

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NOKIA OF AMERICA CORPORATION¹,
Petitioner,

v.

OYSTER OPTICS, LLC
Patent Owner.

Case IPR2018-00258
Patent 7,099,592 B2

Before JAMESON LEE, PATRICK M. BOUCHER, and
JESSICA C. KAISER, *Administrative Patent Judges*.

LEE, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

¹ Petitioner has informed the Board that Alcatel-Lucent USA Inc. has changed its name to Nokia of America Corporation. Paper 11, 1. The following Petitioner entities have been terminated from this proceeding: Coriant (USA) Inc., Coriant North America, LLC, and Coriant Operations, Inc. Paper 20, 4.

I. INTRODUCTION

A. Background and Summary

Petitioner² filed a Petition (Paper 3, “Pet.”) to institute *inter partes* review of claims 1, 3, and 13 of U.S. Patent No. 7,099,592 B2 (Ex. 1401, “the ’592 patent”). We determined that Petitioner demonstrated a reasonable likelihood of success in proving that claims 1 and 3, but not claim 13, of the ’592 patent are unpatentable, and instituted *inter partes* review on all challenged claims with respect to all grounds set forth in the Petition. Paper 13, 42. Patent Owner³ filed a Patent Owner Response. Paper 25. Petitioner filed a Reply. Paper 26. Patent Owner filed a Sur-Reply. Paper 28. The parties waived oral argument. Paper 29.

We determine that Petitioner has proved by a preponderance of the evidence that each of claims 1 and 3 is unpatentable. We determine that Petitioner has not proved by a preponderance of the evidence that claim 13 is unpatentable.

B. Related Matters

The parties identify multiple district court actions involving the ’592 patent. Pet. 1–2; Paper 6, 2–3; Paper 8, 2–3. Patent Owner identifies these *inter partes* review proceedings, involving other patents, as those which may affect or be affected by a decision in this proceeding: IPR2017-01719, IPR2017-01720, IPR2017-01724, IPR2017-01725, IPR2017-01870, IPR2017-01871, IPR2017-01874, IPR2017-01881, IPR2017-01882, IPR2017-02146, IPR2017-02173, IPR2017-02189, IPR2017-02190, IPR2018-00070, IPR2018-00146, IPR2018-00257, and IPR2018-00259. Paper 6, 3–4; Paper 8, 3–4. Petitioner identifies some

² Nokia of America Corporation.

³ Oyster Optics, LLC.

of the above *inter partes* review proceedings identified by Patent Owner as related matters. Pet. 2.

C. The '592 Patent (Ex. 1401)

The '592 patent is directed to telecommunications involving fiber optic networks. Ex. 1401, 1:8–10. An objective of the invention is to provide a card for providing secure optical data transmission over optical fiber. *Id.* at 2:28–29. The '592 patent explains that “[e]xisting amplitude modulated systems have the disadvantage that the fiber can be easily tapped and are not secure.” *Id.* at 1:42–43. The '592 patent aims to provide a card-based phase-modulated transmission system that detects when a tap may have occurred. *Id.* at 2:41–44, 2:63–3:3.

Figure 2 of the '592 patent is reproduced below:

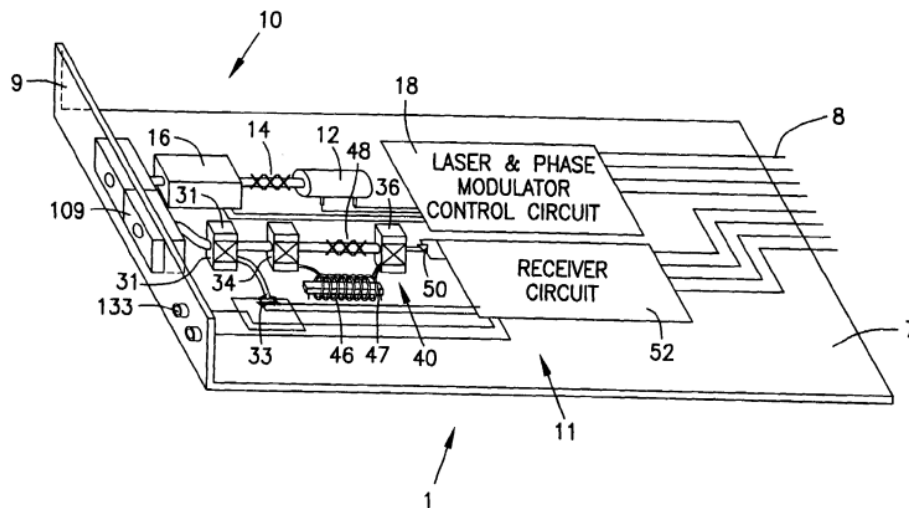


Fig. 2

Figure 2 of the '592 patent illustrates card 1 having backplane 7, which is a printed circuit board, and faceplate 9, which has fiber connector 109 for connecting to input and output fibers. *Id.* at 4:3–4, 4:7–10. Card 1 includes transmitter 10 and receiver 11. *Id.* at 2:33–35, 4:11–13, 4:33.

Transmitter 10 includes laser 12 and phase modulator 16. *Id.* at 2:35–39, 4:13–18. Light emitted from laser 12 may be depolarized by depolarizer 14 and passes through phase modulator 16. *Id.* at 4:16–19. Electronic controller 18 controls phase modulator 16 to phase modulate the light from laser 12 as a function of input data fed through connections 8. *Id.* at 4:19–32. The phase-modulated signal is output to an output fiber at fiber connector 109. *Id.* at 4:7–13.

At receiver 11, incoming optical signals are received from an input fiber at fiber connector 109. *Id.* at 4:38–39. Splitter 31 directs a portion of the light to energy level detector 33, which monitors the light energy in the input fiber. *Id.* at 4:40–44, 4:49–50. If energy level detector 33 detects a drop in amplitude, it is indicative of a tap and an alert is provided via LED 133. *Id.* at 4:50–54.

Receiver 11 also includes interferometer 40, which receives the rest of the light from splitter 31. *Id.* at 4:33–37, 4:45–46. Interferometer 40 includes splitter 34 and coupler 36. *Id.* at 4:46–48. The optical signals enter interferometer 40 through splitter 34, which splits the light so that the signals travel over a first path, which may include depolarizer 48, and a second path, which may include delay loop fiber 46. *Id.* at 4:56–62. Delay loop fiber 46 may be coiled and retained with a fastening device such as spindle 47. *Id.* at 5:10–15. Delay loop fiber 46 also may extend around the perimeter of card 1 and be “retained with a fastening device such as clips or in some similar fashion.” *Id.* at 5:15–17. The signals of the first and second paths are recombined at coupler 36 and read by photodiode 50. *Id.* at 4:62–65, 5:5–6. The signals of photodiode 50 pass through receiver circuit 52, which provides an output signal at connections 8. *Id.* at 5:6–9.

Of the challenged claims, claims 1 and 13 are independent. Both are reproduced below:

1. A card for transmitting data over at least one optical fiber, the card comprising:
 - a transmitter having at least one light source and a phase modulator for phase modulating light from the source so as to create phase-modulated optical signals in the light as a function of an input electronic data stream; and
 - a receiver having an interferometer for reading received optical signals, the interferometer having a delay loop fiber; and
 - a fastening device for securing the delay loop fiber.

Ex. 1401, 5:38–48.

13. A card for transmitting data over at least one optical fiber, the card comprising:
 - a transmitter having at least one light source and a phase modulator for phase modulating light from the source so as to create phase-modulated optical signals in the light as a function of an input electronic data stream; and
 - a receiver having an interferometer for reading received optical signals; and
 - a faceplate having a fiber tap signal device for indicating a fiber tap.

Id. at 6:21–30 (line breaks added for readability).

D. Evidence Relied Upon by Petitioner

Petitioner relies on the following references:⁴

⁴ The '592 patent was filed on February 2, 2001. Ex. 1401, at [22].

Reference		Date	Exhibit
Swanson	Swanson et al., <i>High Sensitivity Optically Preamplified Direct Detection DPSK Receiver with Active Delay-Line Stabilization</i> , IEEE Photonics Tech. Ltrs., vol. 6, no. 2, Feb. 1994	Feb. 1994	1405
Hamlet	U.S. Patent No. 6,285,548 B1	Sept. 4, 2001; filed Aug. 18, 2000	1406
Stowe	U.S. Patent No. 5,138,676	Aug. 11, 1992	1407
Walsh	U.S. Patent No. 5,825,516	Oct. 20, 1998	1408

Pet. iv, 4–5. Petitioner also relies on the Declarations of Drs. Duncan MacFarlane (Ex. 1402) and Carrie Gardner (Ex. 1409).

E. The Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability (Pet. 4; Paper 13, 7):

Claim Challenged	Basis	References
1	§ 103(a)	Swanson, Hamlet, and Stowe
3	§ 103(a)	Swanson, Hamlet, Stowe, and Walsh
13	§ 103(a)	Swanson, Hamlet, and Walsh

II. ANALYSIS

A. Whether the Proceeding must be Dismissed without Issuance of a Final Written Decision

Patent Owner asserts that this *inter partes* review proceeding “should be dismissed without a final written decision.” PO Resp. 11. Patent Owner, citing *SAS Institute Inc. v. Iancu*, 138 S. Ct. 1348 (2018), correctly notes that the Supreme Court instructed that the Board either institute trial on all the claims and grounds alleged by Petitioner, or not at all. *Id.* at 10. According to Patent Owner, however, the Board still has governing regulations requiring that only challenged claims for which Petitioner has shown a reasonable likelihood of prevailing “may be instituted” for trial. *Id.* at 10–11. Thus, Patent Owner argues:

the sole permissible outcome, consistent with both the binary decision required under *SAS* (either all challenged claims or none must be instituted) and the Board’s governing regulations (only challenged claims in which there is a reasonable likelihood of prevailing on unpatentability may be instituted), is for the Board to not institute *inter partes* review.

Id.

In the Decision on Institution, we determined that Petitioner demonstrated a reasonable likelihood of prevailing on claims 1 and 3, but not claim 13. Paper 13, 2. We are not persuaded by Patent Owner’s argument that, absent promulgation of new rules, we are precluded by the Board’s governing regulations from reaching a final written decision with respect to the claims and grounds for which Petitioner was determined to not have presented a reasonable likelihood of success at the time of institution of review. The current rules already cover the situation in which, at the time of institution of review, the Board determines that there are certain claim(s) and ground(s) for which the Petitioner has not shown a reasonable

likelihood of prevailing at trial and do not prohibit institution of review with respect to all claims and grounds in that circumstance.

Specifically, Patent Owner notes 37 C.F.R. § 42.108(a) (2017), which allows the Board to “authorize the review to proceed on all or some of the challenged claims and on all or some of the grounds of unpatentability asserted for each claim.” PO Resp. 9. Patent Owner also notes 37 C.F.R. § 42.108(b), which allows the Board to “deny some or all grounds for unpatentability for some or all of the challenged claims’ prior to institution of *inter partes* review.” *Id.* Patent Owner notes 37 C.F.R. § 42.108(c), which provides: “*Inter partes* review shall not be instituted for a ground of unpatentability unless the Board decides that the petition supporting the ground would demonstrate that there is a reasonable likelihood that at least one of the claims challenged in the petition is unpatentable.” *Id.*

None of these referenced parts of 37 C.F.R. § 42.108 requires exclusion of any claim or ground from an instituted proceeding—including those for which the Board has determined that Petitioner has not shown a reasonable likelihood that it would prevail in establishing unpatentability. The current rules cover and permit a trial to include challenged claims and corresponding grounds of unpatentability for which the Petitioner has not shown a reasonable likelihood of prevailing.

Patent Owner further notes:

In implementing these final rules, the Agency stated, “[t]he Board will identify the grounds upon which the review will proceed on a claim-by-claim basis. Any claim or issue not included in the authorization for review is not part of the review.” *See* 77 Fed. Reg. 48,689. Indeed, the Agency specifically stated that the regulations did not adopt comments requesting that “all challenged claims to be included in the *inter partes* review when there is a reasonable likelihood of prevailing with respect to one challenged claim.” *See* 77 Fed. Reg. 48,702–03.

Id. at 10.

As is the case with 37 C.F.R. § 42.108, however, such statements do not indicate the Board is *prohibited* from including all challenged claims in the *inter partes* review—including when a petitioner shows a reasonable likelihood of success at trial with respect to just some (or even only one) of the challenged claims and just some (or even only one) of the asserted grounds of unpatentability. *See, e.g., FMC Techs., Inc. v. OneSubsea IP UK Ltd.*, Case IPR2016-00378, slip op. at 8 (PTAB June 30, 2016) (Paper 7) (instituting review “on all of the challenged claims and on all of the asserted grounds, as raised in the Petition,” upon finding a reasonable likelihood of success with respect to one claim). We disagree with and reject Patent Owner’s contention that in the circumstances of this case, issuing a final written decision with respect to all challenged claims and grounds identified in the Petition is contrary to regulation.

