

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FORD MOTOR COMPANY, GENERAL MOTORS LLC, and
NISSAN NORTH AMERICA, INC.,¹
Petitioner,

v.

NEO WIRELESS, LLC
Patent Owner.

IPR 2023-00763
U.S. Patent No. 10,447,450 B2

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

¹ General Motors LLC and Nissan North America, Inc. were joined as a petitioner to this proceeding based on a petition and motion for joinder filed in IPR2023-00962, which were granted.

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List of Exhibits

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1001	U.S. Patent No. 10,447,450 (“’450 Patent”)
1002	File History for U.S. Patent No. 10,447,450 (“’450 FH”)
1003	Declaration of Dr. Todor Cooklev (“Cooklev Decl.”)
1004	<i>Curriculum Vitae</i> of Dr. Todor Cooklev
1005	U.S. Patent Application Publication No. 2006/0039274 A1 (“Park”)
1006	IEEE, <i>IEEE Standard for Local and Metropolitan Area Networks, Part 16: Air Interface for Fixed Broadband Wireless Access Systems</i> , IEEE STANDARDS 802.16 (Oct. 2004) (“802.16-2004”)
1007	Declaration of David Ringle (Mar. 1, 2023) (“Ringle Decl. (802.16-2004)”)
1008	Certified Translation of Korean Patent Application No. 65099/2004 (“Park Translation”)
1009	Opinion and Order Granting in Part and Denying in Part Defendants’ Motion to Reduce Number of Asserted Claims (ECF No. 96), <i>In re Neo Wireless, LLC Patent Litig.</i> , No. 2:22-md-03034 (E.D. Mich. Nov. 18, 2022), ECF No. 99 (“ <i>In re Neo</i> Reduction of Asserted Claims Op. (ECF 99)”))
1010	Opinion and Order on Further Prior Art and Claim Narrowing, <i>In re Neo Wireless, LLC Patent Litig.</i> , No. 2:22-md-03034 (E.D. Mich. Dec. 9, 2022), ECF No. 102 (“ <i>In re Neo</i> Claim Narrowing Op. (ECF 102)”))
1011	Joint Claim Construction Statement, <i>In re Neo Wireless, LLC Patent Litig.</i> , No. 2:22-md-03034 (E.D. Mich. Jan. 18, 2023), ECF No. 114 (“Joint Claim Construction Statement”)
1012	United States District Courts – National Judicial Caseload Profile (Sept. 30, 2017–Sept. 30, 2022)
1013	Transfer Order, <i>In re Neo Wireless, LLC Patent Litig.</i> MDL No. 3034 (J.P.M.L. June 14, 2022), ECF No. 50 (“MDL Transfer Order”)

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1014	IEEE, <i>IEEE Standard for Local and Metropolitan Area Networks, Part 16: Air Interface for Fixed Broadband Wireless Access Systems – Amendment 2: Physical and Medium Access Control Layers for Combined Fixed and Mobile Operation in Licensed Bands and Corrigendum 1</i> , IEEE STANDARDS 802.16e (Dec. 2005) (“802.16e-2005”)
1015	Declaration of David Ringle (Mar. 16, 2023) (“Ringle Decl. (802.16e-2005)”)
1016	IEEE, <i>IEEE 802.16 Published Standards and Drafts</i> , https://www.ieee802.org/16/published.html (last visited Mar. 14, 2023, 2:43 PM)
1017	IEEE, <i>IEEE Standard 802.16-2004: Publication History (Updated 2004-04-04)</i> , https://www.ieee802.org/16/pubs/80216-2004.html (last visited Mar. 15, 2023, 8:34 AM)
1018	Patent Owner’s Preliminary Response, <i>Volkswagen Grp. of Am., Inc. v. Neo Wireless, LLC</i> , IPR2022-01567 (Patent 10,447,450), Paper 7 (P.T.A.B. Feb. 8, 2023) (“IPR2022-01567, Paper 7 (POPR)”)
1019	Plaintiff Neo Wireless, LLC’s Opening Claim Construction Brief, <i>In re Neo Wireless, LLC Patent Litig.</i> , No. 2:22-md-03034 (E.D. Mich. Feb. 16, 2023), ECF No. 127 (“Neo Opening Claim Construction Brief”)
1020	Declaration of William Alberth in Support of Neo Wireless’s Opening Claim Construction Brief, <i>In re Neo Wireless, LLC Patent Litig.</i> , No. 2:22-md-03034 (E.D. Mich. Feb. 16, 2023), ECF No. 127-3 (“ <i>In re Neo</i> (ECF 127-3)”))
1021	Patent Owner’s Preliminary Response, <i>Dell, Inc. v. Neo Wireless, LLC</i> , IPR2021-01486 (Patent 10,447,450), Paper 7 (P.T.A.B. Dec. 20, 2021) (“IPR2022-01486, Paper 7 (POPR)”)
1022	Roger Marks, Presentation: <i>IEEE 802.16 WirelessMAN® Standard: Myths and Facts</i> , 2006 Wireless Communications Conference, Wash., D.C. (Doc. No. IEEE C802.16-06/007r1) (June 29, 2006) (“Marks”)
1023	Soon Young Yoon, Presentation: <i>Introduction to WiBro Technology</i> , Telecom R&D Center, Samsung Electronics Co., Ltd. (Sept. 10, 2004) (“Yoon”)

