:5-8.

If a system uses TDMA to provide access to multiple users, then at any given time, a single user uses the entire frequency band, instead of dividing the frequency band between the different users. Ex. 1010 [Gibson] 0318 (“In TDMA systems users share the same frequency band by accessing the channel in non-overlapping time intervals in a round-robin fashion.”). The way that multiple users can access the system is by rotating the time slot between the different users, so that each user can access all the sub-channels at its allocated time slot. *Id.* This is exactly how Suzuki’s cited embodiment, for example, Suzuki’s Figs. 2A-2G, operate. In Suzuki’s Figs. 2A-2G, reproduced below in annotated form, T denotes a transmitting slot and R denotes a receiving slot. Ex. 1009 [Suzuki] 3:41-43. As shown in the annotation, at any given time slot, a single user transmits and a single user receives. For example, at time slot zero (red), only user U_0 receives data, and only user U_3 transmits data. At time 1 (blue), only user U_1 receives data and only user U_4 transmits data. Thus, at any given time, the entire uplink frequency band is assigned to a single user and, conversely, the entire downlink frequency band is assigned to another user.



TDMA is not the same thing as the OFDMA system in Jeong. Unlike TDMA, in Jeong, the frequency band is divided into subchannels, which can be used by different users, and each user may randomly select a ranging subchannel at the same time. Ex. 1008 [Jeong] 003 (“At this time, . . . each user randomly selects . . . the ranging code, and transmits it through ranging sub-channel which is also randomly selected.”).

Petitioner’s expert provides no analysis or evidence that supports his claim that Suzuki “describes an OFDM-based” system that “employs OFDMA.” Ex. 1003 [Cimini-Decl.] ¶ 66; *see also* Pet., 19 (same). The word OFDMA or its equivalent does not appear anywhere in Suzuki. Petitioner’s expert appears to instead erroneously conflate the different concepts of OFDM (Orthogonal Frequency Division *Multiplexing*) and OFDMA (Orthogonal Frequency Division *Multiple Access*).

OFDM, the technology mentioned in Suzuki along with TDMA, is a modulation technique that has no direct bearing on what technique a system subsequently uses for allowing multiple access (*i.e.*, access by multiple users instead of just one user). OFDM stands for Orthogonal Frequency Division ***Multiplexing***. It is a modulation scheme that transmits blocks of symbols in parallel over a number of orthogonal subcarriers. Ex. 1010 [Gibson] 0308. Thus, instead of the data being sent over the single wideband channel, it is split among the multiple subchannels, and a piece of the data is transmitted through each subchannel. *Id.* This modulation approach has numerous benefits. For example, it is more resilient to fading because, statistically, only some of the numerous subchannels may face multipath fading or other poor performance measures at any given time. Ex. 1009 [Suzuki] 1:26-28 (“[t]he transmitted signal according to the OFDM system has an advantage in that even if there is a multipath a good transmission characteristic is ensured”).

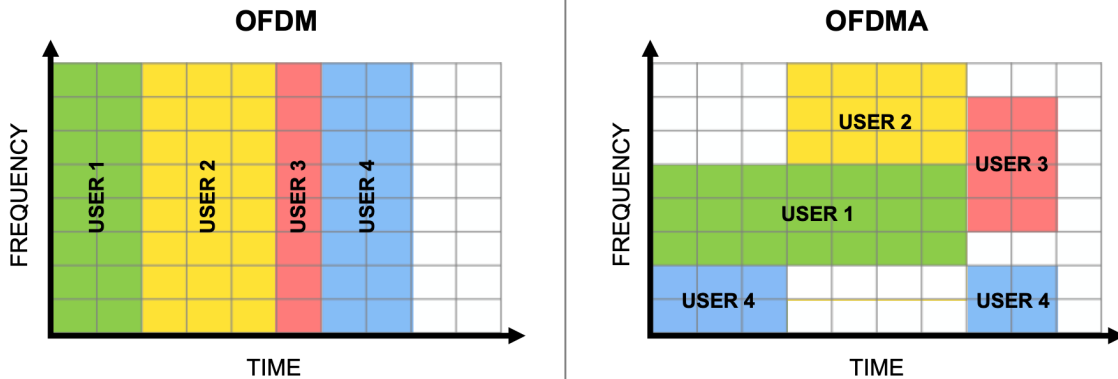
If it is desired that a system utilizing OFDM modulation service multiple users, then the OFDM modulation can be used in conjunction with one of the different multiple access techniques. Ex. 1010 [Gibson] 0312-0313 (describing the different multiple access techniques). For example, some systems like Jeong use OFDMA, which stands for Orthogonal Frequency Division ***Multiple Access***, while others use TDMA. *Id.*

Dr. Cimini's citations to Suzuki do not support the proposition that it uses OFDMA. Ex. 1003 [Cimini-Decl.] ¶ 66 (citing Ex. 1009 [Suzuki] 1:5-30, 2:57-3:30, 3:31-4:34). Specifically, Ex. 1009 [Suzuki] 1:5-30 only states that Suzuki uses the OFDM modulation scheme. *See, e.g., id.*, 8-9 (“method applicable to the orthogonal frequency division multiple system (OFDM system)”; 1:14-15 (“a multicarrier communication method called Orthogonal Frequency Division Multiplexing (OFDM system) has been proposed”); 1:26-27 (“[t]he transmitted signal according to the OFDM system has an advantage in that even if there is a multipath a good transmission characteristic is ensured.”). As explained above, Suzuki does not at all mention OFDMA and instead expressly states that it uses TDMA for multiple access. Ex. 1009 [Suzuki] 4:5-8.

