

NOTE: This disposition is nonprecedential.

**United States Court of Appeals  
for the Federal Circuit**

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**CARUCEL INVESTMENTS L.P.,**  
*Appellant*

**v.**

**KATHERINE K. VIDAL, UNDER SECRETARY OF  
COMMERCE FOR INTELLECTUAL PROPERTY  
AND DIRECTOR OF THE UNITED STATES  
PATENT AND TRADEMARK OFFICE,**  
*Intervenor*

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**CARUCEL INVESTMENTS L.P.,**  
*Appellant*

**v.**

**UNIFIED PATENTS, LLC,**  
*Appellee*

**KATHERINE K. VIDAL, UNDER SECRETARY OF  
COMMERCE FOR INTELLECTUAL PROPERTY  
AND DIRECTOR OF THE UNITED STATES  
PATENT AND TRADEMARK OFFICE,**  
*Intervenor*

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2021-1731, 2021-1734, 2021-1735, 2021-1736, 2021-1737

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Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2019-01079, IPR2019-01101, IPR2019-01102, IPR2019-01103, IPR2019-01105, IPR2019-01573.

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**CARUCEL INVESTMENTS L.P.,**  
*Appellant*

**v.**

**KATHERINE K. VIDAL, UNDER SECRETARY OF  
COMMERCE FOR INTELLECTUAL PROPERTY  
AND DIRECTOR OF THE UNITED STATES  
PATENT AND TRADEMARK OFFICE,**  
*Intervenor*

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2021-1911, 2021-1912, 2021-1913, 2021-1914  
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Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2019-01298, IPR2019-01404, IPR2019-01441, IPR2019-01442, IPR2019-01635, IPR2019-01644.

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Decided: December 26, 2023  
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BRIAN T. BEAR, Spencer Fane LLP, Kansas City, MO, argued for appellant. Also represented by ANDY LESTER, Oklahoma City, OK; ERICK ROBINSON, Houston, TX; R. SCOTT RHOADES, Warren Rhoades LLP, Arlington, TX.

DEBRA JANECE MCCOMAS, Haynes and Boone, LLP,

CARUCEL INVESTMENTS L.P. v. VIDAL

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Dallas, TX, argued for appellee. Also represented by RAGHAV BAJAJ, Austin, TX; ANGELA M. OLIVER, Washington, DC; MICHELLE ASPEN, ROSHAN MANSINGHANI, Unified Patents, LLC, Chevy Chase, MD.

MICHAEL TYLER, Office of the Solicitor, United States Patent and Trademark Office, Alexandria, VA, argued for intervenor. Also represented by PETER J. AYERS, ROBERT MCBRIDE, FARHEENA YASMEEN RASHEED. Also represented by PETER JOHN SAWERT in 2021-1911, 2021-1912, 2021-1913, 2021-1914.

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Before DYK, SCHALL, and STARK, *Circuit Judges*.

STARK, *Circuit Judge*.

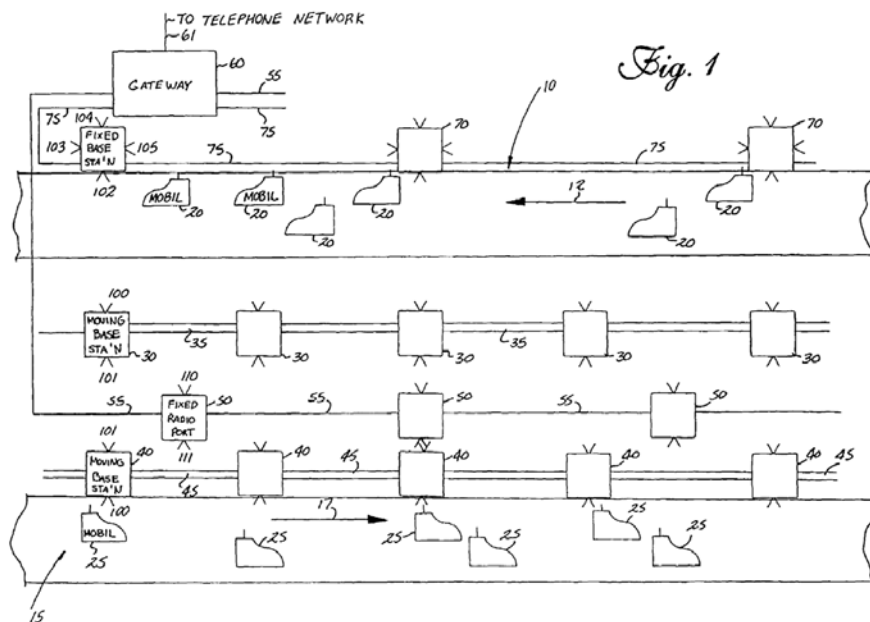
Carucel Investments L.P. (“Carucel”) appeals the final written decisions of the Patent Trial and Appeal Board (“Board”) holding that certain claims of U.S. Patent Nos. 7,221,904 (“’904 patent”), 7,848,701 (“’701 patent”), 7,979,023 (“’023 patent”), and 8,718,543 (“’543 patent” and, together with the ’904, ’701, and ’023 patents, the “Carucel patents”) are unpatentable as obvious. For the reasons provided below, we affirm.

