

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NOKIA OF AMERICA CORPORATION, CIENA CORPORATION, and
INFINERA CORPORATION,
Petitioner,

v.

OYSTER OPTICS, LLC,
Patent Owner.

Case IPR2017-02146
Patent 8,374,511 B2

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

BOUCHER, *Administrative Patent Judge*.

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

In response to a Petition (Paper 1, “Pet.”) filed by Alcatel-Lucent USA Inc., Ciena Corporation, Coriant (USA) Inc., Coriant North America, LLC, Coriant Operations, Inc., Infinera Corporation, and Fujitsu Network Communications, Inc., we instituted an *inter partes* review of claims 1–16 of U.S. Patent No. 8,374,511 B2 (“the ’511 patent”). Paper 12 (“Dec.”), Paper 15. During the trial, Oyster Optics, LLC (“Patent Owner”) filed a Response (Paper 17, “PO Resp.”) to which Petitioner filed a Reply (Paper 28, “Reply”) and Patent Owner filed an authorized Sur-Reply (Paper 31, “Sur-Reply”). An oral hearing was held with the parties, and a copy of the transcript was entered into the record. Paper 39 (“Tr.”).¹

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has shown, by a preponderance of the evidence, that claims 1–7 and 9–15 of the ’511 patent are unpatentable, but has not shown that claims 8 and 16 are unpatentable.

¹ After institution, the proceeding was terminated with respect to Coriant (USA) Inc., Coriant North America, LLC, Coriant Operations, Inc., and Fujitsu Network Communications, Inc., because those parties settled with Patent Owner. Papers 24, 36. In addition, Alcatel-Lucent USA Inc. changed its name to Nokia of America Corporation. Paper 20. We refer collectively herein to the remaining petitioners, i.e., Nokia of America Corporation, Ciena Corporation, and Infinera Corporation, as “Petitioner.”

I. BACKGROUND

A. The '511 Patent

1. Overview

The '511 patent “relates generally to telecommunications and more particularly to transmitters and receivers for fiber optic networks,” and specifically “provide[s] a transceiver card for providing secure optical data transmission over optical fiber.” Ex. 1001, 1:16–18, 2:22–24. Figure 2 of the '511 patent is reproduced below.

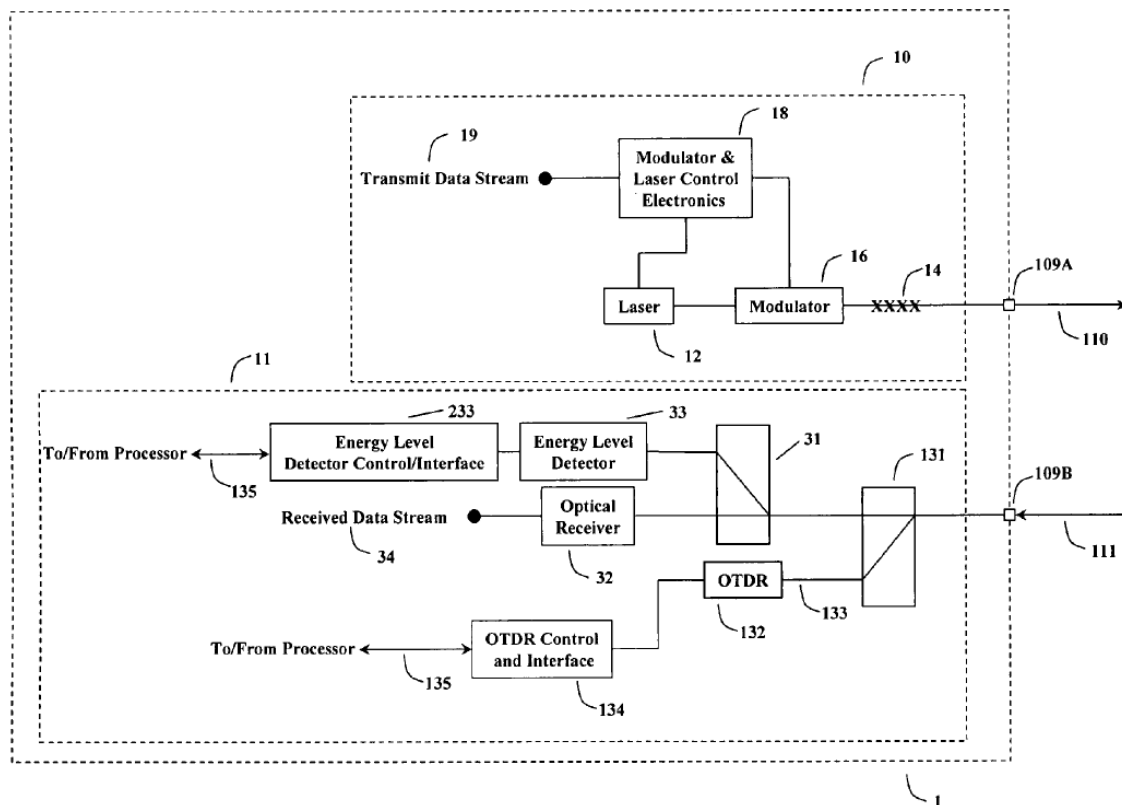


Figure 2

Figure 2 illustrates a structure of a transceiver card that may be used to retrofit an optical fiber multiplexor (“also called a ‘box’ in the industry”). *Id.* at 1:21–22, 4:7–11, 4:28–29. The ’511 patent explains that, in fiber-optic networks, an electronic data stream is fed to such an optical fiber multiplexor, which runs on a specific transmission standard, and the transceiver card is typically “replaceable should a component fail.” *Id.* at 1:20–35.

As illustrated in the drawing, transceiver card 1 includes transmitter 10 (which transmits signals over optical fiber 110) and receiver 11 (which receives optical signals over fiber 111). *Id.* at 4:28–30, 4:51–52. Transmitter 10 includes laser 12, with light emitted from laser 12 passing through modulator 16 and depolarizer 14. *Id.* at 4:32–36. Input data 19 are fed to electronic controller 18, which controls modulator 16 to provide amplitude or phase modulation to the light as a function of the input data. *Id.* at 4:36–41.

Receiver 11 includes three distinct optical paths. First, splitter 131 directs a portion of received light 111 through fiber 133 to optical time-domain reflectometer (“OTDR”) 132. *Id.* at 4:62–64. OTDR 132 can thereby monitor fiber 111 and provide information, through bus 135 under the control of control circuit 134, to a processor “for determining the location of a breach or tap.” *Id.* at 5:4–8. Interruption of the received data can be avoided by operating OTDR 132 at a wavelength different from the

transmitted and received data, and with appropriate configuration of splitter 131. *Id.* at 4:54–64.

Second, splitter 31 directs a portion of the remaining light to energy level detector 33, which monitors the light energy in fiber 111. *Id.* at 4:64–67, 5:9–10. A detected drop in amplitude may indicate a tap and allow an alert to be provided, under the control of energy level detector control circuit 233, to the processor over bus 135. *Id.* at 5:10–22.

Third, the residual light from splitter 31 passes to optical receiver 32, which converts the optical signal to electronic form to recover electronic data stream 34 as appropriate for the optical modulation technique employed. *Id.* at 4:64–5:3.

2. Illustrative Claim

The claims of the '511 patent can be organized into two groups, defined by the two independent claims, i.e., claims 1 and 9. Those independent claims differ in their recitation of “a method for operating an optical fiber multiplexor” in that claim 9 is limited to a phase-modulation mode. *Compare* Ex. 1001, 6:51–67, *with* Ex. 1001, 7:20–8:9. Each independent claim is accompanied by a set of dependent claims, which are identical within the two groups, except for their underlying base claim. *Compare* Ex. 1001, 7:1–19, *with* Ex. 1001, 8:10–27.

Independent claim 1 is thus illustrative of the claims at issue, and is reproduced below.

1. A method for operating an optical fiber multiplexor comprising:
 - feeding input data to a controller of a transmitter of a telecommunications box, the telecommunications box having an electronic data input for the input data and an electronic data output;
 - using the controller, controlling a modulator to modulate light from a laser as a function of the input data;
 - sending the modulated light as an optical signal from the transmitter over an optical fiber;
 - receiving the optical signals from the optical fiber at a receiver of a further telecommunications box and converting the optical signals to electronic output data;
 - passing the optical signals to a photodetector to produce an electric signal; and
 - filtering the electrical signal to produce an average optical power.

Id. at 6:51–67.

B. Evidence Relied Upon

Petitioner relies on the following references.

Corke	US 5,510,917	Apr. 23, 1996	Ex. 1006
Wan	US 6,819,879 B1	Nov. 16, 2004	Ex. 1007
Ade	US 5,347,601	Sept. 13, 1994	Ex. 1009
Large	US 4,749,247	June 7, 1988	Ex. 1012

Petitioner also provides Declarations by Duncan MacFarlane, Ph.D., P.E. Exs. 1002, 1022. Dr. MacFarlane was cross-examined by Patent Owner, and a transcript of his deposition was entered into the record. Ex. 2027.

C. Instituted Grounds of Unpatentability

Petitioner challenges claims 1–16 on the following grounds. Pet. 7–8.

Reference(s)	Basis	Challenged Claim(s)
Wan	102(e)	1–3 and 9–11
Wan and Ade	103(a)	1–3 and 9–11
Corke and Wan	103(a)	1–7 and 9–15
Corke, Wan, and Large	103(a)	8 and 16

We initially instituted this proceeding only with respect to claims 1–7 and 9–15 for obviousness over Corke and Wan. Dec. 32. Subsequent to instituting the proceeding, the Supreme Court held that a final written decision under 35 U.S.C. § 318(a) must decide the patentability of all claims challenged in a petition for *inter partes* review. *SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348 (2018). Accordingly, we notified the parties that “[w]e modify our institution decision to institute on all of the challenged claims and all of the grounds presented in the Petition.” Paper 15, 2. Neither party requested further briefing in light of that notification.

