

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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QUANERGY SYSTEMS, INC.,  
Petitioner,

v.

VELODYNE LIDAR, INC.,  
Patent Owner.

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Case IPR2018-00255  
Patent 7,969,558 B2

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Before CARL M. DEFRANCO JR., JOHN P. PINKERTON, and  
MICHAEL L. WOODS, *Administrative Patent Judges*.

DEFRANCO, *Administrative Patent Judge*.

DECISION  
Denying Petitioner's Request for Rehearing  
*37 C.F.R. § 42.71(d)*

## I. INTRODUCTION

Quanergy Systems, Inc. (“Quanergy”) filed a Petition requesting *inter partes* review of claims 1–4, 8, and 9 of U.S. Patent No. 7,969,558 B2 (“the ’558 patent”). Paper 2 (“Pet.”). Velodyne LiDAR, Inc. (“Velodyne”) is the owner of the ’558 patent. *See* Paper 6. After a trial on the merits, we issued a Final Written Decision holding that Quanergy had not shown the challenged claims unpatentable by a preponderance of the evidence. Paper 59 (“Final Dec.”). Quanergy filed a Request for Rehearing of that decision. Paper 61 (“Rehearing Request” or “Reh’g Req.”). For the following reasons, we deny Quanergy’s Rehearing Request.

## II. STANDARD OF REVIEW

A party requesting rehearing of a Board decision has the burden to show that the decision should be modified. Pursuant to 37 C.F.R. § 42.71(d), the rehearing request must identify, specifically, all matters the party believes the Board misapprehended or overlooked, and the place where each matter was previously addressed in a motion, an opposition, or a reply. When rehearing a decision on a petition, we review the decision for an abuse of discretion. 37 C.F.R. § 42.71(c). An abuse of discretion may arise if a decision is based on an erroneous interpretation of law, if a factual finding is not supported by substantial evidence, or if an unreasonable judgment is made in weighing relevant factors. *In re Gartside*, 203 F.3d 1305, 1315-16 (Fed. Cir. 2000).

## III. ANALYSIS

Quanergy asserts several reasons for why it believes the Board should reconsider its Final Decision that Quanergy had not carried its burden of showing the claimed invention would have been obvious. First, Quanergy

maintains that we erred in denying its motion to exclude certain exhibits. Reh’g Req. 1–3. Second, Quanergy argues we erred in our evaluation of Velodyne’s objective evidence of non-obviousness. *Id.* at 3–8. And, finally, Quanergy contends that we erred in finding the challenged claims unpatentable over the asserted prior art references—either Mizuno alone or Mizuno in combination with Kilpela. *Id.* at 8–15. We address each argument in turn.

*A. Whether We Erred in Our Admission of Certain Exhibits*

Quanergy argues that we erred by permitting Exhibits 2040, 2074, 2076, 2082, and 2098 into evidence over its objections of inadmissible hearsay. Reh’g Req. 1 (citing Pet. Mot. 3–9, 11; Pet. Reply to Mot. 1–4). According to Quanergy, we should have excluded the contents of each exhibit because Velodyne “relied on that content to prove the truth of specific objective evidence arguments.” *Id.* But in making this assertion, Quanergy explains only how “Exhibit 2040 (a *Forbes* article)” is purportedly inadmissible hearsay. *Id.* at 1–2. Nowhere does Quanergy provide meaningful explanation for why the other exhibits are inadmissible. *See id.* In any event, we address below Quanergy’s assertion of error as to the admissibility of each of these exhibits.

*1. Exhibit 2040*

Quanergy asserts that we relied improperly on Exhibit 2040 as proof of Velodyne’s “skyrocketing” revenues “for years 2014–2017 and half of 2018.” Reh’g Req. 1–2 (citing Final Dec. 36). At the outset, we note that Quanergy appears to misunderstand our reliance on Exhibit 2040. In our Final Decision, we did *not* rely on Exhibit 2040 as proof of Velodyne’s revenues for *the years 2014–2017*. Final Dec. 36 (citing “Exs. 2084–87,

2095”). Instead, we relied on Exhibit 2040 solely as proof of Velodyne’s “expected” revenue for *the year 2018*. *Id.* (citing Ex. 2040, 3).

More specifically, our Final Decision cited Exhibits 2084–2087 and 2095, *not* Exhibit 2040, to support our finding that “[b]etween 2013 and 2017, Velodyne’s annual revenues from sales of sensors embodying the claimed invention went from tens of millions to hundreds of millions in dollars.” *Id.* (citing “Exs. 2084–87, 2095”). Because Quanergy never challenged the admissibility of Exhibits 2084–87 and 2095 (*see* Paper 51), we could not have erred in considering those exhibits as proof that Velodyne enjoyed considerable revenue growth from 2013 to 2017.

We acknowledge, however, that our Final Decision did rely on Exhibit 2040 as proof of Velodyne’s *projected revenues in 2018*, namely, that they were “expected to be about \$200 million.” Final Dec. 36–37 (citing Ex. 2040). But what Quanergy ignores is that we also cited Exhibit 2113 to prove the same point. *Id.* (citing Ex. 2113). And while Quanergy sought to exclude Exhibit 2040, it never sought to exclude Exhibit 2113, which is a detailed market analysis projecting Velodyne’s revenues in 2018 to be “\$250M” based on partnerships with “[a]lmost all robotic car manufacturers.” *See* Ex. 2113, 81. So, even had we excluded Exhibit 2040 as Quanergy originally requested, Exhibit 2113, as well as previously discussed Exhibits 2084–2087 and 2095, fully support our finding that Velodyne’s revenues “went from tens of millions to hundreds of millions in dollars.” Final Dec. 36. To the extent our citation to Exhibit 2040 may have given rise to error, it was harmless given that unchallenged Exhibit 2113 proves the same point.

