

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ZEBRA TECHNOLOGIES CORPORATION,
Petitioner,

v.

LONE STAR SCM SYSTEMS, LTD.,
Patent Owner.

IPR2022-01376
Patent 9,996,717 B2

Before KEN B. BARRETT, AARON W. MOORE, and
RUSSELL E. CASS, *Administrative Patent Judges*.

BARRETT, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

Zebra Technologies Corporation (“Petitioner”)¹ filed a Corrected Petition requesting *inter partes* review of U.S. Patent No. 9,996,717 B2 (“the ’717 patent,” Ex. 1001). Paper 3 (“Pet.”). The Petition challenges the patentability of claims 1–4 and 6–20 of the ’717 patent. Lone Star SCM Systems, Ltd. (“Patent Owner”)² filed a Response to the Petition. Paper 19 (“PO Resp.”). Petitioner filed a Reply (Paper 23, “Pet. Reply”) and Patent Owner filed a Sur-reply (Paper 25, “PO Sur-reply”).

Each party also filed objections to the opposing party’s demonstrative exhibits for use at the oral argument. Papers 31, 33.

An oral hearing was held on November 29, 2023, and a transcript of the hearing is included in the record. Paper 36 (“Tr.”).

This Final Written Decision is entered pursuant to 35 U.S.C. § 318(a). For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 1–4 and 6–20 of the ’717 patent are unpatentable. We also do not sustain the parties’ objections to demonstrative exhibits.

B. *Related Proceedings*

Both parties identify, as matters involving or related to the ’717 patent, *Lone Star SCM Systems, Ltd. v. Zebra Technologies Corporation*, No. 6:21-cv-00842 (W.D. Tex.); *Lone Star SCM Systems, Ltd. v. Honeywell*

¹ Petitioner identifies Zebra Technologies Corporation as the real party-in-interest. Pet. 1.

² Patent Owner identifies Lone Star SCM Systems, Ltd. as the real party-in-interest. Paper 6.

International Inc., No. 6:21-cv-00843 (W.D. Tex.); and *Lone Star SCM Systems, Ltd. v. Bluebird Inc.*, No. 6:21-cv-00844 (W.D. Tex.). Pet. 1; Paper 6. Additionally, the parties identify the following Patent Trial and Appeal Board cases as involving patents related to the '717 patent: IPR2022-01374 (U.S. Patent No. 7,557,711); IPR2022-01375 (U.S. Patent No. 9,646,182); and IPR2022-01377 (U.S. Patent No. 10,482,293). Pet. 1–2; Paper 6.

C. The '717 Patent

The '717 patent “is directed, in general, to communication systems and, more specifically, to an interrogator, method of discerning metal and radio frequency identification (RFID) objects, and an interrogation system employing the same.” Ex. 1001, 1:23–27. Although the Specification primarily focuses on the interrogation system’s use in a medical environment, the Specification indicates that the system is not limited to use in that environment. *See id.* at 1:42 (“Of particular note is a surgical environment . . .”), 13:27–30 (“[S]uch an interrogation system may be applied to a wide range of applications and environments such as supply chain management systems in retail facilities or security systems in airports, to name a few.”).

According to the Specification,

[S]urgical items must be counted and accounted for before, during and following the conclusion of a surgical procedure. The presently available systems to track the surgical items are laboriously time consuming, costly and in many cases

antiquated. Thus, a medical facility can benefit from systems that more efficiently track surgical items.

Id. at 14:33–39. “[T]he problem associated with the loss of surgical items, especially surgical items retained within patients, is a serious one.” *Id.* at 2:35–37.

An embodiment of an interrogation system is depicted in Figure 4 of the ’717 patent, reproduced below.

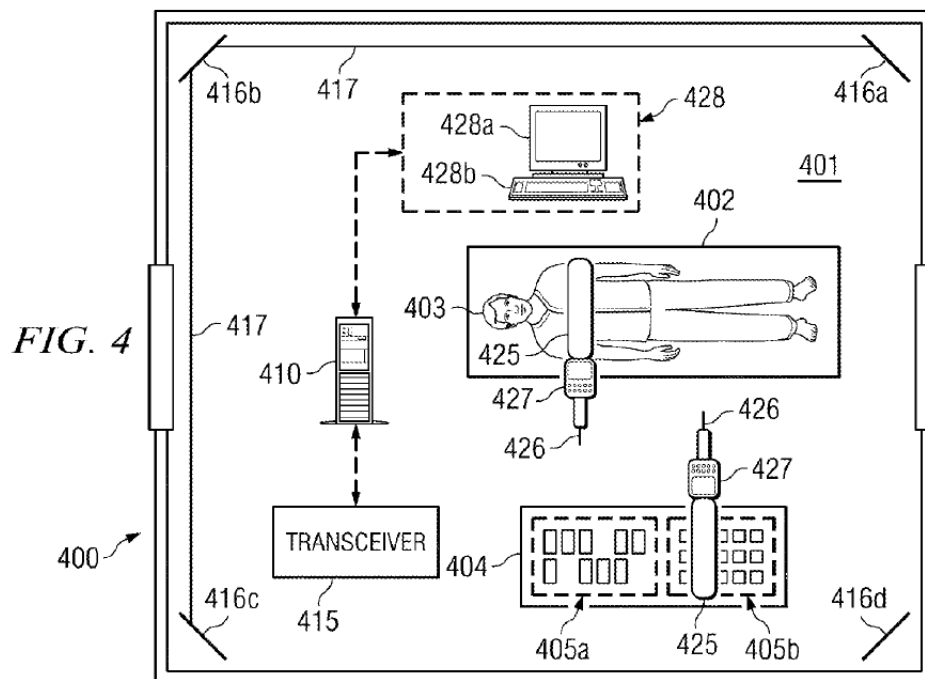


Figure 4 is “a pictorial diagram of an embodiment of an interrogation system, generally designated 400, employable within an operating room of a medical facility and constructed in accordance with the principles of the present invention.” *Id.* at 14:49–53. Shown in the Figure is “an operating table 402 with a patient 403 thereon and a back table 404 that accommodates a plurality of surgical instruments 405a and disposable items 405b (such as sponges).” *Id.* at 14:53–58. Metal objects in an operating room include surgical instruments, surgically implanted metal structures, and disposable sponges having a metal wire that allows for detection by a metal sensing

subsystem. *Id.* at 16:55–61. RFID tags may be applied to surgical metal instruments and disposable items, such as sponges. *Id.* at 17:4–21.

Also depicted in Figure 4 is portable interrogator 425 having internal user interface 427. *Id.* at 14:65–66 (“an interrogator (e.g., a portable interrogator) 425”); *id.* at 15:9 (“the portable interrogator 425”); *id.* at 17:22, Fig. 4. “[T]he interrogator may be affixed to a table (e.g., the back table 404), stand, wall or ceiling within a facility.” *Id.* at 14:66–15:1.

The portable interrogator 425 includes a metal sensing subsystem that provides a first signal having a metal signature representing a presence of a metal object and a radio frequency identification (RFID) sensing subsystem that provides a second signal having a RFID signature representing a presence of a RFID object.

Id. at 15:28–33. Portable interrogator 425 also includes a control and processing subsystem that discerns a presence of objects from signals. *Id.* at 15:46–49. “The portable interrogator 425 still further includes a position sensor that allows a position of the portable interrogator 425 to be determined.” *Id.* at 15:62–65.

The ’717 patent describes an integrated mode of operation that employs a plurality of inputs, including “metal sensing 552, RFID sensing 554, interrogator location observables 556, RFID position markers 558, RFID/metal calibration markers 560, a patient demographics/history database 562, anatomical databases 564, evidence-based medicine databases 566 and RFID and metal object signature databases 568.” *Id.* at 18:27–36 (referring to Figures 5A and 5B). “An adaptive integrating filter 570 processes these inputs to provide a resulting interrogator detected object and location 575.” *Id.* at 18:37–39.

The integrated mode of operation may employ multiscan, coherent signal processing of diverse multiple inputs to achieve

significantly higher detection sensitivities thereby allowing more precise object location and identification. The adaptive integrating filter 570 may be a single adaptive filter, such as a Kalman filter, or it may be more complex to meet a specific patient situation.

Id. at 18:51–58. “A more precise location of the interrogator may be afforded by integrating an instantaneous output of an internal inertial position sensor with RFID position markers 558 placed at predetermined anatomical locations on the patient.” *Id.* at 18:59–62.

D. Illustrative Claim

Of the challenged claims of the ’717 patent, claims 1 and 15 are independent claims. Claim 1, reproduced below, is illustrative.

1. An interrogation system, comprising:
an antenna configured to receive a first signal and a second signal from a first object and a second object, respectively, in close unobstructed proximity; and
a control and processing subsystem configured to discern a presence of said first object and said second object from said first signal and said second signal, respectively, as said first object and said second object moves with respect to said antenna.

Ex. 1001, 29:52–60. Independent claim 15 recites a method of operating an interrogation system that is similar to that of independent claim 1. *Id.* at 30:52–61.

E. Evidence

Petitioner relies on the following references:

Name	Reference	Exhibit No.
Garber	US 6,232,870 B1, issued May 15, 2001	1005
Werb	WO 01/06401 A1, published Jan. 25, 2001	1006
Andersen	US 7,151,979 B2, issued Dec. 19, 2006	1007
Martinez	US 7,039,359 B2, issued May 2, 2006	1008

Name	Reference	Exhibit No.
Arndt	US 6,559,645 B2, issued May 6, 2003	1009

Petitioner also relies on the declarations of Dr. Jacob Sharony (Exs. 1002, 1016) in support of its arguments, and Patent Owner relies on, *inter alia*, the declarations of Patrick Kinney (Ex. 2013), Dr. Omid Kia (Ex. 2018), and John Volpi (Ex. 2020)³ in support of its arguments. The parties also rely on other exhibits as discussed below.

F. Asserted Grounds of Unpatentability

Petitioner asserts that the challenged claims are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. § ⁴	Reference(s)/Basis
1, 3, 4, 8–16, 19, 20	102(b)/103(a)	Garber
2	103(a)	Garber, Werb
6, 7, 17, 18	103(a)	Garber, Andersen
1, 3, 4, 8–16, 19, 20	103(a)	Garber, Martinez, Arndt
2	103(a)	Garber, Werb, Martinez, Arndt
6, 7, 17, 18	103(a)	Garber, Andersen, Martinez, Arndt

³ We list here declarations filed by Patent Owner after institution of the present *inter partes* review. Patent Owner also filed other declarations prior to institution. *Cf.* Paper 12, 9 (“Patent Owner is cautioned that any arguments not raised in the response may be deemed waived.”).

⁴ For purposes of this Decision, we assume the challenged claims have an effective filing date prior to March 16, 2013, the effective date of the Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), and we apply the pre-AIA versions of 35 U.S.C. §§ 102 and 103. *See* Pet. 3 (stating that the “earliest possible priority date is March 3, 2003,” and “[t]he application was examined as pre-AIA”); Paper 10 (Patent Owner’s Preliminary Response; “Prelim. Resp.”), 41 n.2 (“the Patents claim a priority date that falls before the passage of the AIA”).

II. ANALYSIS

A. Principles of Law

Petitioner bears the burden of persuasion to prove unpatentability of the claims challenged in the Petition, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail, Petitioner must establish by a preponderance of the evidence that the challenged claims are unpatentable. 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d).

“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987); *see also Finisar Corp. v. DirecTV Group, Inc.*, 523 F.3d 1323, 1334 (Fed. Cir. 2008) (to anticipate a patent claim under 35 U.S.C. § 102, “a single prior art reference must expressly or inherently disclose each claim limitation”). Moreover, “[b]ecause the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements ‘arranged as in the claim.’” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)). Whether a reference anticipates is assessed from the perspective of one of ordinary skill in the art. *See Dayco Prods., Inc. v. Total Containment, Inc.*, 329 F.3d 1358, 1368–69 (Fed. Cir. 2003) (“‘[T]he dispositive question regarding anticipation [i]s whether *one skilled in the art* would reasonably understand or infer from the [prior art reference’s] teaching’ that every claim element was disclosed in

that single reference.” (second and third alterations in original) (quoting *In re Baxter Travenol Labs.*, 952 F.2d 388, 390 (Fed. Cir. 1991))).

Additionally, under the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates. *MEHL/Biophile Int’l Corp. v. Milgraum*, 192 F.3d 1362, 1365 (Fed. Cir. 1999); *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349–50 (Fed. Cir. 2002).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) any objective evidence of obviousness or non-obviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. The Level of Ordinary Skill in the Art

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (internal quotation marks and citation omitted).

Petitioner, relying on the testimony of Dr. Sharony, contends that:

A person having ordinary skill in the art (“POSITA”) at the time of the alleged invention would have had at least a

bachelor's degree in electrical engineering, computer science, or a related field and significant experience with detection devices, like RFID and metal detectors.

Pet. 5 (citing Ex. 1002 ¶ 22).

Patent Owner does not explicitly address Petitioner's proposal or propose a different definition of the person of ordinary skill in the art. We acknowledge that Patent Owner's witness, Mr. Kinney, opines about the level of ordinary skill in the art. Ex. 2013 ¶ 9. However, Patent Owner does not advocate for that definition. Mr. Kinney's proposed definition contains a degree field (electrical or computer engineering or similar) like that of Petitioner's proposal, but Mr. Kinney's definition refers only to industry experience in RFID systems. *Id.* The challenged independent claims are not so limited, and encompass at least metal sensing systems in addition to RFID sensing systems. *See, e.g.*, Ex. 1001, 29:52–57 (independent claim 1 directed to a system to discern the presence of “object[s]”), 30:4–22 (dependent claims directed, respectively, to RFIDs and metal objects). Thus, Mr. Kinney's proposed definition is not commensurate in scope with the claimed subject matter.

Based on the present record, we determine that the definition offered by Petitioner comports with the qualifications a person would have needed to understand and implement the teachings of the '717 patent and the prior art of record. *Cf. Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art itself may reflect an appropriate level of skill in the art). For purposes of this decision, we apply Petitioner's description of the person of ordinary skill in the art.

C. Claim Construction

We apply the same claim construction standard used in district court actions under 35 U.S.C. § 282(b), namely that articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). In applying that standard, claim terms generally are given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17). “[W]hile extrinsic evidence can shed useful light on the relevant art, . . . it is less significant than the intrinsic record in determining the legally operative meaning of claim language.” *Phillips*, 415 F.3d at 1317 (internal quotation marks omitted).

Petitioner, in the Petition, proposes constructions for several claim terms. Pet. 5–15, 64–66. Patent Owner states that it does not object to Petitioner’s proposed constructions of “a control and processing subsystem configured to . . .” and “a communication subsystem.” PO Resp. 13; *see* Prelim. Resp. 58 (Patent Owner, in the Preliminary Response, stating agreement with Petitioner’s proposed constructions).

In a related proceeding involving Patent Owner but not Petitioner, the District Court construed certain claim terms in the challenged patent. Ex. 1015. We have considered the District Court’s constructions in reaching the determinations in this Decision. *See* 37 C.F.R. § 42.100(b); *cf.* Pet.

Reply 3 (Petitioner contending that the District Court’s constructions, except as discussed in the Reply, “are not material to unpatentability.”).

We address here some claim construction matters pertinent to dispositive issues in this IPR, and we discuss below, in analyzing the application of the prior art references’ teachings to the claims, the parties’ implied constructions of other terms. On this record, we determine that no other claim terms require express construction to resolve the parties’ disputes before us.

1. “close unobstructed proximity”

Independent system claim 1 recites:

an antenna configured to receive a first signal and a second signal from a first object and a second object, respectively, in close unobstructed proximity.

Ex. 1001, 29:53–55. Independent method claim 15 similarly recites operating an interrogation system by “receiving a first signal and a second signal from a first object and a second object, respectively, in close unobstructed proximity at an antenna.” *Id.* at 30:54–56.

In the Institution Decision, we determined that the prosecution history “suggests that ‘unobstructed’ means that there is no structure akin to a shield between the objects,” and preliminarily construed “unobstructed,” in the context of the claimed subject matter, as meaning that “there is no structure located between the objects that blocks signals from an object to the extent that the object cannot be detected by the antenna of the interrogation system.” Paper 11, 16. This preliminary construction goes a bit further than but is not inconsistent with the District Court’s construction of “in close unobstructed proximity” as “objects arranged next to, or near one another and without the presence of anything obstructing signals sent by the

objects.” Ex. 1015, 7. In this IPR, the parties disagree as to the meaning of “unobstructed.”

Petitioner states that it “agrees with the Board that ‘unobstructed’ means that there is no structure akin to a shield between the objects that blocks signals to the extent that an object cannot be detected.” Pet. Reply 6 (internal quotations marks omitted); *see also* Pet. 14 (Petitioner contending that “unobstructed” means “without obstructions to signals sent by the first and second objects.”). Patent Owner contends that, “[b]ased upon Fig. 4 and the Specification’s description thereof, and a definition for ‘obstruct’ in a general dictionary, the subject phrase should be construed to mean ‘a first object and a second object . . . in close **unblocked** proximity.’” PO Resp. 13 (second alteration in original).

We first turn to the claim language itself. As a reminder, the pertinent limitation of independent claim 1 recites “an antenna configured to receive a first signal and a second signal from a first object and a second object, respectively, in close unobstructed proximity.” Ex. 1001, 29:53–55.