D. Real Parties in Interest

Petitioner identifies Nokia of America Corporation, Alcatel-Lucent SA, Ciena Corporation, Coriant (USA) Inc., Coriant North America, LLC, Coriant Operations, Inc., Infinera Corporation, Fujitsu Limited, Fujitsu Network Communications, Inc., and Nokia Corp. as real parties in interest. Paper 20, 1. In addition, Petitioner includes the following statement:

The Coriant entities identified above further identify the following entities in this section without an admission that they are real parties in interest but rather out of an abundance of caution because they were identified in corporate disclosure statements in the case *Oyster Optics, LLC v. Coriant America Inc., et al.*, No. 2:16-CV-1302-JRG and/or because they were originally named by [Patent Owner] as defendants in that case: Tellabs, Inc., Coriant America Inc., Coriant International Group LLC, Marlin Management Company, LLC, and Oaktree Capital Management, L.P.

Id. Petitioner has not updated its statement of real parties in interest in light of termination of the proceeding with respect to Coriant (USA) Inc., Coriant North America, LLC, Coriant Operations, Inc., and Fujitsu Network Communications, Inc. If Petitioner's existing statement is inaccurate in light of that partial termination, it should update its statement by filing updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3).

Patent Owner identifies only itself as a real party in interest. Paper 8, 2.

E. Related Proceedings

Both parties identify *Oyster Optics, LLC v. Coriant America Inc.*, No. 2:16-cv-01302 (E.D. Tex.), as involving the '511 patent and several other patents. Pet. 1; Paper 11, 2. Patent Owner also identifies the following district-court proceedings as involving the '511 patent: (1) *Oyster Optics, LLC v. Infinera Corp.*, No. 2:16-cv-01295 (E.D. Tex.); (2) *Oyster Optics, LLC v. NEC Corp.*, No. 2:16-cv-01296 (E.D. Tex.); (3) *Oyster Optics, LLC*

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v. Nokia Corp., No. 2:16-cv-01297 (E.D. Tex.); (4) *Oyster Optics, LLC v. ZTE Corp.*, No. 2:16-cv-01298 (E.D. Tex.); (5) *Oyster Optics, LLC v. Fujitsu Network Communications, Inc.*, No. 2:16-cv-01299 (E.D. Tex.); (6) *Oyster Optics, LLC v. Ericsson Inc.*, No. 2:16-cv-01300 (E.D. Tex.); (7) *Oyster Optics, LLC v. Cisco Systems, Inc.*, No. 2:16-cv-01301 (E.D. Tex.); (8) *Oyster Optics, LLC v. Huawei Technologies Co. Ltd.*, No. 2:16-cv-01303 (E.D. Tex.); (9) *Oyster Optics, LLC v. Ciena Corp.*, No. 2:17-cv-00511 (E.D. Tex.); and (10) *Oyster Optics, LLC v. Ciena Corp.*, No. 4:17-cv-05920 (N.D. Cal.). Paper 11, 2–3; *see also* Prelim. Resp. 4–5.

In addition, Patent Owner identifies several *inter partes* review proceedings, most involving patents other than the '511 patent, but which Patent Owner indicates “may also 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, IPR2017-02173, IPR2017-02189, IPR2017-02190, IPR2018-00070, IPR2018-00146, IPR2018-00257, IPR2018-00258, and IPR2018-00259. Paper 11, 3–4.

II. ANALYSIS

A. Legal Principles

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008);

Karsten Mfg. Corp. v. Cleveland Golf Co., 242 F.3d 1376, 1383 (Fed. Cir. 2001). While the elements must be arranged in the same way as is recited in the claim, “the reference need not satisfy an *ipsissimis verbis* test.” *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009); *In re Bond*, 910 F.2d 831, 832–33 (Fed. Cir. 1990). Identity of terminology between the anticipatory prior art reference and the claim is not required. Prior art references must be “considered together with the knowledge of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

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

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in

² The parties do not address secondary considerations, which accordingly do not form part of our analysis.

the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); see *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

To prevail on its challenges, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). “In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden never shifts to Patent Owner. See *Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review). Furthermore, Petitioner does not satisfy its burden of proving obviousness by employing “mere conclusory

statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

B. Level of Skill in the Art

Petitioner contends that a person of ordinary skill in the art “would have had a B.S. in Electrical Engineering or a related field with at least five years of experience in designing optical transmission systems, or an M.S. in Electrical Engineering or a related field.” Pet. 10. Dr. MacFarlane makes the same statement, which we find reasonable. Ex. 1002 ¶ 19.

Because this proposed level of skill is unchallenged by Patent Owner, we adopt it for this proceeding.

C. Claim Construction

In an *inter partes* review proceeding based on a petition filed prior to November 13, 2018, the Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. See 37 C.F.R. § 42.100(b) (2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Under the broadest reasonable interpretation standard, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). An inventor may provide a meaning for a

term that is different from its ordinary meaning by defining the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994).

Neither party proposes an express construction for any claim term. *See* Pet. 12–13 (“the claims should be, and have been, given their plain and ordinary meaning under the broadest reasonable interpretation standard”). Nevertheless, in light of Patent Owner’s arguments, we find it necessary to construe expressly the term “telecommunications box,” which is recited in each of the independent claims.³

³ Although it does not proffer a construction of its own, Patent Owner contends that Petitioner’s failure to do so “renders the Petition fatally defective as it is the Petitioner[’s] burden to explain it its Petition ‘[h]ow the challenged claim is to be construed’ and [h]ow the construed claim is unpatentable” PO Resp. 63 (quoting 37 C.F.R. §§ 42.104(b)(3)–(4)). We disagree because Petitioner complied with the regulations by asserting that “the claims should be . . . given their plain and ordinary meaning under the broadest reasonable interpretation standard.” *See* Pet. 12–13; *see also* Dec. 9. Particularly in view of the ’511 patent’s assertion that “an optical fiber multiplexor . . . is also called ‘a box’ in the industry,” it was not apparent when the Petition was filed that the term would acquire the importance Patent Owner places upon it with its arguments—while simultaneously evading limiting itself to its own explicit construction. Ex. 1001, 1:21–22. Regardless, “Petitioner’s election to comply only minimally with the requirement to identify how challenged claims are to be construed does not diminish the ultimate showing required to prevail in an *inter partes* review proceeding.” *Securus Techs., Inc. v. Global Tel*Link Corp.*, Case IPR2015-00155, 2015 WL 2089753, at *3 (PTAB May 1, 2015).

The specification of the '511 patent states that “an optical fiber multiplexor . . . is also called ‘a box’ in the industry.” Ex. 1001, 1:21–22. Notwithstanding this broad assertion, which we do not find made with sufficient clarity, deliberateness, and precision to qualify as definitional, we generally agree with Patent Owner that “[i]t is clear from the '511 patent, including Fig. 1, that a ‘telecommunications box’ is not just an optical fiber multiplexor, but rather a ‘box’ that can be configured to contain telecommunications components, for example the components shown in the '511 patent’s Fig. 1.” PO Resp. 6. That is, the specification of the '511 patent also includes a number of suggestive references to a physical structure for a “telecommunications box,” in addition to explicitly illustrating such a physical structure in its Figure 1. *See* Ex. 1001, 1:23–25 (a card “fits into the box”), 2:44–45 (referring to an embedded processor “within the box”), 2:52–58 (referring to alarm devices “on the outside of the box”), 3:12–16 (referring to “compatib[ility] with most existing box dimensions”), 4:21–23 (referring to a faceplate “flush with a front side of [the] box”).

In this context, the testimony of Dr. MacFarlane is pertinent. In his initial Declaration, while discussing certain prior art, Dr. MacFarlane testifies that

includ[ing] a housing (“telecommunications box”) [was] known in the art because doing so would have . . . provided the known utility of providing protection within a self-contained unit, reducing the complexity of the communications system by providing an easily replaceable, upgradable, expandable box,

and providing an efficient manner of using known technology in an optical fiber network system.

Ex. 1002 ¶ 51; *see also id.* ¶ 102 (similar statement). Patent Owner explored the meaning of “telecommunications box” with Dr. MacFarlane on cross-examination. Ex. 2027, 72:13–96:18. The witness testified that “[t]he term ‘telecommunications box’ . . . would be a box or an enclosure that would house a -- or contain a telecommunications components, modules, subsystems that are used in a telecommunications application.” *Id.* at 72:16–22.

In addition to this summary statement, a number of other statements are relevant. For example, Dr. MacFarlane rejected the characterization that “components arranged inside of [a] telecommunications box are *fully* enclosed inside that box” (emphasis added). *Id.* at 75:7–18 (“So if we take out ‘fully,’ I believe my answer is yes.”). Dr. MacFarlane also emphasized that the term “telecommunications box” would have been known by different terms to those of skill in the art, “depending on, for example, what firm -- what company he or she worked for.” *Id.* at 78:13–19. As an example, Dr. MacFarlane indicated that, at his prior employer, “we talked about shelves, not boxes. So I don’t want to split hairs with you on the difference between shelves and a box.” *Id.* at 93:11–18. In addition, Dr. MacFarlane indicated that “telecommunications boxes” could be of different sizes. *Id.* at 81:16–83:1 (“the ones that I’m thinking of are fairly small [but]

[c]ould have any number of other dimensions depending on the functionality”).

Based on this testimony, which we find consistent with the suggestive references to the structure of a “box” in the specification of the ’511 patent, we construe a “telecommunications box” as a container, such as a housing, configured to contain telecommunications equipment, such as an optical-fiber multiplexor. Because the evidence shows that one of skill in the art would understand such containers to include a variety of structures, including examples provided by Dr. MacFarlane, we conclude that the claims do not impose any particular constraint on the size and structure of the container.

D. Scope and Content of the Prior Art

1. Wan

Wan “relates to signal encoding, and more particularly to a method and apparatus for encoding and decoding optical power and non-payload data in an optical signal.” Ex. 1007, 1:8–11.

Figure 1 of Wan is reproduced below.