In fact, Petitioner's own technology tutorial in the co-pending district court litigation distinguishes between OFDM and OFDMA:⁶

⁶ Patent Owner does not concede that every distinction between OFDM and OFDMA depicted in Petitioner's technology tutorial is accurate, and only presents this graphic to highlight that Petitioner itself has distinguished between OFDM and OFDMA.

OFDM v. OFDMA



Furthermore, Petitioner has not shown that “interference” considerations in a TDMA system (as in Suzuki) are the same or comparable to interference considerations in an OFDMA system as in Jeong. For example, in TDMA, the same user uses the entire frequency band in downlink or uplink. Thus, for example, in TDMA, when data is transmitted by a user, the entire band contains data, and all from the same user. Ex. 1010 [Gibson] 0318. In contrast, in Jeong, different parts of the frequency band contain data from different users at a given time. Thus, at a given time, some parts of the frequency band may contain data and some may not, and the parts that do contain data are from different users. Ex. 1008 [Jeong] 003.

For all of the foregoing reasons, Petitioner has failed to show that Jeong discloses a ranging subchannel that “comprises” zero-power subcarriers at the end of blocks, or why the POSITA would have found it obvious to redefine Jeong’s subchannels to include those zero-power subcarriers.

IV. THE PETITION FAILS TO SHOW A REASON TO MODIFY 802.16ab TO USE A “RANGING SUBCHANNEL COMPRIS[ING]” ZERO-POWER GUARD SUBCARRIERS WITH A REASONABLE EXPECTATION OF SUCCESS (GROUNDS 3 & 4, ALL CLAIMS).

Limitation 1.5 requires that “the ranging subchannel comprises at least one block of subcarriers within the communication channel and power levels of subcarriers at both ends of a block are set to zero.” Ex. 1001 [’366 Pat.] 7:23-26. Independent claims 9, 17 and 22 recite similar limitations. *Id.*, 8:8-11 (claim 9); 8:56-59 (claim 17); 10:8-11 (claim 22). Petitioner relies on its discussion of limitation 1.5 in connection with the corresponding limitation in all independent claims. Pet., 70-71. As will be discussed below, in its Ground 3 (and dependent Ground 4), Petitioner fails to show either a motivation or a reasonable expectation of success for using zero-power subcarriers in ranging subchannels of its second ground references.

Petitioner maps the subcarriers of a ranging subchannel in the IEEE 802.16ab standard to the claimed ranging subchannel that “comprises” “at least one block of subcarriers.” Specifically, Petitioner argues that 802.16ab “discloses that ‘subcarriers’ are ‘grouped into sub-channels,’” and therefore, “the ranging

subchannel(s) disclosed by 802.16ab ... include ‘at least one block of subcarriers within the communication channel.’” Pet., 69 (internal citations and emphasis omitted). For example, Petitioner’s expert cites 802.16ab Fig. 158, reproduced below, which shows the top two subchannels highlighted in grey assigned for ranging:

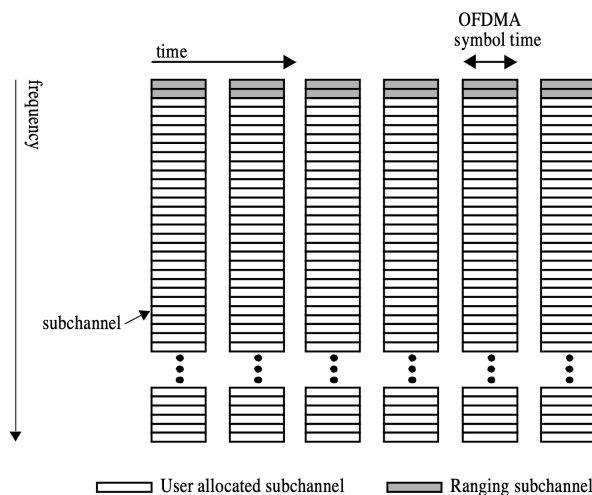


Figure 158—Ranging subchannel allocation, method #2

Ex. 1012 [802.16ab] 0087 (cited by Ex. 1003 [Cimini-Decl.] ¶ 173).

Petitioner admits that IEEE 802.16ab “does not expressly disclose” that, in connection with its ranging subchannels, “the power levels of subcarriers at both ends of a block are set to zero” as claimed. Pet., 69-70.⁷ But Petitioner argues that

⁷ While stating that 802.16ab does not “expressly disclose” zero-power subcarriers for its ranging subchannels, the Petition nowhere alleges or provides

because IEEE 802.16ab discloses guard subcarriers elsewhere, it would have been obvious for the POSITA to look into Suzuki for more details and to apply those guard subcarriers also to the ranging sub-channels “to reduce interference.” Pet., 59. Specifically, Petitioner argues that IEEE 802.16ab’s disclosure of guard subcarriers elsewhere

would have motivated a POSA to look to Suzuki, who discloses additional details of guard bands, such as where to place guard bands (e.g., both ends of one band slot) and their power level (e.g., zero).