The parties agree that it is the signals from the objects that are “unobstructed.” *See* Pet. 14; PO Resp. 14. Facially, there also does not appear to be a substantive difference between the parties’ understandings of the claim term “unobstructed”—namely, Petitioner’s “without obstructions” and Patent Owner’s “unblocked.” However, the parties’ contentions regarding that application of the Garber reference to independent claim 1 indicate that there still remains a disagreement, namely as to what it means to be unobstructed or unblocked. At oral argument, Patent Owner clarified its position, indicating that Patent Owner contends that an object is obstructed if it is not visible, even if the object’s signals are received by the

interrogator's antenna. *See* Tr. 75:18–76:6; *see* PO Resp. 14 (“[Patent Owner] Lone Star . . . agrees that [in Garber] the signals are read but argues, for example, that ‘[m]ore than likely, the tags are embedded within the articles meaning that the respective tags are completely blocked.’” (quoting Prelim. Resp. 11) (third alteration in original)); PO Sur-reply 3 (Regarding the Board's preliminary construction, “[Patent Owner] Lone Star agrees that there is no structure between the objects, but disagrees to the extent that an object cannot be detected.”). Specifically, Patent Owner argues:

Again, Garber does not teach or suggest close unobstructed proximity. *Every article tag or RFID element of Garber may be read by the reader. But not every article tag or RFID element is in close unobstructed proximity.*

So, in other words, the article tags and RFID elements of Garber are the least obstructive from one another, which falls outside the limitations of the claim. . . .

[T]his is exactly what Garber discloses. Garber says the tags may be applied with adhesive between the pages of a book and is desirable to make the tag thin enough *to prevent easy detection by observing* the end of the book.

So, Garber is saying *we want to hide the tag from being visible, but I still want to be able to detect it.* And it's obstructed because it's in the pages and not on the outside cover of the book.

Tr. 75:18–76:6 (emphasis added). Thus, we understand Patent Owner to contend that an object is obstructed if it not observable by or visible to the human eye. Patent Owner appears to go even further by arguing that an obstruction is anything other than air, thus apparently contending that even a material transparent to the human eye is an obstruction. *See id.* at 72:25–73:1 (“It's Patent Owner's position that close unobstructed proximity means there's nothing in between the tags except air.”); *id.* at 69:23–24 (Patent

Owner arguing that “the detection of the object by the antenna is not an issue here.”⁵); PO Sur-reply 4 (arguing that an RFID-containing identification badge in a plastic case is obstructed).

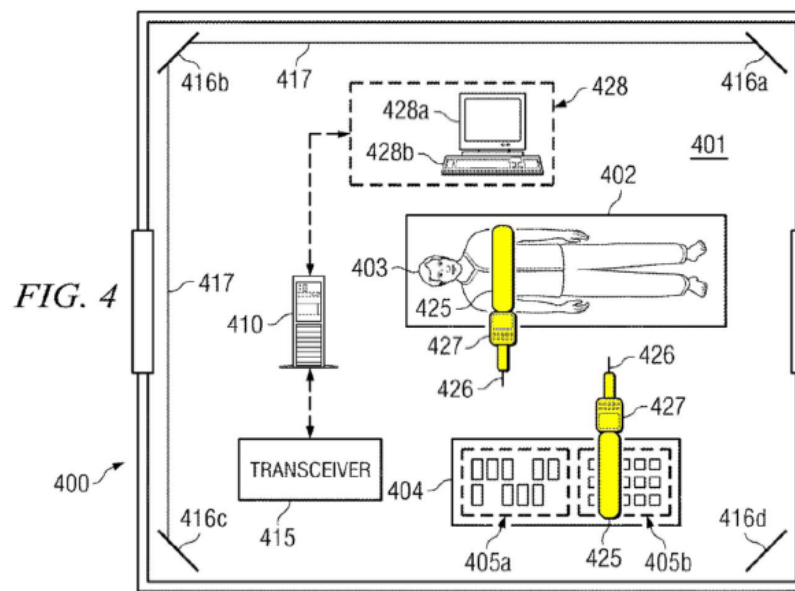
We disagree with Patent Owner’s proposed construction. As the parties agree, the “unobstructed” characteristic relates to *signals* from the objects. That characteristic does not turn on the visibility of the object. And, claim 1 calls for the antenna, not the human eye, to be configured to receive the signals. In addition to taking the term “unobstructed” out of context, Patent Owner’s proposed construction of “unobstructed” may be based on a lay person’s understanding of the term rather than a person of ordinary skill in the art. *But see* PO Resp. 15 (Patent Owner arguing, without citation, elaboration, or explanation that, “[a]t the very least, the signals between the objects in close unobstructed proximity are NOT attenuated.”). “The words used in the claims must be considered in context and are examined through the viewing glass of a person skilled in the art.” *Ferguson Beauregard/Logic Controls v. Mega Sys., LLC*, 350 F.3d 1327, 1338 (Fed. Cir. 2003); *see also Phillips*, 415 F.3d at 1313 (“The inquiry into how a person of ordinary skill in the art understands a claim term provides an objective baseline from which to begin claim interpretation.”). In this case, that person of ordinary skill in the art is an engineer with significant

⁵ To the extent that Patent Owner is impliedly arguing that “detection of the object by the antenna” is irrelevant, we disagree. *See* Tr. 69:23–24; *see also* PO Resp. 24 (“[T]he limitation recites that the objects are in close unobstructed proximity not that the reader is in close unobstructed proximity from the objects.”). The limitation of claim 1 is “an antenna configured to receive” the signals. In addition to the claim language itself, the prosecution history (discussed below) makes clear that the meaning of “unobstructed” is intimately tied to the antenna’s capability of receiving the signals.

experience with detection devices. *See supra* Section II.B. Such a person would not be evaluating the configuration of an antenna based upon whether a human can see the objects that are transmitting the signals.

We next turn to the Specification. Petitioner asserts, and Patent Owner does not dispute, that “[t]he claim term ‘close unobstructed proximity’ is not found in the specification of the ’717 Patent,” and “[t]he term ‘unobstructed’ is not used in the specification.” Pet. 13.

Both parties rely on Figure 4 of the ’717 patent in support of their respective claim construction arguments. Pet. 13–14; PO Resp. 14–15. Petitioner’s annotated version of Figure 4 is reproduced below.



Ex.1001, Figure 4

Pet. 14. Above is the challenged patent’s Figure 4—“a pictorial diagram of an embodiment of an interrogation system, generally designated 400, employable within an operating room of a medical facility”—with “an interrogator (e.g., a portable interrogator) 425” annotated in yellow. Ex. 1001, 14:49–52, 14:65–66.

The Specification explains that “the problem associated with the loss of surgical items, especially surgical items retained within patients, is a serious one.” *Id.* at 2:35–37. Figure 4 depicts the use of an interrogation system to address this problem. Prior to surgery, portable interrogator 425 may be used to inventory surgical instruments 405a and disposable items 405b (e.g., sponges) on back table 404. *Id.* at 14:56–58, 16:1–7. “Additionally, the portable interrogator 425 may be employed to scan the patient 403 before, during or after closing the surgical procedure.” *Id.* at 16:21–23. “Scanning the patient 403 before the surgical procedure provides location of metal or RFID objects already present in the patient 403.” *Id.* at 16:23–25. “Scanning the patient 403 after concluding the surgical procedure provides a verification that any metal or RFID objects remaining are only those intended.” *Id.* at 16:29–32.

Petitioner contends that Figure 4 is a single embodiment having two aspects—the table scan and the patient scan—and that the patient scan disclosure is evidence that its proposed construction is correct. *See* Pet. 13–14; Pet. Reply 7–9; Tr. 12:1–13:6 (Petitioner arguing that Figure 4 is a single embodiment and that it is improper to limit the claim to one “subembodiment.”). Petitioner argues that Patent Owner’s proposed construction is inconsistent with the stated purpose of the claimed invention and inappropriately excludes the patient scan of Figure 4, where the scanned objects would be surrounded by flesh, body fluids, and such. Pet. Reply 7–9. Petitioner asserts that, in the patient’s body, there would be physical “blocking” of the objects in some sense but that the Specification indicates that those do not obstruct the signals and, thus, are not obstructions within the meaning of the ’717 patent. *See id.* at 8 (citing Ex. 1001, 5:40–43,

16:29–32, 18:16–18); Tr. 13:15–19 (“You see that when objects are in the patient, there’s clearly going to be different organs, skin, tissue, that are physically blocking those RFID tags. But [it is] clear those signals are able to penetrate through, again achieving the purpose of the invention.”).

Patent Owner appears to agree with much of Petitioner’s characterization of the Specification’s disclosure including Petitioner’s assertion that the ’717 patent discloses the interrogator scanning objects both on the table and inside the patient. *See* PO Sur-reply 4 (citing Paper 23 (Pet. Reply) 7–8). However, Patent Owner argues that its construction of “close unobstructed proximity,” where an obstruction is anything other than air, “limits the term to a specific feature (i.e., the table scan) of a single embodiment in Figure 4.” PO Sur-reply 4; *see also* Tr. 72:7–73:1 (Patent Owner clarifying that, under its proposed construction, the claims do not cover the patient scan aspect of Figure 4.). According to Patent Owner, “[t]he claims of the ’717 [patent] were narrowed [during prosecution] to recite that the objects are in close unobstructed proximity only to the extent of excluding any blocking obstacle between the objects,” and that “this limitation is consistent with the multiple unobstructed (unblocked) items on the back table illustrated in FIG. 4.” *Id.* at 3. Patent Owner argues that the ’717 patent discloses “different disclosed environments or applications” and that “Fig. 4 illustrates without ambiguity multiple objects in close unblocked proximity whereas, with readings from within a patient’s body, the objects are NOT in close unblocked proximity.” PO Resp. 14–15.

Even if, as Patent Owner asserts, the table scan of Figure 4 is consistent with Patent Owner’s proposed construction, that is not a basis to exclude from the scope of the claims the patient scan of the same

embodiment. In this case, we see no evidence that the claims should be interpreted to omit that patient scan embodiment (or, using Petitioner’s term, “subembodiment”) from the scope of coverage. *See Apple Inc. v. Corephotonics, Ltd.*, 81 F.4th 1353, 1359 (Fed. Cir. 2023) (“Our caselaw counsels against interpreting the claims in a way that would omit a disclosed embodiment absent clear evidence to the contrary.”); *Sequoia Tech., LLC v. Dell, Inc.*, 66 F.4th 1317, 1327 (Fed. Cir. 2023) (“[W]e also recognize that ‘[a] claim construction exclud[ing] a preferred embodiment is rarely, if ever correct.’” (all alterations, except first, in original)(quoting *Kaufman v. Microsoft Corp.*, 34 F.4th 1360, 1372 (Fed. Cir. 2022))). To the contrary, the Specification explains that the purpose of the disclosed invention is to address the “serious” “problem associated with the loss of surgical items, especially surgical items retained within patients,” Ex. 1001, 2:35–37, and that “[s]canning the patient 403 after concluding the surgical procedure provides a verification that any metal or RFID objects remaining are only those intended,” *id.* at 16:29–32. *See also* PO Resp. 57 (Patent Owner arguing that “other solutions were only good enough to scan for items outside a patient’s body, whereas the patented advances allowed for items to be identified and located from inside the body.”). This disclosure provides strong evidence that the patient scan embodiment is important to the invention, and Patent Owner provides no basis for us to exclude it from the scope of the claim.

Patent Owner also argues that “[Petitioner’s] construction reads out an embodiment and limits the construction of the term to a single embodiment of the patent,” and asserts that “[a] claim construction that excludes the preferred embodiment is rarely, if ever, correct and would require highly

persuasive evidentiary support.” PO Sur-reply 5 (citing *Vitronics Corporation v. Conceptronic, Inc.*, 90 F.3d 1576 (Fed. Cir. 1996) (internal quotation marks omitted)). To the extent that Patent Owner is asserting that Petitioner is reading out the table scan aspect of Figure 4, we do not agree. Although Petitioner focuses on how the patient scan aspect of Figure 4 supports its proposed construction, Petitioner does not argue that the table scan is excluded. Petitioner’s implicit position is that its proposed construction encompasses the entirety of the Figure 4 embodiment, i.e., both the patient scan and the table scan aspects. *See, e.g.*, Pet. Reply 7 (In disagreeing with Patent Owner’s proposed construction, Petitioner asserting that “Figure 4, however, shows the portable interrogator scanning objects on back table 404 as well [as] *inside* patient 403.”); Tr. 12:1–13:6 (arguing that it is inappropriate to construe the claim as excluding a preferred subembodiment of the embodiment disclosed in Figure 4).

We determine that Patent Owner’s proposed construction is inconsistent with the Specification’s description of the interrogator being able to read signals of objects within a patient’s body, which would include organs or tissue between the different objects and between the objects and the antenna.

We turn now to the prosecution history. During the prosecution of the application that is the parent of the ’717 patent, the applicant amended the subject limitation a few times. Prior to the first pertinent amendment, the limitation read, “an antenna configured to receive a signal from an object.” Ex. 1013, 181 (amendment of claim 1 showing the added material in underline and deleted material in strikethrough). The Examiner rejected the claim as being anticipated by Francis. *Id.* at 186. The applicant

characterized Francis as disclosing, “[t]o achieve any reasonable accuracy in such determination [of the direction of motion of the interrogator], the two RFID tags 320, 330 must be placed far apart.” *Id.* at 187. The applicant amended claim 1 to add a signal from a second object and the phrase “in close proximity,” asserted that Francis prefers objects far apart, and argued that the new requirement of “close proximity” distinguished the claim over Francis. *Id.* at 181, 188.

The Examiner again rejected claim 1 as anticipated by Francis, maintaining that Francis discloses, in Figure 5, another embodiment that reads tags spaced a short distance apart. *Id.* at 220. Francis’s Figure 5 is reproduced below.

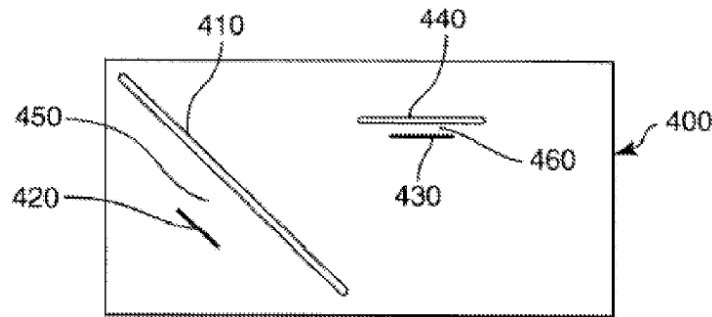


FIG. 5

Figure 5, according to the applicant, “illustrates an embodiment of Francis wherein two radio frequency identification (‘RFID’) tags [element numbers 420 and 430] are positioned in close proximity to each other for detecting relative position of the transport vehicle.” *Id.* at 221. The applicant asserted that Francis uses “[a] radio frequency (‘RF’) shield 410, such as a metal plate, metal screen or other RF reflective or absorbent material . . . positioned between the RFID tags 420, 430,” and that “[t]he second metal plate 440 preferably reduces the maximum read distance of the second RFID tag 430, so as to further ensure that only one RFID tag 420, 430 can be read

at any given position.” *Id.* at 221–222; *see id.* at 222–223 (“Francis shields one RFID tag from the other RFID tag to reduce interference therebetween.”). The applicant stated that, “[b]ecause the RF shield 410 blocks substantially all interrogation signals from the second RFID tag 430 . . . , the RFID interrogator will not detect the second RFID tag 430.” *Id.* at 222. The applicant amended the claim to read “in close unshielded proximity” and argued that distinguished the claim over Francis. *Id.* at 215, 222–223.

Later in prosecution, the Examiner rejected the claims for failing to have written description support in the Specification for “in close unshielded proximity.” *Id.* at 285. The applicant responded: “The Examiner’s attention is directed to FIGURE 4 and paragraphs 84–96 [of the application] wherein a plurality of objects (such as instruments and disposable items) are clearly illustrated and described in close unshielded proximity.” *Id.* at 300. In the next Office Action, the Examiner maintained the written description rejection, again finding that the Specification does not disclose “in close unshielded proximity.” *Id.* at 309–311. In response, the applicant amended independent claim 1 to replace “unshielded” with “unobstructed,” but did not explain how the amendment addressed the written description rejection. *See id.* at 325, 330–331.⁶ The Examiner then issued a notice of allowability with the stated reason for allowance being that the prior art did not teach or

⁶ The applicant stated: “While the Applicants disagree [with the Examiner’s written description rejection], the Applicants have amended ones of the aforementioned claims to expedite the prosecution of the present application.” Ex. 1013, 330.

suggest an interrogator having the as-amended antenna limitation, but did not mention the written description rejection. *See id.* at 345–346.

The prosecution history indicates that the interrogators of the Examiner’s prior art references, in order to read an RFID tag, required each tag to be isolated from others, either by distance or through the use of a strategically placed RF shield. The applicant distinguished the claimed subject matter over those relatively unsophisticated RFID readers (that could only read one tag at a time) by amending the claims to recite, by the inclusion of “close proximity” and “unshielded,” a more sophisticated interrogator that did not need to use spacing or shielding. This is consistent with the background section of the ’717 patent stating that RFID systems at the time of the patent were better than relatively unsophisticated bar code systems. *See* Ex. 1001, 4:6–22; *see also* PO Resp. 17–18 (Patent Owner quoting the same after re-stating the Board’s preliminary construction and conceding that “[t]he Board conclusion here is supported by the plain language of the ’717 Patent.”). Specifically, the ’717 patent explains that “[a]n important attribute of RFID interrogation systems is that a number of tags can be interrogated simultaneously stemming from the signal processing,” and that “[a] related and desirable attribute is that there is not typically a minimum separation required between the tags.” Ex. 1001, 4:6–12. “Most other identification systems, such as systems employing bar codes, usually impose that each device be interrogated separately.” *Id.* at 4:17–19.

The person of ordinary skill in the art would understand, from reading the prosecution history in light of the Specification, that the applicant amended the claim to cover the then-contemporaneous RFID readers rather

than the less sophisticated bar code readers and prior art RFID readers that required object isolation. The prosecution history further indicates that the applicant substituted “unobstructed” as a synonym, or nearly so, of “unshielded.” Patent Owner offers no persuasive explanation why “unobstructed” should be construed as meaning no structure other than air, which would require the exclusion of not only RF shield-like materials but also structures that have no substantive effect on the antenna’s ability to receive signals. Further, although we recognize that the applicant argued that the table scan of Figure 4 provides written description support for “close unshielded proximity” (and, impliedly, “unobstructed”), Patent Owner points to no assertion by the applicant that the patient scan was no longer covered by the amended claims.