Exhibit No.	Description
1024	Kim Tong-hyung, <i>Seoul Chooses Standard for Wireless Broadband Access</i> , THE KOREA HERALD (July 29, 2004)
1025	IEEE, <i>IEEE Standards Wireless Networks Series: WirelessMan®</i> , <i>Inside the IEEE 802.16™ Standard for Wireless Metropolitan Networks</i> (2006) (“Eklund”)
1026	<i>Wireless Internet Operators to Be Picked</i> , KOREA TIMES (July 30, 2004)
1027	Sorour Falahati et al., <i>Adaptive Modulation Systems for Predicted Wireless Channels</i> , 52 IEEE TRANSACTIONS COMMC’NS 307 (Feb. 2004) (“Falahati”)
1028	Sorour Falahati et al., <i>Adaptive Modulation Systems for Predicted Wireless Channels</i> , 52 IEEE TRANSACTIONS COMMC’NS 307 (Feb. 2004) (“Falahati”)
1029	Declaration of Matt Ceglia (October 8, 2024) (the “Ceglia Declaration”)
1030	Full publicly available file history of US Patent No. 10,447,450 B2
1031	Second Declaration of Dr. Todor Cooklev
1032	ITU-APT Regional Seminar Program on Broadband Wireless Access Pacific Region Busan, Republic of Korea, 10 September 2004
1033	International Telecommunication Union (ITU) “About International Telecommunication Union” (Available at https://www.itu.int/en/about/Pages/default.aspx) Accessed March 24, 2025)
1034	Sandor Szabo et al., “Hiradastechnika”, Hírközlési és Informatikai Tudományos Egyesület (HTE) Journal Vol. LX August 2005

I. INTRODUCTION

Patent Owner addresses two limitations in claim 7: “mobile device” and “N=2,4 or 8.” Patent Owner does not address any other limitation of the challenged claims, or the combination of references presented in the Petition.

Patent Owner argues that Park’s improvement to band selection AMC does not “apply” to “mobile devices.” Patent Owner’s sole basis for that argument is a passage in Park’s “Description of the Related Art” section stating that, in the prior art, the band selection AMC region may be “used” to increase transmission speeds for “fixed subscribers.” Nothing in Park suggests that his improvement to the band selection AMC region is limited to “fixed subscribers.” On the contrary, Park expressly states his innovation improves “next generation *mobile* communication systems” such as “WiBro,” which Patent Owner admits (and the record evidence confirms) supported mobile devices.² As explained in the Petition, a POSITA reading Park would understand that Park’s improvement to the band selection AMC region was deployed to support “mobile devices” as recited in claim 7.

We know this is true because the technical details of WiBro, which Petitioner provided in Ex. 1023, which Petitioner’s expert identified during his deposition, and which Patent Owner ignores in its Response, expressly teaches deployment of band

² Unless otherwise indicated, all emphasis has been added.

selection AMC on “mobile stations” in WiBro. Consistent with Petitioner’s evidence, Patent Owner’s “WiBro Article” (Ex. 2027) confirms that *all* WiBro subscribers—including mobile subscribers—leveraged *both* the diversity subchannels and band selection AMC.

Patent Owner ignores Park’s express direction to “mobile communication systems,” and the equally dispositive teachings of Ex. 1023 and Ex. 2027. Taken individually, or in combination, this record evidence confirms Petitioner’s assertion that a POSITA reading Park would understand that Park’s innovation applies to “mobile devices,” meeting the preamble of claim 7.

With respect to the “N=2, 4 or 8” limitation of claim 7, it is undisputed that Park discloses N=2. This ends the analysis. Patent Owner attempts to exclude Park from the scope of claim 7 asserting incorrectly that N “cannot be other plural numbers not equal to 2, 4 or 8.” (POR, 2.) Nothing in claim 7 or the ‘450 Patent excludes values for N *in addition to* “2, 4 or 8.” On the contrary, the disputed claim limitation uses the open-ended “comprising” term, and the ‘450 Patent expressly states that *other values* of N may be implemented to achieve the purported advantages described in the specification. Even Patent Owner admits “[t]he Institution Decision is correct that for other modulation schemes or for other types of data different values of N may be beneficial.” (POR, 48.) Based on this intrinsic record, the Board should reject Patent Owner’s claim construction.

For the reasons stated in the Petition and this Reply, the Board should find challenged claims 7 and 11 unpatentable.

II. ARGUMENT

A. A POSITA Would Have Recognized that Park’s Improvements Apply to “Mobile Devices”

1. Park Is Directed to “next generation mobile communications systems” such as “WiBro”

Petitioner asserted “Park presents an improvement to the existing IEEE 802.16-2004 standard in its effort to support ‘next-generation mobile communications systems’ Park [0005].” (Pet., 10.) Patent Owner ignores this statement in Park because it undermines Patent Owner’s assertion that “Park’s relied-on embodiments apply only to fixed subscribers.” (POR, 2.)