For the foregoing reasons, we reject Patent Owner’s contention that this *inter partes* review should be dismissed without issuance of a final written decision.

B. The Burden of Proof

In an *inter partes* review, the petitioner has the burden of proving unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). That burden never shifts to the patentee. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

C. The Law on Obviousness

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 ordinary skill in the art; and (4) when in evidence, objective indicia of

nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). One seeking to establish obviousness based on more than one reference also must articulate sufficient reasoning with rational underpinning to combine teachings. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

D. Level of Ordinary Skill in the Art

Petitioner proposes a level of ordinary skill in the art. Pet. 5. Patent Owner has not taken a position. *See generally* PO Resp. Petitioner’s articulation is vague, as it refers to “at least” five years of experience in designing optical transmission systems, with no upper bound. The range is too broad, as it encompasses both just 5 years and over 35 years.

We do not adopt Petitioner’s articulation. We nevertheless determine that no express finding on the level of ordinary skill is necessary, and that the level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978). This is the same position we articulated in the Decision on Institution. Paper 13, 13.

E. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b) (2017);⁵ *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2142–46 (2016). Consistent with that

⁵ A recent amendment to this rule does not apply here because the Petition was filed on December 1, 2017, prior to the November 13, 2018, effective date of the rule change. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (to be codified at 37 C.F.R. pt. 42).

standard, claim terms are generally given their ordinary and customary meaning, as would have been understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). There are, however, two exceptions to that rule: “1) when a patentee sets out a definition and acts as his own lexicographer,” and “2) when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Thorner v. Sony Comput. Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012).

It is likewise not enough [for disavowal] that the only embodiments, or all of the embodiments, contain a particular limitation. We do not read limitations from the specification into claims; we do not redefine words. Only the patentee can do that. To constitute disclaimer, there must be a clear and unmistakable disclaimer.

Id. at 1366–67; *see also EPOS Techs. Ltd. v. Pegasus Techs. Ltd.*, 766 F.3d 1338, 1341 (Fed. Cir. 2014); *Liebel–Flarsheim v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004) (“[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.”).

If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). Disavowal can be effectuated by language in the specification or the prosecution history. *Poly-America, L.P. v. API Indus., Inc.*, 839 F.3d 1131, 1136 (Fed. Cir. 2016). “In either case, the standard for disavowal is exacting, requiring clear and unequivocal evidence that the claimed invention includes or does not include a particular feature.” *Id.* The claims must not be read restrictively unless

the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1347 (Fed. Cir. 2015).

Only terms which are in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017); *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011); *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

“fastening device for securing the delay loop fiber”

Under 35 U.S.C. § 112, paragraph 6, “[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.”⁶

Claim 1 recites “a fastening device for securing the delay loop fiber.” Ex. 1401, 5:48. This phrase, containing a functional limitation, does not include the word “means,” and thus presumptively is not a means-plus-function limitation under 35 U.S.C. § 112, paragraph 6. *Williamson*, 792 F.3d at 1348. However, that presumption can be overcome, such as when the phrase does not recite sufficiently definite structure, or recites function without reciting sufficient structure for performing that function. *Id.* at 1349. That is the case here.

⁶ Paragraphs 1–6 of § 112 were replaced with §§ 112(a)–(f) when § 4(c) of the Leahy-Smith America Invents Act, Pub. L. No. 112–29, 125 Stat. 284, 329 (2011) (“AIA”) took effect on September 16, 2012. Because the patent application resulting in the ’592 patent was filed before the effective date of the AIA, we refer to the pre-AIA version of 35 U.S.C. § 112.

The term “device” is so broad that it does not sufficiently convey definite structure. As the Federal Circuit has stated, “[g]eneric 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.’” *Id.* at 1350 (citation omitted). The words before and after “device” are “fastening” and “for securing the delay loop fiber,” and those recitations are not structural but functional. Furthermore, the phrase reflects the typical format of a means-plus-function element that does employ the word “means.” Accordingly, we construe the phrase “fastening device for securing the delay loop fiber” as a means-plus-function element under 35 U.S.C. § 112, paragraph 6. The function recited is “securing the delay loop fiber.” The word “fastening” preceding “device” is simply part of the name for the element and in any event does not change the securing function recited following “device.”

The corresponding structures for “fastening device for securing the delay loop fiber” described in the specification of the ’592 patent are spindle 47 or clips. Ex. 1401, 5:13–18. Thus, we determine that the claimed “fastening device for securing the delay loop fiber” covers a spindle or clips, and equivalents thereof.⁷

“fiber tap signal device”

Claim 13 recites a “fiber tap signal device.” Ex. 1401, 6:29–30. Neither party proposed a construction for this term. Based on arguments presented by Petitioner in its Reply, however, resolution of Petitioner’s challenge to claim 13

⁷ This is the same construction we provided in the Decision on Institution. Paper 13, 9. Post institution of trial, neither party presented arguments against this construction.

depends on the meaning of “fiber tap signal device.” We discuss the term, more in context, in the analysis of claim 13 below.

F. Alleged Obviousness of Claim 1
over Swanson, Hamlet, and Stowe

1. Swanson as Printed Publication

Petitioner asserts that “*Swanson* (Ex-1405) was published in February 1994” and is prior art under 35 U.S.C. § 102(b). Pet. 4–5 (citing Ex. 1409 ¶¶ 11–27). A header appearing on the first and second pages of *Swanson* reads, “IEEE PHOTONICS TECHNOLOGY LETTERS, VOL. 6, NO. 2, FEBRUARY 1994.” Ex. 1405, 1–2.^{8,9} A footer appearing on the first page of *Swanson* reads, “1041-1135/94\$04.00 © 1994 IEEE.” *Id.* at 1. Dr. Gardner, relied on by Petitioner as an expert in the field of library and information science (Ex. 1409 ¶¶ 2, 4–7), testifies that the cover page of *Swanson* “indicates that the document was included in ‘IEEE Photonics Technology Letters’ at volume 6, number 2, dated February 1994” and “indicates that the document was copyrighted by IEEE in 1994.” Ex. 1409 ¶¶ 12–13.

The Patent Owner Response includes no argument regarding the date of publication of *Swanson* or whether *Swanson* was published. We note also that for established publishers, absent some indication that the reference was *not* publicly available, it is generally not necessary for Petitioner to submit evidence of subject matter indexing and/or searchability. See *Giora George Angres, Ltd. v. Tinny Beauty & Figure, Inc.*, No. 96-1507, 1997 WL 355479, at *7 (Fed. Cir. June 26,

⁸ We cite the exhibit page numbers added by Petitioner.

⁹ The third and last page of *Swanson* has a header containing author and title information: “SWANSON *et al.*: HIGH SENSITIVITY OPTICALLY PREAMPLIFIED DIRECT DETECTION.” Ex. 1405, 3.

1997) (unpublished) (finding “no reason to suspect that [a reference published by an established publisher] was not publicly available, including to one skilled in the art” when “no evidence was presented that it was not”).

IEEE is an established and well-known publisher of technical papers. *See Ericsson Inc. v. Intellectual Ventures I LLC*, Case IPR2014-00527, slip op. at 10–11 (PTAB May 18, 2015) (Paper 41). On the evidence presented by Petitioner, we determine that Petitioner has sufficiently established that Swanson was published in February 1994 and is prior art to the ’592 patent under 35 U.S.C. § 102(b).

2. Swanson (Ex. 1405)

Swanson is a report describing the results of experiments performed with a communication link. Ex. 1405, Abstr. The communication link includes a differential phase shift keying (DPSK) receiver having an optical delay line demodulator. *Id.* Swanson states: “We report on the first, to our knowledge, active stabilization of an optically preamplified and optical demodulated DPSK receiver which achieved a record sensitivity of 62 photons/bit at 3Gb/s.” *Id.* at 1. Swanson does not include any negative statement indicating failure or inoperativeness of any kind regarding the tested communication link. Swanson concludes:

In summary, we have demonstrated an active stabilization technique for an optically preamplified and optically demodulated 3 Gb/s DPSK receiver and achieved a record sensitivity of 62 photons/bit. We observed no difference in the receiver BER [bit error rate] with and without the stabilization circuitry when the delay line was housed in a thermal enclosure and achieved stable operation for more than 8 hours.

Id. at 2.

According to Swanson, DPSK offers improved sensitivity over optically preamplified on/off keying. *Id.* Swanson’s DPSK receiver includes a “Mach-Zehnder interferometer with a 1-bit delay in one arm” and a dual balanced receiver.

Id. To “set the received signal power and simulated channel loss” at the DPSK receiver input, Swanson uses an external cavity fiber coupled laser and a fiber-coupled phase modulator, in combination with a variable optical attenuator. *Id.* Thus, Swanson’s described experiment simulates an optical communication link in the field by having the transmitter and receiver connected to each other at the same location, and using a variable attenuator to adjust the signal strength of the transmitted signal to simulate channel loss in an actual system where the transmitter and receiver are disposed remote from each other. *Id.*

Figure 1 of Swanson (*id.*) is reproduced below:

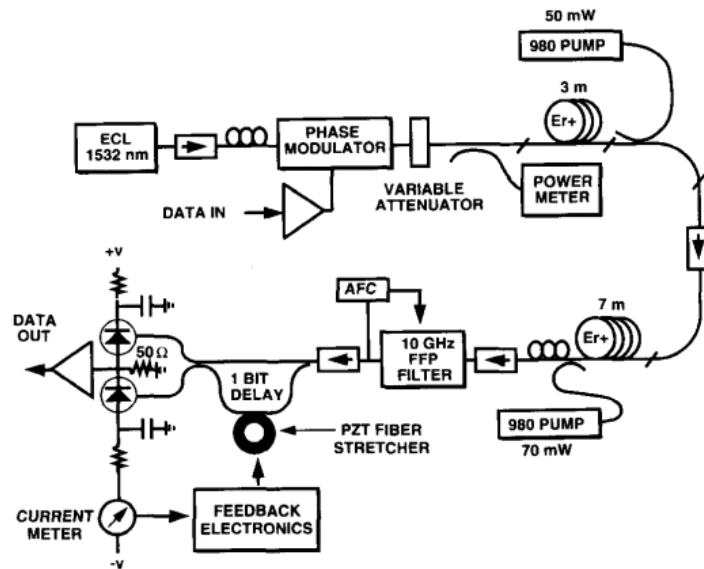


Fig. 1. Diagram of the experimental 3 Gb/s preamplified direct detection DPSK experiment.

Figure 1 of Swanson is a diagram showing an external cavity laser (ECL) tuned to 1532 nm and connected (indirectly) to a phase modulator, the output of which is connected to a variable attenuator. Also shown is an input DATA IN amplified and connected to the phase modulator. According to Swanson, the phase modulation occurs “at the transmitter.” *Id.*

Figure 1 of Hamlet shows modular rack 26, with portions broken away. *Id.* at 2:64–65. Modular rack 26 is for use in optical switching. *Id.* at 3:29–30. Housing 28 of modular rack 26 is formed of sheet metal and has opening 40 to receive printed circuit boards (PCB) 42 (shown in Figure 2) via upper and lower card guides 50, 52. *Id.* at 3:35–39, 3:50–54, 4:7–8. Each PCB 42 has a respective faceplate 20. *Id.* at 5:17–21. The upper portion of housing 28 holds fans 82 (shown in Figure 2) for drawing air through housing 28. *Id.* at 4:24–28. Openings 54 in card guides 50, 52 and holes 90, 92 on housing 28 allow airflow. *Id.* at 3:47–49, 4:32–36. Openings 90, 92 are positioned to reduce the electromagnetic field exiting modular rack 26 through openings 90, 92. *Id.* at 4:38–43. Housing 28 also has openings 72 for routing cables. *Id.* at 4:14–18, 5:66–6:2.

Figure 2 of Hamlet is reproduced below:

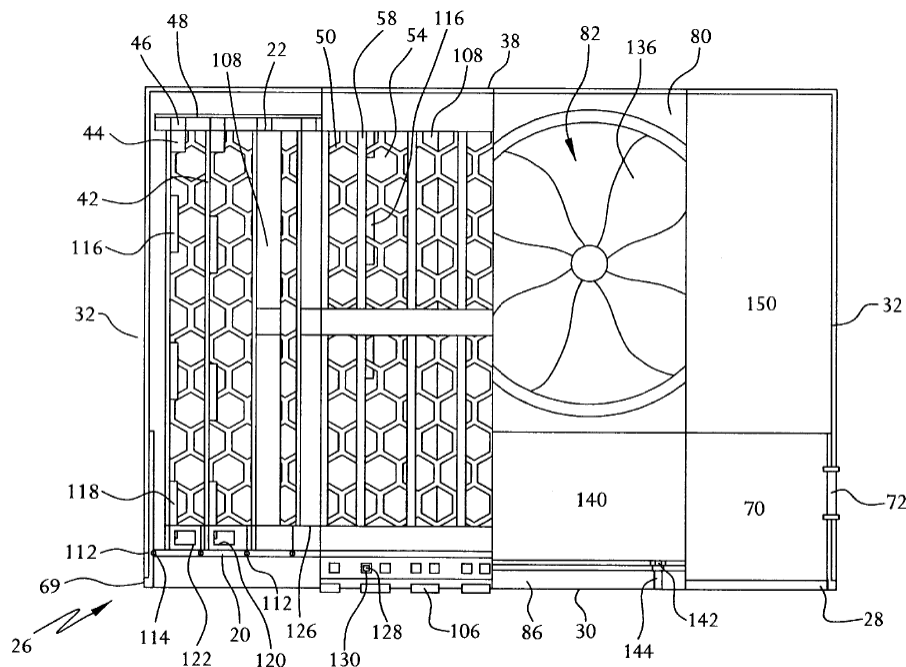


FIG. 2

Figure 2 of Hamlet is a cross sectional view of modular rack 26 showing sections of modular rack 26 at various elevations looking downward. *Id.* at 4:66–5:1.