Pet., 59.

However, Petitioner makes no showing of even a reasonable likelihood that this was true. As explained in the following subsections, Petitioner’s unstated premise, that the IEEE 802.16ab’s lack of disclosure of guard subcarriers in connection with its ranging subchannels, was a teaching that this was an option left to the discretion of the POSITA to modify as necessary “to reduce interference” is unsupported and incorrect. Instead, the IEEE 802.16ab standard deliberately did not utilize guard bands in connection with ranging subchannels, because those subchannels utilize the CDMA spreading technology that has a high resistance to interference.

any analysis or argument that IEEE 802.16ab inherently or implicitly disclose this limitation either.

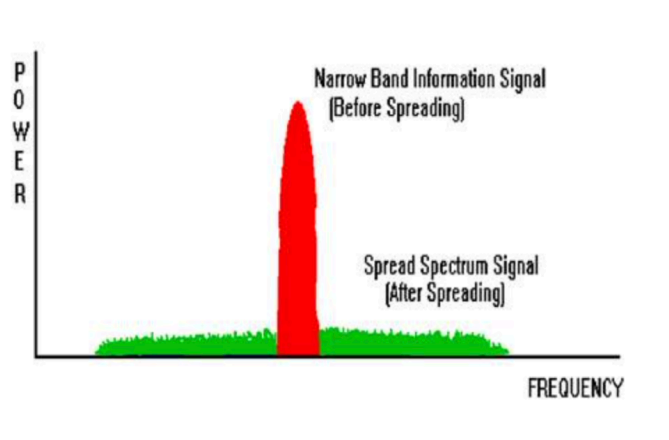
Specifically, IEEE 802.16ab utilizes a spread spectrum technology called CDMA for its ranging operations. *See* Section III.A, *infra*. The standard deliberately does not disclose guard bands in connection with its ranging subchannels, and in fact expressly states that users are “allowed to collide” on the ranging subchannels. Ex. 1012 [802.16ab] 0204. This is because, as the POSITA would have understood, CDMA was well-known to have a high resistance to interference, and in fact, would not necessarily have (or cause) an interference problem even if the spread CDMA signal were overlaid directly on top of narrow frequency band data signals, being transmitted at the same time and on the same frequency. *See* Section IV.B, *infra*. Therefore, Petitioner’s conclusory assertion that the POSITA would have found it obvious to add guard bands to IEEE 802.16ab’s ranging subchannels to “reduce interference” fails to substantiate that interference was a concern, or the source of any such interference, or that, in the circumstances, the POSITA would have reduced the bandwidth and increased the required power by adding guard bands in order to “reduce” an unidentified “interference.” *See* Section IV.C, *infra*. Nor does Petitioner show that the properly defined POSITA would have had a reasonable expectation of success in doing so. *Id.*

A. The IEEE 802.16ab Standard Utilized CDMA For Its Ranging Operation.

As Mr. Alberth explains, the IEEE 802.16ab standard, and therefore the 802.16ab reference, utilizes a multi-access scheme referred to as CDMA to allow multiple users to simultaneously use its ranging subchannels:

CDMA (Code Division Multiple Access) is a method of allowing multiple users to access the bandwidth, and is based on spreading technology. In this method, instead of each user only utilizing an assigned portion of the frequency band, all users utilize the entire available frequency band. For example, if four subchannels are assigned for ranging, all users would use all four subchannels simultaneously.

Each user is assigned a code (sometimes generated based on a pseudo-random number). The user “spreads” the information signal based on its assigned code to cover the entire available frequency bandwidth but with a lower power density. This is shown schematically below, where the red signal is the information signal before spreading, and the green signal is the information signal after spreading:



The receiver of the spread signal is also in possession of the CDMA code that was assigned to the user, and can extract the intended data by applying the reverse of the spreading process. Because each user's spreading code is unique (a part of a pseudo-random generated signal), all users can send their spread signals in the same channel.

By analogy, consider a room where multiple people simultaneously speak in different languages. A listener fluent in a specific language can detect the words of the person speaking in that language, while disregarding the other persons speaking in other languages.

Ex. 2001 [Alberth-Dec1.] ¶¶ 74-77.

This basic aspect of CDMA operation is confirmed by Petitioner's own exhibit 1010, the Mobile Communication Handbook:

When using CDMA, each signal in the set is given its own spreading sequence. As opposed to either FDMA, wherein all users occupy disjoint frequency bands but are transmitted simultaneously in time, or TDMA, whereby all users occupy the same bandwidth but transmit in disjoint intervals of time, ***in CDMA, all signals occupy the same bandwidth and are transmitted simultaneously in time; the different waveforms in CDMA are distinguished from one another at the receiver by the specific spreading codes they employ.***

Ex. 1010 [Gibson] 0193.

Furthermore, as Mr. Alberth explains, the IEEE 802.16ab standard expressly utilizes the CDMA spreading process in connection with its ranging operation:

For example, 802.16ab expressly states that the Ranging Code assigned to each user is “a CDMA code”:

The SS [subscriber station], after acquiring downstream synchronization and upstream transmission parameters, shall choose randomly a Ranging Slot (with the user of a binary truncated exponent algorithm to avoid of possible re-collisions) as the time to perform the ranging, then *it chooses randomly a Ranging Code (from the Initial Ranging domain) and sends it to the BS (as a CDMA code)*.