I

A

The Carucel patents, each entitled “mobile communication system with moving base station,” share substantially identical specifications. The patents disclose a mobile communication system that “employs moving base stations moving in the direction of flow of traffic moving along a roadway.” ’904 patent, Abstract. These “moving base stations” then “communicate with a plurality of fixed radio ports connected by a signal transmission link to a gateway office which, in turn, is connected to the wire line network.” *Id.* This general configuration of the various

elements of the invention is illustrated in Figure 1 of the Carucel patents, reproduced below, which depicts 1) “mobile units 20 traveling on a first roadway 10,” 2) “[a] plurality of moving base stations 30 [which] are disposed along one side of the roadway 10 . . . [and which] may be moved by means of a rail 35, or other suitable conveying device which may include an automotive vehicle travelling on the roadway, in the same direction as the traffic flow on the roadway 10,” and 3) “a plurality of fixed radio ports 50 which are connected . . . to a telephone office connected to the wire line telephone network and referred to as a . . . gateway office 60 [which] forms the interface between the mobile telecommunication system and the wire line telephone network.” *Id.* at 3:66-4:28.



Illustrative claim 22 of the '904 patent recites:

22. An apparatus adapted to move in accordance with a movement of a mobile unit moving relative to a plurality of fixed radio ports, the apparatus comprising:

a receiver adapted to receive a plurality of signals, each of the plurality of signals transmitted from each of the plurality of fixed radio ports within a frequency band having a lower limit greater than 300 megahertz;

a transmitter adapted to transmit, within the frequency band, a resultant signal to the mobile unit in accordance with at least one of the plurality of signals; and

a processor adapted to maximize an amount of transferred information to the mobile unit by evaluating a quality of each of the plurality of signals transmitted from the plurality of fixed radio ports.

## B

Carucel brought patent infringement lawsuits against Volkswagen Group of America, Inc. (“Volkswagen”) and Mercedes-Benz USA, LLC (“Mercedes-Benz”) in the U.S. District Court for the Northern District of Texas, asserting all four Carucel patents. Volkswagen and Mercedes-Benz then filed petitions for several *inter partes* review (“IPR”) proceedings of all of the Carucel patents, which were instituted by the Board. A third-party organization, Unified Patents, Inc. (“Unified”), also obtained institution of an IPR of certain claims of the ’023 patent.

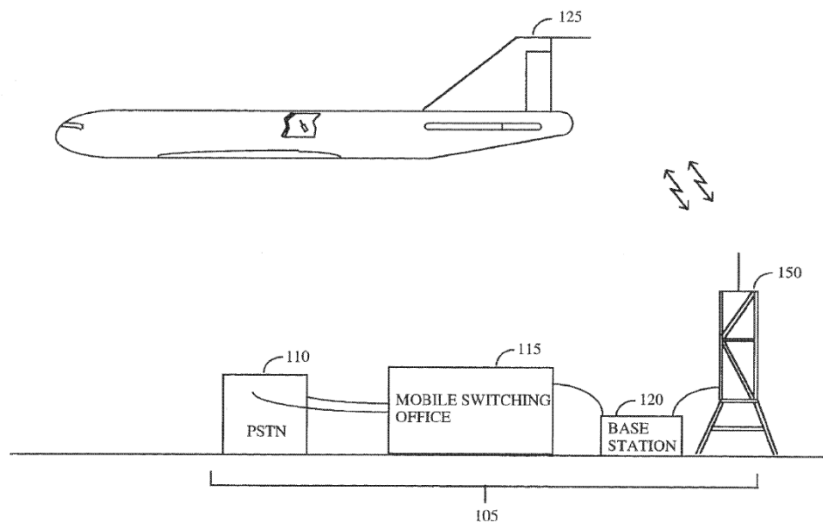
In their petitions seeking institution of IPRs, Volkswagen and Mercedes-Benz set out various obviousness combinations, based on (as pertinent to here) primary prior art references U.S. Patent Nos. 5,559,865 (“Gilhousen865”), 5,519,761 (“Gilhousen761”), and 5,276,686 (“Ito”).<sup>1</sup> Gilhousen865 and Gilhousen761, which share

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<sup>1</sup> Unified’s grounds for unpatentability were obviousness combinations involving primary references U.S. Patent Nos. 5,422,934 (“Massa”) and 4,748,655

substantially identical specifications, disclose an airborne communication system that allows radiotelephones on a plane to communicate with a ground-based telephone system. Figure 1 shows the Gilhousen system with ground-based subsystem 105 and airborne-based subsystem 125. No. 21-1911 J.A. 1241, 1245.<sup>2</sup> As shown, the ground-based subsystem 105 includes base station 120 coupled to antenna 150 and to mobile switching center 115, which in turn is coupled to public switched telephone network (“PSTN”) 110. J.A. 1245.