In paragraphs 73–79, Park expressly applies his invention to WiBro: “[t]he present invention can be applied to the Wibro or IEEE 802.16 standards in various manners.” (Ex. 1005, [0073]–[0079].) Patent Owner admits that WiBro supports “mobile” subscribers. (POR, 1.)

In its Decision on Institution (“DI”), the Board cited Dr. Cooklev’s testimony, and documents cited in the Petition, explaining that WiBro was a mobile wireless system:

A portion of Dr. Cooklev’s Declaration testimony, cited in the Petition, states that “WiBro was a South Korean mobile wireless service

designed to provide wireless broadband access to devices moving up to 60-70 kilometers per hour.” Ex. 1003 ¶ 56 (citing Ex. 1024). The article cited by Dr. Cooklev supports this testimony. *See* Ex. 1024, 1 (“Although the concept is still in its development stages, the portable Internet, named by Korean officials as WiBro (wireless broadband), is designed to provide high-speed access of a maximum 1Mbps to receiver devices moving at speeds of 60 to 70 kilometers per hour.”).

(DI, 27–28.)

Patent Owner neither addresses nor disputes these statements, which confirm WiBro was a “mobile wireless service.”

As it did in its POPR, Patent Owner bases its Response on a statement in Park referring to the “AMC area 13” shown in Figure 1. (POR, 9–12 *citing* Ex. 1005, [0011].) According to Patent Owner:

- “Park unambiguously teaches . . . that the band AMC region of the frame applies only to ‘fixed’ subscribers, ***not*** mobile subscribers.” (POR, 1, emphasis in original.)
- “Park teaches that its relied-upon embodiments exclusively apply to “fixed subscribers,” (POR, 5.)
- “Park’s teachings in its embodiments relied upon by Petitioner only apply to fixed subscribers.” (POR, 9–10.)

- “Park discloses that its invention applies to the resource allocation message for subscribers within the AMC area, which, Park explains, is only for ‘fixed subscribers.’” (POR, 11.)

Patent Owner misreads Park in at least two ways. First, the cited passage does not state that only “fixed” devices and can use the AMC region illustrated in Figure 1, or that “mobile” devices cannot. The passage merely states the AMC area is “used for increasing the transmission speed” for fixed subscribers. That’s true, but not exclusive.

Second, the cited passage describes the “PRIOR ART” illustrated in Figure 1, not Park’s invention. When Patent Owner annotates Figure 1 in its POR, it crops-off the “PRIOR ART” designation. (POR, 11.) Patent Owner never addresses the fact that the cited statement is made only in Park’s “Description of the Related Art,” with respect to only the “PRIOR ART” Figure 1. This is a material omission because it undermines Patent Owner’s repeated assertions that Park’s “embodiments” and “invention” are limited to “fixed” devices.

Nowhere does Park state that mobile devices cannot leverage his innovation to band selection AMC. Instead, Park teaches that his invention applies to “next generation *mobile* communication systems” and “can be applied to the Wibro or IEEE 802.16 standards in various manners.” (Ex. 1005, [0005] and [0075].)

Park applied his invention to devices that are already mobile, just like the

challenged claims. (Ex. 1031, ¶7.) A person of skill in the art would have understood, based on the teachings of Park, the software that would perform Park’s invention would have been executed on a mobile device that is at times stationary or slowly moving. (*Id.*) When a mobile device is stationary or moving slowly, it would have communicated using band AMC “for increasing the transmission speed” as Park teaches. (*Id.*)

2. The WiBro Materials the Parties Cited Confirm Band Selection AMC Was Implemented on Mobile Devices

a. Exhibit 1023 – “Introduction to WiBro Technology”

Patent Owner asserts “[t]he fact that that the band AMC area modified by Park only supports fixed subscribers is also supported by the extrinsic evidence of record, specifically the descriptions of WiBro” (POR, 13.) But Patent Owner fails to address “the descriptions of WiBro” cited in the Petition, which expressly teaches the opposite, *i.e.*, that ***band selection AMC was used for mobile devices in WiBro.*** Exhibit 1023, titled “Introduction to WiBro Technology” explains that mobile devices used band selection AMC in WiBro:

PHY Characteristics (2)

□ Performance Enhancement considering Mobility(1)

◆ H-ARQ

- Increase the efficiency of re-transmission resulting from fading and interference

◆ Band selection AMC & diversity subchannel

- Mobile stations request to select band selection AMC or diversity subchannel by monitoring channel status
- For slowly moving users : allocate band selection AMC subchannels which have high quality channel response to increase transmission efficiency and coverage
- For fast moving users : allocate diversity subchannels distributed over whole frequency band to maximize frequency diversity

(Ex. 1023, 17, highlighting added.)

This evidence explains that channel status was monitored, and depending on that status, either band selection AMC or diversity channel was used depending on whether the user was stationary, slowly moving or fast moving. (Ex. 1031, ¶¶7, 11, 20.) Based on this teaching, a POSITA would have recognized that “slowly moving” “mobile stations” in WiBro leveraged band selection AMC and would have benefitted from Park’s innovation. (Ex. 1031, ¶¶7, 10–11, 19–20.)