2. *Exhibits 2040, 2074, 2076, and 2098*

Quanergy also argues that we “erred in relying on *Joy Techs., Inc.* and *Freeman* to support [our] non-hearsay ruling” with respect to Exhibits 2040, 2074, 2076, and 2098. Reh’g Req. 2. According to Quanergy, “these cases have nothing to do with objective evidence where both the content *and the truth* of the evidence matter.” *Id.*

In our Final Decision, we concluded that the exhibits are not hearsay, as they are evidence of industry praise and were not offered for the truth of the matter asserted therein. Final Dec. 38–39. Specifically, we explained

We rely on those exhibits as evidence of industry praise. . . . For instance, Exhibits 2040, 2076, and 2098 are articles from *Forbes*, *The Verge*, and *Bloomberg*, respectively, reporting independently on the wide recognition and adoption of Velodyne’s sensors by the industry. We do not consider news articles such as these to be inadmissible hearsay as they are “offered simply as evidence of what [each] described, not for proving the truth of the matters addressed in the document.” *Joy Techs., Inc. v. Manbeck*, 751 F. Supp. 225, 233 n.2 (D.D.C. 1990) *aff’d*, 959 F.2d 226 (Fed. Cir. 1992); *Freeman v. Minnesota Mining and Manuf. Co.*, 675 F. Supp. 877, 884 n.5 (D. Del. 1987).

Final Dec. 38–39.

While admittedly *Joy Technologies* and *Freeman* do not address objective evidence per se, these cases nonetheless support the notion that statements offered solely for the purpose of showing they were made are admissible. Indeed, as explained in the advisory committee note to Federal Rule of Evidence 801(c), “[i]f the significance of an offered statement lies solely in the fact that it was made, no issue is raised as to the truth of anything asserted, and the statement is not hearsay.” Fed. R. Evid. 801(c) 1997 Adv. Comm. Note.

Consistent with that reasoning, we allowed into evidence Exhibits 2040, 2074, 2076, and 2098 because they were offered solely for the fact that the statement of praise was made. *See* Final Dec. 39. Numerous courts have come to the same conclusion, namely, it is the existence of the statements of praise themselves that is relevant. As such, “courts have properly found that articles showing the receipt of ‘awards and accolades’ are admissible over a hearsay objection.” *Asetek Danmark A/S v. CMI USA, Inc.*, 2014 WL 12644295, at \*2 (N.D. Calif. Nov. 19, 2014) (collecting Federal Circuit and district court cases). Thus, we reject Quanergy’s assertion that we misapprehended or overlooked the relevant case law by admitting Exhibits 2040, 2074, 2076, and 2098 as evidence of industry praise.

### 3. *Exhibit 2082*

Quanergy also argues that we erred by failing to exclude Exhibit 2082 as inadmissible hearsay. *Reh’g* Req. 1–2. In seeking exclusion, Quanergy argued that, because “Exhibit 2082 is Velodyne’s own press release” in which Velodyne is “simply praising itself,” such “self-praise should be excluded.” Paper 51 at 8–9 (case citations omitted).

In our Final Decision, we agreed with Quanergy that Velodyne’s Exhibit 2082, along with several other exhibits, “appear to be self-serving statements” and, thus, “we do not rely on those exhibits” as evidence of industry praise. Final Dec. 35–36. We explained that there was no need to rely on Exhibit 2082 because “a plethora of other evidence is clearly objective in nature and amounts to strong evidence of industry praise.” *Id.* at 36. That said, however, our Final Decision noted that Exhibit 2082 was admissible as contemporaneous evidence of the construction of Velodyne’s

HDL-64E sensor for purposes of showing how it “resolved a long-felt need.” *See id.* at 36 n.10. And while Exhibit 2082 represented Velodyne’s own description of the HDL-64E sensor (*see id.* at 33), we viewed the question of its accuracy and reliability as going to weight of the evidence, not its admissibility.

As for the weight we ascribed to Exhibit 2082, the record is replete with objective evidence corroborating the accuracy and reliability of Velodyne’s description of the HDL-64E in the relevant time frame. Specifically, Quanergy’s own evidence includes a contemporaneous description of Velodyne’s HDL-64E sensor that is no different than that of Exhibit 2082. *See* Ex. 1090 at 7 (“User’s Manual” dated “2008.”); Ex. 1091 (“Overview” dated “2007”). In addition, numerous other contemporaneous documents describe the HDL-64E sensor in essentially the same manner as Exhibit 2082. *See, e.g.*, Ex. 2046 (dated “January 4, 2009”); Ex. 2059 (dated “October 2007”); Ex. 2091 (dated “7<sup>th</sup> November 2007”). But Quanergy never challenged the admissibility of those exhibits. *See* Paper 51 at 1. Thus, we reject Quanergy’s assertion that we should exclude Exhibit 2082 where the record evidence overwhelmingly corroborates the accuracy and reliability of the description therein.