After considering the parties’ arguments and evidence, we again determine, as we did in the Institution Decision (Paper 11, 16), that the prosecution history indicates that “unobstructed” means that there is no structure akin to a shield between the objects that blocks signals to the extent that an object cannot be detected.

Lastly, we turn to the extrinsic evidence upon which the parties rely. Patent Owner, in support of its proposed construction of “unobstructed” as meaning unblocked, asserts that, “[a]ccording to the general dictionary, the term ‘obstruct’ is defined as ‘to block or close up with an obstacle; make difficult to pass.’” PO Resp. 13–14 (quoting Ex. 2012 (Random House Webster’s Unabridged Dictionary)). We find the dictionary definition to not only be unhelpful to Patent Owner, but to be counter to Patent Owner’s position that an obstruction is anything other than air regardless as to

whether the signals are blocked or “ma[d]e difficult to pass” by the purported obstruction.

Petitioner (Pet. 14) relies on the testimony of Dr. Sharony, who opines:

[A person of ordinary skill in the art] would appreciate that “unobstructed” refers to not having obstructions to the RFID signals sent by the metal or RFID objects because the ’717 patent explains that physical obstructions between the interrogator and the tag, such as human flesh, are allowed. Figure 4 of the ’717 Patent shows the portable interrogator scanning objects on back table 404 as well as object located *inside* patient 403. Ex. 1001, Figure 4. In fact, the ’717 Patent is explicit that “the RFID system 510 may be used to detect a presence and a general location of **objects within the patient** that employ RFID tags. Ex. 1001, 18:16-18. Further, [t]he ’717 Patent states “[b]ody fluids . . . do not affect the programmed code within the tag. The tags will not only survive, but will operate reliably in such environments.” Ex. 1001, 5:40-43. The patent also states “[s]canning the **patient 403 after concluding the surgical procedure** provides a verification that any metal or RFID objects remaining are only those intended.” Ex. 1001, 16:29-32.

Ex. 1002 ¶ 68 (alterations, except the first, in original).

Patent Owner initially did not rely on the testimony of its expert, Mr. Kinney, for claim construction. *See* PO Resp. 13–18, 23–24. In its Sur-reply, Patent Owner embraces Mr. Kinney’s testimony on cross-examination where he opined that the objects in the Specification’s Figure 4 “are aligned next to one another on the back table without blocking barriers or structures between them,” and that his understanding is “[t]hat means there is nothing between them except for air.” PO Sur-reply 5 (quoting Ex. 1014, 75:23–76:4). Patent Owner (*id.*) also points to Mr. Kinney’s cross-examination testimony where he opined that an RFID

tag in a plastic case and an RFID tag in a passport are obstructed even if readable by an interrogator, Ex. 1014, 79:11–80:20.

Mr. Kinney’s opinion that an obstruction is anything other than air is not persuasive as it is inconsistent with the patient scan aspect of the same Figure. Dr. Sharony’s opinion, on the other hand, is consistent with both aspects of Figure 4 and is rationally based on the subject technology in that it distinguishes between a lay and an ordinary artisan’s understanding of an obstruction (such as human flesh). We find Dr. Sharony’s testimony more credible than that of Mr. Kinney. Additionally, to the extent Mr. Kinney was opining on the understanding of a person of ordinary skill in the art, we do not find to be credible his opinion that such a person (e.g., an electrical engineer) would consider readable RFID signals from an identification badge or passport to be blocked. *See* Ex. 1014, 79:6–80:20.

We again construe “unobstructed” as meaning that there is no structure located between the objects that blocks signals from an object to the extent that the object cannot be detected by the antenna of the interrogation system.

2. “*sensing subsystem configured to . . .*”

Dependent claim 3 recites:

The interrogation system as recited in claim 1 further comprising a *sensing subsystem configured to* provide said first signal and said second signal having a signature representing said first object and said second object, respectively, from said antenna to said control and processing subsystem.

Ex. 1001, 29:65–30:3 (emphasis added).

Petitioner, in the Petition, contends that “sensing subsystem” is a means-plus-function limitation governed by 35 U.S.C. § 112 ¶ 6 and, accordingly, is limited to corresponding structure (and equivalents) disclosed

in the Specification for performing the recited function. Pet. 5–8. In particular, Petitioner contends that the claimed “sensing subsystem” means a “sensing subsystem that detects both RFID and metal.” *Id.* at 7. In its Preliminary Response, Patent Owner argues that “[t]he claims in which ‘sensing subsystem’ appear disclose a sufficiently definite structure that would be understood by a POSITA to have sufficiently definite meaning as the name for structure, making § 112 ¶ 6 inapplicable.” Prelim. Resp. 42. In the Institution Decision, we preliminarily determined that § 112 ¶ 6 does not apply to “a sensing subsystem configured to provide [the recited two signals] from said antenna to said control and processing subsystem” and that the phrase is not a means-plus-function limitation. Paper 11, 19. The District Court similarly concluded that “sensing subsystem” “is not a means-plus-function term subject to § 112 ¶ 6.” Ex. 1015, 4. After institution, Petitioner asserts that, “[w]hile [Petitioner] Zebra maintains that § 112 ¶ 6 applies, Zebra focusses on the Petition’s alternative non-§ 112 construction,” Pet. Reply 4, and Patent Owner states that, “[i]n the event Zebra should continue to urge the Board to construe this term as a means-plus-function term subject to 35 U.S.C. § 112 ¶ 6, [Patent Owner] Lone Star adopts and incorporates by reference its arguments set out in its Preliminary Response,” PO Resp. 18 n.18. For the following reasons, we again determine that “sensing subsystem” is not governed by § 112 ¶ 6.

The lack of the word “means” in a claim element creates a rebuttable presumption that § 112 ¶ 6 does not apply. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). “[W]hen a claim term lacks the word ‘means,’ the presumption can be overcome and § 112, para. 6 will apply if the challenger demonstrates that the claim term fails to ‘recite

sufficiently definite structure’ or else recites ‘function without reciting sufficient structure for performing that function.’” *Id.* at 1349 (citation omitted). “Generic terms such as ‘mechanism,’ ‘element,’ ‘device,’ and other nonce words that reflect nothing more than verbal constructs may be used in a claim in a manner that is tantamount to using the word ‘means’ because they ‘typically do not connote sufficiently definite structure’ and therefore may invoke § 112, para. 6.” *Id.* at 1350 (citation omitted).

Petitioner asserts that “system” is a recognized nonce word, and argues that “the purely functional prefix ‘sensing’ does nothing to impart structure to the term ‘subsystem.’” Pet. 6. From this, Petitioner concludes that “sensing subsystem” is governed by § 112 ¶ 6. *Id.* Patent Owner argues that Petitioner failed to rebut the presumption and that a person of ordinary skill in the art would recognize “sensing subsystem” as the name of sufficiently definite structure. Prelim. Resp. 42. We agree that Petitioner has not overcome the presumption that § 112 ¶ 6 does not apply.

Petitioner’s critical propositions—that “the ‘sensing subsystem’ term is a nonce word” and that “the purely functional prefix ‘sensing’ does nothing to impart structure to the term ‘subsystem’”—is conclusory attorney-argument for which Petitioner points to no adequate evidentiary support. Pet. 5–6; *cf. Williamson*, 792 F.3d at 1349 (“The standard is whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure.”); *Greenberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580, 1583 (Fed. Cir. 1996) (“What is important is not simply that a ‘detent’ or ‘detent mechanism’ is defined in terms of what it does, but that the term, as the name for structure, has a reasonably well understood meaning in the art.”).

Patent Owner points to dependent claims 4 and 5, which depend from claim 3 and, respectively, recite an “RFID sensing subsystem” and a “metal sensing subsystem.” Prelim. Resp. 44–45. Patent Owner argues that those claims 4 and 5 support a determination that “sensing subsystem” connotes a known structure rather than a nonce word. *Id.* We find that argument persuasive, particularly where Petitioner contends that a person of ordinary skill in the art would recognize the recited “RFID sensing subsystem” and “metal sensing subsystem” as sufficiently definite structures. *See* Pet. 10–11.

Accordingly, we again determine that § 112 ¶ 6 does not apply to “a sensing subsystem configured to provide [the recited two signals] from said antenna to said control and processing subsystem” and that the phrase is not a means-plus-function limitation.

Both parties offer proposed constructions for “sensing subsystem” if the phrase is not deemed to be governed by § 112 ¶ 6. Petitioner’s proposed construction is a “self-contained system for sensing within a larger system” “that performs the function recited in the claim.” Pet. 9, 34. Patent Owner’s proposed construction is “a component configured to detect a signal representing an object and convert from one format to another.” PO Resp. 18. Both parties’ arguments rely heavily on descriptions in the Specification. “[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.” *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

Petitioner does not explain adequately the reason for including the “self-contained” modifier. *See* Pet. 9. Relatedly, to the extent that Petitioner, as an alternative to its § 112 ¶ 6 construction, proposes a construction that requires the subsystem to have both RFID and metal detection, we do not agree. *See* Pet. 7–8; Pet. Reply 4 (arguing that “PO’s construction . . . ignores that ‘sensing subsystem’ is a combined RFID-metal sensing subsystem”); *id.* at 5–6. Petitioner argues that “[t]he specification describes the ‘sensing subsystem’ (without ‘RFID’/‘metal’ prefixes) as including both metal and RFID sensing subsystems.” Pet. Reply 5. In support, Petitioner parenthetically quotes the Specification using the permissive term “may” in the statement that: “Alternatively, the metal and RFID sensing subsystems *may* be integrated into a sensing subsystem.” Ex. 1001, 15:40–42 (emphasis added); *see* Pet. Reply 5. And, whereas claim 3 recites the unadorned term “sensing subsystem,” dependent claims 4 and 5 further limit that to include, respectively, an “RFID sensing subsystem” or a “metal sensing subsystem.” Ex. 1001, 29:66, 30:7–8, 30:16–17; *see* PO Resp. 29–30 (arguing claim differentiation). We decline to read into the claim an example from the Specification, and Petitioner does not persuade us that the Specification defines “sensing subsystem” as a particular dual-mode species rather than a genus encompassing species in the form of, for example, an RFID sensing subsystem and a metal sensing subsystem, or that the Specification defines the term as a structure integrating both of those sensing subsystems into a self-contained system.

Patent Owner contends that the Specification describes how the disclosed RFID sensing subsystem and metal sensing subsystem each convert signals, but does not explain adequately why claim 3 (which recites

neither “RFID” nor “metal”) should have a requirement of a signal format converter component read into the claim. *See* PO Resp. 20–22 (discussing an RFID subsystem); *see also* PO Sur-reply (discussing both metal and RFID subsystems).

We do not adopt either parties’ proposed construction and decline to require the “sensing subsystem” to be “self-contained” or to have “a component configured to . . . convert from one format to another.” We, for purposes of this decision, need go no further here to resolve any disputed issues in this IPR regarding a “sensing subsystem.” *Cf.* Pet. Reply 6 n.1 (Petitioner contending that the District Court’s “construction is broader than Petitioner’s construction and the claims are unpatentable under either.”).⁷

3. “*multiscan, coherent signal processing*”

System claim 6 depends from independent claim 1 and recites “wherein said control and processing subsystem is configured to employ multiscan, coherent signal processing.” Ex. 1001, 30:23–25. Method claim 17 recites that the “discerning” of independent claim 15 “employs multiscan, coherent signal processing.” *Id.* at 31:1–2.

Patent Owner argues that the phrase “multiscan, coherent signal processing” should be construed to require “compar[ing] information from a plurality of signals resulting from multiple scans of an object to determine a presence of the object.” PO Resp. 43 (citing Ex. 2018 ¶23). In particular, Patent Owner asserts that the term requires “coherently processing multiple signals (resulting from multiple scans) of an RFID object to discern the

⁷ The District Court also declined to adopt Patent Owner’s proposed interpretation having a signal converting requirement and construed “sensing subsystem” as “one or more components configured to detect a signal representing an object.” Ex. 1015, 4.

presence of the RFID object.” PO Sur-reply 18. At the hearing, Patent Owner’s counsel explained that multiple scans are important because “[i]t is not unusual when scanning an RFID object for an interrogator to receive only part of the information from the tag and not to receive enough information to be able to discern the presence of a tag” and, “if that happens, it has to scan again” and “keep scanning until it finally got all of the information.” Tr. 43:21–44:1. Thus, according to Patent Owner, multiscan, coherent signal processing “allows the reader to make multiple scans to an object” and “each scan pulls some data and then it collects that data until it has received enough data to determine the location or to discern the presence of that tag.” *Id.* at 44:2–7.

Petitioner responds that “multiscan, coherent signal processing” is “not a term of art” and that one of ordinary skill “would look to the term’s plain and ordinary meaning.” Pet. Reply 21 (citing Ex. 1016 ¶ 38). According to Petitioner, one of ordinary skill “would appreciate that ‘multiscan, coherent signal processing’ is processing multiple coherent (i.e., ‘in phase’) inputs to improve object detection.” *Id.* (citing Ex. 1016 ¶¶ 44–50; Ex. 1017, 76); *see* Tr. 28:17–29:16. Petitioner argues that Patent Owner’s construction “is inconsistent with the ’717 patent, which only requires ‘processing of **diverse multiple inputs**,’” and “attempts to import into the claims *an example* from the specification where multiple inputs *can* come from multiple scans, (‘a plurality of signals (e.g., **resulting from multiple scans**)’).” Pet. Reply 21 (citing Ex. 1001, 18:51–55, 19:65–20:3; Ex. 1019, 97:16–98:3) (ellipses in original). Thus, Petitioner proposes construing “multiscan, coherent signal processing” as not requiring multiple scans. Tr. 29:20–24, 30:15–31:21.

Based on the evidence of record, we do not agree with Petitioner that “multiscan, coherent signal processing” does not require multiple scans. Petitioner and Dr. Sharony acknowledge that “multiscan, coherent signal processing” is not a term of art and should be given its plain and ordinary meaning. Pet. Reply 21; Ex. 1016 ¶ 44. We determine that the plain and ordinary meaning of “multiscan” requires multiple scans because the term is a combination of the prefix “multi,” which means more than one, with “scan.” See PO Resp. 43; Ex. 2018 ¶ 23. Interpreting “multiscan” to cover only a single scan would read the prefix “multi” out of the claim term. Similarly, construing “multiscan” to require multiple signals, but not multiple scans, would read “scan” out of the term.

Our understanding is consistent with the ’717 patent specification, which states as follows:

The integrated mode of operation may employ *multiscan, coherent signal processing* of diverse multiple inputs to achieve significantly higher detection sensitivities thereby allowing more precise object location and identification.

Ex. 1001, 18:51–55 (emphasis added). This sentence indicates that “multiscan, coherent signal processing” processes “diverse multiple inputs” to achieve higher detection sensitivities. However, it does not redefine the ordinary meaning of the term “multiscan” so that it would cover scanning only once rather than scanning multiple times, or cover receiving multiple inputs but not multiple scans.

The ’717 patent specification also discusses “multiscan, coherent signal processing” in column 19:

The RFID position markers 630–633 may be placed at predetermined locations on the patient 603. Generally, RFID position markers provide “position-unique” mapping of the patient 603 wherein the mapping may employ more or less

RFID position markers than those shown in FIG. 6A. When used in conjunction with a sweeping motion of the portable interrogator 625, it may be possible to specifically identify the presence of a metal or a RFID tagged object as being located between two of the RFID position markers. Thus, *a control and processing of the portable interrogatory may employ multiscan, coherent signal processing to coordinate a processing of a plurality of signals (e.g., resulting from multiple scans) from a sensing subsystem to discern a presence of at least one of metal and RFID objects.*

Ex. 1001, 19:57–20:3 (emphasis added). We do not agree with Petitioner that the parenthetical “(e.g., resulting from multiple scans)” in the above paragraph is sufficient to overcome the ordinary meaning of the term “multiscan,” which would require multiple scans. However, even if we were to find that “multiscan, coherent signal processing” does not require multiple scans, that would not change the outcome as to claims 6 and 17 because, as we discuss below, Petitioner has shown that Andersen teaches multiscan, coherent signal processing under either party’s definition of the term. *See infra* Section II.F.

We also do not agree with Patent Owner’s apparent position that the term “multiscan” requires multiple scans of the same object or RFID tag. *See* PO Sur-reply 18; Tr. 43:21–44:7. Nothing in the language of claims 6 and 17 requires that the multiple scans be of the same object, rather than of different objects. *See* Ex. 1001, 30:23–25, 31:1–2. Indeed, the portion of column 19 of the ’717 patent specification quoted above describes employing “multiscan, coherent signal processing” when the user makes “a sweeping motion of the portable interrogator” across “a RFID tagged object” that is “located between two of the RFID position markers.” *Id.* at 19:61–20:3. Thus, the intrinsic evidence indicates that “multiscan, coherent signal

processing” can involve the scanning of multiple RFID tags, as well as multiple scans of the same RFID tag.

Finally, we agree with Petitioner that the term “coherent” refers to signals that are in phase. *See* Pet. Reply 21. This understanding is supported by the testimony of Dr. Sharony, who explains that “coherent” signals are signals that are “in phase.” Ex. 1016 ¶¶ 44, 46, 48. It is also supported by the Collins Dictionary of Electronics, which defines “coherent light” as “light, as produced by a LASER, whose bursts of waves are all in phase, unlike light from other sources,” and defines “coherent oscillator” as “an oscillator whose bursts of waves are all in PHASE, such as light and microwave oscillators of the LASER and MASER type respectively.” Ex. 1017, 76; *see* Ex. 1016 ¶¶ 44, 46 (citing dictionary). Patent Owner does not point to evidence to the contrary.

Thus, we determine that “multiscan, coherent signal processing” in claims 6 and 17 means “processing multiple coherent (i.e., ‘in phase’) signals resulting from multiple scans.”