Ex. 1012 [802.16ab] 0088.

The standard further confirms its CDMA ranging operation by explaining that the usage of the ranging subchannels are based on the PN code (pseudo-noise code) randomly selected by each user. Ex. 1012 [802.16ab] 0204 (“[t]he usage of the Sub-Channel for ranging is done by the transmission of a Pseudo Noise (PN) code on Sub-Channel allocated for ranging transmission.”); (“Each user randomly chooses one code”). These are the codes used for spreading the user’s signal.

Furthermore, in the IEEE 802.16ab standard, the size of the ranging CDMA code assigned to each user is equal to the combined size of all subchannels assigned for ranging, resulting in *each user’s signal being spread across all the subchannels forming the entire ranging frequency spectrum*. The standard explains that the length of the Ranging Code is in multiples of 53 bits, and it depends on how many

sub-channels are allocated for ranging. Ex. 2012 [802.16ab] 0204. For example, “the default for the 2k mode is 2 sub-channels” allocated for ranging, and, “therefore the ranging code length is 106.” *Id.* Thus, the length of the ranging code would equal ***the combined length of all subchannels allocated for ranging*** because the user would spread its ranging signal across the entire available bandwidth.

Ex. 2001 [Alberth-Decl.] ¶¶ 79-81.

Petitioner does not rely on its primary reference (Koo) for limitation 1.5. Pet., 69-70. The fact that 802.16ab is combined with Koo does not change the CDMA operation in the teachings of the proposed combination (nor does Petitioner argue otherwise). This is because the Koo reference also uses a similar CDMA spreading mechanism.⁸ As Mr. Alberth explains:

Koo explains that a Pseudorandom Noise is used to assign codes to specific users, and because “[t]ypically, one ranging channel is composed of two ranging sub-channels, each having the length of 53 bits, the ranging code is 106 bits long.” Ex. 1011 [Koo] [0032]. It then states that “[t]hese ranging processes and their function are the same as those in the aforementioned prior art.” *Id.* Thus, similar to the typical CDMA operation also utilized by IEEE 802.16ab for ranging, each user

⁸ Dr. Cimini also opines that Koo “describes an OFDMA communication system in the context of the IEEE 802.16 standard.” Ex. 1003 [Cimini-Decl.] ¶ 144.

is assigned a code, which is the size of the entire frequency spectrum assigned for sub-ranging, and which the user then utilizes to spread its information signal across the entire ranging spectrum.

Ex. 2001 [Alberth-Decl.] ¶ 82.

As will be discussed in the following subsection, it was well known that CDMA operations have a high resistance to interference, as confirmed by the IEEE 802.16ab standard itself.

B. IEEE 802.16 Designedly Did Not Utilize Guard Bands For Ranging Because Of Known Interference Resistance Characteristics Of CDMA, And Instead Taught That Users “Are Allowed To Collide.”

Far from being an oversight or an option left to the discretion of a POSITA, the IEEE 802.16ab standard deliberately defined its ranging codes to expand the entirety of all ranging subchannels, without any subcarriers allocated as guard subcarriers, as already explained in the previous section. As Mr. Alberth explains:

The IEEE 802.16ab standard was the result of years of analysis and deliberations by the experts in the field. They were obviously aware of guard bands, and, as I will explain below, the standard discloses them where necessary. However, the standard deliberately defines its ranging code to expand the entirety of the bandwidth of all ranging subchannels without any guard subcarriers in connection with the ranging subchannels. Ex. 1012 [802.16ab] 0204 (explaining that each subchannel is 53 bits, and the ranging code size is a multiple of 53 depending on how many subchannels are allocated for ranging). This is not an oversight or an omission. Rather, it is because the standard

uses CDMA for ranging, which was well known to be resistant to interference, and thus, not requiring guard bands.

Ex. 2001 [Alberth-Decl.] ¶ 83.

The IEEE 802.16ab standard itself confirms this deliberate choice not to include guard bands in connection with ranging signals. For example, 802.16ab explains that users “are allowed to collide” on the ranging subchannels because the “colliding codes” can be separated through the user’s randomly selected ranging code:

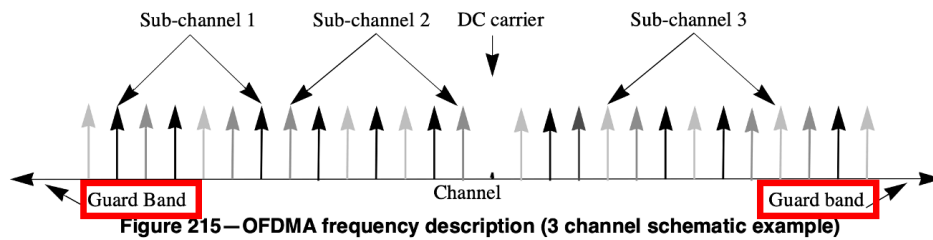
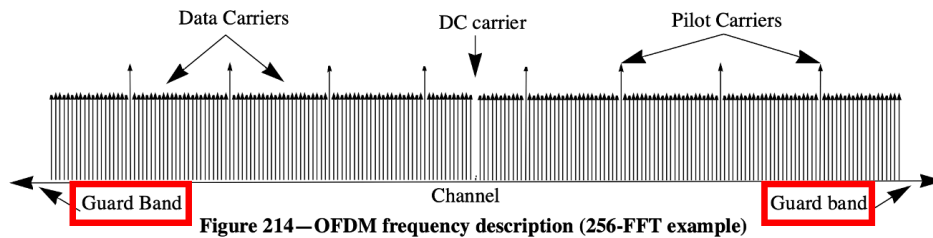
Measurements of Time (ranging) and Power are performed by allocating several Sub-Channels to one Ranging Sub-Channel. *Users are allowed to collide on this Sub-Channel.* Each user randomly chooses one code from a bank of specified binary codes. ... The Base Station can then separate colliding codes and extract timing (ranging) information and power.