*B. Whether We Erred in Giving Substantial Weight to Velodyne’s Objective Evidence of Non-Obviousness*

*1. Presumption of Nexus*

Quanergy argues that we erred by relying on “over 150 paragraphs from [Velodyne’s expert] declaration, which were improperly incorporated by reference into PO’s Response and cannot be used to support the presumption of nexus.” Reh’g Req. 3 (citing Reply 21). According to Quanergy, the entirety of Velodyne’s nexus argument is “a single sentence

in its Response” with “cites to over *sixty paragraphs (60) paragraphs*” of the expert’s declaration for one product and “cites to *ninety (90) paragraphs*” for three other products. *Id.* at 4–6 (citing PO Resp. 53–55).

We disagree. Between its Patent Owner Response and Sur-Reply, Velodyne presented extensive argument of a presumption of nexus (no less than seven pages), explaining how “Velodyne’s HDL-64E, HDL-32E, VLP-32, and VLP-16 sensors practice the challenged claims, and the claimed invention is not a subcomponent of the entire product.” *See* PO Resp. 53–57 (citing Ex. 2115 ¶¶ 218–372); *see also* PO Sur-Reply 25–27 (presenting additional argument on presumption of nexus). Velodyne bolstered its argument with expert testimony in which the expert undertakes a detailed comparison of how each of Velodyne’s four sensor-types embody each of the claim elements and is coextensive with them. *See* PO Resp. 53–56. For instance, as shown below, Velodyne associates a particular range of expert testimony with each claim element, including the claimed “lidar-based 3-D point cloud system” [i.e., preamble], “support structure,” “laser emitters,” “avalanche photodiode detectors” [i.e., APDs], and “rotary component”:

Eden Decl. ¶¶ 225–229 (preamble), ¶¶ 240–242 (annotating Exs. 2099 and 2100 to show support structure), ¶¶ 250–258 (laser emitters, citing, *e.g.*, Exs. 2099, 2100, and 2050 at 4–5), ¶¶ 273–278 (APDs, citing, *e.g.*, Ex. 2024, Ex. 2050 at 42), ¶¶ 288–297 (rotary component, citing, *e.g.*, Exs. 2026, 2027 and 2050 at 2).

*Id.* at 54; *see also* Ex. 2048, 1–2 (HDL-64E “Specifications”); Ex. 2059, 4–7 (“HDL-64E Product Description,” dated October 2007); Ex. 1090, 3, 6–15 (“HDL-64E User’s Manual”). Velodyne provided a similar comparison for



each of its other product models, namely, its HDL-32E, VLP-32, and VLP-16 sensors.<sup>1</sup> PO Resp. 54–56.

To the extent Quanergy asserts now that Velodyne was required to duplicate its expert’s analysis in the body of its Response, we reject any such notion. Our rules specify that “[a]rguments must not be incorporated by reference from one document into another document.” 37 C.F.R.

§ 42.6(a)(3). As shown above, Velodyne presented clear argument of a presumption of nexus, while also citing specific testimonial evidence in support of that argument. *See* PO Resp. 53–57. And, contrary to Quanergy’s assertion, Velodyne’s citations were confined to a limited range of testimony for each claim element and each product model. As for the volume of Velodyne’s citations, it arose not from an attempt to abuse our process, but from the necessity of its expert to conduct a proper and complete analysis of the evidence by reviewing the patent claims, studying Velodyne’s product literature, and comparing each of Velodyne’s products to the patent claims. By no means does Velodyne’s reliance on the careful and independent analysis of its expert run afoul of our rules regarding improper incorporation by reference. Thus, we reject Quanergy’s argument of a procedural infirmity with Velodyne’s presumption of nexus analysis.

Aside from arguing that procedural infirmity, Quanergy never disputed that Velodyne’s products include the claimed features. *See* Pet. Reply 20–22 (arguing only that Velodyne “fails to show its products practice

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<sup>1</sup> The Final Decision mistakenly omitted supporting citations for the VLP-32 and VLP-16 models. The correct citation, at the top of page 30 of the Final Decision, should read “Ex. 2115 ¶¶ 230–239, 243–248, 259–272, 279–287, 298–313 (citing Exs. 2023, 2032, 2034, 2042, 2044, 2058, 2060, 2062, 2093, 2101, 2102, 2104–2108, 2110, 2111).”

the claims, because it merely improperly incorporates by reference its arguments from other documents); Reh’g Req. 3–6 (same). As the Federal Circuit has routinely held, when a patent owner presents expert testimony showing its product is the invention disclosed in the challenged claims, and the patent challenger presents no evidence to the contrary, it is error for the Board to fail to credit that undisputed testimony in the first instance. *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072–73 (Fed. Cir. 2019) (“*Polaris*”). So, to avoid a presumption of nexus that finds support through expert testimony, a petitioner must at least point to some limitation it contends the expert got wrong. Here, Quanergy did no such thing. As noted in our Final Decision, “Quanergy never disputes the testimony of Velodyne’s expert showing that the HDL-64E, HDL-32E, VLP-32, and VLP-16 products embody the claimed invention, let alone point to any missing limitations.” Final Dec. 29–30 (citing Pet. Reply 20–23; Pet. Sur-SurReply 1–5). Thus, under *Polaris* and its progeny, we did not err in giving considerable weight to the testimony of Velodyne’s expert in finding a presumption of nexus.<sup>2</sup>

## 2. *Commercial Success*

Quanergy argues that we erred in finding that Velodyne’s products achieved a high-degree of commercial success. Reh’g Req. 7–8 (citing Final Dec. 36–37). According to Quanergy, we overlooked its argument that Velodyne “improperly inflated” its market share by failing to compare it

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<sup>2</sup> The Board decisions cited by Quanergy to show improper incorporation by reference do not persuade us otherwise. See Reh’g Req. 3–6. Those decision were decided before *Polaris*, and, thus, are inapposite here.

against “the *general* ‘mechanical 3-D lidar sensor’ industry.” *Id.* at 7 (citing Pet. Reply 25) (emphasis added).