D. The Alleged Anticipation by and Obviousness over Garber of Claims 1, 3, 4, 8–16, 19, and 20 (Ground 1)

Petitioner alleges that claims 1, 3, 4, 8–16, 19, and 20 of the ’717 patent “are anticipated (or at least rendered obvious) by Garber.” Pet. 15; *see id.* at 15–25 (addressing claim 1); *see also* Pet. Reply 9–13. In addition to contending that Garber discloses every limitation of the subject claims and, therefore, is anticipatory, Petitioner contends, *inter alia*, that the recitation in claim 1 regarding a subsystem to discern a presence of objects “as said first object and said second object moves with respect to said antenna” would have been obvious. Pet. 22–25; *see also id.* at 33 n.4 (Petitioner contending that a “metal sensing subsystem” would have been

obvious.). Patent Owner argues that Garber is “defective,” and does not teach objects in close unobstructed proximity or such objects in close unobstructed proximity moving with respect to the antenna. PO Resp. 22–28; *see also* PO Sur-reply 5–8.

For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that challenged claims 1, 3, 4, 8–16, 19, and 20 are anticipated by and would have been obvious over Garber.

1. Garber (Ex. 1005)

Garber pertains to “RFID devices, including handheld RFID devices, and applications for such devices.” Ex. 1005, 3:25–26. “The devices and applications are described with particular reference to library materials such as books, periodicals, and magnetic and optical media.” *Id.* at 3:29–32.

Garber’s Figure 13 is reproduced below.

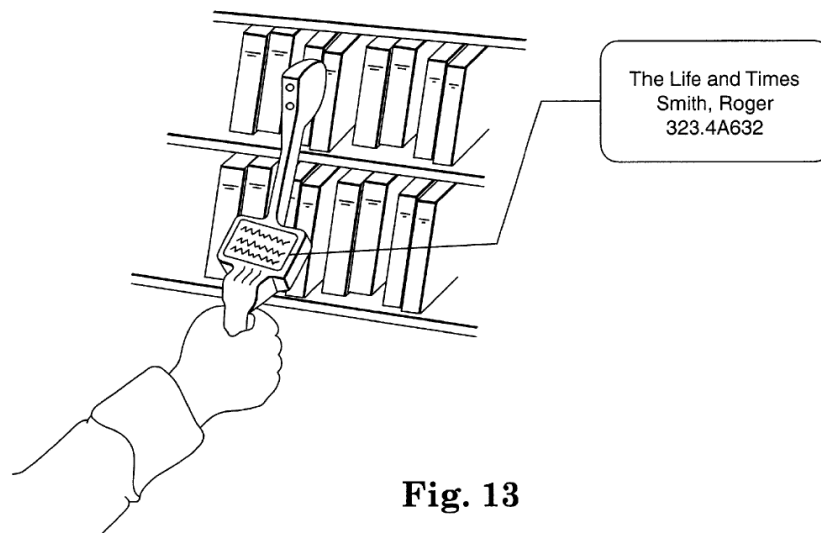


Fig. 13

Figure 13 depicts “[a] hand-held RFID device . . . in which the RFID reader, user interface, power source, antenna, processor, and software are all provided in a single integrated unit.” *Id.* at 15:42–46. According to Garber, the hand-held RFID device preferably includes memory, and the memory may be in the form of a handheld computer. *Id.* at 14:59–67. “The portable

computer may include . . . a touch-screen display.” *Id.* at 15:1–2. “[T]he functions or methods described . . . are equally applicable to non-portable RFID devices, and . . . the functions or methods described . . . in reference to non-portable RFID devices are similarly applicable to portable RFID devices.” *Id.* at 14:49–54.

Garber explains that:

An interrogation zone may be established by placing spaced detection panels across the exits from the room in which the tagged articles are located, near a conveyor carrying items to be monitored, or the like. Hand held detection devices may also be used.

Id. at 6:54–58.

Library materials having an RFID tag of [the combination] type could be checked in and out more easily, perhaps without human assistance. That is, the materials would automatically be checked out to a particular patron (who may herself have an RFID tag associated with her library card) when the patron passes through a suitable detection zone, and checked back in when the patron re-enters the library with the materials.

Id. at 10:11–20.

2. The Allegation that Garber is Defective

Under the heading “Garber Defective,” Patent Owner argues that two publications that are divisional applications of Garber “were disclosed to the Patent Office during the prosecution of U.S. Patent No. 7,019,650 (the ‘650 Patent’).” PO Resp. 22–23. Patent Owner asserts that “[t]he ‘717 Patent stems from the ‘650 Patent.” *Id.* at 23. Patent Owner concludes this section with the argument that “[t]he Examiner’s expressed allowance of the claims of the ‘650 Patent to issue over the disclosures of the Garber Publications leads to a reasonable inference that the Examiner considered the teachings

presented in the common Garber specifications, but found those teachings to be distinct and different from what the inventions claimed in the ‘650 Patent, and its later progeny, including the ‘717 Patent.” *Id.*

In addressing a somewhat similar argument made in the Preliminary Response, we, in the Institution Decision, stated that “Patent Owner has not placed in the record of this *inter partes* review or adequately discussed evidence indicating how and to what extent the Examiner considered and purportedly ‘discounted the teachings of Garber,’ thus hampering our ability to assess these arguments.” Paper 11, 23 (quoting Prelim. Resp. 34). Patent Owner, in its Response, again makes arguments without pinpoint citations to any document in the record.

Patent Owner does not allege that the Garber reference itself was before an Examiner, and does not allege that the allowed claims of the ‘650 patent are substantively the same as the claims of the ‘717 patent now before us. The application that issued as the ‘717 patent is a continuation of a continuation of a continuation of the application that issued as that ‘650 patent, where the Garber divisional applications purportedly were considered. Ex. 1001, code (63). The application that led to the ‘717 patent was filed approximately fourteen years after the application for the ‘650 patent. *See id.* at codes (22), (63). Patent Owner does not explain adequately the basis for the assertion that the Examiner’s allowance of the claims of the ‘650 patent over the Garber-like references “leads to a reasonable inference” that the Examiner also was comparing those references to the claims in the much later filed application for the ‘717 Patent. *See* PO Resp. 23.

Having considered the arguments presented, we do not agree with Patent Owner that it is a “reasonable inference that the Examiner considered the teachings presented in the common Garber specifications, but found those teachings to be distinct and different” from the claimed subject matter of the ’717 patent, and we do not agree that Garber is “defective” as implied by Patent Owner. To the extent that Patent Owner asks us to disregard Garber, we decline to do so.

3. The Alleged Anticipation and Obviousness of Claim 1

a. An interrogation system, comprising:

Petitioner contends that, to the extent that the preamble is limiting, Garber discloses an interrogation system. Pet. 15–16. Petitioner asserts that Garber discloses an interrogator in the form of a hand-held RFID device, and points to, *inter alia*, Garber’s description of Figure 4 as depicting “a block diagram of an **RFID interrogation system** interacting with an RFID tag.” *Id.* at 16 (quoting Ex. 1005, 3:46–47). Patent Owner does not raise any arguments regarding this contention.

b. an antenna configured to receive a first signal and a second signal from a first object and a second object, respectively, in close unobstructed proximity; and

Petitioner contends that Garber discloses a hand-held RFID device having an antenna for the RFID reader. Pet. 16–18 (citing Ex. 1005, 15:43–46, 16:11–13, Fig. 13; Ex. 1002 ¶¶ 83–92). Reproduced below is Petitioner’s annotated version of Garber’s Figure 13.

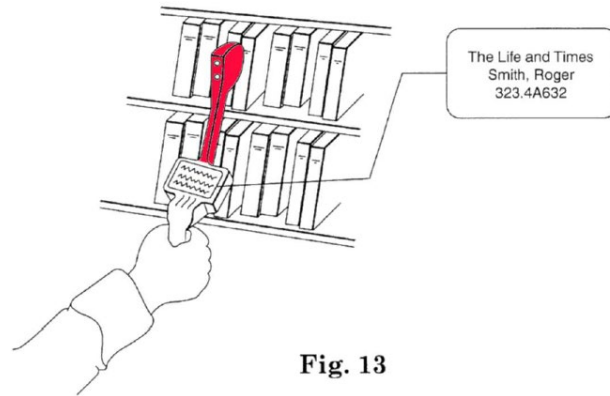


Fig. 13

Pet. 17. Above is Garber’s Figure 13 depicting “[a] hand-held RFID device . . . in which the RFID reader, user interface, power source, antenna, processor, and software are all provided in a single integrated unit,” Ex. 1005, 15:42–46, with Petitioner’s annotation of the antenna in red.

As mentioned, the recited antenna of claim 1 is configured to receive signals from “a first object and a second object . . . in close unobstructed proximity.” Ex. 1001, 29:53–55. Petitioner contends that Garber discloses the identification, by the RFID device, of multiple items (at least first and second objects) in close unobstructed proximity via code signals 202.

Pet. 17–18. Petitioner notes that Garber states, “[t]he hand-held RFID device . . . is **capable of identifying multiple items that are within the range** of the device.” *Id.* at 17 (quoting Ex. 1005, 14:40–45) (emphasis and alterations in original). Petitioner further asserts that “Garber also teaches that ‘if items used in the library are first placed on a book cart [in close proximity without obstructions], for example, **the hand-held device could make a single pass by the items on the cart to record them.**’” *Id.* (quoting Ex. 1005, 18:25–27) (emphasis and alteration in original).

Petitioner also points to Garber’s disclosure that “[t]he hand-held RFID device is capable of searching among shelves, bins, piles and library carts,” and “is capable of identifying multiple items that are within the range of the

device.” Ex. 1005, 14:40–45; *see* Pet. 17–18 (citing same). Petitioner further contends that Garber’s discussion of the possibility of RFID tags being shielded, and thus escaping detection, supports the understanding that Garber’s disclosure of being able identify multiple RFID tags indicates that there are no obstructions to the RFID signals. *See* Pet. 18 (citing Ex. 1005, 2:7–13; Ex. 1002 ¶ 88). Petitioner, in addressing the “control and processing subsystem” limitation (discussed below), also contends that Garber discloses detecting two signals produced by RFID tags in an interrogation zone. *See id.* at 19–21 (citing, *inter alia*, Ex. 1005, 6:65–67). Petitioner further notes that “Garber teaches ‘[l]ibrary materials having **an RFID tag . . . would automatically be checked out to a particular patron (who may herself have **an RFID tag associated with her library card)** **when the patron passes through a suitable detection zone . . .**’” *Id.* at 22 (quoting Ex. 1005, 10:13–18 (alterations and emphasis in original)).**

Patent Owner argues that “Garber does not teach the ‘close unobstructed proximity’ aspect of independent claims 1 and 15.” PO Resp. 23; PO Sur-reply 6. Specifically, Patent Owner argues “the articles of Garber are at least obstructed from one another, which does not meet the limitations of the claims of the ‘717 Patent,” and that “[t]he same concept applies to the library materials traversing the interrogation zone of Garber.” PO Resp. 24. Patent Owner is applying its proposed claim construction for “unobstructed” (i.e., no structure other than air), which we have rejected for the reasons discussed above. *See, e.g., id.* at 23 (Patent Owner indicating that the arguments are based on “the reasons discussed above with regard to claim construction.”). Patent Owner concedes that it “does not contend that every article tag [in Garber] is blocked such that it cannot be read by the

interrogator,” but argues that “every article has an intervening barrier.” *Id.* at 24. The purported barriers, according to Patent Owner, include books in a stack as shown in Figure 10 and the outer casing of a package containing multiple items as shown in Figure 11. *Id.* at 26–27. Figures 10 and 11 are reproduced below.

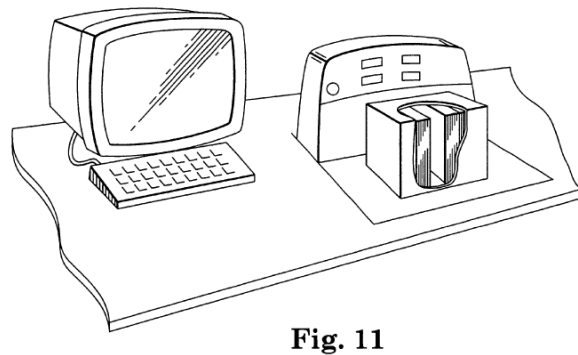
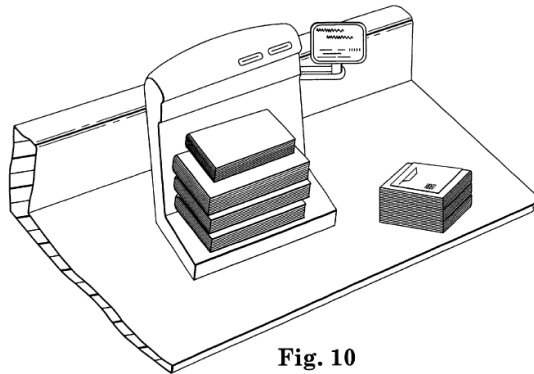


Figure 10 depicts an embodiment with “an RFID device [that has] the ability to process multiple items at one time.” Ex. 1005, 13:26–27. Figure 11 depicts an embodiment with the “device [having] the ability to verify the content of a package or case having multiple items inside.” *Id.* at 14:19–21.

Patent Owner agrees that “Garber does describe that the reader can process multiple items at one time with respect to Fig. 10,” *id.* at 27, and appears to agree that the reader in Figure 11 also can process multiple items simultaneously, *id.* (“The same is true with respect to Fig. 11.”). *See, e.g.*, Ex. 1014, 87:10–15 (Mr. Kinney agreeing that “Garber states that [the RFID elements in Figure 10] may be all read by—by the RFID reader.”).

We find that Garber discloses the recited “antenna configured to receive a first signal and a second signal from a first object and a second object, respectively, in close unobstructed proximity.” The fact that Garber’s reader can receive the RFID signals through the packaging and in the presence of other books in the stack indicates that there is no blockage of

the signal. Further, Garber discloses the RFIDs being read when the books, materials, and library cards are in various orientations—stacked horizontally on the base of the reader as in Figure 10, standing vertically on the base of the reader as in Figure 11, stacked vertically on the shelf for reading in the direction of the books’ spines as in Figure 13, in bins and piles in random orientations, and however the materials and library card are held by patrons as they pass through the detection zone. *See* Ex. 1005, 10:13–18, 14:40–45 Figs. 10, 11, 13; *see* Ex. 1002 ¶ 88 (Dr. Sharony opining that “a POSITA would appreciate that all of the above examples where multiple RFID tags in close proximity are detected by Garber’s hand-held device are examples where the RFID tags are not shielded, i.e., without obstructions to the signals sent by the RFID tags.”). Thus, Garber’s reader is capable of reading multiple tags simultaneously without regard to the position of any alleged obstruction between objects or relative to the position of the reader. This indicates that Garber’s reader, in contrast to prior art RFID readers and bar code readers, is sophisticated enough that it does not require objects to be isolated by distance or by strategically located RF shields or the like.

We determine that Petitioner has demonstrated that Garber discloses and teaches “an antenna configured to receive a first signal and a second signal from a first object and a second object, respectively, in close unobstructed proximity.”

c. a control and processing subsystem configured to discern a presence of said first object and said second object from said first signal and said second signal, respectively, as said first object and said second object moves with respect to said antenna.

As to the first part of this “control and processing subsystem” limitation, Petitioner contends that:

Garber discloses a control and processing subsystem (e.g., the processor in the hand-held RFID device/computer 108) configured to discern a presence of (e.g., decoding response from tags to identify tagged item) said first object and said second object (e.g., the RFID tags) from said first signal and said second signal (e.g., signals produced by tags/response code signal 202), respectively.

Pet. 21 (citing Ex. 1002 ¶¶ 93–99); *see also id.* at 18–21. Patent Owner does not raise any arguments regarding these contentions. *See* PO Resp. 25–28; PO Sur-reply 6–9.

The second part of the subject limitation recites that the subsystem is configured to discern a presence of the objects “as said first object and said second object moves with respect to said antenna.” Ex. 1001, 29:56–60. Petitioner contends that Garber discloses the aspect of the limitation. Pet. 21–22. Specifically, Petitioner contends that Garber discloses the reading of RFID tags in library materials as the patron passes through an interrogation zone, and that Garber discloses that this may be done with either spaced detection panels or handheld detection devices. Pet. 21–22. As Petitioner notes, “Garber teaches ‘[l]ibrary materials having **an RFID tag** . . . would automatically be checked out to a particular patron (who may herself have **an RFID tag associated with her library card**) **when the patron passes through a suitable detection zone**’” *Id.* at 22 (quoting Ex. 1005, 10:13–18 (alterations and emphasis in original)).

In the alternative to the anticipation theory, Petitioner contends that, “[t]o the extent Garber does not explicitly teach this [‘moves with respect to said antenna’] limitation . . . , it would have been obvious to a POSITA to use Garber’s hand-held RFID device to check-out library patrons using the . . . method disclosed by Garber.” Pet. 22 (citing Ex. 1005, 15:36–37). Petitioner further contends that, “[f]or example, a POSITA would appreciate

that Garber's handheld RFID device could be used in any suitable interrogation zone, such as 'across the exits from the room in which the tagged articles are located, near a conveyor carrying items to be monitored, or the like.'" *Id.* at 23 (quoting Ex. 1005, 6:54–58; citing Ex. 1002 ¶ 103).

Petitioner additionally contends that "Garber teaches that 'the functions or methods described . . . in reference to non-portable RFID devices are similarly applicable to portable RFID devices' and vice versa," and "[t]herefore, Garber explicitly discloses that 'functions and methods' taught with respect to non-portable RFID devices are also present in Garber's hand-held RFID device." *Id.* (quoting Ex. 1005, 14:49–54). Petitioner points to Garber's Figures 10 and 11 (discussed above regarding the previous limitation), and contends that "Garber teaches its non-portable devices also discern a presence of multiple RFID tags based on their RFID signals." *Id.* at 23 (citing Ex. 1005, 13:26–27, 14:23–25, Figs. 10, 11). Petitioner additionally contends that "Garber further discloses its RFID devices can read multiple RFID tags as said first RFID tag and said second RFID tag moves with respect to said antenna." *Id.* at 24. We reproduce below Garber's Figure 9.