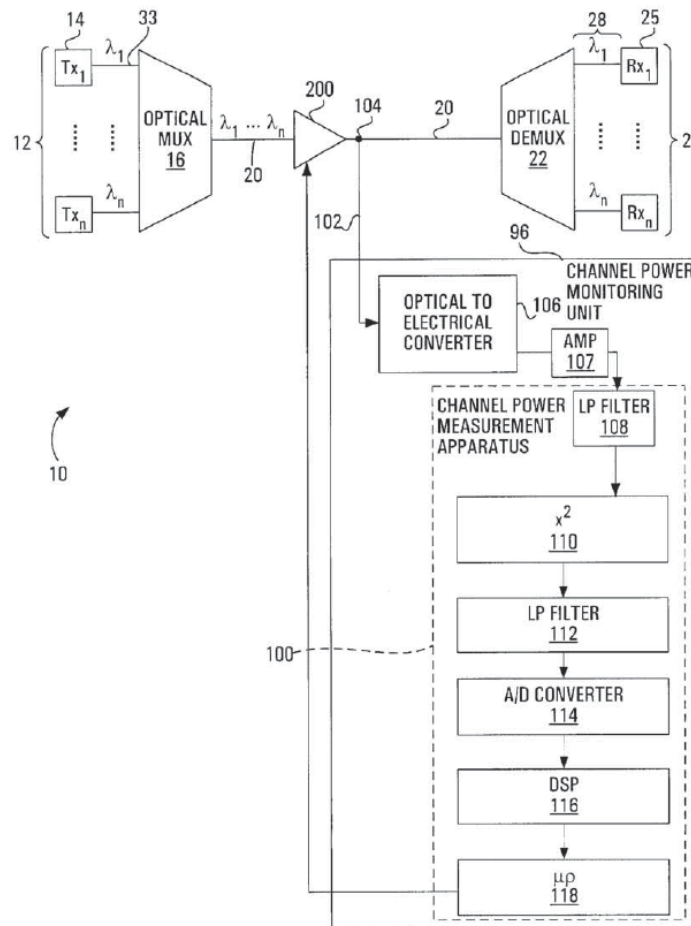


FIG. 1

Figure 1 illustrates a wavelength division multiplexed (“WDM”) network that includes a plurality of optical transmitters 12 and a plurality of optical receivers 24, connected via optical multiplexer 16, optical medium 20, and optical demultiplexer 22. *Id.* at 4:35–41. One or more optical amplifiers 200 may be positioned along optical medium 20 to compensate for optical attenuation. *Id.* at 4:41–45. “Effectively, the network functions to permit

optical signals produced by the optical transmitters 12 to be received at respective optical receivers 24.” *Id.* at 4:46–48.

Figure 2 of Wan is reproduced below.

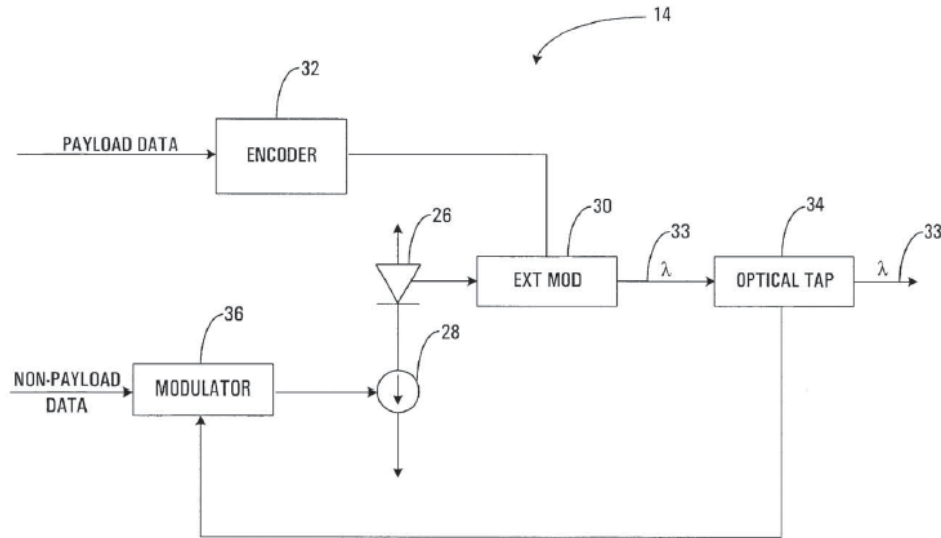


FIG. 2

Figure 2 is a block diagram of transmitter 14, which “is representative of each of the optical transmitters 12 shown in FIG. 1.” *Id.* at 4:49–51.

Transmitter 14 includes optical source 26 (such as a semiconductor laser), which generates light whose intensity is adjusted under the control of bias current controller 28. *Id.* at 4:54–56. The light is modulated by external modulator 30, which receives a payload data modulating signal from encoder 32.

Optical tap 34 taps off or couples approximately 3% of the optical signal on optical medium 33 to produce an optical tap signal that is provided to nonpayload data modulator 36. *Id.* at 5:8–11. Nonpayload data

modulator 36 produces a dither modulating signal having an amplitude that indicates power in the optical signal produced on optical medium 33 and having a phase representing the nonpayload data. *Id.* at 5:23–27. The dither modulating signal controls bias controller 28 to modulate the optical signal produced by optical source 26 before it is modulated by external modulator 30. *Id.* at 5:27–30.

Figure 4 of Wan is reproduced below.

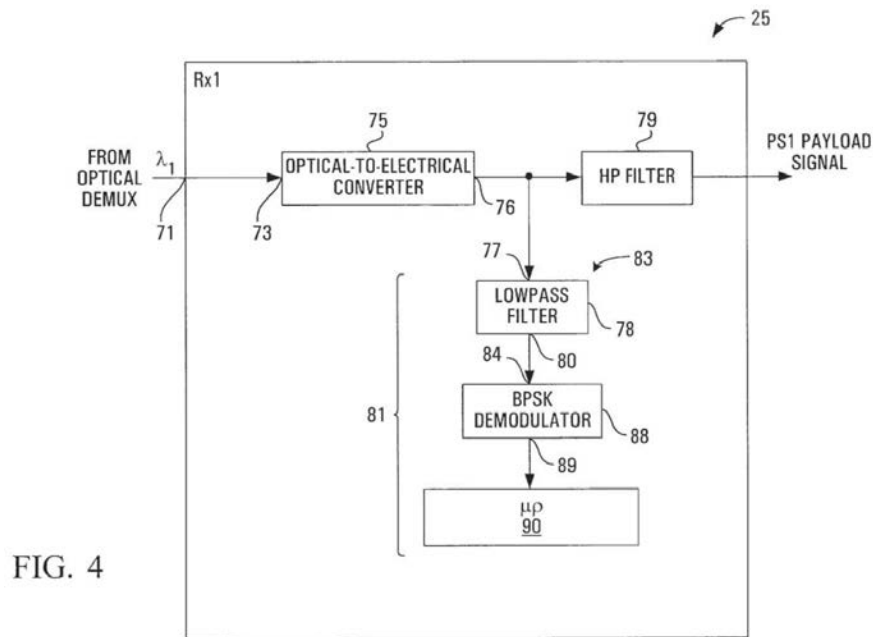


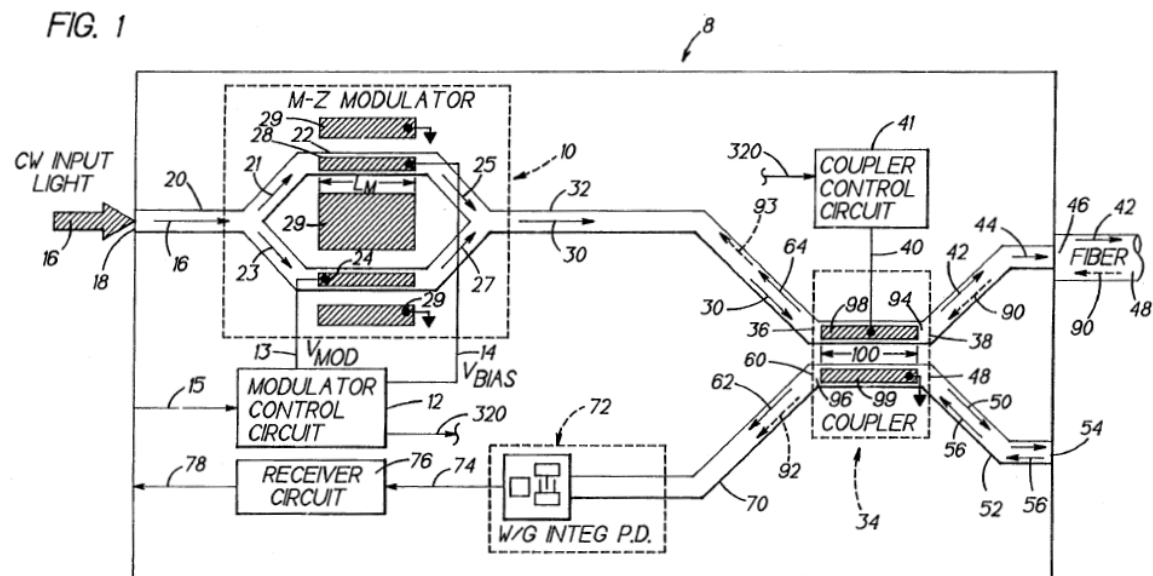
FIG. 4

Figure 4 is a block diagram of receiver 25, which “is representative of each of the receivers 24 shown in FIG. 1.” *Id.* at 8:43–44. Receiver 25 “acts to extract payload data from the received channel composite optical signal,” which is received at input terminal 71. *Id.* at 8:44–51. Optical-to-electrical converter 75 produces a channel composite electrical signal at output 76, from which payload data are extracted as a “payload signal” by high-pass

filter 79 to remove low-frequency components. *Id.* at 8:51–63. Nonpayload data are extracted by apparatus 81, which includes demodulator 83 and microprocessor 90, with demodulator 83 including low-pass filter 78 and binary-phase-shift-keyed (“BPSK”) demodulator 88. *Id.* at 8:64–9:19.

2. Ade

Ade describes an optical-electronic integrated-circuit transceiver, as illustrated in Figure 1, reproduced below. Ex. 1024, 3:8–10.



The integrated optical transceiver of Figure 1, reproduced above, allows both optical-receiver and optical-transmitter functions. *See id.* at 1:23–38. When operating as an optical transmitter, the transceiver receives input light 16 from an external source, such as a laser (not shown), at input port 18. *Id.* at 3:62–4:5. Modulator 10 phase-modulates the light with modulator control circuit 12, in response to an electrical input signal on line 15, and ultimately

outputs the modulated light over fiber 48 after transmission via waveguides internal to the transceiver. *Id.* at 3:62–68, 4:14–21, 4:43–49.

Of particular relevance, Ade describes operation as an optical receiver in a specific embodiment that omits coupler 34, such that “a separate fiber would be used for transmit and receive light.” *Id.* at 16:25–34. In such an embodiment, “the transmit light would exit from the port 46 [as summarized above] and the receive light would enter at the port 54.” *Id.* at 16:25–34. Light received at port 54 is directed to photodetector 72, such that receiver circuit 76 measures a resulting electrical-current signal and converts the electrical-current signal to a voltage that is output over lines 78. *Id.* at 15:15–20.