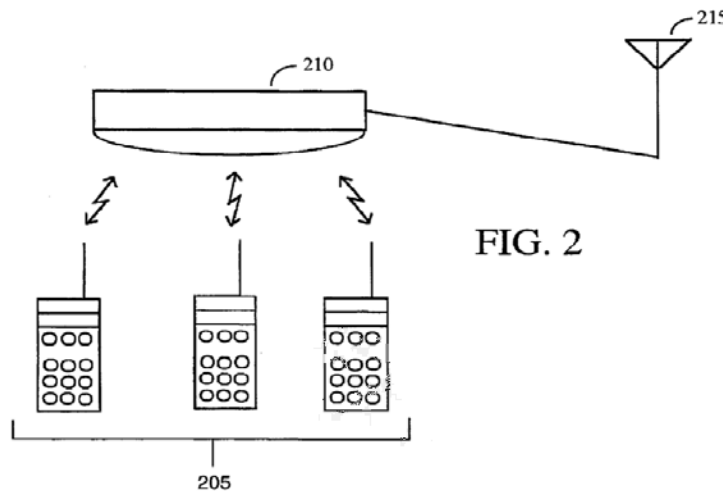
FIG. 1



(“Thrower”), which are not at issue in Carucel’s appeal with respect to Unified (No. 21-1731).

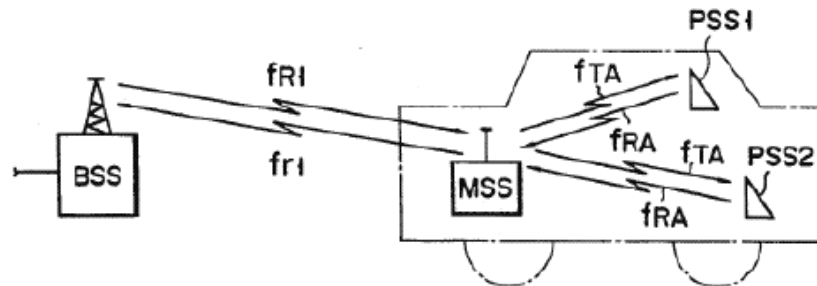
<sup>2</sup> “J.A.” refers to the joint appendix filed in Appeal No. 21-1911, unless otherwise indicated.

Figure 2 of the Gilhousen references depicts an airborne-based subsystem having radiotelephones 205, signal repeater 210, and antenna 215. J.A. 1243, 1245. Repeater 210 receives signals from radiotelephones 205 within an aircraft and relays them to antenna 215 mounted outside the aircraft, which in turn relays the signals to the base station on the ground. J.A. 1245. These references disclose that signal repeater 210 may be replaced by “an airborne base station that has the ability to register the radiotelephones on the aircraft. The airborne base station then registers the radiotelephone with the ground based subsystem.” J.A. 1246 at 3:9-13. The airborne base station has “the same functionality of its ground-based counterpart but on a much smaller scale since it does not have to handle the thousands of radiotelephones of the ground-based station.” *Id.* at 3:13-16.



Ito discloses “a mobile radio communication system that wirelessly connects not only between a base station and a mobile station but also between a mobile station, or a mobile base device, and a portable device by a radio channel in order to eliminate the necessity of wiring the mobile base device and portable device and enhance the

maneuverability of an automobile telephone handset.” J.A. 1212 at 2:6-12. This system is illustrated in Figure 6 of Ito, J.A. 1208, which depicts a mobile radio communication system, in which a mobile base device (MSS) is “connected simultaneously with two portable devices PSS1 and PSS2.” J.A. 1217 at 12:50-54. The base station (BSS) and the mobile base device (MSS) communicate with each other by way of radio frequencies, and the mobile base device (MSS) and portable devices (PSS1 and PSS2) communicate with each other by way of different radio frequencies. J.A. 1217. Ito teaches using frequency-division multiple access (“FDMA”) and time-division multiple access (“TDMA”) techniques “for connection between a base station and a mobile base device as well as for connection between a mobile base device MSS and a portable device PSS. With a FDMA/TDMA technique, a number of radio frequencies are shared by a plurality of stations.” J.A. 1214 at 5:47-52.



**FIG. 6**

The Board issued final written decisions determining that each of the challenged claims is unpatentable as obvious over combinations of prior art references including Gilhousen865, Gilhousen761, and Ito. Carucel filed motions for rehearing, which were denied, and then timely



appealed.<sup>3</sup> Following the Supreme Court's issuance of its decision in *United States v. Arthrex, Inc.*, 141 S. Ct. 1970 (2021), we remanded for the limited purpose of allowing Carucel to seek Director Review. After such review was denied, Carucel filed amended notices of appeal. Mercedes-Benz and Volkswagen then notified us they would not participate in the appeals. Hence, briefing was submitted only by Carucel, Unified, and the Director of the U.S. Patent and Trademark Office ("PTO").

The Board had jurisdiction under 35 U.S.C. § 316(c). We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A) and 35 U.S.C. §§ 141(c), 319.