We could not have overlooked an argument that was never made. During trial, Quanergy never argued that the relevant market is 3-D lidar sensors in “general.” *See* Pet. Reply 24–25. Instead, in reply to Velodyne’s definition of the relevant market as “3-D LiDAR sensors for *autonomous vehicles*,” Quanergy simply stated “[t]his is not the relevant market” and “[t]here is no comparison of [Velodyne’s] market share with respect to a properly defined market.” *Id.* (emphasis added). But nowhere did Quanergy define what it thought the relevant market should be, nor did it proffer any evidence in rebuttal of Velodyne’s definition of the relevant market. Indeed, a comparison of Quanergy’s argument on rehearing with its argument at trial bears out this failure. *Compare* Reh’g Req. 7 (citing Exs. 1003, 2113), *with* Pet. Reply 24–25 (omitting citation to those exhibits). As such, we discounted Quanergy’s assertion as nothing more than conclusory attorney argument, particularly given the myriad evidence from Velodyne showing that the relevant market is “3-D LiDAR sensors for autonomous vehicles” and that its sales represented a commanding share of that market. PO Resp. 69–70 (citing Exs. 2064, 2074, 2087, 2095, 2098, 2113); *see also* Final Dec. 37 (citing same exhibits in finding “Velodyne created a new market in autonomous navigation”).

In sum, Quanergy cannot belatedly introduce exhibits previously omitted from its Reply, namely, exhibits 1003 and 2113, to argue anew that Velodyne “has not shown a breakdown of AV [autonomous vehicle] vs. non-AV sales.” Reh’g Req. 7–8. The time to do so was during trial, either through its Reply or Sur-SurReply. But, rather than follow through with its

burden to submit actual evidence to rebut Velodyne’s myriad evidence as the relevant market and its share of that market, Quanergy chose instead to rely on conclusory attorney argument. *See* Pet. Reply 25. Having done so, Quanergy cannot now attempt to resurrect its conclusory attorney argument with previously uncited evidence. Thus, we reject the notion that we somehow overlooked evidence that was never properly presented to us in the first instance.<sup>3</sup>

*C. Whether We Erred in Our Construction of “lidar”*

According to Quanergy, we erred in construing the claim term “lidar,” as recited in the preamble of claim 1, to mean “pulsed time-of-flight (TOF) lidar.” Reh’g Req. 8–12 (citing Final Dec. 12). At the outset, we note that our Final Decision construed the term “lidar” in the context of the preamble’s recitation of a “lidar-based 3-D point cloud system.” Final Dec. 9–12. In doing so, we looked to the specification of the ’558 patent and found that it supports a construction that limits the claimed “lidar-based” system to a pulsed time-of-flight lidar system. *Id.* at 10–12. Our reasoning was simple—“the specification starts with the basic premise of utilizing the

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<sup>3</sup> Even were we to consider Quanergy’s argument, our finding of commercial success would stand because Quanergy’s own evidence informs us that the vast majority of Velodyne’s sales of 3-D LiDAR are in the market of autonomous vehicle navigation with only “moderate” sales for other applications. *See* Ex. 1130, 27 (“Velodyne LiDAR is currently used by most autonomous car research teams which the company manufactures in Morgan Hill, California . . . Here they have been engineered, tested, and [sold] for five years and also sold in moderate industrial quantities.”); *see also* Ex. 2113, 4, 81 (reporting on “The Automotive LIDAR Market” and noting that Velodyne’s “Investors” include “Baidu” and “Ford,” two manufacturers of robotic cars, and Velodyne’s “Main partners” include “Almost all robotic car manufacturers.”).

timing of laser pulses to derive distance measurements and then builds upon that premise by focusing on how to improve the pulses per second of existing pulsed lidar systems so as to generate a high-density point cloud.” *Id.* at 12.

*1. Whether We Improperly Read Features of the Preferred Embodiment Into the Claims*

In requesting rehearing, Quanergy argues that we “overlooked” the ’558 patent’s “*express definition* of ‘lidar’ as a ‘laser imaging detection and ranging’ system, which is broader than the Board’s construction.” Reh’g Req. 9 (citing Ex. 1001, 3:65–67). It is undisputed that “lidar” is short-hand for “laser imaging detection and ranging.” *See* Ex. 1002 (Quanergy’s expert) ¶¶ 34, 100. But merely re-stating what the “lidar” acronym stands for does little to define the “lidar” term in the context of the “3-D point cloud system” language of the preamble.<sup>4</sup> For that, the claim language must be read in light of the *entire* specification. Indeed, it is axiomatic that the specification is “the single best guide to the meaning of a disputed term.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (en banc)

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<sup>4</sup> As noted in our Final Decision, we agree with the District Court in the related litigation that the preamble of claim 1 “is limiting because it underscores the very essence of the invention . . . and is essential to understanding how the recited components of claim 1 work together.” Final Dec. 8 (citing Ex. 1027, 7–11, 32). According to the District Court, “[r]eading claims 1 and 19 in the context of the entire ’558 patent, it is clear that the inventor[] intended the claims to be limited to ‘LiDAR’ and ‘3-D point cloud’ generation systems” given that the specification “summarizes the advantages of the invention in ways which focus on LiDAR-based 3-D point cloud generation. Ex. 1027 at 9 (citing Ex. 1001, 4:11–13, 6:37–41). Quanergy does not dispute that the preamble is limiting. Pet. 8, 11.