Looking left to right, the first quarter of Figure 2 shows a cross section of PCBs 42 extending from faceplates 20. *Id.* at 5:1–3, 5:17–18. Metallic seals 114 engage and fill the gaps between adjacent faceplates 20 to form a continuous electromagnetic shield. *Id.* at 5:7–12, 7:66–8:2. The second quarter of Figure 2 offers a top view of openings 54 in upper card guide 50. *Id.* at 5:46–48. Components 116 on PCB 42 can be seen through openings 54. *Id.* at 5:48–50. Metallic seals 114 compressed between faceplates 20 and the sides of openings 54 prevent EMI waves from passing through openings 54. *Id.* at 9:47–51. The third quarter shows fan casing 80 having a plurality of fans 82. *Id.* at 5:51–54. The fourth quarter shows cable channel or trough 70 with openings 72 though housing 28 for routing cables, and a plenum 150, to which air flows via a duct, located behind cable channel 70. *Id.* at 5:65–6:5.

Figure 3A of Hamlet is reproduced below:

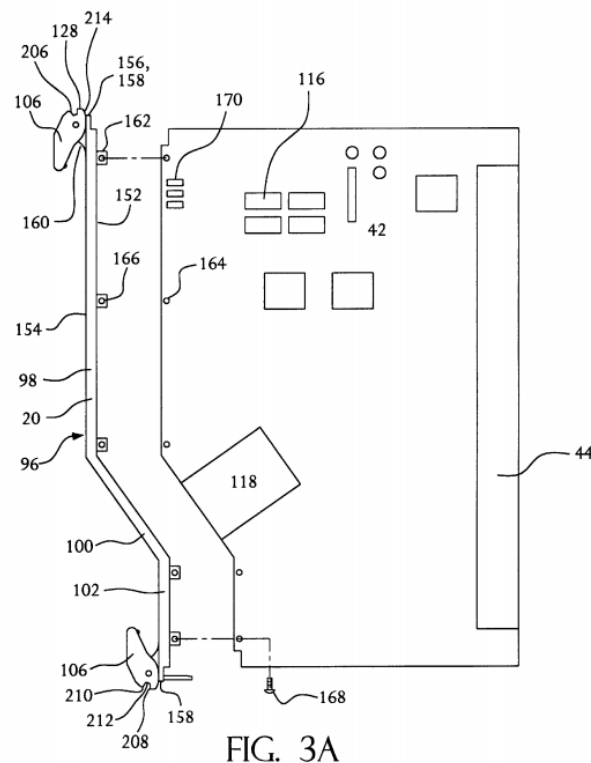


Figure 3A of Hamlet is a side view of PCB 42 with faceplate 20 exploded away. *Id.* at 3:1–2. PCB 42 has a plurality of components 116, including optical transceiver 118 and LEDs 170. *Id.* at 6:32–35. Faceplate 20 has openings 72 (shown in Figure 4A) for light channels to project light from LEDs 170 on PCB 42 to the outside of faceplate 20. *Id.* at 6:45–50. Hamlet does not describe any specific structure or configuration for its optical transceiver 118.

4. Stowe (Ex. 1407)

Stowe relates to bending or twisting optical fibers without incurring appreciable loss of optical power or breakage of the fiber. Ex. 1407, 1:6–10. Stowe discloses that reducing the cross-sectional area of a section of the fiber where bending is desired results in improved performance features, such as reduced optical power loss, and mechanical flexibility. *Id.* at Abstr., 5:27–33.

Figure 7 of Stowe is reproduced below:

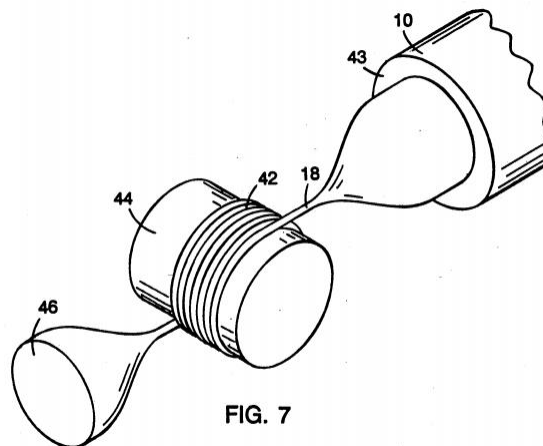


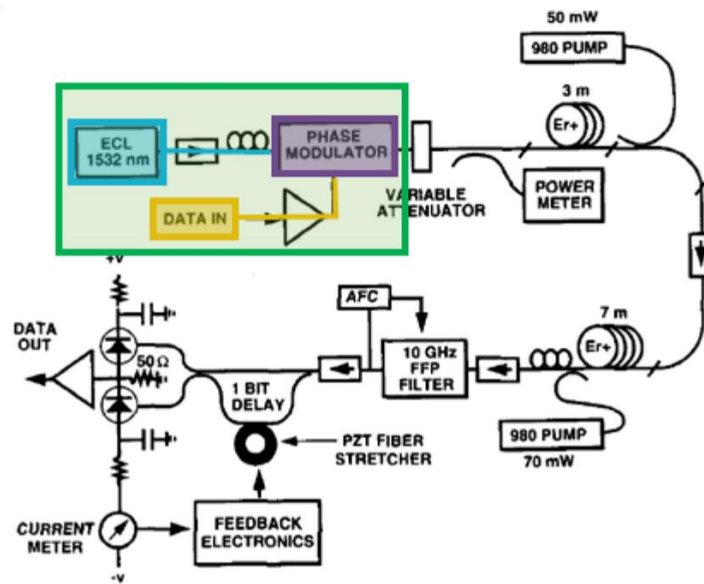
Figure 7 of Stowe shows a section 18 of fiber 10 having a reduced cross-sectional area wrapped 42 around cylindrical rod 44. *Id.* at 16:12–16. Rod 44 may be a piezoelectric element that radially expands when excited by a driving voltage, to phase-modulate an optical signal passing through reduced fiber 18 based on the frequency of the driving voltage. *Id.* at 16:31–35. Stowe discloses that the

assembly of Figure 7 can be used as a miniature phase delay line or a miniature phase or polarization modulator. *Id.* at 16:28–30. Stowe also discloses that a fiber wrapped around rod 44 may act as a phase shift reference arm or sensing arm of an interferometer. *Id.* at 16:42–45.

5. Analysis

Independent claim 1 recites: “A card for transmitting data over at least one optical fiber.” Ex. 1401, 5:38–39. Petitioner asserts that Hamlet discloses PCB card 42 for transmitting data modulated on an optical signal via a “fiber optics cable 222 extending from the optical transceiver 118.” Pet. 44 (quoting Ex. 1406, 8:63–65) (citing Ex. 1406, 5:19–27, 6:42–45, Figs. 3A, 7; Ex. 1402 ¶¶ 82–83). Patent Owner has not argued otherwise. Petitioner’s assertions are supported by the cited evidence, including the testimony of Dr. MacFarlane. We determine that this limitation is satisfied by Hamlet’s card 42.

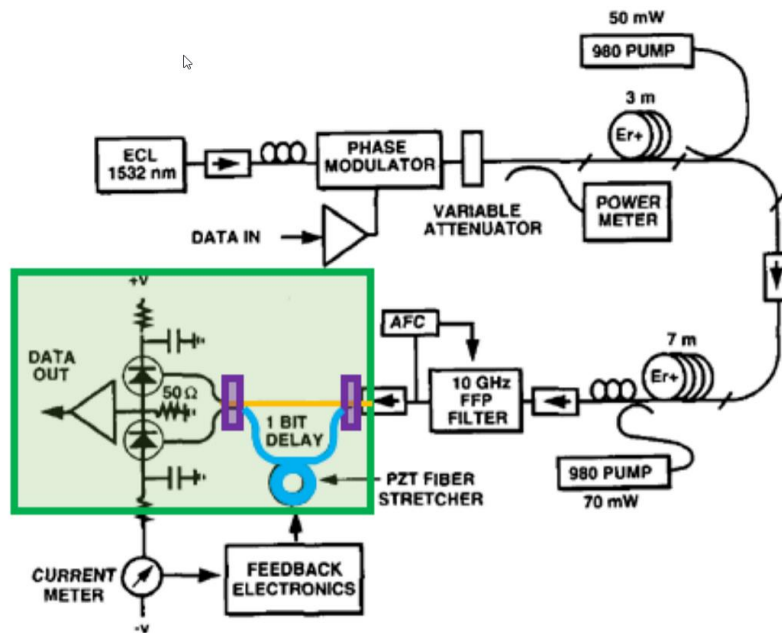
Claim 1 further recites that the card comprises “a transmitter having at least one light source and a phase modulator for phase modulating light from the source so as to create phase-modulated optical signals in the light as a function of an input electronic data stream.” Ex. 1401, 5:40–43. Petitioner relies on Swanson for the transmitter limitation. Pet. 45–47. Dr. MacFarlane provides an annotated Figure 1 of Swanson, reproduced below, using colored boxes, and in particular a green box to identify Swanson’s transmitter:



From Fig. 1 of Swanson

The above-reproduced figure is a color-annotated Figure 1 of Swanson, produced by Dr. MacFarlane, with the green box identifying Swanson's transmitter. Ex. 1402 ¶ 84. Petitioner identifies in Swanson a transmitter (green box in the figure above) in which laser light from an external cavity fiber-coupled laser (light blue) is DPSK modulated by a fiber-coupled AT&T LiNO₂ phase modulator (purple) as a function of DATA IN (orange). Pet. 45–47 (citing Ex. 1405, Abstr., 1–2, Fig. 1; Ex. 1402 ¶¶ 84–85); *see also* Pet. 16–17. Dr. MacFarlane testifies that the “resultant operation of the transmitter [of Swanson] is to create DPSK modulated optical signals . . . which are ‘phase-modulated optical signals.’” Ex. 1402 ¶ 85. Patent Owner has not argued otherwise. Petitioner's assertions are supported by the cited evidence, including the testimony of Dr. MacFarlane. We determine that Swanson's transmitter, i.e., what is shown in the green box above, satisfies the limitation “a transmitter having at least one light source and a phase modulator for phase modulating light from the source so as to create phase-modulated optical signals in the light as a function of an input electronic data stream.”

Claim 1 further recites that the card comprises “a receiver having an interferometer for reading received optical signals, the interferometer having a delay loop fiber.” Ex. 1401, 5:45–47. Petitioner relies on Swanson for this receiver limitation. Pet. 47–49. Dr. MacFarlane provides an annotated Figure 1 of Swanson, reproduced below, using colored boxes, and in particular a green box to identify Swanson’s receiver:



From Fig. 1 of Swanson

The above-reproduced figure is a color-annotated Figure 1 of Swanson, produced by Dr. MacFarlane, with the green box identifying Swanson’s transmitter.