3. *Corke*

Corke “relates to optical communication monitoring and to a control device for connection with optical fibres.” Ex. 1006, 1:11–13.

Figure 2 of Corke is reproduced below.

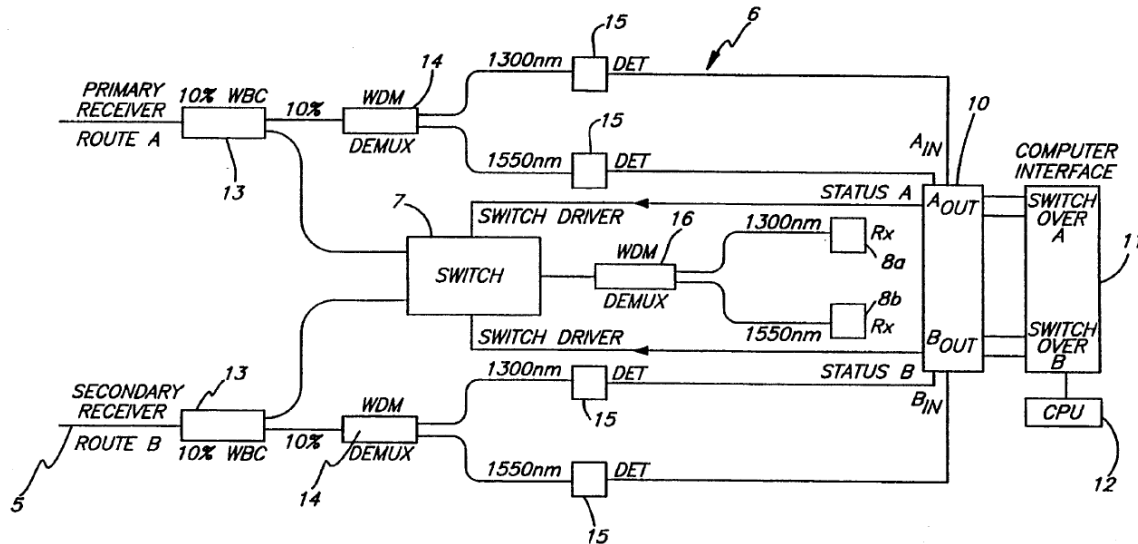


FIG. 2

Figure 2 illustrates a structure for a communication monitoring and control device. *Id.* at 5:61–63. Primary and secondary optical fibers appear on the left of the drawing, identified as “PRIMARY RECEIVER” for “ROUTE A,” and as “SECONDARY RECEIVER” for “ROUTE B.”⁴ *Id.* at 6:3–6. Each of the optical fibers is tapped by tap couplers 13 to direct 10% of the incoming light to demultiplexers 14, with 90% of the light transmitted to switch 7. *Id.* at 6:3–21. Switch 7 operates generally to direct signals to receiver units 8a and 8b, after separation of particular wavelengths by demultiplexer 16, similar to wavelength separation by demultiplexers 14. *Id.* at 5:46–51, 6:16–21.

⁴ Corke refers to these optical fibers with reference numbers 4 and 5. See Ex. 1005, 6:3–4. Reference number 4 appears to have been inadvertently omitted from the drawing.

By diverting a portion of the incoming signals with tap couplers 13, detectors 15 may continuously monitor each wavelength independently. *Id.* at 6:22–26. During normal operation of the device, when both optical fibers are in “good condition,” control circuit 10 defaults to controlling switch 7 to direct signals of the primary optical fiber to receivers 8a and 8b. *Id.* at 6:26–29. But if a fault occurs in the primary optical fiber at either wavelength, as detected by a sufficient drop in intensity at respective detector 15, control unit 10 causes switch 7 to direct signals from the secondary optical fiber to receivers 8a and 8b. *Id.* at 6:30–38.

Figure 3 of Corke is reproduced below.

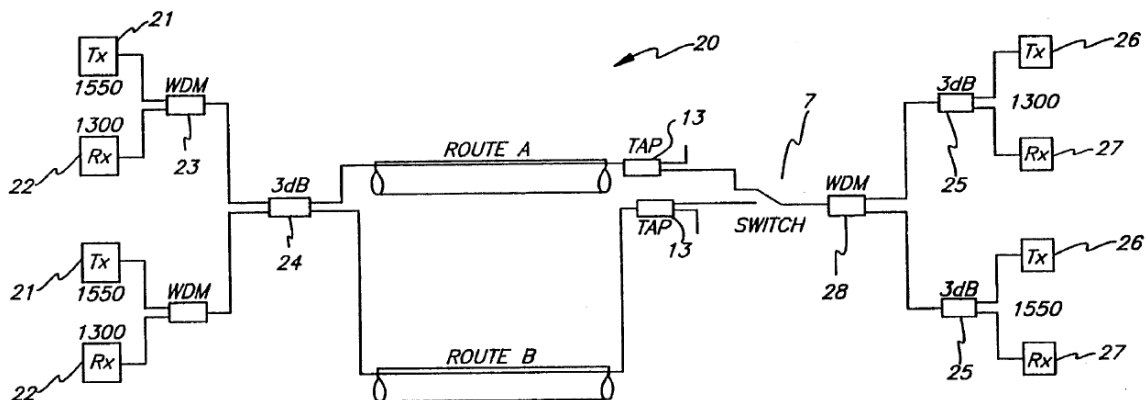


FIG. 3

Figure 3 illustrates an embodiment of Corke in which both ends of the communications structure include transmitter receiver pairs 21, 22 (at the “transmitter” end) and 26, 27 (at the “receiver” end). *Id.* at 7:56–8:2.

E. Anticipation by Wan

Petitioner challenges claims 1–3 and 9–11 as anticipated by Wan. Pet. 58–74. As part of its argument, Petitioner contends that Wan discloses “feeding input data to a controller of a transmitter of a telecommunications box, the telecommunications box having an electronic data input for the input data and an electronic data output,” which is recited in both independent claims 1 and 9. *Id.* at 59–64. Although the same limitation is recited in both independent claims, Petitioner proposes different mappings of Wan’s disclosure to specific elements of the limitation when addressing the individual independent claims. *Id.*

1. Claims 1–3

First, for independent claim 1, Petitioner draws the following correspondences: (1) between the recited “telecommunications box” and Wan’s optical multiplexer 16 and transmitter 14, *id.* at 60–61 (including n.17); (2) between the recited “input data” and Wan’s payload data, *id.* at 59–60; and (3) between the recited “controller” and Wan’s encoder 32, *id.* With these correspondences, Petitioner contends that an input to Wan’s transmitter 14 is “an electronic data input” of the “telecommunications box,” and that “the output of the multiplexer 16 is an ‘electronic data output.’” *Id.* at 60–61. The latter of these contentions is of particular relevance.

In Wan, multiplexer 16 is an “*optical* multiplexer.” *E.g.*, Ex. 1007, 4:38–39 (emphasis added). Although Petitioner thus recognizes that the

output of multiplexer 16 is an optical signal, Petitioner contends that “the claim does not require the electronic data output to output a specific form of data,” and that “the specification of the ’511 patent acknowledges that an optical signal can carry an electronic data stream.” Pet. 62; *see also* Reply 25. We disagree with this contention. Instead, we agree with Patent Owner that Petitioner’s “unreasonable interpretation of ‘electronic data output’ to cover non-electronic optical signals completely ignores the plain language of the claims, which require ‘**electronic** data output’ rather than an optical output.” PO Resp. 55.

Even a general-purpose dictionary recognizes the basic distinction between “electronic” and “optical” under the plain and ordinary meaning that Petitioner advocates we apply in construing the claim terms. Ex. 3001 (defining “electronic” as “of or relating to electrons”); Ex. 3002 (defining “optical” as “of or relating to the science of optics” and “of, relating to, or utilizing light especially instead of other forms of energy”). Nor does Petitioner’s citation to the Specification of the ’511 patent support its position that “electronic data” may encompass both optical and nonoptical forms. The sentence cited by Petitioner for this position reads: “Optical receiver 32 *converts* the optical signal from optical to electronic form to recover the electronic data stream 34 as appropriate for the optical modulation technique employed.” Ex. 1001, 4:67–5:3 (emphasis added). Rather than support Petitioner’s position that optical data are a specific form of a more general class of electronic data, this disclosure unambiguously

distinguishes the two forms of data by requiring *conversion* between them. See PO Resp. 53–55. We further agree with Patent Owner that the Petition itself is inconsistent because footnote 7 of the Petition acknowledges that “convert[ing] the optical signal . . . to electronic form to recover the electronic data stream,” “constitutes *converting* the optical signals to electronic output data.” Pet. 30 n.7 (emphasis added) (quoting Ex. 1001, 4:67–5:3); see PO Resp. 54.

Because Wan’s multiplexer 16 outputs *optical* data, rather than electronic data, we conclude that Petitioner does not show, by a preponderance of the evidence, that claim 1 is anticipated by Wan. Because claims 2 and 3 depend from claim 1, Petitioner also does not show, by a preponderance of the evidence, that those claims are anticipated by Wan.