(quoting *Vitronics Corp. v. Conception, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)).

Here, as explained in our Final Decision, the specification of the '558 patent focuses exclusively on a pulsed ToF lidar system. Final Dec. 10–12. More specifically, the specification begins by noting that prior art lidar systems utilize “the basic concept . . . of *pulsing* a laser emitter” to generate “a collection of pixels emitted and captured in rapid succession (called a ‘point cloud’),” but are “inherently limited to the number of pixels [they] can generate due to the limitation of *how many pulses per second* are possible from a single laser.” Ex. 1001, 1:10–31, 1:65–2:3 (emphases added). With that in mind, the specification underscores the need “to maximize the number of pixels to provide a point cloud that covers a broad field of view yet is as dense as possible.” *Id.* at 2:6–9; *see also id.* at 2:31 (“It is always desirable to collect more points faster.”).

Following on the theme of generating a 3-D point cloud from the emission and detection of laser pulses, the specification highlights the inventiveness of applying a “rotary component” to existing pulsed lidar systems in order to “collect approximately *1 million time of flight (TOF) distance points per second*,” that rate “being necessary for autonomous navigation.” *Id.* at 3:1–14, 3:65–4:14 (emphasis added). The collection of ToF distance points corresponds to the number of pulses emitted and reflected back from the laser. *See id.* at 8:52–54 (“the plurality of laser emitters is configured to pulse at a rate of more than *1 million pulses per second*”); *see also* Ex. 1002 ¶ 39 (Quanergy’s expert pointing to the '558 patent as an example of a LiDAR system that “can then convert the ‘time of flight’ to a distance measurement.”).

Elsewhere, the specification stresses the importance of controlling the timing of pulses emitted and detected by the spinning lidar system. *See, e.g.*, Ex. 1001, 5:11–15 (“Each of the emitter/detector pairs are controlled by one or more DSPs, which determines *when they will fire*, determines the intensity of the firing based on the previous return, *records the time-of-flight*, calculates height data based [on] time-of-flight and angular alignment of each pair.” (emphases added)); *id.* at 7:18–26 (“FIGS. 23A and B illustrate circuits used for controlling the firing of a laser diode. . . . [T]he DSP sends a charge/on signal to a FET 200, . . . , which in turn causes a laser 210 to fire. The DSP turns off the FET 200 after a predetermined period of time as previously determined by return intensity measurements from the last pulse. *The charging pulse is on for ~5 microseconds and the firing pulse is on for ~20 nanoseconds.*” (emphasis added)).

In other words, the theme underlying the *entire* specification of the ’558 patent is the emission and collection of enough pulses of laser light to generate sufficient 3-D point cloud data required for autonomous vehicle navigation. As noted above and in our Final Decision, nowhere does the specification describe or suggest anything but the use of pulsed ToF lidar to derive the distance measurements necessary to generate the 3-D point cloud. With such a consistent and exclusive focus on pulsed ToF lidar, the specification makes clear that the inventor intended to limit the scope of the claims to a pulsed ToF lidar system. *See GPNE Corp. v. Apple Inc.*, 830 F.3d 1365, 1370 (Fed. Cir. 2016) (“[W]hen a patent ‘repeatedly and consistently’ characterizes a claim term in a particular way, it is proper to construe the claim term in accordance with that characterization.”). Thus, given that clear indication in the intrinsic record of the inventor’s intent, we

reject Quanergy’s argument that we improperly read limitations from a preferred embodiment into the claims. *See* Reh’g Req. 9.

2. *Whether Quanergy Had Notice and Opportunity to be Heard on Our Final Adopted Construction*

Also, contrary to Quanergy’s argument, we did not arrive at a construction of “lidar” that was “inconsistent with the constructions proposed and briefed by the parties.” Req. Reh’g 10. As discussed above, we construed “lidar” as “pulsed time-of-flight (ToF) lidar.” Final Dec. 12. That construction coincides identically with the one proposed by Velodyne in its post-institution response. *See, e.g.*, PO Resp. 2 (“the claims require pulsed ToF lidar, which typically measured distances of tens or hundreds of meters”); *id.* at 12 (“Thus, ‘3-D point cloud’ works with ‘lidar-based’ to provide additional structural detail to the claims, requiring *pulsed ToF lidar* along sequential directions in rapid succession—exactly what the ’558 patent describes.”); *id.* at 6 (“The ’558 Patent’s Improved ToF Pulsed Lidar . . . System”). Likewise, in direct response to Quanergy’s reliance on the “lidar” acronym in the specification, Velodyne again made clear that “the cited passage and the rest of the patent discuss *only pulsed ToF lidar*, consistent with lidar’s plain meaning.” PO Sur-Reply 4 (emphasis added).