The Petition and Dr. Cooklev cited Ex. 1023 for the “mobile device” limitation. (Pet., 19; Ex. 1003, ¶126.) In its DI, the Board addressed the portion of Dr. Cooklev’s original declaration directed to this description of WiBro. (DI, 29 *citing* Ex. 1003, ¶126.) During his deposition, Dr. Cooklev again identified Ex. 1023,

asserting these “technical characteristics [of WiBro] were not a secret as of September 4, 2005” and “the technical parameters of WiBro were known.” (Ex. 2024, 110:2–8, 113:14–18.)

Soon Young Yoon from Samsung Electronics, who was a major developer of WiBro, presented Exhibit 1023 to the International Telecommunication Union (ITU) during Session 3 of the ITU-APT Regional Seminar on Broadband Wireless Access for Asia Pacific Region in Busan, Korea on September 10, 2004. (Ex. 1031, ¶¶13–18.) Exhibit 1023 is published and searchable on ITU’s website with respect to ITU events that took place in 2004. (*Id.*, ¶17.) Dr. Cooklev, as an attendee and chairperson of ITU conferences, explains that Exhibit 1023 would have been published and known to persons of skill in the art at that time to understand the details of the WiBro deployment in Korea. (*Id.*, ¶18.) The prior art publication of Exhibit 1023 is also confirmed by an August 2005 Journal of the Hungarian Association of Information and Communication Sciences, which addresses 802.16 and cites Exhibit 1023. (Ex. 1034, 7; Ex. 1031, ¶16.)

Patent Owner ignores Exhibit 1023 in its Response because it flatly refutes its unsupported assertion that Park and WiBro deployed band selection AMC only for “fixed” devices.

b. Exhibit 2027 – Patent Owner’s “WiBro-Article”

Patent Owner cites Exhibit 2027 to support its assertion that “the band AMC

area (and thus Park’s invention) only supported fixed subscribers.” (POR, 15–17.) Patent Owner refers to Exhibit 2027 in shorthand as “WiBro-Article,” but its title confirms the article is directed to “mobile” devices: “Capacity Analysis Considering Channel Resource Overhead for **Mobile** Internet Access (WiBro).” Similarly, the Abstract states “Wireless **mobile** internet access is becoming an important segment for the wireless industry. In this paper the new system, **WiBro**, being standardized in Korea is introduced.” (Ex. 2027, 1.) Like its failure to address Park’s statement directed to “next generation mobile communication systems,” Patent Owner does not attempt to reconcile its narrow reading of Exhibit 2027 with its express applicability to mobile devices. A POSITA would not have overlooked such statements. (Ex. 1031, ¶22.)

A POSITA would have also recognized the teaching in Exhibit 2027 confirming, consistent with Park and Exhibit 1023, that *all* WiBro subscribers, including mobile devices, both received and leveraged band selection AMC. (Ex. 1031, ¶¶23–24.) The publication states that, in the downlink (and the uplink), “[t]he proportion of diversity to band selection can be changed every frame.” (Ex. 2027, 2.) This teaching confirms that all WiBro subscribers, including mobile devices, both received and leveraged band selection AMC in both the downlink (where Park’s invention is applied) and the uplink. (Ex. 1031, ¶23.) Patent Owner ignores this teaching of its WiBro-Article because it directly contradicts Patent Owner’s

assertion that “the band AMC area (and thus Park’s invention) only supports fixed subscribers.” (POR, 15–17.)

3. Patent Owner’s Claim Construction Arguments Are Unfounded

Recognizing the challenge it faces with the record evidence, Patent Owner asserts “even if Park had permitted limited movement of the device, that does not make the device a ‘mobile device,’ under the plain and ordinary meaning in this field.” (POR, 35.) Citing only extrinsic evidence, Patent Owner asserts a wireless device moving 5 km/hr is not “mobile” within the meaning of ’450 claim 7. (*Id.*) There is no basis in the intrinsic record for this assertion, and it is refuted by the express teaching of the ’450 Patent that a “mobile device” can be “fixed,” *i.e.*, moving at 0 km/hr:

One or more *mobile devices* (not shown) may be *fixed* or may roam within the geographic region covered by the network.

(Ex. 1001, 3:40–42.)

Addressing this statement in the ’450 Patent, Patent Owner admits “a mobile device may be stationary at some times, and mobile at other times.” (POR, 35.) That is true, which is why Park and the WiBro references (Exs. 1023 and 2027) teach *each* subscriber receiving and leveraging *both* diversity subchannels and band selection AMC when appropriate. (Ex. 1031, ¶25.) While Park’s innovation focuses on improvements to band selection AMC, nothing in Park suggests those

improvements are not leveraged when the mobile device is stationary. (*Id.*) For the reasons explained in the Petition and above, a POSITA would recognize based on the evidence of record that they were both leveraged by mobile devices at different times. (*Id.*, ¶19.)