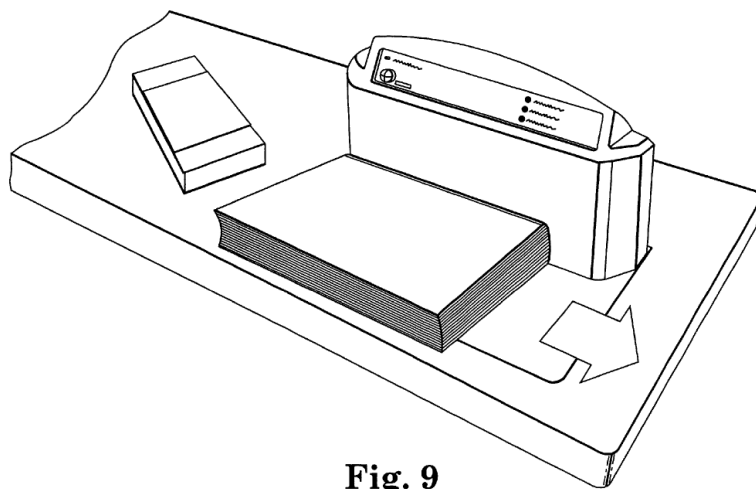


Fig. 9

Figure 9 depicts “an RFID device [that] is equipped to read information from an RFID tag on an item, such as a patron card, book, or other material.” Ex. 1005, 11:32–34. Petitioner asserts that “Figure 9 discloses an RFID tagged library book (said first object) and RFID tagged video tape (said second object) being read as they move with respect to said antenna.” Pet. 24–25 (citing, *inter alia*, Ex. 1002 ¶ 107; Ex. 1005, 11:32–34, Fig. 9).

Patent Owner argues that Figures 10 and 11 do not show items in close unobstructed proximity and do not show the items moving relative to the reader. PO Resp. 26–27. Patent Owner concedes that “Garber shows that the items are moving with respect to the reader in Fig. 9” but argues that the figure does not show items in close unobstructed proximity and shows only one item being interrogated at a time. *Id.* at 28. Patent Owner, in its Response, acknowledges Petitioner’s contentions regarding the reading of tags as the patron passes through an interrogation zone, but does not specifically address further that disclosure or that of a conveyor carrying items to be monitored. *See id.* at 25–28; *but see id.* at 28 (Patent Owner arguing that “in all instances where the objects are moving with respect to the reader in Garber, the objects are not in close unobstructed proximity to one another.”).

In the Sur-reply, Patent Owner, after reiterating its argument that the RFID tags are within the books and therefore not in close unobstructed proximity, addresses the moving patron and moving conveyor disclosures. PO Sur-reply 6–8. Patent Owner “does not dispute that the library materials are checked out through the interrogation zone of Garber and the patron may carry a library card,” but “does dispute, however, that the library material and/or library card are in close unobstructed proximity.” *Id.* at 7–8.

Regardless of whether Figure 9 shows the reading of one or two items simultaneously, it does show the reader being capable of reading at least one item that is moving relative to the reader. Thus, Garber teaches that items do not need to be in a fixed relative position in order for the interrogator to read the signal. It is undisputed that Garber's interrogator is able to read multiple tags as the objects move through the interrogation zone (e.g., a patron's library materials and library card). We do not agree with Patent Owner's argument that Garber fails to disclose objects in close unobstructed proximity, which is based on its proposed claim construction (that "unobstructed" means nothing but air) that we have rejected.

We determine that Petitioner has demonstrated that Garber discloses and teaches "a control and processing subsystem configured to discern a presence of said first object and said second object from said first signal and said second signal, respectively, as said first object and said second object moves with respect to said antenna."

d. Objective Indicia of Non-Obviousness

Patent Owner asserts that there is evidence of long felt but unresolved need that constitutes objective indicia of nonobviousness. PO Resp. 56–57; *see* PO Sur-reply 26 ("others in the field had attempted and failed to solve the problems addressed by the . . . Patent"). Patent Owner also makes certain assertions regarding the adoption and possible acquisition of its technology. PO Resp. 58; *see also* PO Sur-reply 26–27 (referring to "industry acceptance of Lone Star's inventions"). Petitioner characterizes these latter assertions as allegations of industry praise and commercial success. Pet. Reply 29. In support of its objective indicia arguments, Patent Owner relies solely on the declaration of named-inventor John Volpi (Ex. 2020). *See* PO Resp. 56 (incorrectly citing to Ex. 2032).

Petitioner argues that there is no nexus to the claimed invention because Patent Owner “has not identified the merits of the claimed invention or *any* product that embodies the claimed features or is coextensive with them.” Pet. Reply 29. Petitioner also argues that Patent Owner “has not established industry praise or commercial success, let alone a nexus to the merits of the claimed invention.” *Id.*

As the Federal Circuit has explained:

For objective evidence of secondary considerations to be relevant, there must be a nexus between the merits of the claimed invention and the objective evidence. *See In re GPAC*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). A showing of nexus can be made in two ways: (1) via a presumption of nexus, or (2) via a showing that the evidence is a direct result of the unique characteristics of the claimed invention.

A patent owner is entitled to a presumption of nexus when it shows that the asserted objective evidence is tied to a specific product that “embodies the claimed features, and is coextensive with them.” *Brown & Williamson Tobacco Corp. v. Philip Morris, Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000). . . .

However, even absent a presumption of nexus, “the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373–74 (Fed. Cir. 2019) (quoting *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996)).

Volvo Penta of the Americas, LLC v. Brunswick Corp., 81 F.4th 1202, 1210 (Fed. Cir. 2023). “The patentee bears the burden of showing that a nexus exists.” *Fox Factory*, 944 F.3d at 1373 (quoting *WMS Gaming Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999)). “While objective evidence of nonobviousness lacks a nexus if it exclusively relates to a feature that was known in the prior art, the obviousness inquiry centers on

whether the claimed invention as a whole would have been obvious.”

Rambus Inc. v. Rea, 731 F.3d 1248, 1257–58 (Fed. Cir. 2013) (citations and internal quotation marks omitted). “Where the allegedly obvious patent claim is a combination of prior art elements, . . . the patent owner can show that it is the claimed combination as a whole that serves as a nexus for the objective evidence; proof of nexus is not limited to only when objective evidence is tied to the supposedly ‘new’ feature(s).” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1330 (Fed. Cir. 2016); *see also Volvo Penta*, 81 F.4th at 1212 (“It is instead important to consider ‘the invention as a whole,’ rather than on a ‘limitation-by-limitation’ basis.”).

We agree with Petitioner that Patent Owner has not established an entitlement to a presumption of nexus. *See* Pet. Reply 28–29. Patent Owner does not identify any specific product to which the asserted objective evidence is tied. *See Volvo Penta*, 81 F.4th at 1210. Rather, Patent Owner speaks in ambiguous terms such as “[t]he inventions of the ‘717 Patent,” “the patented advances,” “the innovations found in the ‘717 Patent,” “Lone Star’s technology,” and “RFID sensing systems.” PO Resp. 56–58; *see* PO Sur-reply 26–27. Patent Owner’s Sur-reply mentions “RFID systems by Stryker Medical and Surgicount that adopted Lone Star’s inventions” and the “adoption of the inventions by retailers such as Wal-Mart,” but offers no details as to those systems. PO Sur-reply 26–27 (citing Ex. 2024, which is not an exhibit in this IPR; we assume this is a reference to Mr. Volpi’s declaration (Ex. 2020)). Mr. Volpi’s declaration also lacks any details as to a product or method purportedly embodying the challenged claims. *See* Ex. 2020 ¶¶ 3–9. Without a clear identification and description of a specific

product or method, we cannot find that it “embodies the claimed features, and is coextensive with them.” *Brown & Williamson*, 229 F.3d at 1130.

Patent Owner also has not established a nexus by showing that the evidence of secondary considerations is the “direct result of the unique characteristics of the claimed invention.” *Fox Factory*, 944 F.3d at 1373–74. Patent Owner and Mr. Volpi refer to the claimed invention, as they do with embodiments, in generalities and using ambiguous terms. *See, e.g.*, PO Resp. 56 (“The inventions of the ‘717 Patent”); PO Sur-reply 26–27 (making arguments regarding “the claims of the ‘293 Patent,” which presumably is a typographical error as the ‘293 patent is not challenged in this IPR); Ex. 2020. Patent Owner does not identify adequately what it considers to be a unique characteristic of the claimed invention.

Patent Owner argues that “[t]he inventions of the ‘717 Patent addressed a long felt but unresolved need for a better way to track items in a surgical field and other difficult environments.” PO Resp. 56 (citing Ex. 2020 ¶¶ 4–6). Patent Owner makes vague references to “*improvements over existing RFID technology* in order to operate under [the] challenging conditions [of the surgical environment].” *Id.* at 56–57 (emphasis added). Patent Owner also argues that the inventors “later began using *the improved technology* in supply chain and inventory applications, which can also include very challenging conditions, such as numerous tags being placed inside a small space and impediments to the signal transmission between the reader and the tags.” *Id.* at 57 (emphasis added) (citing Ex. 2020 ¶ 6). Patent Owner does not clearly explain how any such RFID technology improvements are reflected in the claimed invention. And, importantly, Patent Owner goes on to argue that it was the use of RFID technology

generally that overcame the identified problems that were not solved by other technology such as bar codes and X-ray using a blue thread. *Id.* Thus, Patent Owner impliedly argues that it was the application of RFID technology to new environments that is the unique characteristic of the invention that addressed a long felt but unresolved need. *See, e.g., id.* (“By using RFID technology, the inventions could, . . .”). However, the challenged claims are not limited to any particular environment but rather broadly claim an interrogation system and the use thereof generally, with the independent claims not even limited to RFID sensing systems. *See* Ex. 1001, claims 1 and 15; *see also id.*, dependent claims 4 and 16 (adding limitations regarding RFIDs).

Even assuming *arguendo* that a need was *long felt* (an element of the case that Patent Owner does not address), the Background of the Invention portion of the Specification, consistent with Patent Owner’s argument, indicates that the use of RFID readers was the solution to the problem and was an improvement over other technologies such as bar codes. *See* Ex. 1001, 4:6–22. The Background section further indicates that RFID readers, as of the time of the filing of the patent application that led to the issuance of the ’717 patent, had the capability to read “numerous tags being placed inside a small space,” PO Resp. 57. As Patent Owner acknowledges,

The Background provided, “[a]n important attribute of RFID interrogation systems is that a number of tags can be interrogated simultaneously stemming from the signal processing associated with the techniques of impressing the identification information on the carrier signal. A related and desirable attribute is that there is not typically a minimum separation required between the tags. Using an anti-collision algorithm, multiple tags may be readily identifiable, and, even at an extreme reading range, only minimal separation (e.g., five

centimeters or less) to prevent mutual de-tuning is generally necessary. *Most other identification systems, such as systems employing bar codes, usually impose that each device be interrogated separately.* The ability to interrogate a plurality of closely spaced tags simultaneously is desirable for applications requiring rapid interrogation of a large number of items.”

PO Resp. 17–18 (quoting Ex. 1001, 4:6–22) (emphasis added; alteration in original). As to challenges due to “impediments to the signal transmission between the reader and the tags,” Patent Owner’s own arguments show that the use of RFID systems solved the problem of the blue thread being “frequently obscured and not visible on the [X-ray] scans” and blood obscuring the bar codes. *Id.* at 57. As indicated in the Background of the Specification and above in the discussions of the prior art, the use of RFIDs was not new and RFIDs had been used in inventory applications. *See, e.g.,* Ex. 1005, 8:5–14 (Garber explaining that: “Another area in which RFID systems offer an advantage over barcode-based systems is in the identification of multiple items. . . . This capability enables the development of numerous useful applications in the areas of inventory control, item tracking, and sorting that would be difficult [or] impossible to implement with barcode-based identification systems.”). Patent Owner has not shown any nexus between the *claimed invention* and any long felt but unresolved need.

Patent Owner’s commercial success/industry praise arguments also are not persuasive. Patent Owner asserts that “two competitors, Surgicount and Stryker Medical, have since introduced RFID sensing systems to be used in tracking medical supplies and medical devices,” “Stryker Medical expressed an interest in possibly acquiring the inventions and technology being developed by Veroscan,” and “other companies interested in

maintaining efficiency in their supply chains have also adopted Lone Star’s technology.” PO Resp. 58 (citing Ex. 2020 ¶ 8); *see* PO Sur-reply 26–27 (arguing “industry acceptance of Lone Star’s inventions”); *see also* Ex. 2020 ¶ 8 (Mr. Volpi stating that there was “skepticism from within the medical community” apparently regarding using RFIDs to track items in medical environments). Patent Owner again fails to tie adequately these allegations to any unique characteristic of the claimed invention, but rather again refers to ambiguous “inventions and technology” and points only to the use of RFIDs generally. *See, e.g.*, PO Resp. 58 (“Wal-Mart and other large retail stores have begun requiring their vendors and suppliers to provide RFID tags on goods so they can be tracked through warehouses and onto retail showroom floors.”).

Even if Patent Owner had established a nexus to the assertion that “Stryker Medical expressed an interest in possibly acquiring the inventions and technology being developed by Veroscan,” PO Resp. 58, we agree with Petitioner that this suggests a lack of industry praise or commercial success, Pet. Reply 29. Patent Owner asserts nothing more definitive than a company “expressed an interest in possibly acquiring the inventions,” suggesting the company *declined* to complete the transaction. Thus, the evidence regarding the acquisition of “inventions,” if not weighing against nonobviousness, is at best neutral.

In sum, we have reviewed Patent Owner’s arguments and evidence regarding objective evidence of nonobviousness and, for the reasons outlined above, do not find them persuasive. And, to the extent Patent Owner’s objective indicia evidence is entitled to any weight, it is outweighed

by Petitioner’s strong evidence that the challenged claims would have been obvious.⁸

e. Conclusion as to Independent Claim 1

Having considered the parties’ arguments and evidence, we determine that Petitioner has shown by a preponderance of the evidence that the subject matter of claim 1 is anticipated by and would have been obvious over Garber.

4. Dependent Claim 3

Dependent claim 3 recites:

The interrogation system as recited in claim 1 further comprising a sensing subsystem configured to provide said first signal and said second signal having a signature representing said first object and said second object, respectively, from said antenna to said control and processing subsystem.

Ex. 1001, 29:65–30:3.

As discussed above in the claim construction section, we determine that this is not a means-plus-function limitation governed by 35 U.S.C. § 112 ¶ 6, and we decline to limit the scope of “sensing subsystem” as proposed by each party in the event that § 112 ¶ 6 does not apply.

Under its alternative, non-means-plus-function construction, Petitioner contends that “Garber discloses a ‘self-contained system for sensing [e.g., Garber’s RFID device] within a larger system [e.g., Garber’s library book detection system]’ that performs the function recited in the

⁸ At least because Patent Owner does not present objective indicia arguments specific to any aspect of the challenged claims (e.g., a particular limitation alone or any claimed invention as a whole), our determinations here regarding independent claim 1 apply to all challenged claims and we do not repeat those determinations when discussing other claims and grounds.

claim.” Pet. 34 (citing Ex. 1002 ¶ 132) (alterations in original); *see id.* at 26–29 (Petitioner’s contentions regarding the function); *see also id.* at 9 (Petitioner’s proposed construction). Petitioner contends that Garber discloses, *inter alia*, an RFID sensing subsystem in the form of an RFID reader having a detector 106 and interrogator 102. *Id.* at 29. Patent Owner does not raise any arguments regarding this contention. *Cf.* PO Resp. 29–30 (arguing claim construction and asserting that the claim scope is *broader* than proposed by Petitioner); PO Sur-reply 9 (Asserting that, “[i]f [Patent Owner] Lone Star does not raise any arguments regarding this limitation (Paper 23 at 13), it follows that Lone Star did not admit to such a limitation.”).

We determine that Petitioner has demonstrated that Garber discloses or teaches the subject matter of claim 3.

5. Independent Claim 15 and Dependent Claims 4, 8–14, 16, 19, and 20

Independent claim 15 recites a method of operating an interrogation system configured the same as or similar to the system of independent claim 1. *See* Ex. 1001, 30:52–61. The remaining challenged claims are all dependent claims. Petitioner identifies teachings in the prior art references that teach or suggest the limitations of independent claim 15 and dependent claims 4, 8–14, 16, 19, and 20, and provides persuasive reasoning as to why the claimed subject matter is anticipated and would have been obvious to one of ordinary skill in the art. Pet. 34–49. For these claims, Patent Owner does not present arguments beyond those regarding independent claim 1 and discussed above. *See* PO Resp. 30–31 (“As the Board’s Decision noted, Independent Claim 15 recites a method of operating an interrogator configured the same as or similar to the interrogator of Independent

Claim 1. . . . Lone Star incorporates by reference its arguments for the corresponding claim terms found in Independent Claim 15 and Dependent Claims 4, 8–14, 16, 19–20 as if fully disclosed herein.”).

Having considered Petitioner’s arguments and evidence, we determine that Petitioner has demonstrated that Garber anticipates and renders obvious claims 4, 8–16, 19, and 20.

E. The Alleged Obviousness of Claim 2 over Garber and Werb (Ground 2)

Petitioner alleges that dependent claim 2 would have been obvious over Garber and Werb. Pet. 49–57. Patent Owner argues that, “given the significant technical differences between the systems taught in Garber and Werb, a Person of Ordinary Skill in the Art (‘POSITA’) would not have been motivated to combine these two references.” PO Resp. 8. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claim 2 would have been obvious over Garber and Werb.