Velodyne’s post-institution responses provided Quanergy with full notice of the contested construction of “lidar.” Moreover, Quanergy had opportunity to be heard on that construction. For instance, in its reply brief, Quanergy took issue with Velodyne’s “attempts to limit ‘lidar’ to ToF,” arguing that “[a]lthough ToF is used in embodiments, the claims are not necessarily directed to that form of pulsed lidar, especially since the claims are drafted so broadly.” Pet. Reply 5–6. And, during the oral hearing, Quanergy’s counsel acknowledged that “it likely is necessary to address” the



parties' disputed construction of "lidar" in our final decision. Hr'g Tr. 15:9–24. Quanergy's counsel then framed the issue as follows:

We think that even under [patent owner's] construction, petitioner has shown that the claims are obvious based on – even *if somehow the claims are limited to what patent owner would like to believe, which is that it's a time-of-flight pulsed system . . .* [s]o even if it were limited to a pulsed time-of-flight system and APDs, petitioner has shown why it would have been obvious to use both of those.

*Id.* at 16:1–7 (emphasis added).

Our final adopted construction of "lidar" as "pulsed time-of-flight (ToF) lidar" is no different than the construction proposed by Velodyne and acknowledged by Quanergy in the course of this proceeding, as discussed above. Thus, because Quanergy had notice of Velodyne's proposed construction and an opportunity to be heard, we reject the notion that our adoption of Velodyne's construction somehow constitutes a new theory in violation of the Administrative Procedure Act. *See Hamilton Beach Brands, Inc. v. f'real Foods, LLC*, 908 F.3d 1328, 1338–39 (Fed. Cir. 2018).

*3. Whether We Overlooked an Express Disclaimer in the Specification in Construing the Claims*

Finally, Quanergy argues that, in construing the term "lidar," we "overlooked an express disclaimer in the '558 patent." Reh'g Req. 10 (citing Ex. 1001, 7:50–56). That supposed disclaimer states:

many changes can be made without departing from the spirit and scope of the invention. Accordingly, the scope of the invention is not limited by the disclosure of the preferred embodiment. Instead, the invention should be determined entirely by reference to the claims.

Ex. 1001, 7:50–56. The '558 patent's recitation of boilerplate language, such as found here, neither controls nor alters our construction. Claims must

always be read in light of the inventor’s *entire* disclosure, not simply a paragraph alluding to undisclosed changes that the inventor might have envisioned. *See D Three Enterprises v. Sunmodo Corp.*, 890 F.3d 1042, 1051 (Fed. Cir. 2018) (“This boilerplate language at the end of the [ ] Application’s specification is not sufficient to show adequate disclosure of the actual combination and attachments used in the [ ] Claims.”). That bedrock principle—giving claims their broadest reasonable construction in light of the entire specification in which they appear—clearly undercuts Quanergy’s counter-intuitive argument of giving overriding weight to a single boilerplate paragraph at the end of the specification. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc); *see also United States v. Adams*, 383 U.S. 39, 48–49 (1966) (“While the claims of a patent limit the invention, and specifications cannot be utilized to expand the patent monopoly, it is fundamental that claims are to be construed in the light of the specifications and both are to be read with a view to ascertaining the invention”) (citations omitted)). Thus, we could not have erred in disregarding an argument that finds no support in the law.

*D. Whether We Misapprehended or Overlooked Quanergy’s Expert Testimony Concerning Mizuno’s System*

Quanergy argues that we erred by misapprehending or overlooking certain testimony of its expert when we found that Mizuno (Ex. 1058)<sup>5</sup> neither discloses nor suggests the claimed “lidar” system. Reh’g Req. 12–13 (citing Final Dec. 17). According to Quanergy, we “mistakenly relied on testimony from [its] expert that was *specifically directed to Figure 5* of

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<sup>5</sup> At one point, our Final Decision mistakenly cites Mizuno as Exhibit 1004. *See* Final Dec. 5 n.2. The correct cite for Mizuno is Exhibit 1058, as indicated elsewhere in our Final Decision. *See, e.g., id.* at 14–15, 20, 23.

Mizuno, which is *one embodiment* of Mizuno's invention and is not representative of Mizuno's disclosure *as a whole*." *Id.* (citing Ex. 2156, 167:23–168:1, 170:21–171:4, 200:2–203:12). We disagree.

At the outset, nowhere does Quanergy's expert treat Mizuno's Figure 5 as being any different from Mizuno's other figures, i.e., Figures 1–4. *See* Ex. 1002 ¶¶ 83–88. Nor could he, for Mizuno states expressly that "Fig. 5 is a diagram for explaining the measurement principle when measuring the outer peripheral shape through the device in Fig. 1." Ex. 1058, 5 ("Brief Description of the Drawings"). Indeed, Mizuno's figures are all directed to the same embodiment, depicting a "view" or "diagram" of the device shown in Figure 1. *Id.* Knowing this, Quanergy's expert likewise speaks of Mizuno's Figures 1–5 as showing the same "peripheral shape measurement device" in which "laser measurement devices 40 use a light-reflection-based measurement technique." Ex. 1002 ¶¶ 84–88. Thus, we are not persuaded by Quanergy's belated attempt to draw an arbitrary distinction in the testimony of its expert when it comes to Mizuno's Figure 5 vis-a-vis Mizuno's disclosure as a whole.