Citing exclusively *extrinsic* evidence, Patent Owner states “[i]n the field of the Patent, a “mobile device” configured to perform the claimed limitations is capable of performing the claimed limitations while the device is in motion.” (POR, 35-36.) But nothing in the ’450 Patent, nor claim 7, requires the claim to be practiced only when the “mobile device” is “in motion.” (Ex. 1031, ¶25.) Instead, claim 7 is an *apparatus* claim directed to a “mobile device” having the three “configur[at]ions” recited in the body of the claim. There is no basis for Patent Owner’s “in motion” argument. (*Id.*)

Even if claim 7 required “motion”—and it does not—a POSITA would have known that in WiBro, to which Park is expressly directed, mobile devices in motion leveraged the band selection AMC:

- Mobile stations request to select band selection AMC or diversity subchannel by monitoring channel status
- For slowly moving users : allocate band selection AMC subchannels which have high quality channel response to increase transmission efficiency and coverage

(Ex. 1023, 17, highlighting added.)

Patent Owner cites the deposition testimony of Petitioner’s expert regarding

his book (POR, 35 *quoting* Ex. 2025) but omits his statement—consistent with the teaching of the ’450 Patent—that “fixed or slowly moving stations can be considered portable.” (Ex. 2024, 49:23–25.) This is consistent with the evidence of record, including the ’450 Patent, that even “mobile” devices are sometimes stationary.

For these reasons, a POSITA would have understood that Park discloses the “mobile device” recited in claim 7. (Ex. 1031, ¶¶11–12, 25.)

4. Patent Owner’s Arguments Regarding 802.16-2004 by Itself, and the Evolution of the 802.16-2004 Standard, Are Not Responsive to Ground 1

Patent Owner devotes a substantial portion of its Response to the evolution of 802.16-2004 to 802.16e to support Patent Owner’s assertion that 802.16-2004 did not, by itself, “support mobile devices.” (POR, 19, 22, 25, 26–30.) There are at least two problems with Patent Owner’s arguments.

First, as explained in the Petition, the Background section of the ’450 Patent admits that messages such as “DL-MAP” in 802.16 “are utilized to broadcast the scheduling decisions to the *mobile* stations.” (Pet., 19 *quoting* ’450 Patent [Ex. 1001] at 1:48–50, emphasis added.) Patent Owner’s concession about the state of the art in the Background section of the ’450 Patent are binding admissions about the applicability of 802.16 to support mobile devices at the time of the purported invention. *Ex Parte McBrady*, 2020-003744, 2021 WL 5083846 at *7–8 (PTAB Nov. 1, 2021) (holding Applicant’s statements in the Background section of the

patent application are “self-admitted prior art” even through the “term ‘prior art’ is not used.”)

Second, Ground 1 is not premised on an assertion that 802.16-2004 *by itself* supports mobile devices. Instead, the Petition presented an obviousness argument based on a combination of Park, 802.16-2004, and the relevant knowledge of those skilled in the art. (Pet., 9, 16; Ex. 1003, ¶22.)

Patent Owner also questions the public accessibility of 802.16e. (POR, 29–30.) But the Petition referenced 802.16e only by footnote and acknowledged it was a “later amendment to the 802.16-2004 standard.” (Pet., 19 fn 8.) Petitioner’s expert referenced the publication of 802.16e after the priority date merely to “reinforce [his] conclusion that Park’s changes to 802.16-2004 will apply to mobile devices.” (Ex. 1003, ¶¶98-101; Ex. 1031, ¶27.)

5. Patent Owner’s Argument that WiBro Was Not Based on 802.16-2004 is Incorrect

Patent Owner asserts WiBro was not based on 802.16-2004. (POR, 31-32.) Yet Exhibit 1023, which Patent Owner ignores, expressly states that WiBro was “Based on IEEE 802.16-2004,” as well as 802.16e Draft 3:

WiBro Policy of Korea

□ Standard

◆ Based on IEEE 802.16-2004 & 802.16e Draft3 or later version satisfying:

- Downlink 512kbps, uplink 128kbps at 60Km/h
- Channel bandwidth >9MHz
- Roaming between operator equipment
- TDD

(Ex. 1023, 24, highlighting added.)

Patent Owner also asserts the frame illustrated in Figure 1 of Park is an 802.16e frame structure, not an 802.16-2004 frame structure as the Petition indicated quoting Park. (POR, 31–32.) Here, Patent Owner is correct. The Petition inadvertently described Park’s Figure 1 as an 802.16 “-2004” frame, whereas Park describes Figure 1 as “illustrating a frame structure of a WiBro stands for Wireless Broadband (Wilbro) system or an IEEE 802.16 system applied to an OFDMA system.” (Ex. 1005, [0007].)³ As explained in the Petition, however, Park repeatedly applies his innovation to WiBro and 802.16-2004:

³ Petitioner’s expert, who provides the invalidity opinions in which the Petition is based, correctly quoted Park in this respect. (Ex. 1003, ¶111.)

[0075] The present invention can be applied to the Wibro or IEEE 802.16 standards in various manners.