Ex. 1402 ¶ 86. Petitioner identifies in Swanson a receiver having a Mach-Zehnder interferometer, where the interferometer includes a differential delay of one bit time (333 ps) and a delay loop fiber wrapped around a piezoelectric transducer (PZT). Pet. 47–48 (citing Ex. 1405, 1–2, Fig. 1; Ex. 1402 ¶¶ 86–87); *see also* Pet. 16–17. Patent Owner has not argued otherwise. Petitioner’s assertions are supported by the cited evidence, including the testimony of Dr. MacFarlane. We determine that Swanson’s receiver, i.e., what is shown in the green box above,

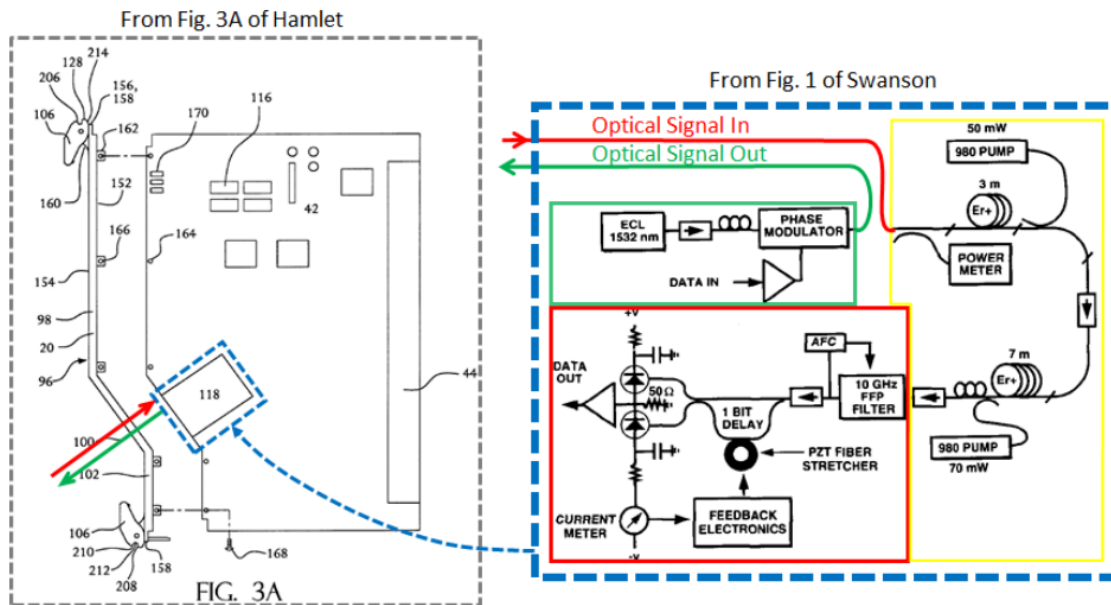
satisfies the limitation “a receiver having an interferometer for reading received optical signals, the interferometer having a delay loop fiber.”

With regard to the requirement of claim 1 that “the card” comprises both the transmitter and the receiver, Petitioner asserts that it would have been obvious to one with ordinary skill in the art to implement Swanson’s transmitter and receiver on the card disclosed in Hamlet. Pet. 26 (citing Ex. 1402 ¶¶ 70–74). Petitioner explains:

Hamlet discloses a modular rack 26, which houses a card 42, on which an optical transceiver 118 (i.e., an optical transmitter and an optical receiver) is mounted. Ex-1402, ¶¶70-71, Ex-1406, 3:29-30, 8:43-46. A POSITA [person of ordinary skill in the art] would have recognized *Hamlet*’s optical transceiver 118 to be analogous to the optical transmitter and an optical receiver in *Swanson* for transmitting and receiving optical signals modulated with binary data over optical fibers in an optical network. Ex-1402, ¶70. Given the common functionality of *Hamlet*’s transceiver and *Swanson*’s transmitter and receiver, a POSITA would have recognized that the problems discussed in *Hamlet*, such as a need to reduce the emission of electromagnetic interference (EMI) and the simultaneous need to expel heat generated by components, would be present in *Swanson*’s transmitter/receiver system, and that implementing the *Swanson* transmitter and receiver on the *Hamlet* card and chassis would be a ready and predictable means for addressing these issues. Ex-1402, ¶¶70–71.

Id. at 26–27. Petitioner’s explanation is supported by the cited evidence, including the testimony of Dr. MacFarlane. Notwithstanding Patent Owner’s contrary argument, discussed and rejected below, we are persuaded by the above-quoted arguments of Petitioner that it would have been obvious to one with ordinary skill in the art to implement Swanson’s transmitter and receiver on card 42 of Hamlet as Hamlet’s transceiver 118.

Petitioner provides a composite figure on page 30 of the Petition, reproduced below:



Pet. 30. The figure illustrates, according to Petitioner, how a person of ordinary skill would have integrated Swanson's transmitter and receiver with Hamlet's card 42. *Id.* at 29. Specifically, Petitioner asserts that Swanson's optical transmitter (green box) and receiver (red box) would have been integrated in place of optical transceiver 118 (light blue) on card 42 of Hamlet. *Id.* at 29 (citing Ex. 1402 ¶ 73). Petitioner explains that Swanson's preamplifier components (yellow) could be located on or off Hamlet's card 42. *Id.* Petitioner further explains:

In *Swanson*, the transmitter and receiver are connected together through a variable optical attenuator for the purposes of demonstrating the performance of the receiver. Ex-1402, ¶¶49, 73; Ex-1405, p. 1, Fig. 1. The variable optical attenuator emulates channel loss in a hypothetical optical network. *Id.* But, in using the *Swanson* transmitter and receiver as a transceiver as in *Hamlet*, the output of the transmitter and the input of receiver would not be arranged to exchange data with each other, but would be arranged to communicate with another transceiver at another location in the optical network. Ex-1402, ¶73. Accordingly, the annotated figure eliminates the variable optical attenuator and replaces it with an optical signal input (red line) path and an optical signal output (green line) path connectable to optical fibers, for example, via *Hamlet's* "LC-LC duplex adapter, which allows fiber

optic cabling to extend, in two segments, from the optical transceiver 118 through the interface 122 and extend outward and enter the cable channel or trough 70.” Ex-1402, ¶73; Ex-1406, 5:19-27; *see also id.*, 8:63-65; Fig. 7.

Id. at 30–31. Thus, in Petitioner’s proposed combination, “*Hamlet’s* transceiver [118 and light blue] would, for example, be implemented with *Swanson’s* transmitter (green) and receiver (red).” *Id.* at 44 (citing Ex. 1406, 5:19–27, 8:63–65, Fig. 7; Ex. 1405, Fig. 1); *see also* Ex. 1402 ¶ 82.

Petitioner additionally asserts that “a POSITA would have recognized that the Hamlet card would have provided several other benefits to the *Swanson* system, such as providing a mechanical structure, electrical and optical interconnect, power supplies, fiber routing, etc., which would be necessary to implement the *Swanson* system. Ex-1402, ¶70.” *Id.* at 27. Specifically, Petitioner refers to auxiliary elements for supporting the operation of the optical transceiver on the card, including (1) a faceplate having fiber optic connectors for interfacing the optical transceiver to optical fibers in an optical network, (2) an interface backplane connector 44 for providing power to the optical transceiver and for providing electrical connections between the optical transceiver and other electrical components in the system, and (3) a plurality of fans 82 and holes 90 and 92, arranged in a manner that allow airflow to dissipate heat and to reduce electromagnetic interference (EMI) for improved performance. *Id.* at 27–28 (citing Ex. 1406, 3:36–39, 4:25–27, 4:33–43, 8:4–46, 8:57–67; Ex. 1402 ¶ 71).

Petitioner’s assertions are supported by the cited evidence, including the testimony of Dr. MacFarlane. Notwithstanding Patent Owner’s contrary argument, discussed and rejected below, we are persuaded by the above-noted arguments and explanations of Petitioner.

Patent Owner advances numerous arguments against Petitioner's proposed combination of Swanson and Hamlet. As explained below, many of Patent Owner's arguments are misplaced based on an apparent misreading or misunderstanding of Petitioner's assertions. As is clearly expressed by Petitioner in text reproduced above from pages 30 and 31 of the Petition, Petitioner proposes an actual optical communication system with the transmitter and receiver remotely located from each other, and not a modified Swanson "experiment" that still connects the output to the input at the same location and uses an attenuator to simulate actual channel loss. Patent Owner erroneously suggests Petitioner is attempting to construct a modified experiment that still simulates an actual communication system. Hereinafter, we refer to this misdirected argument of Patent Owner as "the experiment argument."

Patent Owner argues that Dr. MacFarlane fails to state that "the Swanson Letter's experiment has the problems discussed in Hamlet or that EMI reduction or EMI reduction with simultaneous heat expelling is needed by the Swanson Letter's experiment." PO Resp. 19. But it is not Petitioner's contention that Swanson's experiment had such needs or problems in the described conditions in which the transmitter and receiver are placed at the same location and an attenuator is used to simulate channel loss in transmission. Patent Owner's experiment argument is misplaced and not persuasive.

Patent Owner argues that there is no explanation by Petitioner why one with ordinary skill in the art having possession of Swanson would have needed another reference to show a mechanical structure, electrical and mechanical interconnect, power supplies, thermal management, fiber routing, etc. "to complete the Swanson experiment." *Id.* at 20. But it is not Petitioner's proposal to revise, modify, or redo the Swanson experiment in any other form, or to "complete" the Swanson

experiment, and Patent Owner does not explain in what manner the Swanson experiment is alleged to be incomplete. This experiment argument has been rejected above.

Patent Owner argues that “nothing in Hamlet would have been necessary to conduct the experiment of the Swanson Letter on a direct detection DPSK receiver, and this alleged motivation is not supported by the evidence.” *Id.* at 22. But it is not Petitioner’s contention that components from Hamlet would have been necessary to conduct the Swanson experiment. This experiment argument has been rejected above.

Patent Owner argues: “No explanation is given in the Petition as to why a POSITA would have been motivated to make all of these modifications to an experiment.” PO Resp. 24. But Petitioner has not proposed to change or modify an experiment. This experiment argument has been rejected above.

Patent Owner argues: “Petitioner has not explained why a POSITA would have been motivated to modify the Swanson Letter experiment such that the loop-back [connecting transmitter output to receiver input at the same location] and attenuator [to simulate channel loss in transmission] would be eliminated and the components connected to external fibers that are not a part of the DFPSK receiver being tested.” PO Resp. 26. This experiment argument has been rejected above.

As Petitioner explained:

Given the common functionality of *Hamlet’s* transceiver and *Swanson’s* transmitter and receiver, a POSITA would have recognized that the problems discussed in *Hamlet*, such as a need to reduce the emission of electromagnetic interference (EMI) and the simultaneous need to expel heat generated by components, would be present in *Swanson’s* transmitter/receiver system, and that implementing the *Swanson* transmitter and receiver on the *Hamlet* card and chassis would be a ready and predictable means for addressing these issues. Ex-1402, ¶¶70–71.

Pet. 27. As Petitioner further explained: “a POSITA would have recognized that the Hamlet card would have provided several other benefits to the *Swanson* system, such as providing a mechanical structure, electrical and optical interconnect, power supplies, fiber routing, etc., which would be necessary to implement the *Swanson* system. Ex-1402, ¶70.” *Id.*

Indeed, Hamlet describes nothing in detail about its transceiver 118 and also does not limit the type of transmitter or receiver that may be used in transceiver 118. Patent Owner is incorrect in suggesting that Petitioner states that Swanson’s equipment “could be” placed on card 42 of Hamlet without providing a proper motivation to combine Swanson’s equipment with Hamlet’s chassis. PO Resp. 22–23. To the contrary, as discussed above, Petitioner has provided reasoning with rational underpinning to support its assertion that one with ordinary skill in the art would have known to implement Hamlet’s transceiver with Swanson’s transmitter and receiver.

The teachings relied on by Petitioner regarding a chassis with a modular rack for reducing EMI and expelling heat are from Hamlet, not Swanson. Pet. 26–27. Hamlet provides a modular rack or chassis, with face plates, for use with printed circuit boards or cards in general, does not exclude any particular equipment, and even discloses a transceiver on a printed circuit board as sample equipment for placement on the modular rack. Ex. 1406, 1:53–62; 6:32–35. The record supports the position taken by Petitioner that Swanson’s transmitter and receiver, from the perspective of one with ordinary skill in the art, are among the equipment contemplated by Hamlet for insertion on Hamlet’s modular rack and chassis.

Patent Owner further takes issue with Petitioner’s assertion that auxiliary functions provided by Hamlet’s chassis are “necessary” to implement or support

Swanson's system. PO Resp. 19–20. In that regard, Dr. MacFarlane has testified that a "POSITA would have understood that to implement the *Swanson* transmitter and receiver[,] auxiliary functionality would be necessary to support the system, such as: a mechanical structure, electrical and optical interconnect, power supplies, thermal management (e.g., by fans, etc.), fiber routing, etc." Ex. 1402

¶ 70. Patent Owner asserts that there is no evidence in the record that Swanson's equipment "need[s]" a faceplate, chassis or rack, or "need[s]" to be placed on a printed circuit board. PO Resp. 20. Patent Owner further asserts that Hamlet's auxiliary functions are not "necessary" to operate Swanson's transmitter and receiver. *Id.* at 21.

Although Petitioner does use the words "need" and "necessary" (Pet. 27; Ex. 1402 ¶ 70), in context, such use should not be read literally in the sense of a critical or absolute requirement without which Swanson's transmitter or receiver would be inoperable. We understand Petitioner's usage, in context, to mean desirable or beneficial. Patent Owner asserts that Swanson itself does not provide such auxiliary features. PO Resp. 21–22. That is true, but Swanson's disclosure is directed to an experimental setting that only simulates actual optical transmission in the field. That the Swanson experiment provides no such auxiliary features does not mean such auxiliary features are undesirable in an actual optical communication system using Swanson's transmitter and receiver.