## II

Obviousness is a question of law based on underlying fact findings. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 427 (2007). Those findings include: (1) the scope and content of the prior art; (2) differences between the prior art and the claims at issue; (3) the level of ordinary skill in the pertinent art; and (4) secondary considerations such as commercial success, long felt but unsolved needs, and failure of others. *See Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966). We review the Board's legal conclusions on obviousness de novo and its findings of fact for substantial

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<sup>3</sup> In No. 21-1731, Carucel appeals the final written decisions in IPR2019-1101/1573, regarding the '904 patent; IPR2019-1102 ('701 patent); IPR2019-1103 ('023 patent); IPR2019-1079 ('023 patent); and IPR 2019-1105 ('543 patent). All but one of the IPRs at issue in No. 21-1731 were filed by Volkswagen; the exception, IPR2019-1079 ('023 patent), was filed by Unified. In No. 21-1911, Carucel appeals the final written decisions in IPR2019-1298/1635, regarding the '904 patent; IPR2019-1442 ('701 patent); IPR2019-1404 ('023 patent); and IPR2019-1441/1644 ('543 patent). All of the IPRs in No. 21-1911 were filed by Mercedes-Benz.

evidence. See *HTC Corp. v. Cellular Commc'ns Equip., LLC*, 877 F.3d 1361, 1369 (Fed. Cir. 2017). “Substantial evidence is such relevant evidence as a reasonable mind might accept as adequate to support a conclusion.” *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1378 (Fed. Cir. 2023). “[T]he possibility of drawing two inconsistent conclusions from the evidence does not prevent an administrative agency’s finding from being supported by substantial evidence.” *Consolo v. Fed. Mar. Comm’n*, 383 U.S. 607, 620 (1966). Additionally, we “defer to the Board’s findings concerning the credibility of expert witnesses.” *Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010).

We review the Board’s claim construction de novo and any subsidiary factual findings based on extrinsic evidence for substantial evidence. See *Polaris Innovations Ltd. v. Brent*, 48 F.4th 1365, 1372 (Fed. Cir. 2022). Claim terms are generally given their ordinary and customary meaning, which is the meaning understood by one of ordinary skill in the art at the time of the invention, reading the claim in the context of the full specification and prosecution history. See *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313-14 (Fed. Cir. 2005) (en banc); see also *Lexion Med., LLC v. Northgate Techs., Inc.*, 641 F.3d 1352, 1356 (Fed. Cir. 2011). “There are only two exceptions to this general rule: 1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of the claim term either in the specification or during prosecution.” *Thorner v. Sony Computer Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

We review the actions of the PTO for compliance with the Administrative Procedure Act (“APA”), 5 U.S.C. § 551 *et seq.* Applying this standard of review, we “hold unlawful and set aside agency action, findings, and conclusions found to be . . . arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law,” “without observance of procedure required by law,” or “unsupported by substantial evidence.” 5 U.S.C. §§ 706(2)(A), (D), (E).

### III

On appeal, Carucel challenges: (1) the Board’s construction of the claim terms “mobile unit” and “mobile device;” (2) the Board’s construction of “adapted to;”<sup>4</sup> (3) the Board’s conclusion that various claims of Carucel’s patents are invalid as obvious over several prior art combinations; and (4) the PTO’s “Director Review” procedures, which Carucel contends violate the APA. We conclude that none of these issues has merit.

#### A

Before addressing Carucel’s contentions, we begin by rejecting the PTO’s position that Carucel forfeited its opportunity to appeal the Board’s construction of “mobile unit” and “mobile device” by not first raising these challenges in its request for Director Review. Appeals from IPR proceedings are governed by 35 U.S.C. § 319, which provides that “[a] party dissatisfied with the final written decision of the Patent Trial and Appeal Board . . . may appeal the decision.” The statute does not impose as a further requirement for preserving issues that they also be presented as part of an intra-agency appeal.

The only other authority the PTO cites for its forfeiture position is our non-precedential decision in *Polycom, Inc. v. Fullview, Inc.*, 767 F. App’x 970, 980 (Fed. Cir. 2019), which held that “Polycom could have, and should have, raised [its] anticipation argument in its request for rehearing” and, as such, found the argument waived (forfeited). It would seem to us, however, that just as failure to seek rehearing cannot result in forfeiture, *see In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1377 (Fed. Cir. 2016), neither should failure to raise an issue when rehearing is sought result in

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<sup>4</sup> Carucel raises this issue only in Appeal No. 21-1731 and only in connection with IPRs filed by Volkswagen, not those initiated by Unified.

forfeiture. In any case, *Polycom* concerned *inter partes* reexamination, not *inter partes* review. *Inter partes* reexaminations are governed by a regulation requiring parties seeking rehearing of a Board decision to “state with particularity the points believed to have been misapprehended or overlooked in rendering the Board’s opinion reflecting its decision.” 37 C.F.R. § 41.79(b)(1). No similar regulation or other authority exists in the IPR context.<sup>5</sup> Thus, issues Carucel litigated in the IPR but chose not to present in its requested Director Review are not forfeited and may be pressed on appeal.