[0076] First, a new type indicating the MAP_IE scheme of the present invention can be added to an extension mode of DL_MAP IE TYPE and UL_MAP IE TYPE fields in Table 87 of the IEEE 802.16 (802.16-2004) standard.

[0077] Second, the MAP_IE scheme of the present invention can be represented by using a reserved value of DL_MAP IE TYPE and UL_MAP IE TYPE fields in Table 87 of the IEEE 802.16 (802.16-2004) standard.

[0078] Third, the present invention can be represented by using 1 bit of a reserved field in Table 95 H-ARQ Compact_DL_MAP IE of the IEEE 802.16 (802.16-2004) standard.

[0079] Fourth, it is also possible to newly define Table 95 of IEEE 802.16 (802.16-2004) such that the Table 95 may indicate the MAP_IE scheme of the present invention as well as the conventional scheme.

(Pet., 14; Ex. 1005, [0075]–[0079].)

The correction of Petitioner’s quotation of Park with respect to Figure 1 is inconsequential to the merits of the Petition because Ground 1 applies Park’s innovation to the band selection AMC region of the OFDMA frame structure, which the Petition explained was present in *both* 802.16-2004 and Park Figure 1. (Pet., 20–23.) The Petition explains “Park provides exemplary modifications to 802.16-2004’s DL-MAP for allocations in an AMC area,” which both 802.16-2004 and Park’s Figure 1 frame structure disclose. (Pet., 21–22, 45.) The fact that Park’s Figure 1 teaches a “diversity area” *in addition to* the band selection AMC region does not impact Park’s innovation and its applicability to 802.16-2004 and mobile devices for the reasons explained in the Petition.

For the above reasons, the Board should reject Patent Owner’s argument that

“Park’s relied-on embodiments applied only to fixed subscribers.” (POR, 2.) A POSITA reading Park would understand that his innovation applied to “mobile” devices leveraging band selection AMC as taught in Park and the WiBro materials cited in the Petition and the Response—teachings Patent Owner does not address.

B. Park Discloses “ $N = 2, 4$ or 8 ”

1. Patent Owner Does Not Dispute that Park Discloses $N=2$

Claim 7 recites “the segment *comprising N time-frequency resource units . . . where $N = 2, 4, \text{ or } 8$. . .*” The Petition explained that Park discloses an embodiment having “2” time-frequency resource units:

In addition, [allocation region] A 401 can be represented as $c(0)$ and $c(1)$. This means continuous resource allocation regions can be simply represented by assigning a start allocation unit index and a total number of the allocation units.

(Pet., 34 *quoting* Park [0053], [0051]; Ex. 1003, ¶172.)

Patent Owner does not dispute this teaching of Park, or any of the other examples of time-frequency resource units described in Park that were raised in the Petition. (Ex. 1031, ¶¶28–29.)

2. Patent Owner Improperly Narrows the Open-Ended “ $N=2, 4$ or 8 ” to “excluding other plural numbers”

In its attempt to exclude Park from the scope of claim 7, Patent Owner asserts “the plain meaning of the claims confirms that N must be selected from $N=2, 4$ or 8 ,

excluding other plural numbers.” (POR, 37.) Because Park discloses values for N ***in addition to*** 2, 4 or 8, Patent Owner asserts that Park fails to satisfy the Patent Owner’s narrow claim construction. (*Id.*)

Nothing in claim 7 indicates that “N=2, 4 or 8” “exclude[es] other plural numbers” as Patent Owner asserts. The relevant limitation of claim 7 uses the open-ended “comprising” language indicating that, while N=2, 4 or 8 must be a supported configuration, a system that *additionally* supports unclaimed values of N are not excluded from the claim. *See Crystal Semiconductor Corp. v. TriTech Microelectronics Int’l, Inc.*, 246 F.3d 1336, 1348 (Fed.Cir.2001) (“In the parlance of patent law, the transition ‘comprising’ creates a presumption that the recited elements are only a part of the device, that ***the claim does not exclude additional, unrecited elements.***”); *Gillette Co. v. Energizer Holdings Inc.*, 405 F.3d 1367, 1371–73, 74 USPQ2d 1586, 1589–91 (Fed. Cir. 2005) (holding claim directed to a razor “comprising . . . a group of first, second, and third blades” does not exclude razors with more than three blades). The Federal Circuit has contrasted such open-ended “comprising” claim language from a closed set of features expressed as a “Markush group” in the claim by the phrase “consisting of.” *Id.* Claim 7 does not recite a Markush group.

Patent Owner interprets the “N=2, 4 or 8” language as limiting N to “only” the values 2, 4 or 8, at the exclusion of all others. But, like the Federal Circuit, the

Board has rejected such a narrow interpretation of open-ended “comprising” limitations. *See Cisco Systems, Inc. v. Finjan, Inc.*, 2018 WL 1635926, IPR2017-02154, Decision Denying Institution, (PTAB Apr. 3, 2018) (holding the challenged claim “must *at least* include, but is not necessarily limited *only* to” the claimed features).