In our Final Decision, we found that Quanergy's own expert provided clear and unequivocal evidence of Mizuno's failure to disclose the use of pulsed ToF lidar system as required by claim 1. Final Dec. 16–17 (citing Ex. 2156, 166:14–167:4, 168:11–169:1, 178:4–9). For instance, under cross-examination, Quanergy's expert conceded that Mizuno is directed to "a specular reflection system *as opposed to . . . a time-of-flight LiDAR system*. This is a system whereby you're simply looking at the specular reflected light off of an object and you are looking at where it hits." Ex. 2156, 166:14–167:4 (emphasis added). Similarly, Quanergy's expert

repeated that Mizuno “is a very simplistic system here, whereby the light reflects specular, . . . if you shine a light in to a shiny object or a mirror, it will reflect off of it and hit another location. And so you can track that, where it actually hits. *And so this is opposed to what one would call perhaps a time-of-flight system.*” *Id.* at 168:11–169:1 (emphasis added). In our view, that testimony by Quanergy’s expert clearly supported our finding that Mizuno’s specular-reflection system is different from a pulsed ToF system and consequently fails to meet the claimed “lidar” limitation. Final Dec. 17.

In an effort to minimize the damaging impact of that cross-examination testimony from its expert, Quanergy now points to testimony on re-direct in which its expert testified as to methods “Mizuno could use” for measuring distance. Reh’g Req. 13 (citing Ex. 2156, 200:2–203:12). However, the full line of Quanergy’s questioning on re-direct exposes the weakness of Quanergy’s argument:

Q. [by Quanergy’s counsel] Counsel for [Velodyne] had asked you to identify categories of LiDAR systems. Do you recall that?

A. [by Quanergy’s expert] Yes, I believe so. . . .

Q. And could Mizuno’s system . . . could Mizuno’s system use any of those categories of LiDAR systems?

[Objection from Velodyne’s counsel]

THE WITNESS: Mizuno – let me go through each one. Mizuno *could use* AM radar. Mizuno *could use* FM – LiDAR, I should say light radar. Mizuno *could use* a time-of-flight pulsed LiDAR system. Mizuno *could use* a triangulation system. Mizuno *could use* an interferometric system.

Ex. 2156, 199:18–200:14 (emphases added). Under further questioning, Quanergy’s expert testified that Mizuno could use other methods as well:

Q. And did counsel for Velodyne ask you what you relied on in your opinion during direct that Mizuno could use any of those five categories of LiDAR systems?

A. He may have. This -- what is described here in [Mizuno] is a LiDAR system in my opinion, a light radar system which *could be any of the methods that I mentioned, as well as perhaps others as well.*

*Id.* at 201:22–203:12 (emphasis added).

That re-direct testimony by Quanergy’s expert does not amount to persuasive evidence of what a skilled artisan would have understood from Mizuno’s disclosure. In an obviousness inquiry, “[t]he mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.” *In re Oelrich*, 666 F.2d 578, 581 (CCPA 1981) (citations omitted). More aptly, rather than focus on whether a skilled artisan *could modify* the relevant art, the obviousness inquiry focuses on whether the skilled artisan *would have been led to modify* the relevant art. *See Personal Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993–94 (Fed. Cir. 2017); *see also Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (“[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.”); *InTouch Technologies, Inc. v. VGO Commc’ns, Inc.*, 751 F.3d 1327, 1352 (Fed. Cir. 2014) (finding that accused infringer’s expert “succumbed to hindsight bias in her obviousness analysis” where the expert’s “testimony primarily consisted of conclusory references to her belief that one of ordinary skill in the art *could* combine these references, not that they *would* have been motivated to do so”).

Like those cases, the testimony of Quanergy’s expert is wanting and lacking basis in the law. The mere belief of Quanergy’s expert that a skilled

artisan *could use* pulsed ToF lidar with Mizuno’s system is not enough by itself to justify a finding that a skilled artisan *would have done so* with a reasonable expectation of success. In the end, the testimony of Quanergy’s expert on re-direct was incomplete, unspecific, and ultimately conclusory. Such testimony does not qualify as persuasive evidence of obviousness. As such, we accorded it little weight. Indeed, “crediting such testimony risks allowing the challenger to use the challenged patent as a roadmap to reconstruct the claimed invention using disparate elements from the prior art—i.e., the impermissible *ex post* reasoning and hindsight bias that *KSR* warned against.” *TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1361 (Fed. Cir. 2019). For these reasons, Quanergy does not persuade us that we misapprehended or overlooked any aspect of its expert’s testimony when we found that Mizuno lacks disclosure or suggestion of a pulsed ToF lidar system.

*E. Whether We Erred in Finding Quanergy Failed to Show a Reasonable Expectation of Success of Using Pulsed ToF Lidar in Mizuno’s System*

Similarly, Quanergy argues that we erred in finding that a skilled artisan would not have had a reasonable expectation of success in using a pulsed ToF lidar in Mizuno’s system. Reh’g Req. 13–15. According to Quanergy, our finding “was based entirely on the Berkovic reference” to the exclusion of supposedly “more compelling evidence . . . that there were *actual commercial products available on the market* by 2006 that used pulsed TOF to measure distances as close as three (3) inches.” *Id.* at 13 (citing Pet. Reply 11–12; Exs. 1073, 1082, 2050). Had we reviewed that evidence, Quanergy asserts, we would have found “a *reasonable expectation of success* in using a pulsed ToF system in Mizuno because these products actually achieved close range measurements.” *Id.* at 13–14. We disagree.