1. Werb (Ex. 1006)

Werb pertains to “location and position identification of mobile and stationary assets, such as items warehoused in a storage facility.” Ex. 1006, 1:5–6. Werb explains that a Real Time Locating System (RTLS) has been used to track assets, and some RTLS’s employ RFID tags. *Id.* at 1:10–11, 1:24–28. According to Werb, “a need exists for a more economical, reliable, and flexible system for coverage of extended facilities, and particularly enclosed facilities where the use of Global Positioning System (GPS) is not possible because communication signals from satellites will not penetrate the structures enclosing the facility.” *Id.* at 3:1–5. Werb discloses a mobile tag reader and that, “[b]y communicating with the tags, the mobile tag reader

can generate information suitable for determining the absolute position of the tag reader and/or the movable tags,” and “[t]he tag reader may store information about the relative position of assets in its vicinity.” *Id.* at 3:11–17. “The relative and/or absolute positions of the tag reader and the tagged assets may be determined using a positioning system onboard the tag reader, such as a GPS or an inertial navigation system, or the positions may be determined subsequently by the central controller.” *Id.* at 3:17–20. “[V]arious off-the-shelf technologies, such as speedometers, compasses, gyroscopes, and inertial motion sensors, may be used by the tag reader 3 or central controller 10 to estimate the position of the tag reader 3.” *Id.* at 13:29–31.

2. Discussion

Claim 2 depends directly from independent claim 1 and adds to that subject matter “a position sensor configured to cooperate with said control and processing subsystem to provide a location of said first object and said second object.” Ex. 1001, 29:61–64.

Petitioner contends that “Garber teaches its control and processing subsystem can provide a location of first and second RFID tags based on ‘location tags’ placed within the library,” but is silent as to the use of a position sensor. Pet. 49–50; *see also id.* at 37–39. Petitioner, relying on the testimony of Dr. Sharony, further contends that it would have been obvious to modify Garber’s interrogator to include Werb’s inertial position sensor. *See id.* at 55–57 (citing, *inter alia*, Ex. 1002 ¶¶ 223–232).

Petitioner asserts that “Werb teaches an RFID mobile tag reader and method for tracking RFID tags to monitor and track the location of assets in a facility.” *Id.* at 54–55. According to Petitioner:

Where GPS is unavailable (e.g., indoors), Werb discloses that “the position of the tag reader 3 **may also be determined and/or predicted**, e.g., by using the speed and time of travel of the tag reader 3 in a known direction, **by using inertial navigation systems . . . or other devices.**” Ex. 1006, 13:3-6; *see also* 13:29-31 (“**inertial motion sensors, may be used by the tag reader 3 . . . to estimate the position of the tag reader 3.**”).

Id. at 51 (emphasis and alterations in original). Petitioner also contends that, “[l]ike Werb, the ’717 patent discloses . . . ‘employing an inertial position sensor in the portable interrogator 625.’” *Id.* at 50 n.5 (citing Ex. 1001, 20:4–13, 23:19–26). Petitioner further contends that “[t]he Garber-Werb combination thus discloses a position sensor (e.g., inertial motion sensor) configured to cooperate with said control and processing subsystem to provide a location of said first object and said second object.” *Id.* at 52; *see* Tr. 22:3–10 (Petitioner: “[W]e certainly rely on the general teachings [of Werb], . . . but we rely on Werb’s inertial motion sensor as one of our primary arguments.”). Petitioner asserts that, “[l]ike Werb, the ’717 patent discloses . . . ‘employing an inertial position sensor in the portable interrogator 625.’” Pet. 50 n.5 (citing Ex. 1001, 20:4–13, 23:19–26); *see* Ex. 1001, 23:19–20 (“The position sensor 935 may typically be of an inertial type.”).

Petitioner reasons that:

[A] POSITA would have been motivated to modify Garber based on Werb’s express teachings. Specifically, while Garber does not disclose the use of a position sensor, Werb does, and provides ample motivation to add such a sensor to Garber’s hand-held device. As Werb explains, “[m]onitoring and tracking the location of assets in a facility can be important,

for example, for purposes of inventory and process control.”
Ex. 1006, 1:9–10

Id. at 55. Petitioner also contends that Werb teaches the advantages of using inertial navigation systems when GPS is unavailable, such as inside the library of Garber, and, therefore, it would have been obvious to modify Garber’s handheld device to have a position sensor. *Id.*

Petitioner additionally asserts that the interrogator components described in Garber and Werb, including sensors such as inertial position sensors, were well-known and reasons that “combining Werb’s position sensor with Garber’s hand-held device, as taught by Werb, would have been an obvious combination of prior art elements to yield predictable results.” *Id.* at 56–57 (citing Ex. 1002 ¶¶ 223–232).

Patent Owner begins its arguments with its own characterization of Werb’s disclosure.⁹ *See* PO Resp. 31–33. Patent Owner concedes that Werb discloses that the positions of the tag reader and the tagged assets may be determined using a positioning system of the reader. *Id.* at 31. Patent Owner, however, argues that most disclosed methods, including the inertial position sensor relied on by Petitioner, determine the location of the reader, not the tag location, and that it is “more likely” that most disclosed position-determining devices are not part of the tag reader. *Id.* at 32–33 (citing Ex. 2013 ¶ 43). Patent Owner then argues that, “[t]herefore, the inertial navigation system is the only position sensor disclosed by Werb that is part

⁹ The first heading in the Patent Owner Response regarding Ground 2 is “A Skilled Practitioner Would Not Combine Garber and Werb,” but the text under the heading merely is an acknowledgement that Petitioner relies on Werb for the position sensor aspect, and does not contain argument directed to a reason to combine the two references’ teachings.

of the interrogation system and configured to ‘provide a location of said first object and said second object’ as required by Claim 2.” *Id.* at 33 (citing Ex. 1006, 3:17–20). In the Sur-reply, Patent Owner similarly argues that Werb “exclusively contemplates systems or multiple sensors to determine a position of the tag reader, as opposed to the RFID object.” PO Sur-reply 10–11. We understand Patent Owner to also impliedly argue that claim 2 is limited to the use of a single sensor and excludes the use of multiple sensors. *See, e.g.*, PO Sur-reply 10–11 (“While Werb discloses multiple position sensors, it exclusively contemplates systems or multiple sensors to determine a position of the tag reader, as opposed to the RFID object. . . . [T]he ‘717 Patent specifically claims a position sensor. . . . A gyroscope by itself cannot determine the position of an RFID object (an object with an RFID tag) and thus, is not a position sensor contemplated in the interrogation system of the ‘717 Patent.” (citing claim 2)); Prelim. Resp. 22 (“[T]he inertial navigation system [of Werb] is a system with a plurality of different types of sensors, which is contrary to the claim limitation in the ‘711 Patent of a ‘position sensor,’ let alone a ‘single position sensor.’”).

We do not agree with Patent Owner’s arguments. Even if Patent Owner’s characterization of Werb’s position sensor is correct, we are not persuaded by Patent Owner’s implied and underdeveloped claim construction arguments regarding the recitation “comprising a position sensor configured to cooperate with said control and processing subsystem to provide a location of said first object and said second object.” Ex. 1001, 29:61–64 (claim 2). First, we do not agree with Patent Owner’s argument that a sensor that contributes to the identification of a reader location is not the recited sensor configured to cooperate with a subsystem to provide a

location of the objects. The Specification indicates that the location of the reader “provide[s] a location” of the objects, as recited in claim 2. *See, e.g., id.* 22:1–5 (“Employing this mitten-like embodiment, the health care individual may move his/her hand over the patient *to obtain specific locations of metal and RFID tagged objects* based on the location of his/her hand.” (emphasis added)); *see* Tr. 61:25–64:4 (Patent Owner’s counsel responding to questions regarding the mitten embodiment, and arguing, in contradiction to the Specification, that: “What the mitten is doing, it is discerning the presence of RFID objects, but *it is not determining the location of the objects.*” (emphasis added)). Second, to the extent that Patent Owner makes a single-sensor argument, we do not agree because claim 2 recites “a position sensor” immediately after the open-ended term “comprising,” and thus requires at least one position sensor, but the claim is not closed to additional position sensors. *See* Tr. 55:2–14 (discussing the distinction between a related patent that refers to a single position sensor and the ’717 patent challenged in this IPR, which recites “a position sensor”); Tr. 60:6–8 (Patent Owner’s counsel conceding: “So the claims in the ’182 and the ’717, they require a position sensor. They are not limited to a single position sensor.”). Additionally, Patent Owner is attacking Werb’s purported disclosure standing alone rather than addressing Petitioner’s proposed combination, which uses a position sensor, as taught by Werb, in Garber’s interrogator. *See, e.g.,* Pet. Reply 15–16 (Petitioner asserting that Patent Owner’s arguments are irrelevant because: “[T]he Petition explains that Werb expressly teaches using an inertial position sensor with a tag reader to determine the location of a tagged item. . . . The Petition further explains that a POSITA would take this express teaching and incorporate it

into Garber’s handheld RFID reader to accurately determine the location of a tagged object.” (citing Pet. 49–57)); *see In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.”).

Patent Owner, building on its argument that an inertial navigation system “is the only viable onboard position sensor” in Werb, PO Resp. 36, argues that “the inclusion of an inertial navigation system would render the portable RFID reader of Garber unsuitable and inoperable for its intended purposes,” *id.* at 34–35. Patent Owner asserts that, “at the time of the priority date of the ‘717 Patent, inertial navigation systems were complex, large-scale systems requiring multiple sensors directed to industrial applications and not suitable for handheld RFID devices like the one disclosed in Garber.” *Id.* at 35 (citing Ex. 2013 ¶ 47); *see also id.* at 36–40 (further argument that an inertial navigation system would not be appropriate for Garber’s handheld interrogator); PO Sur-reply 11–12. Patent Owner relatedly argues that there is no reasonable expectation of success in incorporating an off-the-shelf inertial position sensor into Garber’s portable interrogator because Werb purportedly discloses only the use of GPS and inertial navigation *systems* in an onboard system. PO Sur-reply 14.¹⁰

¹⁰ Patent Owner, apparently in asserting that the interrogator must be small, handheld, and portable, also argues that the Specification discloses and claim 2 requires relative movement between the object and the interrogator (“movement or sweeping motion of the interrogator”) to determine location. PO Resp. 33, 35–36; PO Sur-reply 13–14. Patent Owner does not argue how this assertion, even if correct, distinguishes the claimed invention over Petitioner’s proposed combination. *Cf.* Paper 11, 36 (the Institution Decision addressing the argument that a *GPS* system does not determine

Patent Owner is discussing a hypothetical combination other than that proposed by Petitioner. Again, Petitioner's proposed combination modifies Garber's interrogator to have an inertial position sensor like that taught by Werb, and does not involve a bodily incorporation of a large-scale, industrial system as Patent Owner posits. *Cf. In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references.").

As Petitioner points out, Werb discloses that "various off-the-shelf technologies, such as . . . inertial motion sensors, may be used by the tag reader 3 or central controller 10 to estimate the position of the tag reader 3." Ex. 1006, 13:29–31; Pet. 52 (quoting the same). As Petitioner also points out, the '717 patent describes inertial position sensors as applicable in portable interrogators. *See, e.g.*, Ex. 1001, 20:4–7 ("[E]mploying an inertial position sensor in the portable interrogator 625 allows a more precise determination of the presence and location of a RFID or metal object between these two RFID position markers."), 23:19–20 ("The position sensor 935 may typically be of an inertial type."); Pet. 50 n.5 (citing the same); PO Resp. 35 (Patent Owner acknowledging the challenged patent's disclosure). The inoperability opinion of Patent Owner's witness, Mr. Kinney, unpersuasively focuses on the use of an inertial navigation *system* rather than an inertial position sensor. *See* Ex. 2013 ¶ 57 (Mr. Kinney testifying that "an inertial navigation system would render the

location based on movement and explaining why Patent Owner's implied claim construction argument is not persuasive).

Garber device unsatisfactory and inoperable for its intended purpose because (1) it is too large, (2) it must be installed on a flat surface and, therefore, cannot be carried around by a human operator, (3) it requires too much energy, and (4) it would not be sufficiently accurate even if installed and calibrated correctly.”). Dr. Sharony, however, credibly testifies that a person of ordinary skill in the art would have had a reasonable expectation of success in making the proposed modification because the interrogator components, including inertial position sensors, were well-known, and that “[i]t would also have been straightforward for a POSITA to modify Garber’s interrogator with [sic] to an include Werb’s inertial position sensor and that such a system would work.” Ex. 1002 ¶ 231; *id.* ¶¶ 214–222 (discussing Garber’s and Werb’s teachings and that “[a] POSITA would understand that within these implementations [of Werb’s teachings] Gerber discloses Claim 2’s requirements”); *see also* Ex. 1016 ¶ 40 (replying to the reasonable expectation of success arguments and opining that “it would have been an obvious and routine matter to combine Werb’s position sensor with Garber’s handheld reader”).

Having considered Petitioner’s arguments and evidence, we determine that Petitioner has demonstrated that Garber in combination with Werb renders obvious claim 2.

F. The Alleged Obviousness of Claims 6, 7, 17, and 18 over Garber and Andersen (Ground 3)

Petitioner alleges that dependent system claims 6 and 7 and dependent method claims 17 and 18 would have been obvious over Garber and Andersen. Pet. 57–64. Patent Owner argues that “[t]he combination of Garber and Andersen fails to teach ‘multiscan, coherent signal processing’ and ‘an adaptive integrating filter,’ thus there is a lack of a motivation to

combine Garber and Andersen,” *id.* at 40–41. For the reasons discussed below, we determine that Petitioner has shown by a preponderance of the evidence that claims 6, 7, 17, and 18 would have been obvious over Garber and Andersen.

1. Andersen (Ex. 1007)

Andersen “relates to a paper roll that incorporates RFID components and a system for tracking inventory having RFID components in a warehouse environment.” Ex. 1007, 1:7–10. Andersen describes the multipath error problem, explaining:

A warehouse environment is potentially susceptible to multipath errors due to metal or other structures in the warehouse 12 that reflect the electromagnetic waves emitted by the RFID beacons 48. Multipath errors are caused when a radio signal is received directly by an antenna, but then the same signal is received again as it is reflected off an interfering structure.

Id. at 11:22–28.

To address the problem, Andersen explains that “[t]he use of ‘Preprocessing’ filters minimizes the instability effects that multipath may cause by selectively ignoring beacon multipath measurements.” *Id.* at 11:28–30. “Pre-processing filters can be used on radio signals to filter out any erroneous signals.” *Id.* at 11:30–32. “The signals may then be further refined in a Kalman Filter, which is a known multiple-input software filter that can optimally select or reject, in real time, the sensor inputs based on the quality of the respective sensor measurements.” *Id.* at 11:32–36. “The Kalman filter may reject erroneous sensor inputs to calculate the desired output of the position locating system 28 with the location measurement unit 56, and a Kalman filter provides improved overall navigation accuracy.” *Id.* at 11:35–39.

2. *Claims 6 and 17: Multiscan, Coherent Signal Processing*

System claim 6 depends from independent claim 1 and recites “wherein said control and processing subsystem is configured to employ multiscan, coherent signal processing.” Ex. 1001, 30:23–25. Method claim 17 recites that the “discerning” of independent claim 15 “employs multiscan, coherent signal processing.” *Id.* at 31:1–2.

Petitioner argues that, “[l]ike the ’717 patent, Andersen also discloses a computer processor that uses a Kalman filter and performs multiscan, coherent signal processing to improve the quality and accuracy of an RFID system’s measurements.” Pet. 58. Petitioner asserts that “Andersen discloses that a ‘warehouse environment is potentially susceptible to multipath errors due to metal or other structures in the warehouse 12 that reflect the electromagnetic waves emitted by the RFID beacons 48.’” *Id.* (citing Ex. 1007, 11:22–25). “For example,” according to Petitioner, “Andersen describes that ‘[m]ultipath errors are caused when a radio signal is received directly by an antenna, but then the same signal is received again as it is reflected off an interfering structure.’” *Id.* (citing Ex. 1007, 11:25–28) (alteration in original). Petitioner further contends that Andersen “describes a solution to the multipath (i.e., processing **multiple signals scanned from a particular object**) issue using filters such as a Kalman filter.” *Id.* Petitioner relies on the following portion of Andersen for this disclosure:

The use of ‘Preprocessing’ filters minimizes the instability effects that multipath may cause by selectively ignoring beacon multipath measurements. . . . The signals may then be further refined in a **Kalman Filter, which is a known multiple-input software filter that can optimally select or reject, in real**

time, the sensor inputs based on the quality of the respective sensor measurements.

Id. (citing Ex. 1007, 11:28–42) (ellipses in original). Thus, according to Petitioner, the Garber-Andersen combination “discloses said control and processing subsystem is configured to employ multiscan (e.g., the multiple scanned signals of the same object), coherent signal processing (e.g., to coherently process these multiple scanned signals).” *Id.* at 59.

Patent Owner argues that Garber and Andersen fail to teach the recited “multiscan, coherent signal processing.” PO Resp. 40. Patent Owner asserts that “Garber is silent as to multiscan, coherent signal processing.” *Id.* at 42. As to Andersen, Patent Owner contends that multiscan, coherent signal processing is different than Andersen’s correction of multipath errors. *Id.* at 41–44 (citing Ex. 2018 ¶¶ 19, 22–26). More specifically, according to Patent Owner, Andersen discloses that signal processing of radio signals received by an antenna in a warehouse environment is potentially susceptible to multipath errors caused by the reflection of electromagnetic waves emitted by RFID beacons off of interfering structures in the warehouse. *Id.* at 42 (citing Ex. 1007, 11:22–25; Ex. 2018 ¶ 22). Andersen, Patent Owner contends, discloses the use of “Preprocessing” filters that minimize the instability effects that multipath errors may cause by selectively ignoring beacon multipath measurements. *Id.* Patent Owner argues that these multipath errors are different from “multiscan, coherent signal processing” because the latter “compares information from a plurality of signals resulting from multiple scans of an object to determine a presence of the object,” while the former receives multiple versions of the same signal. *Id.* at 43 (citing Ex. 2018 ¶ 23). Patent Owner further asserts that Kalman filters have been applied to a large number of problems, and

Andersen's use of a Kalman filter for a multipath problem does not dictate that multiscan, coherent signal processing is performed. *Id.* at 43–45 (citing Ex. 2018 ¶¶ 24–26, 28–30).