## B

Carucel appeals the Board’s construction of “mobile device” and “mobile unit,” terms the parties agree have the same meaning as each other. Carucel proposed that these terms should be construed as “a device that must register with and be able to directly communicate with the cellular network.” The Board held, instead, that no construction

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<sup>5</sup> At the time Carucel made its requests for Director Review, the PTO’s *Arthrex* Q&As webpage did not mention any exhaustion requirement. See PTO, *Arthrex* Q&As, <https://www.uspto.gov/patents/patent-trial-and-appeal-board/procedures/arthrex-qas> (last accessed December 18, 2023). Later, on April 22, 2022, the *Arthrex* Q&As webpage was superseded by the PTO’s Interim Process for Director Review webpage, which instructed that parties “should raise any additional issues sparingly, if at all.” No. 21-1911 Appellant’s Reply Br. at 9. On July 24, 2023, the PTO published “Revised Interim Director Review Process,” announcing that henceforth “[a]ny argument not made within the Request [for Director Review] may be deemed waived.” See PTO, *Revised Interim Director Review Process*, <https://www.uspto.gov/patents/ptab/decisions/revised-interim-director-review-process> (last accessed December 18, 2023).

was necessary. On appeal we must address two disputes: (1) whether the “mobile device” and “mobile unit” are limited to devices that work with a “cellular network” or may also include devices that work with other telephone networks, such as cordless phones; and (2) whether the claimed “mobile device” and “mobile unit” must be capable of registering and communicating with the network “directly” (i.e., “by itself”) without relying on actions by intermediaries.<sup>6</sup> We agree with the Board on both issues: the “mobile device” and “mobile unit” are not limited to devices that work with a “cellular network” or to those that are capable of registering and communicating “directly” with the network.

First, there is no basis in the intrinsic record to limit the “mobile device” or “mobile unit” to devices that work only with a “cellular network.” Nothing about the claim language – that is, the words “mobile,” which refers to capability of movement, or “unit” or “device,” which are generic indications of a physical article – even suggests Carucel’s proposed restriction.

Turning to the specification, Carucel points to the “Field of the Invention,” which states that the Carucel patents “*relate[] to cellular telephone systems* in which a mobile unit communicates by wireless communication to a

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<sup>6</sup> Although its proposed construction does not explicitly require that the claimed “mobile device” and “mobile unit” register with a network “by itself,” Carucel has maintained, both during the IPRs and in the present appeals, that its proposed construction does so. *See, e.g.*, No. 21-1731 J.A. 10635 (stating that prior art did not disclose “mobile device” limitation as prior art telephone was “not capable of registering with a cellular network by itself”); No. 21-1731 Appellant’s Reply Br. at 12 (arguing that “mobile device must register as part of its independent functionality” and “by definition . . . can do so by itself”).

base station connected to the wire telephone network.” *E.g.*, ’904 patent at 1:15-18 (emphasis added). That the invention “relates to” cellular telephone systems does not mean the invention is also *limited to*, and may only be practiced with, a cellular network. Carucel emphasizes that “[t]he only embodiments disclosed in the specification are mobile units and mobile base stations that connect to mobile cellular networks” and “[t]he only communications standards discussed” in the specification, “TDMA/CDMA and IS-95,” are “cellular phone standards.” No. 21-1731 Appellant’s Br. at 36-37. However, “[e]ven when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction.” *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004) (internal quotation marks omitted). We see no such clear intention here. To the contrary, adoption of Carucel’s construction would result in the claims failing to capture the breadth of the patents’ disclosure – including embodiments in which mobile devices communicate with the moving base stations using “a standard radio interface, well known in the art,” ’904 patent at 6:43-45 – a generally disfavored outcome in the absence of intrinsic evidence limiting the scope of the claims. See *Vitronics Corp. v. Conceptor Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996) (noting that claim construction excluding preferred embodiment “is rarely, if ever, correct”).

Second, the intrinsic evidence does not require the “mobile device” or “mobile unit” to be able to “directly” communicate with the telephone network or to register with the telephone network “by itself.” To the contrary, the specification repeatedly discloses embodiments in which the claimed “mobile device” or “mobile unit” communicates with the telephone network indirectly via intermediaries. In one such embodiment, “the mobile unit does not receive communications from the fixed radio port but only from the

movable base station . . . thereby *eliminating any direct communication* from the mobile unit to the fixed radio port.” ’904 patent at 3:49-56 (emphasis added); *see also id.* at 3:18-21 (explaining that moving base stations may be interposed between fixed base stations and mobile device).

For its narrower construction, Carucel relies on a portion of the specification which states, in pertinent part:

When a mobile unit set is first powered up or first enters a service area, the mobile unit must register in the manner described earlier, by transmitting its unique address in the new service area. The address will be received by the closest moving base station 30 and transmitted via a fixed radio port and the gateway switch 60 to the telephone network. This registration procedure is required so that an incoming call for the mobile unit can be appropriately directed.

’904 patent at 9:64-10:4. Even this portion of the specification, however, describes indirect communication between the “mobile unit” and the telephone network during the registration process, explaining that the “address” of the mobile unit is relayed to the telephone network via intermediaries including “the closest *moving base station* 30 and . . . a *fixed radio port and the gateway switch* 60.” *Id.* (emphasis added). This language does not support the restrictive reading of the claim terms pushed by Carucel.

Thus, we agree with the Board’s decision to reject Carucel’s proposed construction of the terms “mobile device” and “mobile unit.” Because Carucel only challenges the Board’s claim construction to the extent that it failed to narrow claim scope in the manner Carucel had proposed, we need not determine whether the Board was also correct that these terms require no construction.