Ex. 1012 [802.16ab] 0204; Ex. 2001 [Alberth-Decl.] ¶ 84.

In fact, where the 802.16ab standard in other situations believes guard bands are helpful, it does disclose them, further confirming that the non-disclosure of guard bands with ranging subchannels was deliberate. As Mr. Alberth explains:

Further evidence that the standard’s omission of guard bands from the ranging subchannels was a deliberate design choice, the standard does disclose guard bands in other situations where it deems them desirable. For example, Petitioner relies on the standard’s discussion of guard bands, and argues that “these teachings would have motivated a POSA

to look to Suzuki, who discloses additional details of guard bands, such as where to place guard bands (e.g., both ends of one band slot) and their power level (e.g., zero).” Pet., 59 (citing Ex. 1012 [802.15ab] 0175). But, contrary to Petitioner’s assertion, even the very page of the IEEE 802.16ab standard cited by Petitioner does specify both the power level of the guard bands, and their location—it simply elects not to structure them at the location required by the claims. Specifically, as the annotated versions of the standard’s Figs. 214 and 215, reproduced below, show, the standard discloses “guard bands,” but does not place them within or in connection with any ranging subchannels. Rather, it places them at the very end of the entire communication channel, *i.e.*, at both ends of the entire bandwidth assigned to the system:



Guard Bands are only placed at the end of the entire communication channel.

As another example, even in the context of the ranging operation, the standard discloses a quiet interference monitoring time, but still elects not to include any guard frequency bands in connection with ranging.

Specifically, the standard explains that TDD (Time Division Duplexing) can be used as an alternative scheme of allocating ranging subchannels. Ex. 1012 [802.16ab] 0086. In TDD, ranging is temporally separated from all other operations by allocating all available subchannels to ranging during a first time interval, and allocating all available subchannels to other operations during a second time interval. *Id.*, 0086-0087; Fig. 157. In that context, the standard determined that a quiet interference monitoring period is beneficial that temporally separates the ranging operation from the other operations, as shown in the annotated version of the standard's Fig. 157, reproduced below:

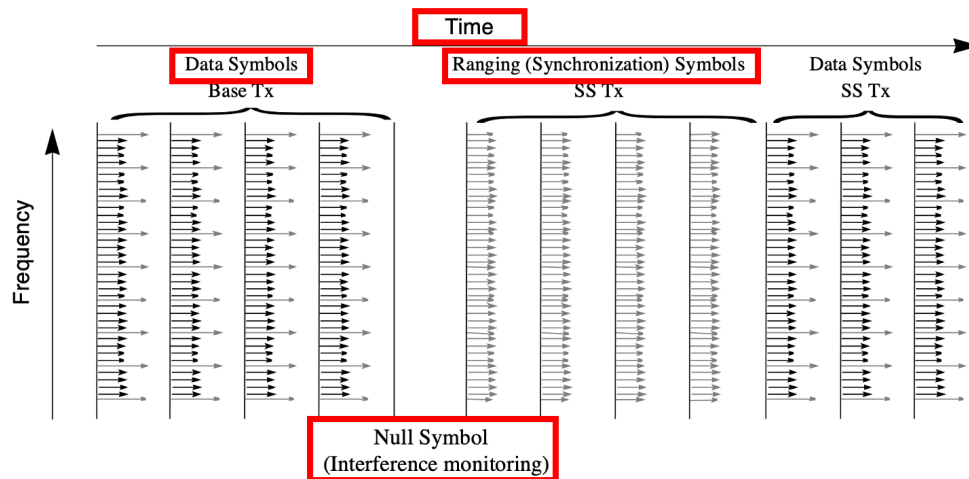


Figure 157—Ranging symbol allocation, method #1, (TDD mode)

This further confirms that the standard not allocating frequency guard subcarriers to or in connection with ranging subchannels was a deliberate design choice.

Ex. 2001 [Alberth-Decl.] ¶¶ 85-87.

The IEEE 802.16ab standard's teaching not to include guard frequency subcarriers in connection with ranging signals is due to the well-known fact that CDMA signals have a high tolerance to interference. Ex. 2001 [Alberth-Decl.]