Petitioner responds that “Andersen teaches processing multiple inputs from multiple scans of an object to determine its location as part of Andersen's multipath error correction process.” Pet. Reply 21. Andersen, Petitioner argues, “explicitly teaches that its location processing utilizes a plurality of signals resulting from multiple scans of an object” by disclosing “a system for **tracking inventory** having RFID components” in which “RFID receivers 50 are **continuously receiving** the RFID beacon signals to **continually determine the position of the RFID receivers.**” *Id.* at 22 (citing Ex. 1007, 1:8–10, 10:42–44; Pet. 62). Moreover, Petitioner asserts, “Andersen teaches its positioning system may alternatively use ‘Radio Frequency Identification Circuit’s’ (passive RFID) instead of RFID beacons (active RFID).” *Id.* (citing Ex. 1007, 13:36–40, 14:24–25). According to Petitioner, in the passive RFID embodiment, the continuously received signals will be generated by multiple scans. *Id.* at 22–23 (citing Ex. 1018, 56:1–10, Figs. 10–12). Additionally, Petitioner contends, because Andersen's receiver 50 “**selects several of the signals for processing,**” and the beacons transmit RF signals at a specific frequency, one of ordinary skill “would appreciate that specific frequency signals would also have a constant phase difference and, thus, be coherent.” *Id.* at 23–24 (citing Ex. 1007, 10:54–54, 11:6–9; Ex. 1016 ¶¶ 46–50; Ex. 1017, 76). Therefore, Petitioner argues, “Andersen discloses receiving multiple coherent inputs from multiple objects as part of its location signal processing.” *Id.* at 23.

Petitioner next addresses Andersen’s teaching that “[t]he use of ‘Preprocessing’ filters **minimizes the instability effects** that multipath may cause by **selectively ignoring** beacon multipath measurements’ that ‘can be used on radio signals to **filter out any erroneous signals.**’” Pet. Reply 24 (citing Ex. 1007, 11:28–32; Pet. 58–59). Relying on Dr. Sharony and Dr. Kia, Petitioner argues that “beacon multipath signals are replicas of the sent signal that have constant phase differences with the sent signal,” and one of ordinary skill “would therefore appreciate Andersen’s ‘selectively ignoring’ means that some multipath measurements can be used to improve detection, whereas, the ‘erroneous signals’ are filtered out.” *Id.* at 24–25 (citing Ex. 1018, 38:1–7, 38:11–13; Ex. 1019, 57:22–24; Ex. 1016 ¶ 51). Thus, according to Petitioner, “[b]ecause Andersen teaches it is ‘continually communicating with the RFID beacons 48’ (multiple scans of an object) (Ex. 1007, 11:3–7) and ‘**selectively ignoring** beacon multipath measurements . . . to **filter out any erroneous signals**’ (permitting beneficial signals and rejecting erroneous signals) to ‘minimize instability effects,’ Andersen teaches multiscan, coherent signal processing.” *Id.* at 25 (citing Ex. 1007, 11:28–32; Pet. 57–59; Ex. 1018, 38:1–7, 41:17–42:3) (ellipses in original).

Petitioner further argues that Andersen teaches another example of multiscan, coherent signal processing when it describes a second processing step in which “[t]he signals may then be further refined in a Kalman Filter, which is a known **multiple-input** software filter than can optimally select or reject, in real time, the sensor inputs **based on the quality of the respective sensor measurements.**” Pet. Reply 25–26 (citing Ex. 1007, 11:32–36, 12:41–46; Pet. 58; Ex. 1018, 39:2–14, 53:4–21). In this step, Petitioner

asserts, “Andersen’s Kalman Filter analyzes the multiple signals already processed by the preprocessing filter and further refines those signals to ‘calculate the desired output of the position locating system 28 with the location measurement unit 56, and a Kalman filter provides **improved overall navigation accuracy.**’” *Id.* at 25 (citing Ex. 1007, 11:36–40, 12:44–46).

Patent Owner responds that Andersen “solves a very different problem” than the ’717 patent because it only corrects for multipath errors rather than “compar[ing] information from a plurality of signals resulting from multiple scans of an RFID object to determine the presence of the object.” PO Sur-reply 17. Patent Owner argues that “[m]ultipath errors receive multiple versions of the same signal, whereas multiscan, coherent signal processing compares multiple separate signals from the RFID object resulting from multiple scans.” *Id.* at 17 (citing PO Resp. 41–46). “In solving multipath errors,” Patent Owner asserts, “Andersen assumes that the first version of the same signal is not corrupt and discards the other versions of the same signal,” while multiscan, coherent signal processing in the ’717 patent “does not assume that the first scan of the RFID object is clean, performs multiple scans of the RFID object, and coherently processes the signals to discern the presence of the RFID object.” *Id.* Additionally, Patent Owner argues that “[t]he ’717 Patent does not mention receiving multiple coherent inputs from multiple objects as claimed by [Petitioner] of the teachings of Andersen” and receiving multiple coherent inputs “has nothing to do with multiscan coherent signal processing.” *Id.* at 21.

Patent Owner also argues that “[t]he position locating system 28 of Andersen operates very differently than the interrogation system of the ’717

Patent” because “[t]he interrogator of the ’717 Patent includes a sensing subsystem and antenna in cooperation with the control and processing subsystem that discerns the presence of and tracks the location of the RFID object,” while “[t]he position locating system 28 of Andersen oppositely tracks the location of the truck 18 that houses the receiver 50.” PO Sur-reply 20. Relying on Dr. Kia, Patent Owner also asserts that “Andersen filters out versions of a signal to minimize the instability effects caused by multipath errors,” and thus Andersen, instead of improving the detection, removes the multipath. *Id.* at 21–22 (citing Ex. 1019, 136:21–137:1).

Patent Owner further argues that Petitioner’s reliance on Andersen’s Kalman filter is flawed because, “[a]gain, Andersen is addressing multipath errors by removing versions of the same signal, not multiscan coherent signal processing.” PO Sur-reply 22. Andersen’s Kalman filter, Patent Owner asserts, “is not being used in Andersen to coherently process multiple signals from an RFID object resulting from multiple scans of the RFID object.” *Id.* at 22–23 (citing PO Resp. 43–45). This is because, according to Patent Owner, Andersen’s beacons 48 are “not receiving multiple scans from an interrogator and responding to the interrogator with multiple signals for coherent signal processing to discern a match and presence of the beacon 48.” *Id.* at 23.

Based on the full trial record, we find that Petitioner has sufficiently proven that the combination of Garber and Andersen teaches that the control and processing subsystem “is configured to employ multiscan, coherent signal processing” as recited in claim 6 and “employs multiscan, coherent signal processing” as recited in claim 17. As discussed above, we construe “multiscan, coherent signal processing” to mean “processing multiple

coherent (i.e., ‘in phase’) signals resulting from multiple scans.” We find that Andersen teaches processing multiple signals from multiple scans by disclosing “a system for tracking inventory having RFID components” in which “RFID receivers 50 are continually receiving the RFID beacon signals to continually determine the position of the RFID receivers.” Ex. 1007, 1:8–10, 10:42–44; *see id.* at 11:3–6 (The receiver is “continually communicating with the RFID beacons 48”). We agree with and find credible Dr. Sharony’s testimony that the term continually “basically says that [the receivers] continued to read, and these are the multiscan or multi measurements.” Ex. 1016 ¶ 45 (emphasis omitted). Andersen also teaches that the receiver 50 “communicates with all beacons 48 in its relative vicinity” and “selects several of the signals for processing.” Ex. 1007, 11:6–9. And, Andersen also teaches that, instead of active RFID beacons, the system may use Radio Frequency Identification Circuits (RFICs), which “are preferably passive and are powered by an external reader,” which would involve having an external reader scan the RFICs to generate signals that are received by a receiver for processing. *Id.* at 13:36–41. Based on these disclosures, as well as the testimony of Dr. Sharony, we find that Andersen teaches “multiscan” signal processing by processing signals arising from multiple (“continuous”) scans of the same passive RFID, as well as processing signals from multiple scans of different passive RFIDs in the relative vicinity of the receiver. *See* Ex. 1016 ¶¶ 45, 51. We also agree with Petitioner and Dr. Sharony that the processing and further refinement of these signals from multiple scans in a Kalman filter involves “multiscan, coherent signal processing.” *See* Pet. 58–59; Pet. Reply 25–26; Ex. 1007, 11:32–40, 12:41–46.

Additionally, we find that Andersen teaches multiscan *coherent* signal processing. In this regard, we rely on and find credible Dr. Sharony's testimony that one of ordinary skill "would appreciate that specific frequency RFID signals would also have a constant phase difference and, thus, be coherent." Ex. 1016 ¶ 46. Dr. Sharony further testifies that the coherent signal processing in Andersen "helps mitigate phase differences in these multiple paths [taken by the different signals], thereby allowing the receiver to combine the various paths' signals more effectively and improve the overall signal quality and reliability, thus, resulting in improved reception." *Id.* ¶ 48. Based on this testimony in combination with the disclosures of Andersen, we agree with Dr. Sharony that "Andersen discloses receiving multiple coherent inputs from multiple objects as part of its location signal processing." *Id.* ¶ 46.

We do not agree with Patent Owner's arguments to the contrary. First, we do not agree with Patent Owner's argument that Andersen discloses only receiving multiple signals and does not perform multiple scans. *See* PO Resp. 43–44; PO Sur-reply 17. As discussed above, we find that Andersen does disclose analyzing signals from multiple scans, both from the "continual" scanning of the same RFIC/RFID as well as from scanning of multiple RFIC/RFIDs.

We also disagree with Patent Owner's argument that the combination fails to teach "multiscan, coherent signal processing" because Andersen solves a different problem than the '717 patent. More specifically, Patent Owner asserts that Andersen seeks "to improve signal detection in multipath signal processing" while the '717 patent is directed to the problem of using multiple scans for "localizing and detecting multiple objects." PO Resp. 46.

Patent Owner also contends that Andersen and the '717 patent “are solving different problems with very different processing techniques” because “Andersen assumes that the first version of the same signal is not corrupt and discards other versions of that same signal,” which is not performed in the '717 patent. PO Sur-reply 17. Claims 6 and 17, however, do not recite the purpose of the “multiscan, coherent signal processing”; they merely recite that the control and processing subsystem is configured to employ or employs multiscan, coherent signal processing without further limitation on how that processing is used or what its purpose is. Ex. 1001, 30:23–25, 31:1–2. Claims 6 and 17 also do not recite specific processing techniques beyond the bare use of the term “multiscan, coherent signal processing” which, as explained above, we find broadly covers “processing multiple coherent (i.e., ‘in phase’) signals resulting from multiple scans.” *See supra* Section II.C.3. Therefore, even if Patent Owner were correct that Andersen’s processing was for a different purpose than that described in the '717 patent specification, or used different processing techniques for carrying out the “multiscan, coherent signal processing,” that would not distinguish Andersen from claims 6 and 17.

Additionally, we do not agree with Patent Owner’s argument that “[t]he position locating system 28 of Andersen operates very differently than the interrogation system of the '717 Patent” because “[t]he interrogator of the '717 Patent includes a sensing subsystem and antenna in cooperation with the control and processing subsystem that discerns the presence of and tracks the location of the RFID object,” while “[t]he position locating system 28 of Andersen oppositely tracks the location of the truck 18 that houses the receiver 50.” *See* PO Sur-reply 20. Petitioner does not rely on

Andersen to teach these limitations of the '717 patent claims. To the contrary, Petitioner relies on Garber to teach the interrogator with a sensing subsystem and antenna in cooperation with a control and processing subsystem to determine the presence of an object, and relies on the combination of Garber and Werb to teach a position sensor to provide a location of first and second objects. Pet. 15–25, 49–53. Petitioner relies on Andersen to teach the use of “multiscan, coherent signal processing” by the control and processing system. *Id.* at 57–60. As discussed above, we find that Petitioner has sufficiently shown that Andersen teaches this limitation.

Finally, we disagree with Patent Owner’s argument that Andersen’s Kalman Filter is not being used “to coherently process multiple signals from a RFID object resulting from multiple scans of the RFID object” but instead “is addressing multipath errors by removing versions of the same signal.” PO Sur-reply 22–23 (citing PO Resp. 43–45). As discussed above, we find that Andersen discloses receiving signals from multiple scans of one or more passive RFID objects, and processing those signals in a Kalman filter.

For the foregoing reasons, Petitioner has proven by a preponderance of the evidence that the combination of Garber and Andersen teaches employing multiscan, coherent signal processing.

3. *Claims 7 and 18: Adaptive Integrating Filter and an Observable and Data*

System claim 7 recites:

The interrogation system as recited in claim 1 wherein said control and processing subsystem includes *an adaptive integrating filter* and is configured to coordinate a processing of said first signal and said second signal *in conjunction with one*

of an observable and data to discern said presence of said first object and said second object.

Ex. 1001, 30:26–31 (emphasis added). Method claim 18 depends directly from independent claim 15 and recites “coordinating a processing of said first signal and said second signal in conjunction with one of an observable and data to discern said presence of said first object and said second object.” *Id.* at 31:3–7.

Petitioner, referring to its contentions for claim 6, asserts that “Andersen teaches the use of a Kalman filter, i.e., an example of the claimed adaptive integrating filter.” Pet. 59. Petitioner further contends that Garber discloses relying on “an observable” (in the form of location information) and “data” (in the form of information stored within the handheld device) to determine the presence of RFID tags. *Id.* at 59–61; *see id.* at 14–15, 37–39.

Patent Owner argues that “the Kalman filter disclosed in [Petitioner’s] combination does not constitute an adaptive integrating filter as taught in the ’717 Patent” because “Andersen teaches the use of a pre-processing and a Kalman filter to correct multipath signal errors arising from the transmission of a single signal, as opposed to Claims 7 and 17 [of the ’717 patent] which teach the use of an adaptive integrating filter to process multiple diverse inputs with a signal representing an RFID object to discern the presence of that object.” PO Resp. 46–47. Patent Owner also argues that “Andersen teaches **filtering out** the erroneous signals received when the original signal ‘is received again as it is reflected off an interfering structure’” unlike claim 7, which “employs an extended plurality of inputs” that are processed “to provide a resulting interrogator detected object and location.” *Id.* at 49 (citing Ex. 1007, 11:22–31; Ex. 1001, 18:27–39; Ex. 2018 ¶ 35).

Patent Owner further argues that “a Kalman filter can be applied to many applications including an adaptive integrating filter,” and thus “the use of the Kalman filter in the ’717 Patent as an adaptive integrating filter is not the same as—or even analogous to—Andersen’s use of a Kalman filter to address multipath errors.” *Id.* at 50 (citing Ex. 2018 ¶ 37). According to Patent Owner, “[t]he ’717 Patent’s use of processing such as Kalman filtering as an adaptive integrating filter is entirely for the purpose of locating the scanned objects” while, “[c]onversely, Andersen uses Kalman filtering to address the problems associated with multipath signals where the signal on the main path is received by the detector along with one or more copies of the same exact signal, delayed and corrupted by the transmission channel.” *Id.* at 50 (citing Ex. 2018 ¶ 37). Patent Owner contends that these two problems “are completely different,” and Andersen’s solution to improve multipath signal processing “does not address the ’717 Patent’s problem of localizing and detecting multiple objects.” *Id.*

Petitioner responds that Patent Owner acknowledges that “[a]n adaptive integrating filter 570 may be a single adaptive filter, **such as a Kalman filter.**” Pet. Reply 26 (citing PO Resp. 47). Petitioner argues that Patent Owner “does not dispute that Andersen teaches an adaptive integrating filter (i.e., a Kalman filter), but whether Andersen *uses* its Kalman filter as described in an embodiment of the ’717 Patent specification,” which would result in “importing a limitation into the claims.” *Id.* More specifically, Petitioner contends that “[c]laim 7 includes two requirements: that **the control and processing system** (1) includes an adaptive integrating filter (Kalman Filter) and (2) is configured to coordinate a processing of said signal in conjunction with one of an observable and data

to discern a presence of said RFID object.” *Id.* (citing Ex. 1001, claim 7). According to Petitioner, “[t]he claims do not require that the Kalman filter do anything,” but rather that requirement (2) is performed by “the control and processing subsystem.” *Id.* Petitioner argues that “Andersen teaches a Kalman filter as part of its ‘first onboard computer processor 58,’ and that one of ordinary skill ‘would have been expressly motivated’ to incorporate Andersen’s Kalman filter into Garber’s device to ‘‘improve the accuracy of the calculated position information’ of the interrogated tags.” *Id.* at 26–27 (citing Pet. 59–64; Ex. 1007, 11:22–42, 12:39–49).

Moreover, Petitioner argues, “Andersen teaches that its Kalman filter is configured to coordinate a processing of said signal in conjunction with one of an observable (location information) and data (database information).” Pet. Reply 27. For example, Petitioner cites Andersen’s disclosure that “[t]he **Kalman filter** may reject erroneous sensor inputs **to calculate the desired output of the position locating system 28** with the location measurement unit 56, and **a Kalman filter provides improved overall navigation accuracy.**” *Id.* (citing Ex. 1007, 11:36–40). Petitioner further cites Andersen’s disclosure that “one algorithm that may be used . . . in the **position calculation** is a **Kalman Filter**,” and that “[t]he algorithms are applied to the **signal data . . . to calculate a position** of the lift truck 18 . . . and **a position of the item of inventory 16.**” *Id.* (citing Ex. 1007, 6:42–46, 12:44–46) (ellipses in original); *see also id.* (quoting Ex. 1007, 11:63–65 (“The **inertial measurement unit 56** and **distance sensors** update the Kalman filter . . .”), 6:54–55 (“**Material identification, manufacture date, customer, and other data** are preferably stored in the RFIC.”)).