In appeal No. 21-1731 only, Carucel challenges the Board's construction of the term "adapted to," as it appears in the preambles of claims 22 and 34 of the '904 patent. In previous litigation, a district court construed the term to mean "constructed to move with the traffic at a rate of speed which is comparable to the speed of the traffic." No. 21-1731 J.A. 234-35 (quoting J.A. 5556-59). The Board accepted the parties' agreement to adopt this same construction. Later, the parties developed a dispute over the meaning of "traffic" as used in the Board's construction. Specifically, Carucel proposed that "traffic" refers only to "an automotive vehicle traveling on a roadway" and does not also include "airplane traffic." No. 21-1731 J.A. 6639. Carucel argued that because "[a]n airplane does not move with traffic as it is not bound to predetermined roads," and "an airplane can travel at speeds up to five hundred miles-per-hour and, as such, does not move with the traffic at a rate of speed which is comparable to the traffic," airplanes must be excluded from the construction. *Id.* The Board rejected Carucel's proposed narrowing of the term, as it was not supported by the specification or the prosecution history of the Carucel patents.

We agree with the Board's rejection of Carucel's proposal to narrow the claim term "adapted to" by restricting "traffic" to only "vehicular traffic" traveling on "predetermined roads." Carucel asserts that "[t]he type of traffic that is described in the specification is *solely* automobile traffic" and "the sole embodiment is directed to 'roadways' involving 'vehicular traffic.'" No. 21-1731 Appellant's Br. at 46. However, as the Board explained and the PTO argues on appeal, the specification also discloses pedestrian traffic. *See, e.g.*, '904 patent at 2:41 ("The low speed is mostly pedestrian traffic . . ."), 3:35-39 ("[A] number of fixed base stations are provided in addition to moving base stations allowing slower moving traffic, such as pedestrian traffic . . . to communicate via the fixed base stations."), 4:48-51 ("[F]ixed base stations 70 would accommodate



communications with mobile units traveling at a speed of less than 30 miles per hour including pedestrian traffic and stationary units.”). Carucel’s narrowed construction, thus, would improperly read embodiments relating to pedestrian traffic out of the scope of the claims. *See Vitronics*, 90 F.3d at 1583.

Carucel urges us to consider the testimony of its expert, Dr. Lanning, who opined that there is a significant difference in the circuitry and signaling between a car-based system and one involving commercial aircraft. We may not, however, rely on extrinsic evidence to adopt a claim construction that contradicts what a person of ordinary skill in the art would understand from the intrinsic evidence. *See Seabed Geosolutions (US) Inc. v. Magseis FF LLC*, 8 F.4th 1285, 1287 (Fed. Cir. 2021) (“If the meaning of a claim term is clear from the intrinsic evidence, there is no reason to resort to extrinsic evidence.”).

For these reasons, we affirm the Board’s construction of the term “adapted to.”

#### D

Carucel next contends that substantial evidence does not support the Board’s determination that its patent claims were proven to be invalid as obvious. In particular, Carucel challenges the Board’s findings with respect to the combination of Gilhousen865 with Gilhousen390<sup>7</sup> and the combinations of Ito with references relating to a CDMA cellular system.<sup>8</sup> We are unpersuaded.

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<sup>7</sup> U.S. Patent No. 5,109,390. *See* No. 21-1731 J.A. 2166-76.

<sup>8</sup> In the No. 21-1731 appeal, Carucel also faults combinations involving the Vercauteren reference. But the Board did not consider the Vercauteren-based combinations in its final written decision and neither do we.

Carucel first attacks the Board’s findings regarding the combination of the aircraft repeater disclosures in Gilhousen865 with the CDMA system of Gilhousen390, criticizing the Board for failing to credit the testimony of Carucel’s expert, Dr. Lanning, who pointed out “technical flaws that would render the combination of the two references non-functional.” No. 21-1731 Appellant’s Br. at 48. Substantial evidence supports the Board’s determination of obviousness based on the combination of Gilhousen865 and Gilhousen390. For instance, with respect to claim 22 of the ’904 patent, the Board relied on the testimony of petitioner’s expert, Dr. Ding, to find that a person of ordinary skill in the art would have been motivated to modify Gilhousen865’s airborne communication system with Gilhousen390’s “various configurations to achieve signal diversity at the receiver,” at least for the purpose of “reducing errors caused by well-known deleterious effects on wirelessly-transmitted signals.” No. 21-1731 J.A. 259, 261-62; *see also* No. 21-1731 J.A. 3457-65 ¶¶ 97-109. The Board also credited Dr. Ding’s testimony that an ordinarily skilled artisan would have combined these references “with a reasonable expectation of success.” No. 21-1731 J.A. 261 (citing No. 21-1731 J.A. 10509-12 ¶¶ 46-50). The testimony cited by the Board directly addressed Carucel’s contentions as to the purported incompatibility caused by the high speed of aircraft. Having determined to credit the opinion of Dr. Ding, a finding to which we defer, *see Yorkey*, 601 F.3d at 1284, the Board had substantial evidence for its conclusion that “the proposed combination of Gilhousen865 and Gilhousen390 would involve nothing more than incorporating well-known concepts . . . into a well-known system.” No. 21-1731 J.A. 263-64 (citing No. 21-1731 J.A. 3465 ¶ 109).<sup>9</sup>

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<sup>9</sup> Carucel faults the Board’s final written decisions for failing to adequately explain why it was persuaded by

Carucel next challenges the Board’s obviousness determinations regarding combinations involving Ito and a CDMA cellular phone system. Carucel argues that Ito describes a TDMA system and, because “CDMA and TDMA cellular phone systems are incompatible as a matter of technology,” a skilled artisan would not combine these references. No. 21-1731 Appellant’s Br. at 50. Substantial evidence supports the Board’s conclusion to the contrary.