2. Claims 9–11

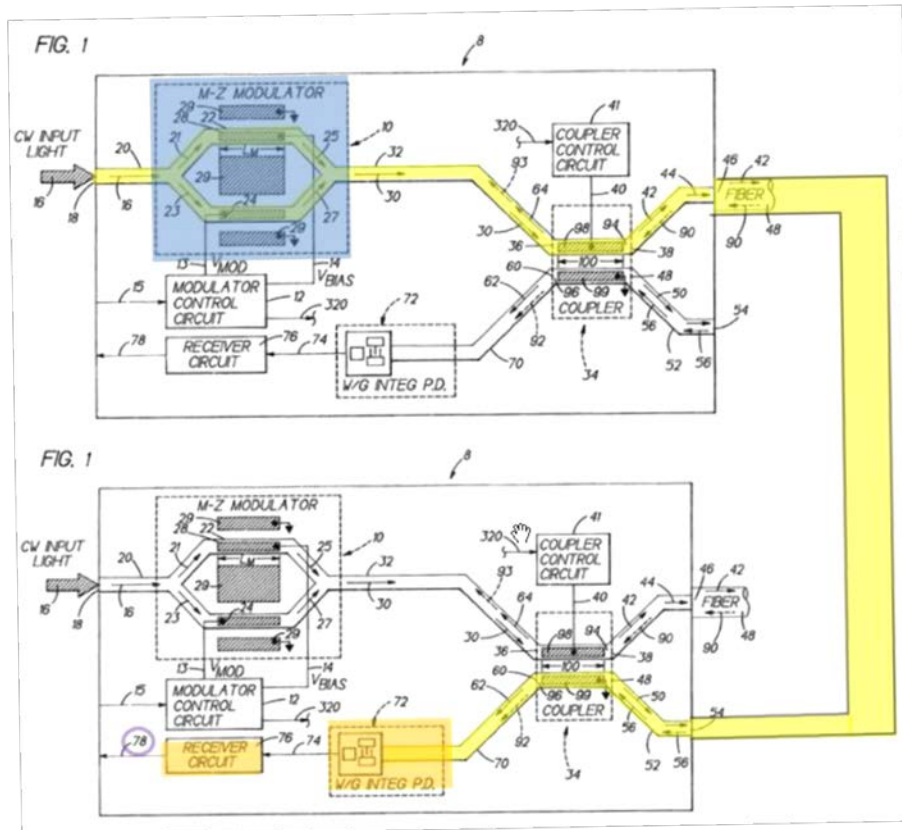
Second, for independent claim 9, Petitioner draws the following correspondences: (1) between the recited “telecommunications box” and Wan’s optical multiplexer 16 and transmitter 14, Pet. 63; (2) between the recited “input data” and Wan’s nonpayload data, *id.*; and (3) between the recited “controller” and Wan’s nonpayload data modulator 36 and bias current controller 28, *id.* at 62. Although some of these correspondences differ from those for claim 1, Petitioner again relies on its overbroad interpretation of “electronic data output” in addressing the parallel limitation of claim 9. *Id.* at 63–64 (“Wan discloses that the telecommunications box

has an electronic data output for substantially similar reasons” as the similar element of claim 1). For the reasons expressed above, we disagree with that position.

We conclude that Petitioner does not show, by a preponderance of the evidence, that claim 9 is anticipated by Wan, nor that claims 10 and 11, which depend therefrom, are anticipated by Wan.

F. Obviousness over Wan and Ade

In advancing its alternative obviousness challenge to claims 1–3 and 9–11 over Wan and Ade, Petitioner addresses the potential conclusion—which we reach—that “electronic data” do not encompass Wan’s optical data. Pet. 74–75 (“it would have been obvious to implement such features [(nonoptical) electronic input and output] given the disclosures of *Ade* and a POSITA’s knowledge”) (citing Ex. 1002 ¶ 146). Specifically, Petitioner contends that a person of ordinary skill in the art “would have been motivated to use a transceiver card, like *Ade*’s, to provide the ability to transmit and receive data at the same location,” and “would have found using such techniques in *Wan*’s system/process a predictable implementation at the time of the alleged invention of the ’511 patent.” Pet. 78–79 (citing Ex. 1002 ¶ 149). Petitioner illustrates the result of such a combination with the following composite, annotated drawing:



Petitioner’s drawing includes two copies of Ade’s Figure 1, “annotated to show that the optical signals (yellow) are received at a receiver (orange) and converted into electronic output data (purple).” *Id.* at 78. According to Petitioner, the signal on line 15 corresponds to the recited “electronic data input” and the signal on line 78 corresponds to the recited “electronic data output” “because the receiver circuit 76 demodulates the signal on line 74 and provides a demodulated output signal on line 78.” *Id.* at 77. Petitioner summarizes its argument as follows:

[T]he '511 patent concedes that a telecommunication box was “well known in the art” and that it was well known that such

boxes had motherboards connecting to the electronic data input/output. . . . Thus, given this knowledge of a POSITA and the transceiver chip of the modified *Wan* system/process, it would have been obvious to connect the electronic data input 15 and output 78 of *Wan* as modified to circuitry, such as a well-known motherboard.

Id. at 79 (citations omitted, footnote omitted).

This reasoning is not persuasive, and appears guided by hindsight to reconstruct the inventions of claims 1 and 9. *See In re Fritch*, 972 F.2d 1260, 1266 (Fed. Cir. 1992) (“It is impermissible to use the claimed invention as an instruction manual or ‘template’ to piece together the teachings of the prior art so that the claimed invention is rendered obvious.” (citation omitted)). Petitioner’s description of how it proposes to modify *Wan* in view of *Ade* is unclear, and—despite our remark on that lack of clarity in the Institution Decision—the Reply takes no steps to offer a clarification. *See* Dec. 22 (“Petitioner’s description of how it proposes to modify *Wan* in view of *Ade* is unclear.”); Reply 25 (reiterating that the combination of *Wan* and *Ade* “discloses claims 1-3 and 9-11 for the reasons set forth in the Petition”).

At best, we understand Petitioner to propose that the transmitter of *Wan* be substituted with a transceiver that includes both a transmitter and receiver. *See* Pet. 75–80. But Petitioner insufficiently explains why a person of ordinary skill in the art would have been motivated to make such a substitution, particularly because it identifies no articulated reason to modify *Wan*’s separated transmitters and receivers, arranged not at the same

location but remotely from each other, with an integrated transceiver. The remote separation of Wan's transmitters and receivers is evident, for example, from Wan's disclosure of using optical amplifiers 200 positioned at locations along optical medium 20 to compensate for optical attenuation, Ex. 1007, 4:41–45.

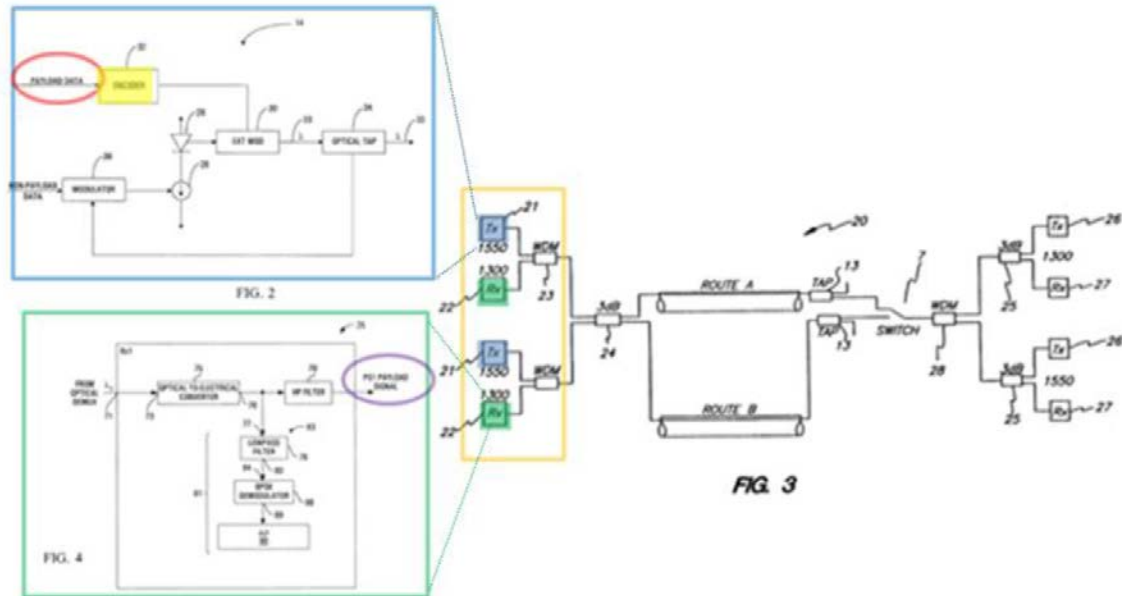
We conclude that Petitioner does not show, by a preponderance of the evidence, that claims 1–3 and 9–11 are unpatentable under 35 U.S.C. § 103(a) over Ade and Wan.

G. Corke-Based Grounds

Petitioner challenges claims 1–7 and 9–15 as unpatentable for obviousness over Corke and Wan, and challenges claims 8 and 16 as unpatentable for obviousness over Corke, Wan, and Large. Pet. 13–58.

1. Independent Claim 1

In its detailed analysis of independent claim 1, Petitioner includes the following annotated composite drawing to explain its proposed combination of Corke and Wan. Pet. 24.



Petitioner's annotated drawing effects a composite of Corke's Figure 3 on the right side of the drawing, with Wan's Figure 2 in a blue box in the upper left of the drawing, and Wan's Figure 4 in a green box in the lower left of the drawing. *Id.* That is, Petitioner proposes to implement the Corke system by substituting details of the transmitter and receiver as taught by Wan. *Id.* at 20–23. Petitioner uses additional colors in the annotated composite drawing to identify other correspondences that it draws with the claim: (1) (orange) the combination of Corke's transmitters, receivers, and multiplexer/demultiplexers corresponds to the recited "telecommunications box"; (2) (red) Wan's payload data corresponds to the recited "input data" and is input at an "electronic data input"; (3) (purple) Wan's payload signal corresponds to data output from an "electronic data output"; and (4) (yellow)

the encoder in Wan’s transmitter corresponds to the recited “controller of a transmitter.” *Id.* at 24.

In making these correspondences, Petitioner addresses the recited structure of the “telecommunications box” by observing that Corke makes at least inferential reference to a housing structure at the receiver end, and by reasoning that one of skill in the art would have found it obvious to configure the transmitter end similarly. *Id.* at 15–16 (citing Ex. 1006, 7:19–27; 6:57–59, 7:15, 7:46–48 (references to a module’s front face plate)). Petitioner supports its reasoning, which we find sufficient, with testimony by Dr. MacFarlane, who further testifies that placing telecommunications modules into housings at each end of a network was well known prior to the claimed invention. Ex. 1002 ¶ 50.⁵ With respect to the “further telecommunications box” recited in the “receiving optical signals” limitation

⁵ Dr. MacFarlane’s testimony cites Ex. 1014 (“Rowan”) to support his assertion that “in my opinion, it was well known, predictable, and common sense for one having ordinary skill in the art to place telecommunications modules into housings at each end of [a] network.” Ex. 1002 ¶ 50 (citing Ex. 1014, 7:13–21, 11:63–12:5, 19:45–64). In doing so, Dr. MacFarlane asserts that he cites to Rowan “only to demonstrate the state of the art as understood by a person having ordinary skill in the art prior to the alleged invention of the ’511 patent.” *Id.* n.2; *see also* Pet. 15 n.4. Patent Owner characterizes such reference to Rowan as “an alternative obviousness theory.” PO Resp. 23. We disagree with this characterization and treat Rowan as Dr. MacFarlane and Petitioner clearly intend, i.e. not as applied in Petitioner’s obviousness challenge over Corke and Wan, but as extrinsic support for Dr. MacFarlane’s opinion regarding the knowledge of one of ordinary skill in the art at the relevant time.

of claim 1, Petitioner observes that “the modified *Corke* system/process includes a receiver end having receiver ports 27,” which are shown on the right side of Petitioner’s composite drawing above. Pet. 27 (citing Ex. 1006, Figs. 2–4; Ex. 1002 ¶ 66).