Patent Owner notes that with respect to the components disclosed in Swanson, Petitioner proposes to (1) remove the variable attenuator, (2) disconnect the power meter, (3) remove the fiber feedback loop, (4) add an output fiber, and (5) add an input fiber. *Id.* at 23. Patent Owner argues that Petitioner fails to state why one with ordinary skill in the art would have been motivated to make these changes to Swanson's experiment. *Id.* at 24–26. Patent Owner further argues that

the removal and replacement of these various components is not described in any of the cited references. *Id.* at 25. This experiment argument has been rejected above. We note also that a basis to combine teachings need not be expressly stated in any prior art reference. *In re Kahn*, 441 F.3d 977, 989 (Fed. Cir. 2006); *Beckson Marine, Inc. v. NFM, Inc.*, 292 F.3d 718, 728 (Fed. Cir. 2002).

The simulation nature of Swanson's experiment does not obstruct or otherwise hinder a recognition by one with ordinary skill in the art that in an actual communication system, Swanson's transmitter and receiver would not be connected to each other at the same location through a loop-back arrangement. It is implicit that when used in an actual communication link, Swanson's transmitter would be connected by optical fiber to a corresponding receiver at another location, and Swanson's receiver would be connected by optical fiber to a corresponding transmitter at another location. Indeed, that is how Petitioner has explained the circumstance and the proposed combination:

But, in using the *Swanson* transmitter and receiver as a transceiver as in *Hamlet*, the output of the transmitter and the input of receiver would not be arranged to exchange data with each other, but would be arranged to communicate with another transceiver at another location in the optical network. Ex-1402, ¶73.

Pet. 30. The explanation is supported by the testimony of Dr. MacFarlane. Ex. 1402 ¶ 73.

Patent Owner argues: "The only support for the proposition that Swanson's experimental equipment can be reconfigured, placed on a card, and function with predictable results is the Detailed Description of the Invention of the '592 patent itself." PO Resp. 26–27. Patent Owner explains its argument as follows:

The Swanson Letter is reporting experimental results. The Swanson Letter's authors "report on the first, to our knowledge, active stabilization of an optically preamplified and optical demodulated

DPSK receiver which achieved a record sensitivity of 62 photons/bit at 3 Gb/s.” Swanson Letter, 1. There is no discussion in the Swanson Letter that modifying the experimental equipment, as Petitioner and MacFarlane have argued, would lead to predictable results. Given that the Swanson Letter is reporting on the first of its kind experiment, something more than a conclusory statement by Petitioner’s declarant is needed to show that the combination of the Swanson Letter, Hamlet, and Stowe or Swanson, Hamlet, and Walsh would produce predictable results.

Id. at 27–28. Patent Owner’s argument is unpersuasive because the characterization of Swanson as describing unpredictable experimental results stretches beyond what is reasonably supported by the record. Swanson itself confirms, by simulation results, that its transmitter and receiver are operative; Swanson does not refer to any potential or likely problem that would be encountered when using its transmitter and receiver in a non-simulation setting; Swanson does not identify any need for further simulation.

Much to the contrary, Swanson reported favorably on the simulation, stating that a record sensitivity of 62 photons/bit at 3 Gb/s was achieved in the simulation. Ex. 1405, 1. To the extent that one could say that, prior to Swanson’s simulation, operating Swanson’s transmitter and receiver including an interferometer would have had unpredictable results, it is no longer reasonable to make that assertion in light of the simulation Swanson states was successfully conducted. And Patent Owner has not specifically articulated any technical problem with the design of Swanson’s transmitter or receiver that has to be further investigated. This record shows a person of ordinary skill in the art would have understood the simulation to be a success, and Patent Owner has not shown that one with ordinary skill in the art would have doubted the operability of Swanson’s transmitter and receiver in an actual setting that does not merely simulate communication between remotely located units.

Patent Owner asserts that there is no discussion in Swanson that the experimental equipment would fit on a transceiver card, and that there is no discussion in Hamlet that a DPSK receiver would fit and function on a card in the chassis. PO Resp. 28. But that information does not have to be expressly stated in any prior art reference, if it would have been otherwise recognized or appreciated by one with ordinary skill in the art. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (references must be “considered together with the knowledge of one of ordinary skill in the pertinent art”). We determine Patent Owner’s argument is misplaced.

Hamlet discloses card 42 having transceiver 118 disposed thereon, shows much space on card 42 and around transceiver 118, and does not specify that the card is limited to a certain size. Ex. 1406, 5:19–21, Fig. 3A. Dr. MacFarlane testifies that “different size cards could be used [by one with ordinary skill in the art] depending upon component size requirements.” Ex. 1402 ¶ 74.

Dr. MacFarlane further testifies that “[i]n my opinion, it would have been a simple choice for a POSITA to choose an appropriate card size that would have fit all of the components together.” *Id.* ¶ 67.

Patent Owner further argues:

In a pure hindsight analysis, MacFarlane posits that a POSITA would have recognized that the Swanson letter components would fit on a card because the ’592 patent teaches placing the claimed equipment on a card. MacFarlane, ¶66. Clearly this is an inappropriate hindsight analysis, using the claimed teachings in the body of the ’592 patent to support an obviousness argument. *See Mintz*, 679 F.3d at 1377.

PO Resp. 28. That assertion also is misplaced. Petitioner already has provided separate motivation to implement Swanson’s transmitter and receiver as transceiver 118 in Hamlet’s chassis, and that motivation does not stem from the ’592 patent. Petitioner’s reference to the ’592 patent is understood as indicating, in

addition to what Petitioner already has represented about sizing, that the specification of the '592 patent is consistent with the notion that sizing is a non-issue.

Patent Owner further argues:

[T]he Petition provides no discussion on how either of the two different types of optical delay line modulators, investigated by the experimenters of the Swanson Letter, and the modulators' thermal enclosures and coolers would function with the remaining equipment on Hamlet's card. Swanson Letter, 1-2. In particular, the optical delay line demodulator including a PZT "was housed in a thermally insulating enclosure to minimize the thermal and acoustic disturbances." Swanson Letter, 1. Petitioner failed to address how this optical delay line demodulator and thermally insulating enclosure would function with or change in a combination involving Hamlet's card and chassis as well as Stowe's PZT rod. Indeed, Petitioner fails to recognize the existence of the thermally insulating enclosure, and therefore the thermally insulating enclosure of the demodulator is completely ignored by Petitioner. The failure to address the thermally insulating enclosure of the optical delay line demodulator with regard to motivation to combine and ability to combine Swanson with the Hamlet card and chassis, by itself, causes the combination to fail.

The Swanson Letter's experimental circuit by definition is an experiment and would not be expected to function without additional experimentation to reconfigure the experimental circuit onto the Hamlet card and chassis. Indeed, the experimental nature of the Swanson Letter is completely ignored by Dr. MacFarlane and Petitioner.

PO Resp. 29. The argument is unpersuasive, for reasons discussed below.

The record does not persuade us that putting Swanson's transmitter and receiver on a circuit board and placing that circuit board on Hamlet's modular rack for circuit boards require any experimentation. Hamlet provides a "modular" rack for circuit boards. Ex. 1406, 3:35–39. Sample circuit boards 42 each have transceiver 118. *Id.* at 5:19–21. The modular design conveys that one needs only

to slide a circuit board or card onto the rack and connections would be completed with respect to an input fiber, output fiber, and power source. As for the “cooler” and “thermal enclosure” noted by Patent Owner, it is not apparent and Patent Owner does not explain what interaction they would have with the off-board external structures in Hamlet. In that regard, Patent Owner has not submitted the testimony of any technical witness to support its assertion of unpredictable results or need for further experimentation. Insofar as Swanson describes an “experiment,” as discussed above, Swanson indicates that it was a complete and successful experiment using simulation to show the operability of its transmitter and receiver. Additionally, in the context of Swanson, a “cooler” is not a necessary component and the absence of a cooler does not keep the delay line in the receiver from being operative. *See* Ex. 1405, 2.

Furthermore, Dr. MacFarlane testifies that implementing Swanson’s transmitter and receiver on Hamlet’s card reflects a predictable use of known elements each performing the functions they were intended to perform. Ex. 1402 ¶ 72, *cited at* Pet. 26, 28. We credit that testimony because it is consistent with and supported by the disclosures of Swanson and Hamlet as discussed above.

Finally, claim 1 recites that the card comprises “a fastening device for securing the delay loop fiber.” Ex. 1401, 5:48.

Petitioner asserts:

The *Swanson/Hamlet/Stowe* combination discussed above includes *Swanson’s* delay loop fiber fastened to the splitter and coupler of the interferometer Ex-1402, ¶¶76-77, 88-89; Ex-1405, Fig. 1. The delay loop fiber is further coiled around the PZT stretcher which is fastened by wires . . . to the feedback electronics. Ex-1402, ¶¶76-77, 89; Ex-1405, Fig. 1. The splitter, coupler, and PZT stretcher with wires connected to the feedback electronics are all fastening devices that secure the delay loop fiber to the rest of the receiver integrated on the *Hamlet* card. Ex-1402, ¶¶ 77-80, 89-90; Ex-1405, Fig. 1, p. 1; Ex-1407,

16:31-17:12. Thus, each of these elements are “a fastening device for securing the delay loop fiber” as recite in element [1d]. *Id.*

Pet. 49–50. As discussed above, the claimed “fastening device for securing the delay loop fiber” covers a spindle or clips, and equivalents thereof. There is no indication that any of the “splitter, coupler, and PZT stretcher with wires connected to the feedback electronics” in Swanson, purported by Petitioner to constitute fastening devices, are a spindle or clips, or equivalents thereof. Thus, Swanson’s disclosure alone does not meet the claim limitation, as Petitioner argues.

Petitioner further asserts that “a separate fastening device providing mechanical support and strain relief would have been an implicit element to prevent movement and damage to the delay loop fiber and PZT element” in the combination of the references, and that such fastening devices were well known and “would have been considered *necessary* in designing and fabricating a circuit card.” Pet. 32 (citing Ex. 1402 ¶ 77; Exs. 1416, 1417). This assertion also fails to account for the claimed “fastening device for securing the delay loop fiber,” as there is no indication that a spindle or clips would have been either implicit or inherent on a circuit card.

Petitioner also relies on Stowe’s disclosure of rod 44 for the claimed “fastening device for securing the delay loop fiber.” Pet. 50–51 (citing Ex. 1407, 16:9–14, 16:57–61, Fig. 7; Ex. 1402 ¶¶ 88–90). We determine that Stowe’s rod 44 has the structure and function of a spindle and thus is a spindle. Patent Owner does not argue otherwise. Further, Stowe explicitly discloses that rod 44 is a “support structure . . . being used to anchor bend-sensitive transitional tapering regions” of fiber 10. Ex. 1407, 16:56–61. Thus, on this record, rod 44 of Stowe meets the limitation “a fastening device for securing the delay loop fiber.”

Petitioner asserts that it would have been obvious to one of ordinary skill in the art to implement Swanson's PZT fiber stretcher using Stowe's PZT rod 44 because "*Stowe's PZT rod 44 and Swanson's PZT perform the same function of controlling a delay in an interferometer arm.*" Pet. 33 (citing Ex. 1402 ¶¶ 78, 81; Ex. 1405, 1–2; Ex. 1407, 16:42–45). For example, Stowe discloses that "a fiber . . . wrapped on a rod 44 that expands or contracts its diameter *can act as a phase shift reference arm or sensing arm of an interferometer.*" Ex. 1407, 16:42–45 (emphasis added). Petitioner also asserts that it would have been obvious to one of ordinary skill in the art to use Stowe's rod 44 as Swanson's PZT fiber stretcher because "*Stowe's PZT rod would have provided a compact design suitable for mounting on Hamlet's card or any other known card.*" Pet. 33.¹⁰ In support of Petitioner's assertions, Dr. MacFarlane testifies that one of ordinary skill in the art would have found it predictable "to implement *Swanson's PZT stretcher using Stowe's rod 44*, since *Stowe* discloses that a specific application for the rod is that of the PZT stretcher as described in *Swanson*. Ex-1407, 4:65–5:8, 16:42–45." Ex. 1402 ¶ 81.

Petitioner has, notwithstanding Patent Owner's contrary arguments which we address below, articulated reasoning with rational underpinning to support using Stowe's PZT rod 44 as Swanson's PZT fiber stretcher, and shown that the claimed "fastening device for securing the delay loop fiber" is met by Stowe's PZT rod 44 in Petitioner's proposed combination of Swanson, Hamlet, and Stowe.

¹⁰ We are not persuaded by Petitioner's argument that it would have been obvious to one of ordinary skill in the art to use Stowe's rod 44 to "provide[] a means for strain relief of the delay loop fiber" in Swanson. See Pet. 33–34. On this record, there is no persuasive evidence of any such strain to be relieved in Swanson.