At the outset, we note that Quanergy’s primary evidence for showing “it was well known” to use pulsed ToF lidar for measuring short-range distances centered on the prior art references of Kilpela (Ex. 1005) and Berkovic (Ex. 2007). *See* Pet. 17, 22, 32 (citing Ex. 1005); Pet. Reply 11–18 (citing Exs. 1005, 2007). We discussed both of those references at length in our Final Decision. *See* Final Dec. 17–28. As for Quanergy’s supposedly more compelling evidence in Exhibits 1073, 1082, and 2050, we did not overlook it, but rather gave it little weight for reasons that Quanergy clearly should have comprehended. For instance, rather than showing “*actual commercial products available on the market by 2006*,” as Quanergy suggests (Reh’g Req. 13), Exhibit 2050 is a User’s Manual depicting an embodiment of *the claimed invention after 2006*. *See* Ex. 2050, 1, 4, 5. Because Exhibit 2050 is not indicative of the state-of-the art “by 2006,” we gave it no weight.

Quanergy’s reliance on Exhibits 1073 and 1082 as evidence of “*products . . . on the market by 2006 that used pulsed ToF to measure distances*” is equally unavailing. Reh’g Req. 13; *see also* Pet. Reply 12 (“sensors from 2004 using pulsed ToF techniques”). Exhibit 1073 is a catalogue depicting “DME 2000/DME 3000” scanning sensors from the 2004 time frame. Exhibit 1082 depicts the same, i.e., a “DME 2000” sensor. But neither of these exhibits supports Quanergy’s assertion of showing products “that used *pulsed TOF* to measure distances.” Reh’g Req. 13 (emphasis added). Importantly, upon being asked “[d]o you know if it’s pulsed time-of-flight” being used by the DME 2000/3000 sensors of Exhibit 1073, Quanergy’s own expert conceded, “[w]ell, with just this information, I’m not sure.” Ex. 2194, 187:15–188:14. That testimony left

us with little regard for Quanergy’s attempt to show the relevant art through Exhibits 1073 and 1082.

*F. Whether We Overlooked Quanergy’s Expert Testimony Regarding Modification of Mizuno’s System as Taught by Kilpela*

Quanergy argues we overlooked its expert’s testimony of “*how* a [skilled artisan] would modify Mizuno’s system to achieve close range measurements” and “*why* Mizuno’s system would not suffer from the shortcomings identified in Kilpela.” Reh’g Req. 14 (citing Ex. 1063 ¶¶ 56–59; Final Dec. 22). In our Final Decision, we noted how Berkovic (a reference offered by Quanergy to show the state-of-the-art) explains that a pulsed ToF sensor would encounter degradation problems when operating “[a]t distances shorter than tens of meters,” such as Mizuno’s device. Final Dec. 18, 22, 27 (citing Ex. 2007, 10; Ex. 2115 ¶ 37). Significantly, we highlighted that “[n]owhere does Quanergy’s expert account for those problems, despite Quanergy’s reliance on Berkovic as state-of-the-art.” *Id.* at 22 (citing Ex. 1063 ¶¶ 28–34, 55–59).

Moreover, in opining that a skilled artisan would understand that the Mizuno system “could be modified,” or “could be designed,” or “could be calibrated” to account for these known problems in implementing Kilpela’s teachings, Quanergy’s expert fails to address how a skilled artisan *would* have done so with a reasonable expectation of success. *See* Ex. 1002 ¶¶ 57–58. As discussed above, the relevant inquiry is not whether a skilled artisan *could* modify the prior art, but whether the skilled artisan *would* have been motivated to do so. *See Personal Web Techs.*, 848 F.3d at 993–94; *Belden*, 805 F.3d at 1073; *InTouch Techs.*, 751 F.3d at 1352. Thus, we gave little weight to the testimony of Quanergy’s expert, especially in the face of the more persuasive testimony of Velodyne’s expert that, like Berkovic,



Kilpela's pulsed ToF lidar exhibits inaccuracy and imprecision at close-range distances. *See* Final Dec. 24–27 (citing Ex. 2115 ¶¶ 119, 143, 151, 152).

Lastly, Quanergy summarily lists four arguments from its Reply that we purportedly overlooked in finding that Quanergy failed to show a skilled artisan would have had a reasonable expectation of success in modifying Mizuno's device in accordance with Kilpela's teachings. Reh'g Req. 14–15 (citing Reply 9–11, 12–14). In our Final Decision, we explained in great detail why Quanergy had not carried its burden of showing a reasonable expectation of success with respect to the asserted modification. *See* Final Dec. 17, 23–28. We neither overlooked nor misapprehended any of Quanergy's arguments in this regard, which are merely repeated in its rehearing request without further explanation. *See* Reh'g Req. 14–15. Nor do we find those arguments any more persuasive now than we did then. In the end, we are unpersuaded of any error in our ultimate determination that Quanergy failed to carry its burden of showing that a skilled artisan would have had a reasonable expectation of success of using a pulsed ToF lidar technique in Mizuno's device.

#### IV. CONCLUSION

For the foregoing reasons, Quanergy's Request for Rehearing is *denied*.

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Patent 7,969,558 B2

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