For example, looking again at ’904 patent claim 22 – which was challenged in IPR2019-1298/1635 based on the combination of Ito and Gilhousen501<sup>10</sup> – the Board credited testimony from petitioner’s expert, Dr. Fischer, that developments in the telecommunications industry would have led a person of ordinary skill in the art to apply Gilhousen501’s CDMA technology to Ito’s disclosures, given the advantages of CDMA over FDMA/TDMA. J.A. 40-41 (citing J.A. 1387-89 ¶¶ 104-09). The Board also pointed to Gilhousen501’s disclosure that CDMA technology has “significant advantages” over Ito’s FDMA/TDMA technology. J.A. 40 (citing J.A. 1230 at 1:18-23).

Taking claim 13 of the ’543 patent as another example – which was challenged in IPR2019-1105 based on the combination of Ito, Paneth,<sup>11</sup> and Gilhousen390 – the Board

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certain obviousness arguments, analogizing the situation here to what we encountered in *Alacritech, Inc. v. Intel Corp.*, 966 F.3d 1367, 1371 (Fed. Cir. 2020). This comparison lacks merit. Here, unlike in *Alacritech*, the Board outlined the parties’ dispute and articulated its rationale, including by identifying the evidence it relied on, all of which allows us to “reasonably discern that [the Board] followed a proper path.” *Ariosa Diagnostics v. Verinata Health, Inc.*, 805 F.3d 1359, 1365 (Fed. Cir. 2015).

<sup>10</sup> U.S. Patent No. 5,101,501. See J.A. 1225-40.

<sup>11</sup> U.S. Patent No. 4,675,863. See No. 21-1731 J.A. 3341-76.

credited Dr. Ding’s testimony, considered Carucel’s competing evidence, and then found that a person of ordinary skill in the art would have been “motivated to combine the teachings of Ito and Paneth with the well-known CDMA technology of Gilhousen<sup>390</sup> with a reasonable expectation of success.” No. 21-1731 J.A. 219 (citing J.A. 4125-28 ¶¶ 176-81; J.A. 10597-604 ¶¶ 49-61). The Board also noted that Dr. Ding provided “examples in the technical literature describing the combination of TDMA, FDMA, and CDMA.” No. 21-1731 J.A. 218 (citing J.A. 10602-03 ¶¶ 59-60).

Carucel’s reliance on *In re IPR Licensing, Inc.*, 942 F.3d 1363 (Fed. Cir. 2019), where we reversed a Board decision that was based on non-record evidence, is inapposite, as the record of the present appeals contains direct expert support for the Board’s findings. Most particularly, substantial evidence supports the Board’s conclusions of obviousness.

## E

We conclude by addressing Carucel’s APA arguments concerning its requests for Director Review of the Board’s final written decisions. Carucel acknowledges that our decision in *Arthrex, Inc. v. Smith & Nephew, Inc.*, 35 F.4th 1328 (Fed. Cir. 2022) (“*Arthrex II*”), is dispositive on certain aspects of its challenges. It points to other issues that are not directly controlled by binding precedent. Because there is at least one dispositive flaw with respect to each of the issues Carucel raises, we need not, and do not, catalog all of the defects in its positions.

Carucel first argues that the orders denying its requests for Director Review violate the APA because they are unsigned and provide no explanation. We disagree. The denial orders list the Office of the Under Secretary of Commerce and Director of the PTO as the issuing office, identify Commissioner Hirshfeld as the presiding officer, and state that Carucel’s requests had been referred to him. Although the orders do not bear the signatures of

Commissioner Hirshfeld, it is sufficiently clear that he is the official responsible for issuing them. *See generally Butler v. Principi*, 244 F.3d 1337, 1340 (Fed. Cir. 2001) (explaining that, “[i]n the absence of clear evidence to the contrary,” we “presume that what appears regular is regular,” including that “public officers have properly discharged their official duties”). The orders at issue here are not, as Carucel suggests, anonymous.

Nor is Carucel entitled to additional explanation for the denial of its requests for Director Review. Pursuant to the APA, agency decisions must “include a statement of . . . findings and conclusions, and the reasons or basis therefor, on all the material issues of fact, law, or discretion presented on the record.” 5 U.S.C. § 557(c)(3)(A). Commissioner Hirshfeld’s determination not to disturb the Board’s final written decisions is not separately subject to these requirements because, as the orders expressly state, “the Patent Trial and Appeal Board’s Final Written Decision is the final decision of the agency.” *E.g.*, No. 21-1731 J.A. 12442. The Board’s final written decisions were and are reviewable final decisions of the agency; they contain a reasoned explanation for the agency’s conclusion, an explanation that remained the position of the PTO even after Carucel’s request for Director Review was denied. Even where the agency adopts an earlier subordinate decision within the agency, adoption of the already-existing explanation in the subordinate decision for the agency’s action is permissible. *See, e.g., City of Bethany v. Fed. Energy Regul. Comm’n*, 727 F.2d 1131, 1144 (D.C. Cir. 1984) (“FERC’s summary affirmance of the ALJ’s adoption of a 5% transmission loss figure is not improper.”); *Armstrong v. Commodity Futures Trading Comm’n*, 12 F.3d 401, 403-04 (3d Cir. 1993) (“An administrative agency need not provide an independent statement if it specifically adopts an ALJ’s opinion that sets forth adequate findings and reasoning.”).