To address all steps in the recited method of claim 1 except the last limitation, Petitioner observes that, with the correspondences identified above, input payload data are fed to the transmitter encoder, which accordingly modulates laser light that is sent as an optical signal over a fiber to the receiver end, where it is converted to electronic data output. *Id.* at 14–31. In addition, tap coupler 13, shown in Figure 2 of *Corke*, reproduced above, taps off 10% of the optical signal to photodetector 15 to produce an electric signal. *Id.* at 31–32 (citing Ex. 1006, 6:3–44, 2:19–24, 8:20–35). We agree with this analysis, which addresses all but the last limitation of the claim.

For the last limitation, i.e., “filtering the electrical signal to produce an average optical power,” Petitioner observes that “*Corke* discloses that photodetector 15 ‘is selected to detect the *average* intensity of the signal . . . for comparison with a threshold value of the minimum signal intensity acceptable.” *Id.* at 33 (quoting Ex. 1006, 2:46–49) (alterations by Petitioner). Acknowledging that *Corke* “does not expressly disclose the details of how the detector 15 detects the average intensity of the optical signal,” Petitioner contends that a person of ordinary skill in the art “would

have found it obvious to modify such features to find the average of a signal using a low pass filter (LPF) in light of *Wan*.” *Id.*

In doing so, Petitioner highlights similarities in the optical tapping disclosed by Corke and the optical tapping disclosed by Wan, including conversion to an amplified and digitized electrical signal. *Id.* at 34 (citing Ex. 1006, 5:51–53, 6:50–7:8; Ex. 1007, 5:8–10, 5:61–66, 6:5–10). In light of these similarities, Petitioner reasons that a person of ordinary skill in the art would both have looked to Wan for details on producing an average intensity and have found it obvious to apply a low-pass filter as taught by Wan. *Id.* at 35 (citing Ex. 1002 ¶¶ 77–80). With testimony by Dr.

MacFarlane, Petitioner supports its position that

[u]sing a [low-pass filter] for this purpose would have amounted to no more than applying a known technique (low-pass-filtering the output of a photodiode to produce an average optical power as disclosed in *Wan*) to a known device (*Corke*’s detector that detects the average intensity of the optical signal) to yield predictable results (producing a signal indicative of the average optical power of the received optical signal).

Id. (citing Ex. 1002 ¶ 80). We credit Dr. MacFarlane’s uncontroverted testimony on this point. Accordingly, we find that Petitioner makes a sufficient showing with respect to all steps of independent claim 1.

Patent Owner makes three arguments in response. First, Patent Owner argues that the combination of art does not disclose the recited “telecommunications box” having “an electronic input for the input data and an electronic data output.” PO Resp. 22–31. According to Patent Owner,

“Corke’s monitoring system has **optical** data inputs and outputs, and no amount of hand-waving or highlighting of what Corke actually teaches can demonstrate the required **electrical** data input and output in a telecommunications box along with the remainder of the claimed elements.” *Id.* at 22.

In making this argument, Patent Owner improperly attacks Corke individually, rather than addressing the combination with Wan. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for obviousness is not . . . that the claimed invention must be expressly suggested in any one or all of the references.”). Petitioner does not rely on the optical data inputs and outputs of Corke to meet the recited “electronic input for the input data and an electronic data output.” Rather, Petitioner relies on the “PAYLOAD DATA” of Wan’s Figure 2 (identified in red in Petitioner’s composite drawing above) and relies on the “PS1 PAYLOAD SIGNAL” of Wan’s Figure 4 (identified in purple in Petitioner’s composite drawing above), when the references’ teachings are combined as illustrated by Petitioner’s composite drawing. Pet. 23. In the Institution Decision, we noted that such payloads “appear[] to provide electronic data,” an assertion that Patent Owner does not dispute in its Response. Dec. 26–27. Indeed, the transmitter and receiver operation in Wan is, in material respects, strikingly similar to that described by the ’511 patent itself. *Compare, e.g.*, Ex. 1001, 4:28–41 (light from laser 12 modulated by modulator 16 as a function of input data 19 in Figure 2 of the ’511 patent, reproduced above), *with* Ex.

1007, 4:49–65 (light from laser 26 modulated by modulator 30 as a function of payload data from encoder 32 in Figure 2 of Wan).

Furthermore, Corke includes sufficient suggestion, bolstered by the uncontroverted testimony of Dr. MacFarlane, that the combination would have been understood to be embodied in a “telecommunications box,” as we have construed the term. In particular, Corke describes “an effective human to machine interface” that includes a “front[]panel of the module,” where a field engineer may adjust certain settings, as well as “LED’s on the front face-plate which allows the [field engineer] to determine the present status of the module.” Ex. 1006, 7:19–27, 7:46–48. In addition to Dr. MacFarlane’s testimony discussed above, Dr. MacFarlane testified on cross-examination that these disclosures of Corke make “crystal clear that they’re talking about the front faceplate of . . . an enclosure or box or telecommunications box.” Ex. 2027, 100:13–20. When challenged to explain why such an inference was “crystal clear,” Dr. MacFarlane testified that “any person of ordinary skill in the art would put their expensive, sensitive, fragile equipment or components, they would -- they would house it in an enclosure or a box or a shelf.” *Id.* at 101:10–16. Dr. MacFarlane further testified that Corke’s phrasing prompts “[an] image that goes in my mind[, which] is okay, yeah, I have a front faceplate and that suggests that it’s in a box.” *Id.* at 101:21–102:2. We give weight to this testimony, which is uncontroverted by any opposing expert testimony, and is supported by disclosures in Corke.

In light of these considerations, we find that the combination articulated in the Petition includes a “telecommunications box having an electronic data input for the input data and an electronic data output,” as recited in the claim.

Second, Patent Owner contends that “Petitioner[] only recreate[s] all of the claimed elements in the proposed Corke-Wan combination through hindsight” and that its “alleged reasons for the proposed modifications of Corke and Wan are founded upon unsupported conclusions.” PO Resp. 31–34. This contention is not persuasive because Petitioner provides compelling reasons, supported by the testimony of Dr. MacFarlane, to effect the combination as described above.⁶ In particular, we agree with Petitioner that “Dr. MacFarlane provided ample reasons as to why a ‘box’ would have been used in the prior art combination (Ex. 1002, ¶¶51-52) and explained that a ‘box’ would have allowed upgrading/expanding a system by sliding in transceiver cards and ‘wouldn’t have to tear down everything to – realize that.’” Reply 13 (citing Ex. 2027, 117:6–15, 116:9–117:19).

Although Patent Owner contends that “[t]hese evidentiary gaps” “taint” Petitioner’s analysis of both the “feeding input data” limitation and

⁶ For example, Patent Owner complains that “Petitioner[] ha[s] failed to identify the ‘elements’ they are attempting to protect these components from, or how a ‘telecommunications box’ provides such protection from the undisclosed and undescribed ‘elements.’” *Id.* at 32. But in referring to “the elements,” Petitioner and Dr. MacFarlane clearly mean *what*, and it is self-evident how an enclosure provides protection.

the “receiving optical signals” limitation (referring to “a further telecommunications box”), we disagree. *See* PO Resp. 32–33. Contrary to Patent Owner’s assertion of hindsight, Corke’s specific disclosure of both transmitter and receiver ends in the bidirectional configuration illustrated in its Figure 3 provides explicit support for Petitioner’s argument. *See* Ex. 1006, 7:56–8:2; Pet. 27–31.

Third, Patent Owner contends that “Petitioner[] pick[s] and choose[s] features of Corke and Wan, without considering the references as a whole.” PO Resp. 34–37. In advancing this contention, Patent Owner focuses on the last limitation of claim 1, “filtering the electrical signal to produce an average optical signal.” According to Patent Owner, Petitioner’s analysis of this limitation is deficient because Petitioner mixes receiver-side and transmitter-side functionality. *Id.* at 37. That is, Patent Owner contends that the purposes of signal averaging in Corke and Wan are different, i.e. that “Corke, on one hand, is detecting an ‘average intensity of the [**received**] signal . . . for comparison with a threshold value of the minimum signal intensity’ while Wan, on the other hand, is determining an amplitude in order to generate a dither modulating signal for transmission.” *Id.* at 35.

This narrow focus on the specific application context in Wan is inapt. As the Supreme Court has emphasized, “the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418.

Relying on testimony by Dr. MacFarlane, Petitioner adequately supports its position that a person of ordinary skill in the art would have found it obvious to apply the averaging technique taught by Wan in other contexts, including the receiver-side functionality of Corke. *See* Ex. 1002 ¶¶ 73–81. Notably, Dr. MacFarlane addresses this issue in the fuller context of the knowledge a person of ordinary skill in the art would have had in understanding electrical-signal filtering and thereby brought to the evaluation of the respective teachings of the references. *See id.* ¶¶ 73–75.

For these reasons, we conclude that Petitioner shows, by a preponderance of the evidence, that independent claim 1 is unpatentable under 35 U.S.C. § 103(a) over Corke and Wan.

2. Independent Claim 9

To address the additional phase modulation requirement of independent claim 9 (as compared to independent claim 1), Petitioner presents a similar analysis, Pet. 46–52, but with a distinction illustrated by Petitioner’s annotations to Figure 2 of Wan, reproduced below.