The '450 Patent specification makes clear that, while claim 7 requires N=2, 4 or 8, the use of *other values* of N is contemplated. Table 1, for example, describes N=1:

TABLE 1

MCSI	Modulation	Coding rate	Information bits	Raw symbols	Units
1	16QAM	$\frac{1}{2}$	160	80	1
2	QPSK	$\frac{1}{2}$	160	160	2
3	QPSK	$\frac{1}{4}$	160	320	4
4	QPSK	$\frac{1}{8}$	160	640	8

(Ex. 1001, 6:35-45, highlighting added.)⁴

Like the use of “comprising” in claim 7, the '450 Patent specification is consistently open-ended when describing the number of time-frequency resource units that may be implemented. Table 1 is described as providing “representative” modulating and coding schemes (“MCS”). (Ex. 1001, 6:31–33.) The specification explains that “other MCS” values may be implemented that are “simply an integer

⁴ The utilization of N=1 is also shown in Figure 6 of the '450 Patent.

multiple of the basic unit.” (*Id.*, 6:52.) The patent explains that “[i]n practice, different voice packets may be transmitted using *different MCSs*, some with MCSI = 1, some with MCSI = 4, *so on so forth.*” (*Id.*, 7:34–37.)

A POSITA reading Table 1 and these passages, together with the “comprising” language of claim 7, would not conclude that claim 7 is limited to “only” N=2, 4 or 8 as Patent Owner asserts. (Ex. 1031, ¶¶30–32).

3. The Purported Benefits of N=2, 4 or 8 Do Not Compel Exclusion of Prior Art Systems Supporting Both Claimed and Unclaimed Values of N

Petitioner extols the purported advantages of a system having N=2, 4 or 8. (POR, 41–45.) But patent claims are not limited to unclaimed benefits or advantages. *See Ex Parte Negley*, 2016-002222, 2018 WL 1392405 at *6 (PTAB March 15, 2018) *citing In re Self*, 671 F.2d 1344, 1348 (CCPA 1982) (rejecting nonobviousness contentions related to unclaimed benefits that were “**not** express limitations of the **claims.**”) (emphasis in original); *Ex Parte Holt*, 2012-007857, 2014 WL 6449817 (PTAB Nov. 12, 2014) (rejecting arguments relying on “unclaimed features disclosed in the Specification, and purported advantages of unclaimed material over the subject matter disclosed in various cited references.”)

Because none of the alleged benefits of N= 2, 4 or 8 are recited in claims 7 or 11, Patent Owner’s focus on them is irrelevant. In addition, the asserted advantages of N=2, 4 or 8 apply to additional values of N. Patent Owner admits “[t]he Institution

Decision is correct that for other modulation schemes or for other types of data ***different values of N may be beneficial.***” (POR, 48.) A POSITA reading the ’450 Patent would have recognized it is a simple exercise to extend Table 1 and obtain other numbers of time-frequency resource units that may be implemented and achieve the same benefit. (Ex. 1031, ¶¶33–36.) For example, continuing with the same example of 160 information bits provided in Table 1, a POSITA would have recognized that if the modulation is BPSK, and the coding rate 1/8, the result is 1280 symbols, which corresponds to $N=16$. (Ex. 1031, ¶¶37–38.) This value preserves the modularity as $N=16$ is an integer multiple of the basic unit as taught in the ’450 Patent. (*Id.*, ¶37.)

There are no advantages that are limited to only the values given in Table 1 ($1/2$, $1/4$, and $1/8$) that are not available for other values not listed in the table. (*Id.*, ¶38.) In another example, coding at a rate of $1/3$ ($N=3$) would have performance between the performance of coding at rates $1/2$ and $1/4$ disclosed in Table 1. (*Id.*, ¶38.)

4. Patent Owner’s Case Citations Do Not Support its Exclusionary Claim Construction

Patent Owner cites several cases to support its dramatic narrowing of claim 7 to require “that N must be selected from $N = 2, 4$ or 8 , ***excluding other plural numbers.***” (POR, 37.) Petitioner explains how each case Patent Owner cites fails to

support Patent Owner's exclusionary construction.

First, Patent Owner cites *Insituform Techs., Inc. v. Cat Contr., Inc.*, 99 F.3d 1098 (Fed. Cir. 1996) where a method claim was limited to “a process using only one vacuum cup.” The Federal Circuit reached this construction based on specific claim language indicating the claim was limited to only one cup, and the patent specification, which “show[s] only a single vacuum cup.” *Insituform*, 99 F.3d at 1105–06. In the present case, in contrast, the disputed claim limitation claim uses the open-ended “comprising” term, claim 7 recites no language indicating the claim excludes values of N in addition to the claimed values, and as explained above, the specification indicates that other values of N may be implemented.

Patent Owner cites *Free Motion Fitness, Inc. v. Cybex Int'l*, 423 F.3d 1343 (Fed. Cir. 2005). (POR, 39.) In that case, the Federal Circuit noted “[t]he addition of unclaimed elements does not typically defeat infringement when a patent uses an open transitional phrase such as “comprising.” *Free Motion Fitness*, 423 F.3d at 1347. The court rejected the argument that a claim directed to “a cable” is limited to a “single” cable. *Id.* at 1350.