¶ 88. As Petitioner's own exhibit 1010, Mobile Communication Handbook, explains, resistance to interference is an inherent property of spreading methods because the interference occurs after the signal is already spread, and its effect is greatly diminished after the original signal is despread:

In the presence of narrowband interference, however, there is a significant advantage to employing the spreading/despreading procedure described. The reason for this is as follows. Since the interference is introduced after the transmitted signal is spread, then, whereas the despreading operation at the receiver shrinks the desired signal back to its original bandwidth, at the same time it spreads the undesired signal (interference) in bandwidth by the same amount, thus reducing its power spectral density. *This, in turn, serves to diminish the effect of the interference on the receiver performance*, which depends on the amount of interference power in the despread bandwidth. *It is indeed this very simple explanation, which is at the heart of all spread spectrum techniques.*

Ex. 1010 [Gibson] 0184. As a result, Gibson explains, spreading techniques are used in the military because they “are *robust to interference generated by an intelligent adversary*,” and are used in the commercial settings due to their resistance to interference. *Id.*, 0195. Gibson then explains that *even if spreading*

signals are overlaid directly on top of narrowband frequency signals such that they occupy the same time and frequency, their resistance to interference would allow the system to properly operate in connection with potential interference *both for the spread signal and for the narrowband frequency signals*:

To illustrate these two ideas, consider a scenario whereby a given band of frequencies is somewhat sparsely occupied by a set of conventional (i.e., nonspread) signals. To increase the overall spectral efficiency of the band, a set of spread spectrum waveforms can be overlaid on the same frequency band, thus forcing the two sets of users to share common spectrum. ... *Because of the interference suppression properties of spread spectrum waveforms, the despreading process at each spread spectrum receiver will attenuate the components of the final test statistic due to the overlaid narrowband signals. Similarly, because of the LPI [Low Probability of Intercept] characteristics of spread spectrum waveforms, the increase in the overall noise level as seen by any of the conventional signals, due to the overlay, can be kept relatively small.*

Ex. 1010 [Gibson] 0195.

For these reasons, and as will be explained in more detail below, Petitioner fails to substantiate its assertion that “reducing interference” would have motivated the POSITA to modify 802.16ab to utilize frequency guard bands in connection with its ranging subchannels.

C. The Petition Fails To Show A Rationale To Modify IEEE 802.16ab To Implement Guard Bands For Its Ranging Subchannels With A Reasonable Expectation Of Success.

Petitioner fails to show why a POSITA would have modified IEEE 802.16ab in view of Suzuki to implement guard bands in connection with its interference-resistant CDMA ranging subchannels, or a reasonable expectation of success in doing so.

Petitioner's sole proffered motivation for its combination is to "reduce interference." Pet., 59, 70. However, Petitioner fails to substantiate why a POSITA would have understood there to be undesired interference to be reduced, or even what the source of this alleged interference is—or, even if there was any minimal interference, why the POSITA would have understood the detrimental effects of guard bands to have been outweighed by this justification.

As Mr. Alberth explains:

Suzuki discloses a system where each set of consecutive 24 subcarriers are grouped together, similar to a subchannel, with the first and last subcarriers within the set having zero-power. Ex. 1009 [Suzuki] 3:5-20. For its combination, Petitioner argues that a POSITA would look into Suzuki to add guard bands between IEEE 802.16ab's ranging subchannels, and its proffered motivation is "to reduce interference." Pet., 59; *see also id.* ("inserting guard bands between frequency bands was a well-known technique ...").

However, as I explained above, there is no evidence that a POSITA would believe interference in connection with IEEE 802.16ab's ranging subchannels is a problem that needs improvement. Specifically, the standard deliberately uses CDMA spreading techniques for ranging, which was well known for its high resistance to interference, and states that "users can collide" on the ranging subchannels. Ex 1012 [802.16ab] 0204. As explained in Ex. 1010 [Gibson] 0184, 0195, this is an inherent property of the spreading process, which also resulted in spreading process to be used for military purposes. As Gibson explained, even if the spread signals were laid directly on top of other narrow frequency band data, there would not necessarily be interference problems either for the spread signals or for the narrow band frequency data. *Id.*, 0195.

Ex. 2001 [Alberth-Decl.] ¶¶ 90-91.

In short, Petitioner has failed to substantiate the "interference" problem that it argued motivates its combination. The Petition does not substantiate where the interference might come from; why the interference would be present; or why, given the known interference-resistant nature of CDMA, the supposed interference would render guard bands advantageous instead of disadvantageous. *Compare, e.g., Arctic Cat Inc. v. Polaris Indus.*, 795 Fed. Appx. 827, 833 (Fed. Cir., 2019) (rejecting motivation where party "failed to prove that these alleged problems with Sundahl existed"); *In re Omeprazole Patent Litig. v. Apotex Corp.*, 536 F.3d 1361, 1380 (Fed. Cir. 2008) (similar); *In re NuVasive, Inc.*, 842 F.3d 1376, 1383

(Fed. Cir. 2016) (stating that “conclusory statements” amount to an “insufficient articulation[] of motivation to combine”; “instead, the finding must be supported by a ‘reasoned explanation’” (citation omitted)); *TriVascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016) (“Although the *KSR* test is flexible, the Board ‘must still be careful not to allow hindsight reconstruction of references . . . without any explanation as to *how* or *why* the references would be combined to produce the claimed invention.’” (citation omitted) (emphasis in original)).