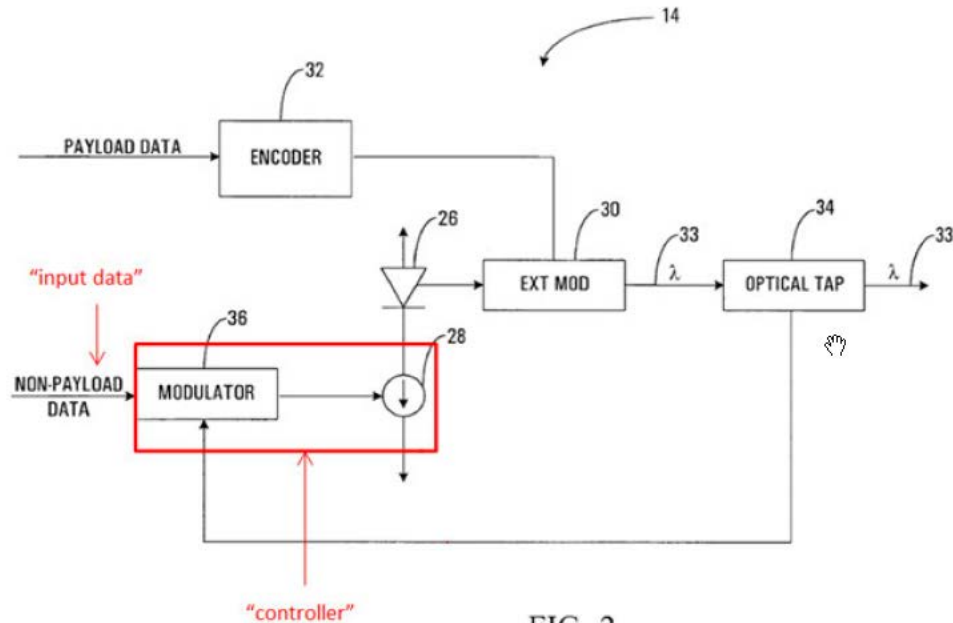


FIG. 2

Petitioner's annotated Figure 2 highlights the difference in the structure of Petitioner's analysis between claim 1 and claim 9. Pet. 48. That is, in addressing claim 1, as discussed above, Petitioner draws a correspondence between (1) the recited "input data" and Wan's *payload data* and (2) the recited "controller" and Wan's external modulator 30. *Id.* at 23. Petitioner's analysis of claim 9, which is supported by Dr. MacFarlane, instead draws a correspondence between (1) the recited "input data" and Wan's *nonpayload data* and (2) the recited "controller" and a combination of modulator 36 and bias current controller 28, as indicated by Petitioner's red annotations. Pet. 47–49; Ex. 1002 ¶¶ 101–103. There is no dispute that the light travelling over optical medium 33 is phase-modulated as a function of the nonpayload data.

But Patent Owner contends that claim 9's requirement of "controlling a modulator to phase modulate *light from a laser* as a function of the input data" is not met because "Petitioner[] fail[s] to recognize the difference between Wan's external modulator 30 and the non-payload data modulator 36." Ex. 1001, 7:26–28 (emphasis added); PO Resp. 44. The difference that Patent Owner highlights is grounded in the fact that external modulator 30 *externally* modulates light emanating from laser 30 *after* the laser has generated the light, whereas modulator 36 *directly* phase-modulates the light in accordance with a dither modulating signal generated *before* the laser generates the light. As Wan states, bias controller 28 receives the dither modulating signal and the "optical signal produced on the optical medium 33 is effectively a composite optical signal as it is comprised of the payload signal and the dither modulating signal." Ex. 1007, 8:22–24. According to Patent Owner, "[t]his disclosure confirms that the bias controller 28 does not independently phase-modulate the light *from* the optical source 26, but rather controls the optical source 26 to output light according to the amplitude and phase of the dither modulating signal." PO Resp. 45.

Patent Owner's argument, which would require placing inordinate weight on the preposition "from" such that claim 9 requires *external* modulation, and excludes *direct* modulation, is not persuasive. In his original Declaration, Dr. MacFarlane testifies that, in the area of encoding information to be transmitted across the channel of a communication system, it was known "that the drive current of the semiconductor laser may be

directly modulated or an external modulator was placed between the laser output and the optical fiber to encode the light beam.” Ex. 1002 ¶ 23. Although Patent Owner cites this testimony, as well as cross-examination testimony of Dr. MacFarlane, in its Sur-Reply, that testimony merely establishes the undisputed fact that both direct and external modulation were known, and that Petitioner’s analysis as directed at claim 9 relies on direct modulation. Sur-Reply 9–10 (citing Ex. 1002 ¶ 23; Ex. 2027, 66:7–68:7, 53:19–55:1, 60:9–61:19, 179:19–180:7).

Dr. MacFarlane’s testimony does not establish, and Patent Owner points to no other evidence establishing, that a person of ordinary skill in the art “would have understood claim 9 as [Patent Owner] implies or why the claim would require *Wan*’s bias controller to ‘external[ly]’ phase modulate the light from optical source 26.” Reply 15 (quoting PO Resp. 45). Rather, we agree with Petitioner that “[t]he plain language of this phrase under the [broadest reasonable interpretation] standard simply requires ‘light from a laser’ to be phase-modulated by a modulator, as opposed to [Patent Owner’s] implied construction that the modulator must externally, instead of directly, modulate light from a laser.” *Id.* at 14–15.

Petitioner’s analysis of other limitations recited in claim 9 generally parallels its analysis of claim 1, which we find sufficient for the reasons expressed above. We conclude that Petitioner shows, by a preponderance of the evidence, that independent claim 9 is unpatentable under 35 U.S.C. § 103(a) over Corke and Wan.

3. Dependent claims 2–4 and 10–12

Claims 2–4 and 10–12 depend respectively from claims 1 and 9, and recite aspects of scaling the electrical signal after filtering with a logarithmic or linear amplifier. Ex. 1001, 7:1–7; 8:10–16. Petitioner accounts for all of the limitations added by claims 2–4 and 10–12 on pages 36–41 and 52–53 of the Petition. Notwithstanding Patent Owner’s arguments to the contrary, which we discuss below, we are persuaded by Petitioner’s showing as to these claims.

Specifically, in addressing the general scaling requirement recited in claims 2 and 10, Petitioner observes that Wan discloses scaling the electrical signal after filtering “to bring the signal . . . up to a level compatible with an analog to digital converter.” Pet. 36–37 (quoting Ex. 1007, 5:67–6:4), 52 (asserting that the Corke-Wan combination “discloses or suggests the features of claim 10 for the same reasons discussed above for claim 2”). Petitioner supports its further analysis of the requirements of claims 3, 4, 11, and 12 that such scaling be a function of an expected optical power level or a span length of the optical fiber with testimony by Dr. MacFarlane, who opines that a person of ordinary skill in the art would have understood that achieving such compatibility is dependent on such factors. See Ex. 1002 ¶¶ 89–94. In addition, Petitioner observes that Wan describes that the output of a photodiode (used in the filtering discussed above in connection with the last limitation of claim 1) is a function of the photodiode’s transfer function. Pet. 38–39 (citing Ex. 1007, 7:25–35). Petitioner reasons that, consequently,

the scaling to bring the signal up to a level compatible with an analog-to-digital converter “is a function of the expected optical power.” *Id.* (citing Ex. 1002 ¶ 89).

Apart from its arguments directed at independent claims 1 and 9, Patent Owner does not dispute Petitioner’s positions with respect to claims 2 and 10. For claims 3 and 11, Patent Owner attacks Petitioner’s positions based on the photodiode transfer function. PO Resp. 39–40. According to Patent Owner, such positions “include[] a critical factual error” because Petitioner and Dr. MacFarlane point to discussion in Wan involving a different amplifier. *Id.* Patent Owner’s argument is misplaced. As Petitioner explains, it “cites that portion of *Wan* only to explain that ‘the output of the **photodiode** is a function of the photodiode’s transfer function’—not for the amplifier.” Reply 18 (citing Pet. 38; Ex. 1002 ¶ 89).

In addition, when addressing claims 3, 4, 11, and 12, Patent Owner repeats a variation of its argument that components on the *transmitter* side of Wan cannot properly inform how such components would be used on the *receiver* side in the combination of Corke and Wan:

Indeed, in Wan, the optical tap 34 is still within the transmitter and so the tapped optical signal has not incurred any loss of optical power due to the length of the optical medium 33. This arrangement in Wan fundamentally changes the purpose of the optical tap 34, and reveals that Wan does not teach amplifying any signal according to an “expected optical power.”

PO Resp. 40; *see also id.* at 42–43 (arguing that Petitioner “fail[s] to address how or why an amplifier at Corke’s receiver side would have been calibrated

to scale an electrical signal as ‘a function of a span length of the optical fiber’”). For reasons similar to those we discuss above, this argument is not persuasive because it is contrary to the Supreme Court’s instruction that “the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418. Petitioner adequately supports its position regarding the application of the references’ teachings with testimony by Dr. MacFarlane, and Patent Owner has not offered any countervailing expert testimony for us to consider.

We conclude that Petitioner shows, by a preponderance of the evidence, that claims 2–4 and 10–12 are unpatentable under 35 U.S.C. § 103(a) over Corke and Wan.

4. Dependent Claims 5–7 and 13–15

Claims 5–7 and 13–15 depend respectively from claims 4 and 12, and recite aspects of comparing the electrical signal after scaling with a reference voltage. Ex. 1001, 7:8–14, 8:17–25. Petitioner contends that such aspects are disclosed through Corke’s disclosure of effecting comparisons of digitized signals for determining performance quality in light of the knowledge of a person of ordinary skill in the art. Pet. 41–45. We agree with this analysis, which is supported by the testimony of Dr. MacFarlane. Ex. 1002 ¶¶ 95–98, 113–115. Patent Owner does not separately dispute

these aspects of Petitioner’s analysis apart from its arguments directed at the underlying claims from which claims 5–7 and 13–15 depend, which we already have discussed and rejected above.

We conclude that Petitioner shows, by a preponderance of the evidence, that claims 5–7 and 13–15 are unpatentable under 35 U.S.C. § 103(a) over Corke and Wan.

5. Dependent Claims 8 and 16

Claims 8 and 16 depend respectively from claims 1 and 9, and recite “continuously operating an OTDR to monitor the optical fiber.” Ex. 1001, 7:18–19, 8:26–27. For this limitation, Petitioner additionally relies on Large, which discloses “continuously monitoring a fiber optic communication link according to . . . an optical time domain reflectometry (OTDR) signal.” Ex. 1012, 1:31–35. Noting that Large is also “in the field of optical communications,” Petitioner reasons that it would have been obvious to a person of ordinary skill to implement such features in the Corke-Wan combination because they “would have beneficially provided ‘a self-monitoring fiber optic link system for continuously monitoring the status of a fiber optic communications link . . . utiliz[ing] standard components.’” Pet. 55–56 (quoting Ex. 1012, 4:9–13) (alterations by Petitioner).