Patent Owner next cites a footnote in *Moleculon Research Corp. v. CBS, Inc.* for the proposition that the term “comprising” is not always open-ended. (POR, 40.) Patent Owner omits the relevant claim language in that case, which the Federal Circuit deemed dispositive. In that case, the question was whether the phrase

“engaging eight cube pieces *as a composite cube*” could read on cubes having more than eight pieces. *Moleculon Research Corp. v. CBS, Inc.*, 793 F.2d 1261, 1271–72 (Fed. Cir. 1986). Focusing on the “composite cube” language, the Federal Circuit held the claim limitation was limited to a 2x2x2 “composite cube.” *Id.* In the present case, in contrast, claim 7 lacks a limitation akin to *Moleculon*’s “composite cube” limitation indicating the claim could not read on systems having features *in addition to* the claimed features. And in *Moleculon*, “[n]either party challenge[d] the general proposition that an accused method does not avoid literally infringing a method claim having the transitional phrase “which comprises” (or “comprising”) simply because it employs additional steps.” *Moleculon*, 793 F.2d at 1271. Patent Owner here proceeds contrary to the “general proposition” when it argues that a prior art system teaching N=2, 4 or 8 is excluded from the scope of claim 7 merely because, in addition to disclosing N=2, the prior art *also* discloses N=3.

Patent Owner next cites *Apple Inc. v. LBT IP I LLC*, IPR2020-01189, Paper 48, 20 (PTAB, Dec. 5, 2023). (POR, 40–41.) In that case, the disputed claim limitation was “the power level comprising a multitude of threshold values.” The claim construction dispute was whether the claimed “threshold values” referred to *battery power level* threshold values, or whether they may also include *GPS signal level* threshold values. Based on the claim language (directed to a “battery power level monitor”), the specification, and the file history, the Board held the “power

level” refers to battery power threshold values. In *Apple*, neither party contended, and the Board did not find, that a prior art system disclosing **both** types of signals was somehow **excluded** from the scope of the claim as Patent Owner asserts in this proceeding.

Patent Owner next cites *In re Varma v. IBM Corp.*, 816 F.3d 1352 (Fed. Cir. 2016). (POR, 41.) *In re Varma* supports Petitioner, holding:

“Comprising” means that the claim can be met by a system that contains features over and above those specifically required by the claim element, but only if the system still satisfies the specific claim-element requirements: the claim does not cover systems whose unclaimed features make the claim elements no longer satisfied.

In re Varma, 816 F.3d at 1362.

Patent Owner cites *Chi. Bd. Options Exch., Inc. v. Int'l Sec. Exch., LLC*, 677 F.3d 1361, 1372 (Fed. Cir. 2012), which held, “[w]here the specification makes clear that the invention does not include a particular feature, that feature is deemed to be outside the reach of the claims of the patent.” (POR, 45–46.) There are two problems with Patent Owner’s citation of this case. First, the case neither addresses nor supports Patent Owner’s assertion that a claim construction would somehow exclude a prior art system that discloses, in addition to the claimed subject matter, unclaimed subject matter.

Second, the ’450 Patent does not “make clear” that systems having values of

N in addition to any of the claimed N values are excluded from the scope of claim 7. As explained above, the '450 Patent expressly discloses unclaimed values for N, including N=1 in Table 1, which describes the values in that table as merely “representative.” (Ex. 1001, 6:31–33.) The '450 Patent explains that “other MCS” values may be implemented that are “simply an integer multiple of the basic unit” (*Id.*, 6:52), and “[i]n practice, different voice packets may be transmitted using *different MCSs*, some with MCSI = 1, some with MCSI = 4, *so on so forth*” (*Id.*, 7:34–37). The language in the '450 Patent specification is as open-ended as claim^o7.

Patent Owner next string-cites three cases for the proposition that a patent claim may be limited to an embodiment disclosed in the specification where that is the sole embodiment disclosed in the patent. (POR, 46.) But the Federal Circuit in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (en banc) stated, “we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment.” And as just indicated, the '450 Patent specification makes clear that the number of time-frequency resource units may be different than the three values for N recited in claim 7, e.g., N=1, “so on so forth.” (Ex. 1001, 7:34–37.) This intrinsic disclosure is consistent with the Patent Owner’s admission that “[t]he Institution Decision is correct that for other modulation schemes or for other types of data *different values of N may be beneficial*.” (POR, 48.)

C. Patent Owner Does Not Address Other Limitations of Claims 7 and 11 or the Combination of References.

Patent Owner's Response addresses only the "mobile device" and "N=2, 4 or 8" limitations of claim 7. Patent Owner does not assert that Ground 1 fails to teach or suggest other limitations of the asserted claims, or that a POSITA would lack a reason to take the identified references in combination.

III. CONCLUSION

For the reasons stated in the Petition, and above, the Board should find claims 7 and 11 unpatentable.

Dated: March 24, 2025

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Certificate of Service

The undersigned hereby certifies that on March 24, 2025, a complete and entire copy of **Petitioner's Reply**, was served via electronic mail to the attorneys listed below at the following email addresses:

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