In fact, adding guard bands to 802.16ab’s ranging subchannels would be contrary to one of 802.16ab’s principles of operation. As explained above (Ex. 2001 [Alberth-Decl.] ¶¶ 81, 83), 802.16ab deliberately defines the ranging code to expand the entirety of the ranging subchannels and deliberately does not include guard bands in connection with its ranging subchannels. Instead, 802.16ab expressly explains that “[u]sers are allowed to collide” on the ranging subchannels (Ex. 1012 [802.16ab] 0204). It further defines guard bands elsewhere, but not for its ranging subchannels. Ex. 2001 [Alberth-Decl.] ¶¶ 85-86). *In re Ratti*, 270 F.2d 810, 813 (C.C.P.A. 1959) (holding that a proposed combination of references is not proper where it would change the basic principles of operation of one of the references); *Plas-Pak Indus., Inc. v. Sulzer Mixpac AG*, 600 Fed. Appx. 755, 759 (Fed. Cir. 2015) (“a change in a reference’s ‘principle of operation’ is unlikely to motivate a person of ordinary skill to pursue a combination with that reference”).

For similar reasons, Petitioner’s argument that a POSITA would “look to Suzuki, who discloses additional details of guard bands,” Pet., 59, is incorrect and unsubstantiated. As its unspoken premise for this argument, Petitioner incorrectly assumes that the IEEE 802.16ab standard simply did not disclose the details of the guard bands, and left it to a POSITA to modify the standard as it sees fit. *See id.* However, as Mr. Alberth explained, that is not accurate. Ex. 2001 [Alberth-Decl.] ¶¶ 83-88. The standard, developed through years of analysis by experts in the field, does provide for guard bands when it considers them to be desired. *Id.*

Petitioner’s failure to substantiate its motivation of “reducing interference” is even more pronounced here than it was in the -1480 Petition against the same Patent, where the PTAB denied institution. In the -1480 case, in the primary reference, Ma, the ranging signal was laid on top of the data signals, “transmitted simultaneously both in time and frequency with the transmission of the other Mode-1 signals by other users,” which, as a result, would be “a form of interference to the other users.” *Dell*, IPR2021-01480, Paper 11, 10 (quoting Ma, ¶ 206). As the Board found, Ma spread the ranging signal across the spectrum at lower power densities, which caused it to behave like noise to the narrow band frequency signals over which it was laid. *Id.*, 17-18. The Board found that Petitioner had failed to show why “reducing interference” in the context of such a system would have motivated a POSITA to implement guard subcarriers in

connection with the ranging signal. *Dell*, IPR2021-01480, Paper 11, 17-18. In so holding, the Board also found that there were known negative impacts of adding guard bands, in particular reducing the available bandwidth and requiring higher power transmissions. *Id.*

Petitioner's failure to substantiate an "interference" problem that would motivate modifying the IEEE 802.16ab standard to implement guard bands with its ranging subchannels is even more striking here as compared to the -1480 petition, because here, the spread ranging signals in IEEE 802.16ab are not even alleged to be overlaid on any other signal; they are entirely separate. Ex. 1012 [802.16ab] 0087 (cited by Ex. 1003 [Cimini-Decl.] ¶ 173) (showing two highest frequency subchannels assigned for ranging). Petitioner does not identify the "interference" that supposedly motivates its combination, and there is no explanation from Petitioner about where the interference might come from or the basis of why there is interference or why the interference resistant nature of CDMA would require guard bands. Pet., 59. Petitioner's failure is further apparent since, consistent with the Board's holding in -1480, Gibson's teaches that, as discussed above, a spread signal would not necessarily have an interference problem *even if it was overlaid directly on top of non-spread narrow frequency band signals*. Ex. 1010 [Gibson] 0195. Instead, "because of the interference suppression properties of spread

spectrum waveforms,” interference is minimal *both within the spread signal and to the narrow band frequency signal upon which the spread signal was laid. Id.*

Furthermore, adding guard bands has various detrimental effects, and a POSITA would not be motivated to simply modify the standard and add guard bands without a compelling and real interference problem:

A POSITA would understand that adding guard bands would carry a substantial cost, and would not be motivated to add them without a compelling and real interference problem that could be solved with guard bands. Specifically, if subcarriers are converted to guard subcarriers instead of being used in the spreading process carrying data, that has adverse impacts for the CDMA process. For example, the power in the remaining subcarriers that are used for spreading would have to be increased, which would reduce the interference resistance properties of the process. As another example, the spreading code would become smaller, which would reduce the separation of various spread signals submitted by different users. A smaller bandwidth available for the spreading process would also reduce the number of users that could reliably utilize the bandwidth. In short, adding guard bands could have detrimental consequences for the system and a POSITA would not add them unless there was a real problem with interference, which is not shown to exist here for IEEE 802.16ab’s ranging process.

Ex. 2001 [Alberth-Decl.] ¶ 93; *see also Arctic Cat Inc.*, 795 F. App’x. at 833 (“The Board must weigh the benefits *and drawbacks* of the modification against each

other, to determine whether there would be a motivation to combine.”); *Hulu*, IPR2018-00582, Paper 34, 18-19 (informative) (noting the disadvantages of main memory and adequacy of traditional disks in rejecting Petitioner’s proffered motivation to combine). Again, this is consistent with the Board’s rejection of a motivation to combine in the -1480 Petition. *Dell*, IPR2021-01480, Paper 11, 18 (noting and relying on the drawbacks of adding guard bands).