Next, Carucel argues that the PTO violated the APA by failing to promulgate regulations governing the Director

Review process through notice-and-comment rulemaking, thereby rendering the orders denying Director Review null and void. According to Carucel, at the time it submitted its requests for Director Review, the PTO had only provided informal guidance about the review process on a webpage called “*Arthrex Q&As*.” The PTO, joined by Unified, responds that notice-and-comment rulemaking is not required because the challenged guidance explaining the agency’s internal processes and outlining the procedural requisites for seeking Director Review falls within the APA’s exemption for “rules of agency organization, procedure, or practice,” which need not emanate from notice-and-comment procedures. 5 U.S.C. § 553(b)(A).

We need not determine if the PTO’s guidance governing the Director Review process is exempt from notice-and-comment rulemaking under the APA because, even assuming it is not exempt, any error by the PTO in this regard would be harmless and would not render the denial of Carucel’s requests for Director Review “null and void.” When we review agency actions for APA violations, we must take “due account . . . of the rule of prejudicial error.” 5 U.S.C. § 706(2); *see also Jicarilla Apache Nation v. U.S. Dep’t of Interior*, 613 F.3d 1112, 1121 (D.C. Cir. 2010) (“The burden to demonstrate prejudicial error is on the party challenging agency action.”). We can find no prejudice to Carucel here. Carucel does not contend it was unaware of the relevant procedural requirements for filing a request for Director Review; nor does it identify any way in which it was prejudiced by the manner in which the PTO distributed its guidance. Carucel filed its requests for Director Review in a timely manner and consistent with the procedures set out by the PTO. Its requests were not denied due to any failure to comply with that guidance. Thus, the PTO’s failure, if any, to follow the APA’s notice-and-comment requirement is harmless error. *See generally Window Covering Mfrs. Ass’n v. Consumer Prod. Safety Comm’n*, 82 F.4th 1273, 1284 (D.C. Cir. 2023) (“We will not set aside a

rule absent a showing by the petitioner[] that [it] suffered prejudice from the agency's failure to provide an opportunity for public comment.") (internal quotation marks omitted); *see also Nat'l Ass'n of Home Builders v. Defs. of Wildlife*, 551 U.S. 644, 659 (2007) (holding alleged agency error harmless). Furthermore, the APA provides that if a rule is erroneously issued outside the Federal Register publication process it may nonetheless bind a party, like Carucel, that had "actual and timely notice of the terms thereof." 5 U.S.C. § 552(a)(1).<sup>12</sup>

Finally, Carucel argues that the PTO violated the APA by delegating the Director's review function to unidentified "advisory committee" members. In Carucel's view, because the identities of the "advisory committee" members are not made known to the parties requesting Director Review, conflicts of interest might escape the PTO's attention and then avoid all scrutiny. Carucel grounds its argument on 5 U.S.C. § 556(b)(3), which provides that "[t]he functions of . . . employees participating in decisions . . . shall be conducted in an impartial manner." Even assuming the Director Review process is a formal adjudication, as defined in § 554 (making § 556 applicable), and even further assuming that the involvement of the "advisory committee" members in the Director Review process constitutes "participating in decisions," issues we do not decide, we agree with the PTO that the Director is entitled to consult

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<sup>12</sup> On July 20, 2022, the PTO published in the Federal Register a "Request for Comments on Director Review, Precedential Opinion Panel Review, and Internal Circulation and Review of Patent Trial and Appeal Board Decisions." *See* 87 Fed. Reg. 43249-52; *see also* 87 Fed. Reg. 58330-31 (extending comment period). The comment period closed on October 19, 2022. As of the issuance date of this opinion, the PTO has not adopted final rules on the Director Review process.

with subordinate agency employees in exercising her authority in connection with Director Review without disclosing the identities of these agency employees.

In its reply brief, Carucel belatedly adds that the PTO further violated the APA by not publishing the recommendations made by the “advisory committee” members. Carucel’s reliance on 5 U.S.C. § 557(c), which requires that “[a]ll decisions, including initial, recommended, and tentative decisions, are a part of the record,” is misplaced, as the “recommended decisions” referred to in the statute are those made by “the presiding employee or an employee qualified to preside at hearings pursuant to [S]ection 556.” 5 U.S.C. § 557(b). Any “recommendations” made by the “advisory committee,” by contrast, are merely internal advice provided to the Director, who is the agency decisionmaker.

In sum, none of the purported APA violations provides any basis for us to reverse or vacate the Board’s decisions.

#### IV

We have considered Carucel’s remaining arguments and find them unpersuasive. For the foregoing reasons, we affirm the Board’s final written decisions holding the claims of the Carucel patents unpatentable as obvious.

#### **AFFIRMED**

#### COSTS

Costs shall be assessed against Appellant.