Patent Owner responds that Petitioner erroneously “attempts to read the adaptive integrating filter out of the claim” by “asserting that the claim does not require that the Kalman filter do anything” and is instead “directed to the control and processing subsystem.” PO Sur-reply 23 (citing Pet. Reply 26). In doing so, Patent Owner argues, Petitioner disregards the ’717 patent specification, which discloses that, “[w]hen coordinating the processing of observables and data, the ’717 Patent relies on the adaptive integrating filter.” *Id.* at 23–24 (citing Ex. 1001, 7:5–10, 15:52–56, 19:31–35, 29:11–17). Patent Owner further contends that Figure 5B of the ’717 patent “illustrates an adaptive integrating filter 570 that processes disparate inputs including observables and data to provide a resulting interrogator detected object and location 575.” *Id.* at 24. “Thus,” according to Patent Owner, “the control and processing subsystem of Claim 1 employs the adaptive integrating filter to coordinate a processing of signals from the objects in conjunction with one of an observable and data to discern a presence of the objects.” *Id.*

Patent Owner also argues that “Andersen does not teach the use of an adaptive integrating filter as described in Claim 7” because “Andersen teaches the use of pre-processing and a Kalman filter to correct multipath signal errors arising from the transmission of a single signal.” PO Sur-reply 24–25 (citing Ex. 1007, 11:22–32). Patent Owner acknowledges that Andersen’s “Kalman filter can assist with navigation accuracy,” but argues that it “performs that task by filtering out erroneous versions of a signal (Ex. 1007 at 11:36–40) as opposed to processing multiple diverse inputs to discern the presence of an object.” *Id.* at 25. Patent Owner also acknowledges that “Andersen refers to an inertial

measurement unit 56 and distance sensors to update the Kalman filter during time periods when between Kalman filter updates by the radio frequency direction finding system (“RFDFS”) 28,” but argues that “[u]pdating the Kalman filter software is still different from processing multiple diverse inputs to discern the presence of an object.” *Id.* (citing Ex. 1007, 11:63–65). Finally, Patent Owner acknowledges that “Andersen discloses that the Kalman filter can use an algorithm to correct for erroneous measurements in the position calculation,” but argues that, “[a]gain, the algorithm is filtering out erroneous versions of a signal for multipath error correction.” *Id.* (citing Ex. 1007, 12:44–46).

Based on the full trial record, we find that Petitioner has sufficiently shown that the combination of Garber and Andersen teach the limitations of claims 7 and 18. To begin with, we agree with Petitioner that claim 7 includes two limitations: (1) that the control and processing subsystem “includes an adaptive integrating filter” and (2) that the control and processing subsystem “is configured to coordinate a processing of said first signal and said second signal in conjunction with one of an observable and data to discern said presence of said first object and said second object.”¹¹ *See* Pet. Reply 26; Ex. 1001, 30:26–31. This understanding flows from the structure of the claim language, which recites that “said control and processing system . . . is configured to coordinate a processing of said first signal and said second signal” Ex. 1001, 30:26–31. If the inventors

¹¹ We discuss, here, claim 7, and our analysis applies, as appropriate, to claim 18. Claim 18, like claim 7, recites coordination with an observable and data, but does not recite an adaptive integrating filter. *See* Ex. 1001, 31:2–7.

intended to require the “adaptive integrating filter” to perform the “coordinate a processing . . .” activity, they could have written the claim to state that “said control and processing system includes an adaptive integrating filter *which* is configured to coordinate a processing” Instead, claim 7 states that the control and processing subsystem “includes an adaptive integrating filter *and* is configured to coordinate a processing” The use of the term “and” makes clear that the “is configured to coordinate a processing . . .” language is performed by the “control and processing subsystem,” not by the “adaptive integrating filter.”

The ’717 patent explains that “[t]he adaptive integrating filter 570 may be a single adaptive filter, such as a Kalman filter.” Ex. 1001, 18:55–56; *see* PO Resp. 47 (citing Ex. 1001, 18:51–58). Andersen discloses the use of a Kalman filter in Column 11 of its specification:

The use of “Preprocessing” filters minimizes the instability effects that multipath may cause by selectively ignoring beacon multipath measurements. Preprocessing filters can be used on radio signals to filter out any erroneous signals. ***The signals may then be further refined in a Kalman Filter***, which is a known multiple-input software filter that can optimally select or reject, in real time, the sensor inputs based on the quality of the respective sensor measurements.

Ex. 1007, 11:28–42 (emphasis added); *see* Pet. 58–59. Thus, we agree with Petitioner that Andersen discloses an “adaptive integrating filter” as part of a control and processing subsystem. As noted above, this is all claim 7 requires with respect to the “adaptive integrating filter” limitation.

We do not agree with Patent Owner’s argument that this understanding of the claim language is inconsistent with the ’717 patent specification. More specifically, Patent Owner argues that the ’717 patent specification discloses that that “[w]hen coordinating the processing of

observables and data, the '717 Patent relies on the adaptive integrating filter,” and that Figure 5B “illustrates an adaptive integrating filter 570 that processes disparate inputs including observables and data to provide a resulting interrogator detected object and location 575.” PO Sur-reply 23–24 (citing Ex. 1001, 7:5–10, 15:52–56, 19:31–35, 29:11–17). However, as discussed above, the plain and ordinary meaning of the claim language does not require that the “adaptive integrating filter” perform any particular operations. Moreover, the portions of the '717 patent cited by Patent Owner are merely exemplary embodiments, and none of those passages define or limit the term “adaptive integrating filter” to require it to perform particular functions or operations beyond those indicated by the term’s ordinary meaning which, as explained above, includes a Kalman filter as disclosed in Andersen.

We also find that Petitioner has sufficiently proven that the combination of Garber and Andersen discloses a control and processing subsystem that “is configured to coordinate a processing of said first signal and said second signal in conjunction with one of an observable and data to discern said presence of said first object and said second object,” as the second portion of claim 7 requires. Specifically, Garber teaches that “[t]he inventive handheld RFID device has particular usefulness in item location,” and one of its applications “includes locating items that are believed to be missing.” Ex. 1005, 16:36–37, 16:48–49; *see* Pet. 38. Garber further teaches that the hand-held RFID device can locate items by associating them with a shelf location, and can identify when books are located in the incorrect order on a shelf. Ex. 1005, 17:17–21, 17:44–46, 17:49–60, 18:18–22; *see* Pet. 38. Garber also teaches that the control and processing

subsystem in its hand-held RFID device carries out the above locating functions. Ex. 1005, 14:59–62, 15:63–65; *see* Pet. 39.

Additionally, we agree with Petitioner that Garber discloses locating tags based on “an observable,” i.e., location information. *See* Pet. 60. Specifically, Garber discloses that “[w]hen items are associated with a shelf location, by either method above, the operator can use the hand-held device to locate items that are in the wrong location,” by either reading several RFID tags and processing the data to infer a location, or using location tags on shelves that are read by the hand-held device to indicate that subsequent items read should belong to that location. Ex. 1005, 17:44–46, 17:49–60; *see* Pet. 60. Garber also teaches relying upon known “data,” such as “information stored within the hand-held device that is related to the tagged item.” Ex. 1005, 16:19–25; *see id.* at 16:55–17:1; Pet. 60.

Finally, we do not agree with Patent Owner’s argument that Andersen’s Kalman filter is different from the “adaptive integrating filter” of claim 7 because Andersen’s filter is used to correct multipath signal errors rather than processing a plurality of inputs to identify and locate an object. *See* PO Resp. 49–51; PO Sur-reply 24–26. As noted above, claim 7 merely states that the control and processing subsystem “includes an adaptive integrating filter,” and does not specify any particular functions or operations that the adaptive integrating filter must perform. Thus, even if Patent Owner were correct that the functions and operations performed by Andersen’s Kalman filter are different from those performed by the filter described in the ’717 patent, that would not take Andersen’s Kalman filter out of the scope of claim 7.

For the foregoing reasons, Petitioner has proven by a preponderance of the evidence that the combination of Garber and Andersen teaches the limitations of claims 7 and 18.

4. Motivation to Combine Garber and Andersen

Relying on the testimony of Dr. Sharony, Petitioner argues that one of ordinary skill would have been motivated to combine Garber and Andersen for several reasons. Pet. 62 (citing Ex. 1002 ¶¶ 255–265). First, Petitioner argues that “Garber and Andersen are analogous art to the ’717 Patent because they are in the same field of endeavor—namely, interrogation systems.” *Id.* Specifically, Petitioner relies on its arguments in Ground 2 that “Garber is analogous to the ’717 Patent because it is reasonably pertinent to the technical problem allegedly addressed by the claimed invention.” *Id.* at 62; *see id.* at 53–54. Petitioner argues that “Andersen is also analogous because it teaches ‘a system for tracking inventory having RFID components’ and is designed to remedy the deficiencies of prior art inventory tracking systems using bar codes, which can be torn, destroyed, or hidden from view. *Id.* at 62–63 (citing Ex. 1007, 1:8–10, 1:58–2:2, 2:4–5). Additionally, according to Petitioner, Andersen is intended to address multipath errors and teaches that one way to refine radio signals received by RFID tags is by using a Kalman filter. *Id.* at 63 (citing Ex. 1007, 11:25–28, 11:32–36).

Petitioner also argues that Andersen “provides ample motivation to add a Kalman filter to Garber’s hand-held device” to provide “correction of multi scanned signal / multipath errors.” Pet. 63 (citing Ex. 1007, 11:25–28, 11:32–36, 12:39–41). “As such,” Petitioner asserts, one of ordinary skill would have found it obvious “to modify Garber’s handheld device, which is used inside a library where shelves and other obstacles can result in

multipath errors, to use Andersen’s Kalman filter to address these errors.” *Id.* Additionally, according to Petitioner, one of ordinary skill “could have combined Andersen’s Kalman Filter with Garber’s hand-held device using known methods, and such a filter would merely perform the same function—resolving errors to improve detection accuracy, which is entirely predictable.” *Id.* at 63–64. Finally, Petitioner contends, one of ordinary skill would have had a reasonable expectation of success in making the proposed combination because “[t]he interrogator components described in Garber and Andersen were well-known at the time,” and the modification of Garber’s interrogator to include Andersen’s Kalman filter would have been straightforward for a person of ordinary skill. *Id.* at 64.

Patent Owner responds that Petitioner’s motivation to combine Garber and Andersen is insufficient. PO Resp. 51–54; PO Sur-reply 26. First, Patent Owner argues that the combination is based on impermissible hindsight because Petitioner did not explain why one of ordinary skill would have combined Garber and Andersen “to teach a control and processing unit employing an adaptive integrated filter or multiscan, coherent signal processing.” PO Resp. 53. According to Patent Owner, one of ordinary skill would not have been motivated to combine Garber and Andersen because “Andersen teaches the use of filters to correct multipath signal errors arising from the transmission of a single signal,” while the ’717 patent “teaches the use of filters to process multiple diverse inputs with a signal representing an RFID object to discern the presence of that object and teaches multiscan, coherent signal processing to coordinate the processing of a plurality of signals.” *Id.* at 53–54. “In either case,” Patent Owner contends, “the

problems solved by the '717 Patent involve multiple signals and not the single signal problem addressed by Andersen.” *Id.* at 54.

Petitioner responds that the references themselves provide explicit motivations to combine as discussed in the Petition. Pet. Reply 28 (citing Pet. 62–64). “These express motivations,” according to Petitioner, “negate any potential hindsight reasoning.” *Id.* (citing Ex. 1016 ¶¶ 59–60).

Based on the full trial record, we find that Petitioner has sufficiently proven that one of ordinary skill would have been motivated to combine Garber and Andersen as Petitioner proposes. First, we agree with and find credible Dr. Sharon’s testimony that Garber and Andersen are analogous art to the challenged claims of the '717 patent because all three references are directed to an RFID interrogation system and device, and Garber and Andersen are reasonably pertinent to the technical problem addressed by the claimed invention—creating an interrogation system for identifying and accounting for items that does not require each device to be interrogated separately and allows an identification element to be attached to each item. Ex. 1002 ¶¶ 256–259.

We also agree with Petitioner and Dr. Sharony that Andersen provides explicit motivations to combine Garber and Andersen because Andersen teaches the benefits of using a Kalman filter to, for example, improve the accuracy of calculated position information. Pet. 62–64; Pet. Reply 28; Ex. 1002 ¶¶ 260–261; Ex. 1016 ¶¶ 59–60. Specifically, we agree with and find credible Dr. Sharony’s testimony that Andersen teaches that multipath errors caused by reflection of a radio signal off interfering structures (such as would be found in a library where Garber’s hand-held RFID reader is intended to be used) can be resolved using a Kalman filter in order “to

improve the accuracy of the calculated position information.” Ex. 1002 ¶ 261; Ex. 1007, 11:25–28, 11:32–36, 12:39–41. We further agree with Dr. Sharony that, “[i]n view of these advantages, it would have been obvious for a [person of ordinary skill in the art] to modify Garber’s handheld device, which is used inside a library where shelves and other obstacles can result in multipath errors, to have a filter in order to achieve the advantages identified by Andersen.” Ex. 1002 ¶ 261. Finally, we agree with and find credible Dr. Sharony’s testimony that the proposed combination of Garber and Andersen would have yielded predictable results and that one of ordinary skill would have had a reasonable expectation of success in making this modification. *Id.* ¶¶ 262–263.

For the foregoing reasons, we find that Petitioner has proven by a preponderance of the evidence that one of ordinary skill would have been motivated to combine Garber and Andersen as Petitioner proposes.

5. Conclusion as to Dependent Claims 6, 7, 17, and 18

Having considered the parties’ arguments and evidence, we determine that Petitioner has shown by a preponderance of the evidence that the subject matter of claims 6, 7, 17, and 18 would have been obvious over Garber and Andersen.

G. The Remaining Grounds (Grounds 4–6)

Petitioner contends that claims 1, 3, 4, 8–16, 19, and 20 would have been obvious over Garber, Martinez, and Arndt (Ground 4), that claim 2 would have been obvious over Garber, Werb, Martinez, and Arndt (Ground 5), and that claims 6, 7, 17, and 18 would have been obvious over Garber, Andersen, Martinez, and Arndt (Ground 6). Pet. 64–74.

Petitioner contends that certain claim terms are *not* means-plus-function limitations governed by 35 U.S.C. § 112 ¶ 6. Pet. 9–12, 64; *see, e.g., id.* at 10 (“a POSITA, when reading the patent specification, would appreciate that the prefixes ‘RFID’ and ‘metal’ provide sufficiently definite structure to the term ‘sensing subsystem,’ such that the terms should not be subject to §112¶6”). Petitioner applies those constructions in Grounds 1–3. Petitioner offers Grounds 4–6 in the alternative and to the extent that the terms are deemed to be means-plus-function limitations. *Id.* at 64. The subject terms are: “RFID sensing subsystem,” “metal sensing subsystem,” “control and processing subsystem,” and “a communications subsystem.” Patent Owner agrees that these terms are not means-plus-function terms. PO Resp. 55. Petitioner, in its Reply, does not address Grounds 4–6. *See, e.g.,* Pet. Reply i–ii (Table of Contents lacking a heading for these grounds). Thus, Grounds 4–6 are premised on claim constructions for which neither party advocates.

For the reasons discussed above, Petitioner has shown persuasively that claims 1, 3, 4, 8–16, 19, and 20 are anticipated by and would have been obvious over Garber (Ground 1), that claim 2 would have been obvious over Garber and Werb (Ground 2), and that claims 6, 7, 17, and 18 would have been obvious over Garber and Andersen (Ground 3). As a result, we need not determine whether the claims also would have been obvious over those references in further combination with Martinez and Arndt (Grounds 4, 5, and 6). *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Boston Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 Fed. App’x. 984, 990 (Fed. Cir. Apr. 30, 2020) (non-precedential)

(recognizing that the “Board need not address issues that are not necessary to the resolution of the proceeding” and, thus, agreeing that the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”).

III. THE PARTIES’ OBJECTIONS TO DEMONSTRATIVE EXHIBITS

Both parties filed objections to the opposing party’s demonstrative exhibits for use at oral argument. Paper 31 (Petitioner’s objections); Paper 33 (Patent Owner’s objections). Petitioner contends that certain of Patent Owner’s demonstrative exhibit slides contain new argument not previously made in any paper and evidence not previously asserted or relied on in any paper. *See* Paper 31. Patent Owner similarly contends that certain of Petitioner’s demonstrative exhibit slides contain new argument and evidence not previously referenced or relied on. *See* Paper 33.

The parties’ demonstrative exhibits are not evidence and we do not rely on them herein. *See* PTAB Consolidated Trial Practice Guide 84 (Nov. 2019), *available at* <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf> (explaining that demonstratives exhibits are merely “aids to oral argument and not evidence” and therefore “the Board has not found that such objections are helpful in many cases”). Accordingly, we do not sustain the parties’ objections.

IV. CONCLUSION¹²

Petitioner has shown by a preponderance of the evidence that claims 1–4 and 6–20 of the ’717 patent are unpatentable.

¹² Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not Shown Unpatentable
1, 3, 4, 8–16, 19, 20	102(b)/ 103(a)	Garber	1, 3, 4, 8–16, 19, 20	
2	103(a)	Garber, Werb	2	
6, 7, 17, 18	103(a)	Garber, Andersen	6, 7, 17, 18	
1, 3, 4, 8–16, 19, 20	103(a) ¹³	Garber, Martinez, Arndt		
2	103(a) ¹⁴	Garber, Werb, Martinez, Arndt		
6, 7, 17, 18	103(a) ¹⁵	Garber, Andersen, Martinez, Arndt		
Overall Outcome			1–4, 6–20	

V. ORDER

For the foregoing reasons, it is

decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

¹³ As explained above, we do not reach this Ground 4 offered in the alternative to Ground 1.

¹⁴ As explained above, we do not reach this Ground 5 offered in the alternative to Ground 2.

¹⁵ As explained above, we do not reach this Ground 6 offered in the alternative to Ground 3.

ORDERED that claims 1–4 and 6–20 of the '717 patent have been proven to be unpatentable;

FURTHER ORDERED that Petitioner's Objections to Patent Owner's Demonstratives (Paper 31) and Patent Owner's Objections to Demonstratives (Paper 33) are not sustained; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

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