Patent Owner argues that Swanson already has a working PZT fiber stretcher element (PZT fiber stretcher), and that Petitioner has presented no reason why one with ordinary skill in the art would have wanted to change it, replace it, or implement it in a different way. PO Resp. 33. Patent Owner asserts that because Swanson already discloses a working PZT element, one with ordinary skill in the art would not have been motivated to combine Swanson's teaching with Stowe's teaching to implement a different PZT element. *Id.* at 34. The argument is misplaced because Petitioner has not proposed to change, replace, or implement in a different way the PZT element disclosed in Swanson. Instead, Petitioner has proposed to implement Swanson's PZT stretcher by use of Stowe's PZT rod 44. Pet. 33. Swanson does not disclose specific details about its PZT fiber stretcher, e.g., particular structure and/or shape.

The term "PZT fiber stretcher" in Swanson refers to and discloses something generic, not specific. Stowe, on the other hand, discloses PZT "rod" 44 around which optical fiber is wrapped and expressly states: "a fiber so wrapped on a rod 44 that expands or contracts its diameter can act as a phase shift reference arm or sensing arm of an interferometer." Ex. 1407, 16:42–45. Thus, the motivation to implement Swanson's PZT fiber stretcher with Stowe's PZT rod 44 stems from the recognition that Swanson does not disclose specific structure for its PZT fiber stretcher and from the teaching in Stowe that its PZT rod 44 can be used in an interferometer.

Patent Owner asserts: "The focus of Stowe is not interferometers or piezoelectric transducers. Instead, Stowe relates to miniaturizing and reducing the diameter of optical fiber." PO Resp. 31. The assertion is misplaced. A reference must be considered for everything it teaches by way of technology and is not limited to the particular invention it is describing and attempting to protect. *EWP*

Corp. v. Reliance Universal Inc., 755 F.2d 898, 907 (Fed. Cir. 1985). As the predecessor to the U.S. Court of Appeals for the Federal Circuit stated: “The use of patents as references is not limited to what the patentees describe as their own inventions or to the problems with which they are concerned. They are part of the literature of the art, relevant for all they contain.” *In re Lemelson*, 397 F.2d 1006, 1009 (CCPA 1968). Here, Stowe expressly states “a fiber . . . wrapped on a rod 44 that expands or contracts its diameter *can act as a phase shift reference arm or sensing arm of an interferometer.*” Ex. 1407, 16:42–45 (emphasis added). Thus, Stowe generally teaches that a fiber wrapped around a rod that expands or contracts its diameter can act as a phase shift reference arm in an interferometer regardless of whether the fiber has a reduced diameter and whether the rod is miniaturized.

Patent Owner further argues: “Stowe uses a reduced diameter fiber and a miniaturized PZT rod that is incompatible with Swanson.” PO Resp. 30. Patent Owner also asserts: “the miniaturized PZT rod of Stowe would not function in the Swanson experiment having standardized size fiber to be wrapped.” *Id.* at 33. In that connection, Patent Owner asserts that Stowe discloses use of a “miniaturized PZT element,” citing Stowe (Ex. 1407, 16:12–13). *Id.* at 32. The cited portion of Stowe, however, does not refer to a miniaturized rod. Stowe states: “Wrapping 42 a reduced fiber 18 around a cylindrical rod 44, for example, as shown in FIG. 7 accomplishes this end.” Ex. 1407, 16:12–14. We find no mention in Stowe of a “miniaturized” rod. Even assuming that Stowe’s rod 44 is miniaturized, Patent Owner has not submitted the testimony of any technical witness to support its assertion of incompatibility between Stowe’s PZT rod 44 and Swanson’s optical fiber. Patent Owner also has not submitted the testimony of any technical witness

to support its assertion that Stowe's miniaturized PZT rod 44 would be inoperable with a fiber of standard size.

Further assuming that there is such incompatibility and inoperability, Patent Owner's argument does not sufficiently undermine Petitioner's obviousness showings because the level of ordinary skill in the art must be considered. Patent Owner has not asserted, much less shown, that if Stowe's rod is too small to have a fiber of standard size wrapped around it, one with ordinary skill in the art would not have known to use a larger rod. Indeed, if Stowe uses a miniaturized rod for a reduced diameter fiber, that disclosure itself indicates a level of ordinary skill that recognizes using fiber and rod of comparable size.

Patent Owner asserts that Dr. MacFarlane fails to address that Stowe is a miniaturized system with a miniaturized PZT rod and reduced diameter fiber. PO Resp. 32. Patent Owner also asserts that Dr. MacFarlane did not even consider the dimensions of the PZT rod in his hypothetical combination of Swanson, Hamlet, and Stowe. *Id.* In particular, Patent Owner argues:

Dr. MacFarlane proposes wrapping 2.64 inches of Swanson's fiber around Stowe's miniaturized rod, without ever supporting whether this particular dimension would be compatible between a full-sized fiber and a miniaturized PZT rod. Ex. 1402, ¶¶54; ¶81; Ex. 2036, 70:8–71:16. In essence, he simply “cherry-picks” the miniaturized PZT rod of Stowe to combine with the “full-size” fiber in Swanson. In his declaration, Dr. MacFarlane provides no motivation to combine Stowe's miniaturized PZT rod with the Swanson experiment. Ex. 1402, ¶¶54; ¶¶57–59; ¶81; ¶¶89–90. In particular, Dr. MacFarlane does not explain any alleged motivation to combine the miniaturized PZT rod with the regular sized fibers of Swanson. Especially given the experimental nature of the circuit of the Swanson Letter, a POSITA would not be motivated to combine Stowe's reduced diameter optical fibers and miniaturized PZT rod with the Swanson Letter DPSK experimental receiver.

Id. at 32–33. These arguments are misplaced and unpersuasive, for reasons discussed below.

In none of the above-cited paragraphs of Dr. MacFarlane’s declaration (Ex. 1402) does he refer to a “miniaturized rod,” “miniaturized PZT rod,” or “miniaturized PZT element.” It is not a reasonable characterization to say that Dr. MacFarlane has proposed, inflexibly, to wrap a standard size fiber around a miniaturized rod. He simply did not provide specific testimony about the relative sizes of the fiber and the rod. For instance, Dr. MacFarlane testifies that it would have been predictable “to implement *Swanson*’s PZT stretcher using *Stowe*’s rod 44, since *Stowe* discloses that a specific application for the rod is that of the PZT stretcher as described in *Swanson*.” Ex. 1402 ¶ 81 (citing Ex. 1407, 4:65–5:8, 16:42–45).

Additionally, Patent Owner does not point us to evidence that one with ordinary skill in the art would not have had sufficient skill to match the size of the PZT rod to the size of the delay fiber to wrap around the PZT rod. On that issue, Dr. MacFarlane explained: “And so you’re – you’re perceptive in the sense that, as you design – as a person of ordinary skill in the art designs that particular piece of the – of the combination, the choice of fiber, the choice of diameter, and so on, will all have to be comprehended. But again, that’s all well known and available to a person of ordinary skill in the art.” Ex. 2036, 77:14–21. Thus, Patent Owner’s suggestion that Dr. MacFarlane proposes to combine mismatched fiber and rod is without merit.

Patent Owner also is incorrect in its assertion that Dr. MacFarlane did not even consider the dimensions of the PZT rod in his hypothetical combination of *Swanson*, *Hamlet* and *Stowe*. Dr. MacFarlane testifies: “I’ve given you estimates of sizes of that PZT. And then I’ve also told you that there’s a variety of other

things to consider, such as specific fiber type of even – and specific fiber types of typically available fibers at that time.” *Id.* at 78:12–16. When Dr. MacFarlane was asked how he knew that rod 44 of Stowe would fit on a card if he has not calculated the size of the rod, he answered “I’ve estimated the diameter.” *Id.* at 80:1.

Finally, Patent Owner argues:

Further, Swanson’s optical delay line demodulator, which uses a PZT, “was housed in a thermally insulating enclosure to minimize thermal and acoustic disturbances.” Ex. 1405, p. 1. The record is devoid of any explanation regarding why Stowe’s miniaturized PZT would be combined (or whether it even could be combined) inside the thermally insulating enclosure of Swanson or how it would function inside the enclosure. Ex. 1402, ¶¶57–59; ¶¶89–90.

PO Resp. 33. The argument is unpersuasive for two reasons.

First, it is not explained by Patent Owner why anything requires further explanation by Petitioner. To the extent that Swanson describes a thermal enclosure for its optical delay line demodulator, which includes a PZT element, the thermal enclosure will continue to exist and to function as a thermal enclosure when the PZT element is implemented by a PZT rod. Also, the PZT rod will continue to operate as a PZT rod when it is inside the thermal enclosure, the same as it operates outside of a thermal enclosure. Petitioner has not proposed to change the operation of the PZT rod or the characteristics of the thermal enclosure in any way. The existence of the thermal enclosure in Swanson does not affect Petitioner’s reasoning for implementing Swanson’s PZT element by the PZT rod of Stowe.

Second, the use of a thermal enclosure in Swanson is not necessary for achieving operability. In that regard, Swanson describes: “Without the environmental enclosure the thermal and acoustic disturbances seen by the delay

line are much more severe to the point where operation was possible only with the tracking loop enabled.” Ex. 1405, 2. Patent Owner has not explained why the thermal enclosure is necessary for operability of Swanson’s DPSK receiver.

6. Conclusion

For the foregoing reasons, Petitioner has proved by a preponderance of the evidence that claim 1 would have been obvious over Swanson, Hamlet, and Stowe.

G. Alleged Obviousness of Claim 3 over Swanson, Hamlet, Stowe, and Walsh

1. Walsh (Ex. 1408)

Walsh relates to detecting and identifying perturbations to fiber optics. Ex. 1408, 1:6–8. Walsh discloses an optical power meter for a fiber optic link in which a photodetector generates a current proportional to the energy of the light transmission in the fiber optic. *Id.* at Abstr. Figure 4 of Walsh is reproduced below:

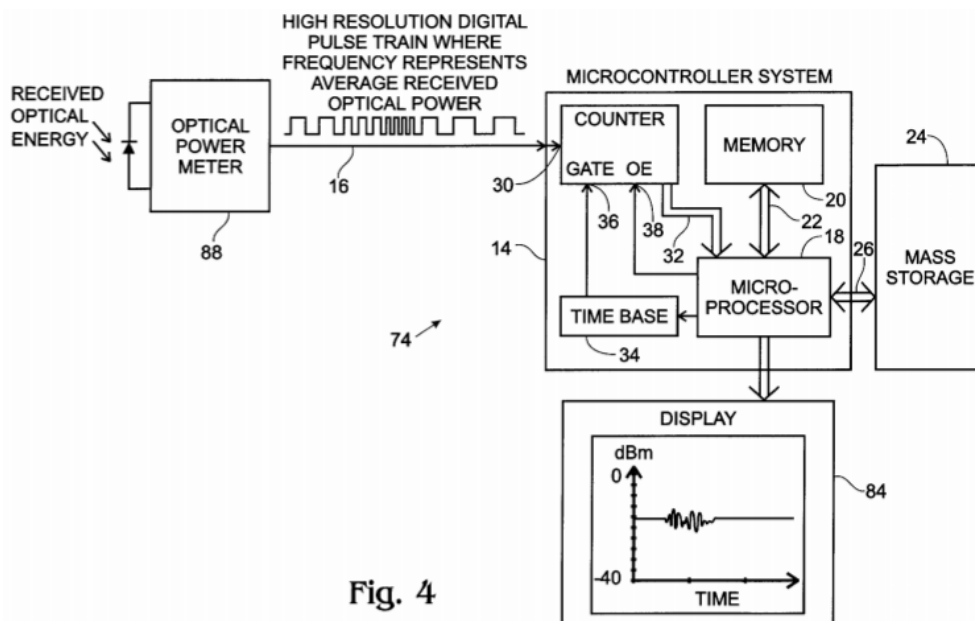


Figure 4 is a block diagram illustrating Walsh’s optical power meter and associated electronics. *Id.* at 5:14–16. The current generated by the photodetector is

converted to a proportional voltage, which is then converted to a digital pulse train proportional to the amplitude of the voltage. *Id.* at Abstr. The digital pulse train increments a counter, which is periodically read by a microprocessor, the value read by the microprocessor corresponding to the average power in the light transmission. *Id.* The power level over time is displayed on a liquid crystal display (LCD), and a user may input a range within which the power can fluctuate. *Id.* If the measured power falls outside of that range, an audible or visual warning signal is triggered to indicate a perturbation to the fiber optic link such as mechanical stress, connector misalignment, or a security breach. *Id.*

2. Analysis

Claim 3 depends from claim 1 and recites “[t]he card . . . further including an energy level detector.” Ex. 1401, 5:51–52. For this limitation, Petitioner relies on Walsh’s disclosure of an optical power meter for detecting a security breach. Pet. 42–43, 54–55 (citing Ex. 1402 ¶¶ 90–102, 110–113); *see also* Pet. 35–36 (referring to the optical power meter shown in Walsh’s Figure 6 as “the *Walsh* circuit”). Petitioner explains that Walsh’s optical power meter includes a visual alarm for indicating a security breach, such as a fiber tap, if the power level crosses a threshold. Pet. 38–39 (citing Ex. 1402 ¶¶ 60–63, 97). Walsh describes that if the measured power falls outside a bound, the system will set an alarm condition or generate a warning, that the alarm condition can be either audio or visual, and that the alarm may indicate a security breach such as a fiber tap. Ex. 1408, 7:53–56, 8:6–7, 8:17–20.