Nor do Suzuki or the ’366 Patent’s teachings help Petitioner. With respect to Suzuki, even though it discloses a system where each set of consecutive 24 subcarriers are grouped together, and the first and last subcarriers within the set having zero-power, it does not utilize CDMA or other spreading technology. Ex. 1009 [Suzuki] 3:5-20; *see* Section III.B, *supra* (discussing Suzuki’s use of TDMA). Therefore, the fact that, in the abstract, it discloses guard bands in the context of a different system has no bearing on whether a POSITA would have been motivated to modify the IEEE 802.16ab standard to utilize guard bands with its ranging subchannels that utilize CDMA. “[A] patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art.” *KSR*, 550 U.S. at 418.

A recent Board decision in another of Petitioner’s challenges to Patent Owner’s rights is also instructive. In *Volkswagen*, IPR2023-00086, Paper 7, 20, Petitioner argued that a POSITA would have implemented guard periods from a

first reference into the second reference. In rejecting the combination, the Board held that the different channel structures of the two systems meant that the guard periods of the second reference would not have “their established functions” in the first reference:

due to the differences between Gibson (the separation of random-access and data channels) and Frank (the transmission of a random- access preamble and data on the same channel), we do not agree with Petitioner that the proposed combination would have been nothing more than the combination of well-known, prior art elements, *according to their established functions*, and would have yielded predictable results. Petitioner does not present arguments that sufficiently explain otherwise.

Id., 31 (emphasis in original).

The fact that the ’366 Patent utilizes guard bands in connection with its inventive system’s ranging subchannels also cannot help Petitioner, for the invention cannot render itself obvious. “The inventor’s own path itself never leads to a conclusion of obviousness; that is hindsight.” *Otsuka Pharm Co. v. Sandoz, Inc.*, 678 F.3d 1280, 1296 (Fed. Cir. 2012). Instead, “[c]are must be taken to avoid hindsight reconstruction by using the patent in suit as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claims in suit.” *Comcast Cable Commc’ns v. Rovi Guides, Inc.*, IPR2017-00217, Paper 40, 31 (PTAB May 14, 2018) (internal

quotations omitted); *see also InTouch Techs., Inc. v. VGo Commc'ns., Inc.*, 751 F.3d 1327, 1351 (Fed. Cir. 2014) (rejecting Petitioner's effort to use the invention as a "roadmap" to put together various pieces of references like the proverbial "jigsaw puzzle.").

In addition to the lack of showing of a motivation to combine, Petitioner has not shown a reasonable expectation of success for a POSITA to modify 802.16ab to add these guard bands, especially against its operating principle. As discussed in Section II, Petitioner and its expert require a person of ordinary skill to have at least 3-5 years of relevant experience in addition to a Bachelor's degree. Ex. 1003 [Cimini-Decl.] ¶ 42. However, as also explained in Section II, this arterially heightened level of ordinary skill is contrary to the Board's prior finding, for the same patent, that an ordinary artisan would only have two years of relevant experience. Thus, Petitioner's "ordinary artisan" would have been an expert in the field in light of the proper level of ordinary skill in the art. Petitioner's expert's testimony that a person who is essentially an expert in the field could modify the IEEE 802.16ab standard is therefore irrelevant. Rather, as Mr. Alberth explains, a properly defined person of ordinary skill would have simply implemented, not redesigned, the standards:

A POSITA would not have been required to design a wireless system from the ground up. This is because many important parameters and design choices had already been made by standard setting committees.

Thus, a POSITA would have had enough knowledge of the technology to understand and deploy equipment adhering to these technical specifications but would have a very limited ability to change the fundamental specifications of the network.

Ex. 2001 [Alberth-Decl.] ¶ 94. This is further confirmed by the fact that Carl Eklund, Roger Marks, Kenneth Stanwood, and Stanley Wang, who all had heavy involvement in the development of the IEEE 802.16 standard, were all of extraordinary skill in the field. Ex. 2003 [Eklund] 107 (biographies); Ex. 2001 [Alberth-Decl.] ¶ 94.

For all the foregoing reasons, Petitioner has failed to show disclosure or obviousness of a “ranging subchannel compris[ing]” zero-power subcarriers at both ends of a block.

V. CONCLUSION

For the foregoing reasons, Petitioner has failed to meet its burden to show a reasonable likelihood that any of the claims are unpatentable.

Respectfully submitted,

/ Kenneth J. Weatherwax /

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Date: June 29, 2023

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITS

This Patent Owner Preliminary Response (the “POPR”) consists of 13,956 words, excluding table of contents, table of authorities, certificate of service, this certificate, or table of exhibits. The POPR complies with the type-volume limitation of 14,000 words as mandated in 37 C.F.R. § 42.24. In preparing this certificate, counsel has relied on the word count of the word-processing system used to prepare the paper (Microsoft Word).

Respectfully submitted,

/ Parham Hendifar /

Date: June 29, 2023

CERTIFICATE OF SERVICE

The undersigned hereby certifies that the following documents were served by electronic service, by agreement between the parties, on the date signed below:

PATENT OWNER PRELIMINARY RESPONSE

EXHIBITS 2001 – 2005

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