Petitioner asserts that a person having ordinary skill in the art would have been motivated to add Walsh’s optical power meter to the combination of Swanson, Hamlet, and Stowe for various benefits, including (1) permitting the recording of historical power level data without interrupting optical signal

transmission to the receiver in Swanson, (2) enabling the detection of a fiber security breach or tap caused by a temporary pinch of an optical fiber, (3) detecting other mechanical disturbances on the optical fiber, (4) notifying a technician of such issues, and (5) providing multiple thresholds against which the received optical power is compared. Pet. 36 (citing various parts of Walsh and Dr. MacFarlane’s testimony (Ex. 1402 ¶ 92)). Dr. MacFarlane testifies that Walsh “discloses an energy level detector, which would measure the level of optical energy received by the *Swanson* receiver on the *Hamlet* card” in the combination of Swanson, Hamlet, Stowe, and Walsh. Ex. 1402 ¶ 113.

Petitioner additionally asserts that it would have been predictable, convenient, and practical to implement Walsh’s visual alarm by using Hamlet’s LEDs 170 because both Hamlet and Walsh use LEDs to indicate the status of operation, and because Hamlet’s LEDs would be at the same location as Walsh’s circuitry that provides the visual alarm. Pet. 41 (citing various parts of Walsh and Dr. MacFarlane’s testimony (Ex. 1402 ¶¶ 99–101)).

Petitioner asserts that a person of ordinary skill in the art (1) “could incorporate the *Walsh* circuit [shown in Figure 6 of Walsh] with the . . . *Swanson/Hamlet* card in multiple ways,” such as in series with the photodiodes or at the power meter or AFC in Swanson (Pet. 36–39), or (2) “incorporate only a portion of the *Walsh* design onto the *Hamlet* card, while implementing other portions of the design on other cards in *Hamlet*’s modular rack 26, and connecting the portions through the backplane via *Hamlet*’s connector 44” (Pet. 41). The assertions are supported by the testimony of Dr. MacFarlane. Ex. 1402 ¶¶ 93, 101, 103, *cited at* Pet. 36, 41.

Petitioner has, notwithstanding Patent Owner’s arguments, which we address below, shown that the limitation “the card as recited in claim 1 further

including an energy level detector” is met by the combined teachings of Swanson, Hamlet, Stowe, and Walsh. In brief, the benefits Petitioner identifies adequately support the use of Walsh’s circuit in connection with Swanson’s transceiver, but do not adequately support placing Walsh’s circuit on the same card as Swanson’s transceiver. Although we reject that aspect of Petitioner’s argument—for reasons that differ from those advanced by Patent Owner—Petitioner also makes an alternative argument regarding the placement of Walsh’s optical power meter that we find persuasive, namely implementation of Walsh’s visual alarm using Hamlet’s LEDs. We elaborate our analysis fully as follows.

Patent Owner argues:

The Petition lists five reasons to add the Walsh circuit to the Swanson/Hamlet card. Pet., 36. However, none of the five is a proper motivation for a POSITA in possession of the Swanson Letter to integrate the Swanson Letter’s experimental equipment with Walsh’s circuit on a Hamlet card, and to also connect an LED light.

PO Resp. 36. The five reasons identified by Petitioner are noted above. However, we agree with Patent Owner, but for different reasons, that the five reasons, individually or in combination, do not support a suggestion to place Walsh’s circuit on the same card as Swanson’s transmitter and receiver.

According to Patent Owner, Swanson already has a power meter and thus does not need additional equipment to record power level data or detect mechanical disturbances on the fiber. *Id.* at 37. But in Petitioner’s proposed combination of Swanson and Hamlet, discussed above, only Swanson’s transmitter and receiver are incorporated in Hamlet’s transceiver card. According to Patent Owner, Swanson’s experiment loops the transmitter output back as input to the receiver at the same location and there is no communication outside of the closed experiment. *Id.* at 37. Thus, Patent Owner asserts there is no concern about any

fiber tap in Swanson's experiment. *Id.* The argument is misplaced because, as discussed above, Petitioner is not proposing to repeat or redo Swanson's experiment, but to use Swanson's transmitter and receiver in a communication system in which the transmitter and receiver are located at different locations. Regarding notifying a technician of "such issues," Patent Owner asserts that there are no "such issues" as explained by its other arguments, and that because Swanson is a monitored experiment, there is no reason to notify technicians of issues that arise in the experiment. *Id.* But, again, Petitioner is not proposing to repeat or redo Swanson's experiment, but to use Swanson's transmitter and receiver in a communication system. Patent Owner asserts that providing multiple thresholds against which the received optical power is compared simply is not relevant to Swanson's experiment or to Hamlet's chassis. *Id.* Still again, the argument is misplaced because Petitioner has not proposed to redo an experiment where the transmitter and receiver are placed at the same location.

Nevertheless, the five reasons do not support a suggestion to place Walsh's circuit on the same card as Swanson's transmitter and receiver because all corresponding objectives manifestly may be accomplished whether or not Walsh's circuit is placed on the same card as Swanson's transceiver: (1) permitting the recording of historical power level data without interrupting the transmission of the optical signal to the receiver in *Swanson*; (2) enabling the detection of a fiber security breach or tap caused by a temporary pinch of an optical fiber; (3) detecting other mechanical disturbances that occurred on the optical fiber; (4) notifying a technician of such issues; and (5) providing multiple thresholds against which the received optical power is compared. Pet. 36. These functions do not require placing Walsh's circuit on the same card as Swanson's transmitter and receiver. They constitute sufficient reasoning with rational underpinning only for use of

Walsh's circuit in connection with Swanson's transceiver, not for placing Walsh's circuit on the same card as that containing Swanson's transmitter and receiver.

That is the same position we expressed in the Decision on Institution. Paper 13, 18. In its Reply, Petitioner takes exception to that position and argues:

The Board's distinction between Swanson and the Swanson/Hamlet combination is inconsistent with its explanation that a POSITA would have found it obvious to combine Swanson and Hamlet when implementing a real communication system on a single card. Institution Decision, 26–28. For example, the second benefit is enabling detection of a fiber security breach or tap. *Id.* at 38. But there is no benefit to security in a controlled experiment. It is the combination of Swanson/Hamlet onto one card that allows for a benefit from the addition of the circuit of Walsh. Petition, 35–36; Ex. 1402, ¶ 92. The benefits Walsh adds would be recognized by a POSITA as applying to real communication systems, and a POSITA would have been motivated to combine the circuit of Walsh with the Swanson/Hamlet card. Ex. 1402, ¶ 92.

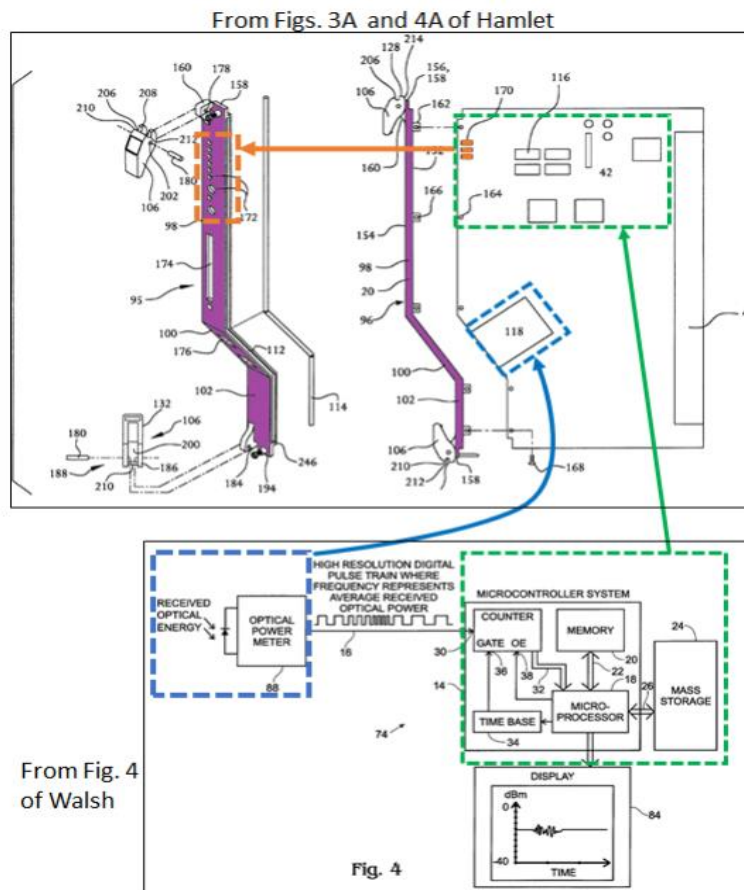
Reply 19. The argument is unpersuasive. We have analyzed Petitioner's reasoning from the perspective of the combination of Swanson and Hamlet in a real communication system, and not in the context of Swanson's configuration as an experiment. It remains the case, however, that the record does not support that enabling detection of a fiber security breach or tap requires putting Walsh's optical power meter on the same card as Swanson's transmitter and receiver. Petitioner has not explained why Walsh's optical power meter cannot be placed on a separate card. We see no inconsistency as alleged by Petitioner.

However, on pages 39–41 of the Petition, Petitioner does present reasoning with rational underpinning to place Walsh's optical power meter on the same card 42 as that on which Swanson's transmitter and receiver (implementing Hamlet's transceiver 118) are placed. Specifically, the reasoning is that doing so would be “predictable, convenient, and practical to implement *Walsh's* visual alarm using

Hamlet's LEDs 170 [also placed on card 42].” Pet. 41. Indeed, Dr. MacFarlane testifies:

As shown in the figure [reproduced below], *Walsh's* optical power meter (blue box) is incorporated into *Swanson's* optical receiver implemented in *Hamlet's* transceiver 118 as detailed above, and the remaining components of *Walsh's* circuit (green box) are implemented as components 116. In implementing the circuit in this manner, it would be convenient and practical to implement *Walsh's* visual alarm using *Hamlet's* LEDs 170 (orange), because the LEDs would be collocated with *Walsh's* circuitry, which provides the visual alarm, and because the light emitted by the LEDs would be viewable from the faceplate of the card (purple) through the light channels in the faceplate.

Ex. 1402 ¶ 102. The referenced figure is reproduced below:



Ex. 1402 ¶ 101. The figure illustrates how Walsh's optical power meter and associated control circuitry would be incorporated on the same PCB card 42 of

Hamlet on which Swanson's transmitter and receiver used to implement transceiver 118 would be placed.

We are persuaded by Petitioner's reasoning (Pet. 41) that because Hamlet's LEDs 170 are mounted on the same PCB card 42 as transceiver 118, it would have been predictable, convenient, and practical to install Walsh's optical power meter on the same PCB card as transceiver 118, and to use those LEDs as a visual alarm in case a condition of alarm is detected. Patent Owner argues that "Walsh does not show its circuit attached to an LED light for the purpose of notifying a technician of a tap," and Swanson "also does not have an LED light for notifying of a tap." PO Resp. 38.

Patent Owner's arguments are unpersuasive and do not undermine Petitioner's obviousness reasoning. The level of skill in the art, as reflected by Hamlet, is such that one with ordinary skill would have known to use an LED to indicate an alarm condition. Indeed, Hamlet describes using LEDs to indicate the status of a fan. Ex. 1406, 4:28–30. Hamlet also describes using LEDs to indicate the status of the fan casing or tray. *Id.* at 5:58–61. And Walsh describes generating a visual alarm indication if the measured power level is outside a boundary. Ex. 1408, 7:53–56, 8:6–7. Also, one cannot show non-obviousness by attacking references individually where the obviousness assertions are based on combinations of references. *In re Merck & Co. Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986); *In re Keller*, 642 F.2d 413, 426 (CCPA 1981).

Patent Owner further argues that "convenient and practical" is not a legally accepted motivation to combine teachings, citing *Personal Web Technologies, LLC v. Apple Inc.*, 848 F.3d 987, 993–94 (Fed. Cir. 2017). We see no such legal exclusion of the law in the cited case, or any binding authority. Convenience and practicality serve as genuine and valid motivations for one with ordinary skill in

the art to place Walsh's optical power meter on the same printed circuit board as that which already receives the optical fiber carrying the incoming signal and to which LEDs already are mounted and connected to indicate status of equipment. Under Petitioner's stated rationale, Walsh's optical power meter takes input from the incoming optical signal and produces an output that activates the LEDs. Pet. 41. In this context, "convenient and practical" is not an empty slogan but a genuine and reasonable motivation for one with ordinary skill in the art to place Walsh's optical power meter on the same card that already receives the incoming optical fiber and to which the LEDs are mounted and connected. It is not simply a "could be" rationale the Federal Circuit cautioned against in the authority cited by Patent Owner: "But that reasoning seems to say no more than that a skilled artisan, once presented with the two references, would have understood that they *could be* combined." *Personal Web*, 848 F.3d at 993. Accordingly, Patent Owner's argument is unpersuasive.

3. Conclusion

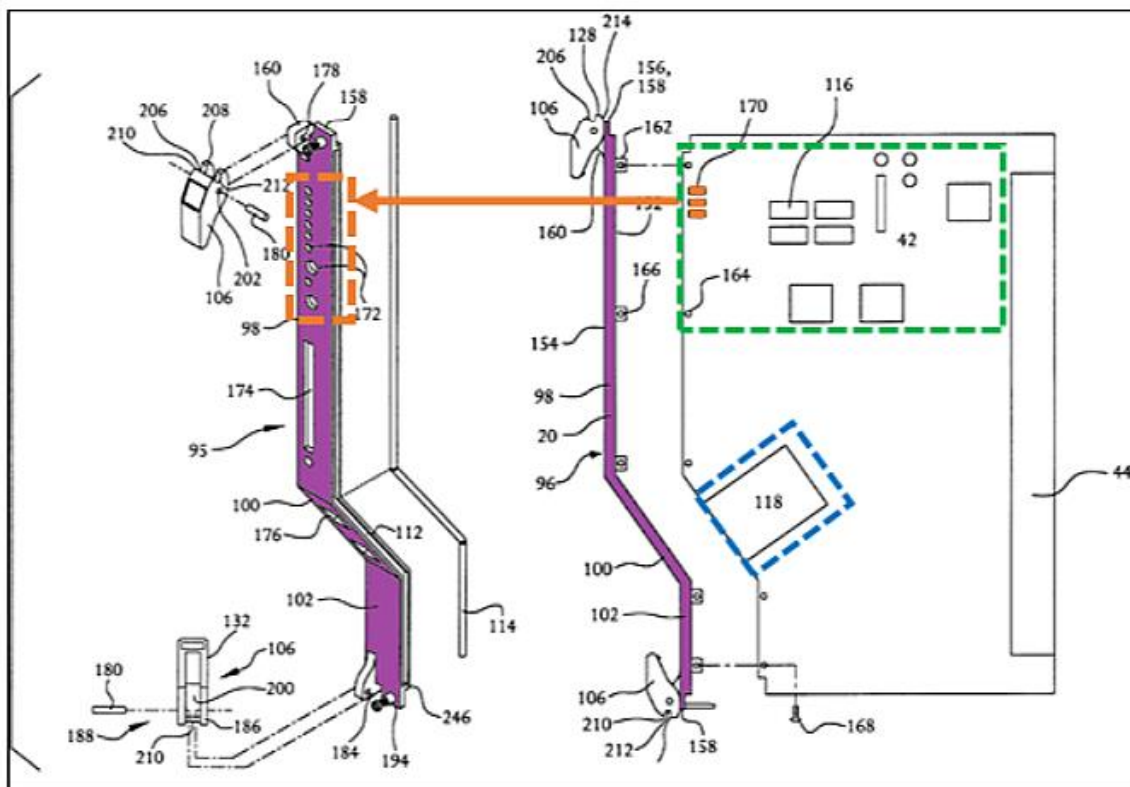
For the foregoing reasons, Petitioner has proved by a preponderance of the evidence that claim 3 would have been obvious over Swanson, Hamlet, Stowe, and Walsh.

H. Alleged Obviousness of Claim 13 over Swanson, Hamlet, and Walsh

Independent claim 13 is similar to independent claim 1 in that it also recites "[a] card for transmitting data over at least one optical fiber." Ex. 1401, 6:21–22. Claim 13 further recites a transmitter and a receiver similar to those of claim 1. *Id.* at 6:23–29. Petitioner relies on Hamlet's disclosure of card 42 and Swanson's

disclosure of a transmitter and receiver in the same manner discussed with respect to claim 1 above. Pet. 51–53 (citing Ex. 1402 ¶¶ 105–107).

Claim 13 further recites “a faceplate having a fiber tap signal device for indicating a fiber tap.” *Id.* at 6:29–30. Petitioner refers to the addition of Walsh’s optical power meter to the combination of references discussed above, and, for this limitation, identifies Hamlet’s faceplate 20 “with an opening 172 forming a light channel, through which an LED 170 would emit light (orange box) to provide the visual alarm from *Walsh*’s integrated circuit (green box), which would indicate ‘a security breach, i.e., a fiber tap’ on the optical fiber cable connected to the receiver.” Pet. 53 (citing Ex. 1402 ¶¶ 108–109; Ex. 1406, 6:45–50; Ex. 1408, Abstr., 8:6–9, 8:17–20). To illustrate how the claim limitation is purportedly met, Petitioner provides a figure on page 54 of the Petition, reproduced below:



Pet. 54. Petitioner's figure includes a front perspective view of Hamlet's faceplate 20 (purple) having openings 172 (orange box), through which light *emitted by LEDs 170* (orange) located on PCB card 42 is visible.

In the Decision on Institution, we stated that the “‘fiber tap signal device’ in this arrangement, as identified by Petitioner, is LEDs 170.” Paper 13, 41. We explained, in the Decision on Institution, that Walsh's LEDs 170 are not mounted on or within faceplate 20, as required by claim 13. *Id.* We further explained, in the Decision on Institution, that although the light generated by LEDs 170 does pass through holes in the faceplate, that is insufficient to establish “a faceplate having a fiber tap signal device.” *Id.*

In its Reply, Petitioner argues:

In the Institution Decision (at 41), the Board suggests that Petitioner relies on Hamlet's LEDs 107 to satisfy this limitation of Claim 13. But that is incorrect. Petitioner respectfully submits that the Institution Decision does not fully address Petitioner's position that it is Hamlet's “light channel”—not the LED—that corresponds to the fiber tap signaling device on the faceplate.

As the Petition and Dr. MacFarlane's declaration show (and which Patent Owner does not contest), Hamlet discloses that its faceplate 20 includes an “opening 172 forming a **light channel**, through which an LED 170 would emit light (orange box.)” Ex. 1402, ¶ 108 (emphasis added); *see also* Petition at 53. When the LED behind it turns on, that light channel in Hamlet is the “fiber tap signal device for indicating a fiber tap” located on the faceplate.

Reply 22–23. Petitioner cites to the following testimony of Dr. MacFarlane:

The other [approach] is to – is to design – is to consider what is meant by a light channel. It's not just a hole. It's called a light channel. And so it's – it's – it needs to be designed to be able – to allow people to easily and readily see the LED.

I have a – I want to point out these lights up here, for example, in our conference room. There's a – light bulb recessed into the ceiling, and then there's a good 2 inches or 3 inches of a reflector that could be

construed as a light channel. And that allows us to be able to see the light from the recessed light source.

And I believe that's a good – I believe that's an analogy, a good analogy, for – for how the light channel functions in this manner.

Ex. 2036, 120:8–121:1, *cited at* Reply 23. In summary, Petitioner asserts: “As a result, it is the ‘opening 172 forming a light channel’ from Hamlet that is the ‘fiber tap signal device,’ not the LED itself.” Reply 23.

We are unpersuaded by Petitioner’s assertion that openings 172, within the orange box in the above-reproduced figure, constitute a “fiber tap signal device.” The specification of the ’592 patent does not contain an express definition for “fiber tap signal device.” The term “fiber tap signal device” is not used anywhere outside of claim 13. The closest description to such a device are the following:

Preferably, a splitter and an energy level detector are also placed on the printed circuit board, and a light emitting diode (LED) or other light emitting device is connected to a faceplate connected to the printed circuit board. The LED indicates a change in energy at the detector.

Ex. 1401, 3:40–44.

Detector **33** monitors the light energy in the fiber **111** via the light energy coupled to the detector by splitter **31**. If the amplitude drops during this mode, most likely from a tap, the detector **33** provides an alert and can, for example, sound an alarm or alert network maintenance personnel, for example through an LED **133**. Another LED **134** can provide an indication of proper signal reception.

Id. at 4:49–55.

Figure 2 of the ’592 patent is reproduced below, and it shows LED 133 mounted on faceplate 9 of card 1:

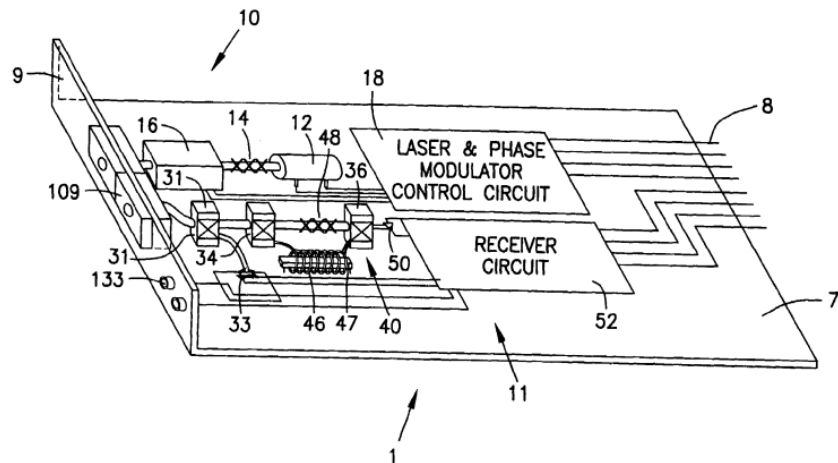


Figure 2 of the '592 patent illustrates card 1 having backplane 7, which is a printed circuit board, and faceplate 9, which has fiber connector 109 for connecting to input and output fibers. *Id.* at 4:3–4, 4:7–10. The only fiber tap signal device described in the specification is LED 133.

A plain reading of the term “signal device” indicates a physical device that outputs a signal. A plain reading of “fiber tap signal device” is a physical device that outputs a signal indicating the occurrence of a fiber tap. That understanding is fully consistent with the specification of the '592 patent, which describes LED 133 as providing a visual alarm of a fiber tap. *Id.* at 4:49–55.

Hamlet's openings 172, whether they are called light channels by Petitioner, are not physical devices but are mere empty space. The analogy set forth by Dr. MacFarlane between Hamlet's openings 172 and reflectors, which redirect the light from a recessed light source, is inapposite. A reflector is a physical device. An opening is the absence of any physical device, and an opening does not redirect light as does a reflector. Also, removal of Hamlet's faceplate having openings 172 does not eliminate or diminish in any way the light originating from LEDs 170 that would have passed through openings 172 if the faceplate is not removed. The same is untrue for the reflector discussed by Dr. MacFarlane.

Accordingly, we find unpersuasive Petitioner’s argument that openings 172 on Hamlet’s faceplate constitutes a fiber tap signal device. Consequently, we find unpersuasive Petitioner’s assertion that Hamlet’s faceplate satisfies claim 13’s recitation of “a faceplate having a fiber tap signal device for indicating a fiber tap.”

For the foregoing reasons, Petitioner has not proved by a preponderance of the evidence that claim 13 would have been obvious over Swanson, Hamlet, and Walsh.

I. Constitutional Challenge of this Proceeding

In addition to the arguments addressed above, Patent Owner raises a constitutional argument based on the fact that “[a]t the time Patent Owner’s patent issued, the express provisions of the Patent Act did not make patents revocable through *inter partes* review.” PO Resp. 40. Patent Owner asserts:

The Supreme Court’s decision in *Oil States Energy Services, LLC v. Green’s Energy Group, LLC*, 138 S. Ct. 1365 (2018) does not resolve the constitutionality of using *inter partes* review to extinguish pre-AIA patent such as the ’592 patent. Retroactively subjecting Patent Owner’s vested patent rights to new qualifications—including possible cancelation by a newly constituted, non-Article III body operating under new statutes, rules, and procedures, including procedures contrary to 35 U.S.C. § 282(a)—presents a constitutional concern sufficient to preclude invalidation of the claims.

Id. at 40–41. We decline to address this argument. *Califano v. Sanders*, 430 U.S. 99, 109 (1977); *Riggin v. Office of Senate Fair Emp’t Practices*, 61 F.3d 1563, 1569 (Fed. Cir. 1995).

III. CONCLUSION

Petitioner has shown by a preponderance of the evidence that claim 1 would have been obvious over Swanson, Hamlet, and Stowe.

Petitioner has shown by a preponderance of the evidence that claim 3 would have been obvious over Swanson, Hamlet, Stowe, and Walsh.

Petitioner has not shown by a preponderance of the evidence that claim 13 would have been obvious over Swanson, Hamlet, and Walsh.

IV. ORDER

It is

ORDERED that claims 1 and 3 have been proved unpatentable; 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.

IPR2018-00258
Patent 7,099,592 B2

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