Patent Owner responds that “Corke already includes a monitoring feature,” as prominently reflected by its title, and “[i]ndeed, Corke includes

a more sophisticated monitoring system than Large that allows for ‘route monitoring’ to determine ‘route quality’ on the optical routes, and also responds to the detected performance and ‘trigger[s] switching to alternative monitored routes.” PO Resp. 47 (quoting Ex. 1006, abst.) (alteration by Patent Owner). Patent Owner reinforces its position by observing that Corke was filed “more than two years after Large issued in the United States,” and describes “a system much different than Large’s for ‘providing an optical communication monitoring and control device to overcome’ prior communication systems.” *Id.* at 49 (citing Ex. 1006, 1:12–24).

In the Institution Decision, “[we] agree[d] with Patent Owner that the redundancy that would result from Petitioner’s proposed combination evinces the improper application of hindsight in Petitioner’s analysis.” Dec. 32 (citing *Fritch*, 972 F.2d at 1266). Petitioner responds by providing additional argument and evidence with its Reply. Reply 21–25; Exs. 1016–1029. This additional evidence includes a Reply Declaration by Dr. MacFarlane specifically addressing the combination of Corke, Wan, and Large as directed at claims 8 and 16. Ex. 1022.

“Rebuttal evidence is supposed to be limited to that which is responsive to the adversary’s evidence: ‘the traditional principle [is] that evidence offered to rebut must accomplish the function of rebuttal; “to explain, repel, counteract, or disprove the evidence of the adverse party.”’” *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1081–82 (Fed. Cir. 2015) (quoting Victor Gold, 28 Fed. Prac. & Proc. Evid. § 6164 (2d ed. 2015))

(quoting *United States v. Luschen*, 614 F.2d 1164, 1170 (8th Cir. 1980))). Under the specific facts before us, we agree with Patent Owner that Petitioner presents a new theory in its Reply that is insufficiently supported by its Petition. See Sur-Reply 10–11 (noting “new reasons to modify the Corke-Wan combination in view of Large,” “new opinions from Dr. MacFarlane,” and “eleven new references directed to OTDR teachings”).

The argument presented in the Petition proposes to modify the Corke-Wan combination with Large to add a monitoring feature. Pet. 54–58. In particular, the Petition’s argument proposes to incorporate Large’s OTDR “into the *Corke-Wan* system/process to continuously monitor the optical fiber to provide a warning when ‘observed perturbation’ falls outside of ‘acceptable and preselectable limits’ as suggested by *Large*.” *Id.* at 55 (citing Ex. 1012, 2:67–3:2; Ex. 1002 ¶ 118). As a rationale to effect the further combination, the Petition argues that a person of ordinary skill in the art “would have recognized that such a feature would have beneficially provided a ‘self-monitoring fiber optic link system for continuously monitoring the status of a fiber optic communication link . . . utiliz[ing] standard components.’” *Id.* at 55 (citing Ex. 1012, 4:9–13).

The theory presented in the Reply is different in that it argues that the combination with Large “would have provided an additional feature that *Corke* lacks, which is to identify the **location** of the perturbation.” Reply 22 (citing Ex. 1012, 2:67–3:2, 1:16–25, 4:4–8; Ex. 1002 ¶ 42; Pet. 54). Although the Reply cites to the Petition and to Dr. MacFarlane’s

Declaration, we agree with Patent Owner that “Petitioner[] did not rely on location-detecting features of Large as a basis to modify Corke-Wan in their Petition.” Sur-Reply 12. At best, only Dr. MacFarlane’s Declaration makes reference to the location-detection feature—and does so only obliquely. *See* Ex. 1002 ¶ 42 (quoting language from Large in summarizing Large’s disclosure).

We do not consider Petitioner’s new obviousness theory, presented for the first time in the Reply, nor do we accord weight to the evidence proffered to support that new theory. *See* 37 C.F.R. § 42.23(b) (“A reply may only respond to arguments raised in the corresponding opposition, patent owner preliminary response, or patent owner response.”) We also find that the Petition’s original theory lacks sufficient explanation to account for redundant monitoring features in the combination, suggesting an improper application of hindsight in Petitioner’s analysis. *See Fritch*, 972 F.2d at 1266.

Accordingly, we conclude that Petitioner does not show, by a preponderance of the evidence, that claims 8 and 16 are unpatentable under 35 U.S.C § 103(a) over Corke, Wan, and Large.

H. Other Patent Owner Arguments

Patent Owner argues: “The Board’s partial institution decision (Paper 12) was unlawful under 35 U.S.C. § 314, and the Board cannot correct that unlawful order by issuing an unauthorized Order (Paper 15) attempting to

modify the institution decision outside of the statutory period for issuing institution decisions.” PO Resp. 12. Patent Owner asserts:

First, the Board’s institution “modification” order improperly attempts to address, without the statutorily-mandated rulemaking, how to govern a proceeding covering all challenged claims and grounds, including those for which a petitioner failed to establish a reasonable likelihood of prevailing. Second, the Board lacks authority to modify an unlawful institution decision once the statutory timeframe for issuing an institution decision has expired.

Id. at 12–13. For those reasons, Patent Owner asserts the issuance of a final written decision in this case would be improper and seeks dismissal of the Petition. *Id.* at 17. For reasons discussed below, we reject both aspects of Patent Owner’s reasoning and decline to dismiss the Petition on these bases.

1.

In the Institution Decision, we determined that Petitioner demonstrated a reasonable likelihood of prevailing on some claims and grounds, but did not demonstrate a reasonable likelihood of prevailing on other claims and grounds. We are not persuaded by Patent Owner’s argument that, absent promulgation of new rules, we are precluded from reaching a final written decision with respect to the claims and grounds for which we determined Petitioner had not 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 claim(s) and ground(s) for which the Petitioner has

not shown a reasonable likelihood of prevailing at trial.

Specifically, Patent Owner notes 37 C.F.R. § 42.108(a), which allowed 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,” and 37 C.F.R. § 42.108(b) (2016), which allowed 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.* at 13–14. Patent Owner further cites 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.* at 14.

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. Thus, the rules that were in effect at the time of institution of review in this proceeding already covered the situation in which the trial includes 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, “The 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.” 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.” 77 Fed. Reg. 48,702-03.

PO Resp. 14. 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, 2016 WL 5219870 (PTAB June 30, 2016) (instituting review “on all 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).

In short, Patent Owner asserts that in the circumstances of this case, issuing a final written decision on all challenged claims and grounds identified in the Petition is “contrary to and specifically rejected by the regulations promulgated by the Agency to govern *inter partes* review,” and that the Board may not depart from those regulations. *Id.* at 15–16. According to Patent Owner, issuing a final written decision here would be improper. *Id.* at 17. For reasons discussed above, we disagree with and reject Patent Owner’s contention that issuing a final written decision with respect to all challenged claims and grounds identified in the Petition is

contrary to regulation.

2.

We are not persuaded that the statutory due date under 35 U.S.C. § 314(b) for determining whether to institute an *inter partes* review was violated in this proceeding.

Patent Owner asserts that under 35 U.S.C. § 314(b), the due date for determining whether to institute *inter partes* review is three months from the date of filing of a preliminary response, if a preliminary response has been filed; or, if no preliminary response has been filed, then three months from the last date on which such a preliminary response may be filed. PO Resp. 13. We agree with Patent Owner’s articulation of the due date for the Board to determine whether to institute *inter partes* review. We also agree with Patent Owner that in this case, because Patent Owner filed a preliminary response on January 18, 2018 (Paper 10), the due date for the Board to determine whether to institute review was April 18, 2018. *Id.*

According to Patent Owner, however, the Board’s complete determination of whether to institute an *inter partes* review did not occur until May 7, 2018 (Paper 15). *Id.* at 16–17. Patent Owner explains:

The Board’s Institution Decision (Paper 12) issued on February 28, 2018, but this Institution Decision partially instituted in a manner that the Supreme Court has confirmed was not in accordance with law. *SAS*, 138 S. Ct. [at] 1355 (“The Director’s claimed ‘partial institution’ power appears nowhere in the text of § 318 or anywhere else in the statute for that matter.”) The Board’s modification Order (Paper 15) attempted to

bring the content of the Board’s Institution Decision into compliance with § 314(a), but the modification Order also fails to comport with the governing statute by violating the mandatory timing of institution decisions, 35 U.S.C. § 314(b).

Id. at 16.

We determine that Patent Owner’s contention is misplaced, because the question before the U.S. Supreme Court in *SAS Institute*, and decided by the Supreme Court, was not whether a partial institution decision was null and void, as though the Board never determined whether to institute an *inter partes* review, but whether the Board must issue a final written decision with respect to the patentability of every patent claim challenged by a petitioner.

In *SAS Institute*, the U.S. Supreme Court framed the issue before it this way:

When the Patent Office initiates an inter partes review, must it resolve *all* of the claims in the case, or may it choose to limit its review to only *some* of them? The statute, we find, supplies a clear answer: the Patent Office must “issue a final written decision with respect to the patentability of *any* patent claim challenged by the petitioner.” 35 U.S.C. § 318(a) (emphasis added). In this context, as in so many others, “any” means “every.” The agency cannot curate the claims at issue but must decide them all.

SAS Institute, 138 S. Ct. at 1352–53. We recognize that the Supreme Court explained: “The Director, we see, is given only the choice ‘whether’ to institute an inter partes review. That language indicates a binary choice—either institute review or don’t.” *Id.* But that is not a holding that the Board’s institution decision in *SAS Institute* was null and void. Rather, the Court in *SAS Institute* simply recognized that the Board instituted review, but incorrectly limited the scope of the review. *SAS Institute* did not

preclude a scope correction by the Board, including where the time of correction is after the due date for the Board to decide whether to institute review. Similarly, the U.S. Court of Appeals for the Federal Circuit, subsequent to the Supreme Court’s decision in *SAS Institute* and for the Board proceeding underlying *SAS Institute*, did not vacate the Board’s initial institution decision in that proceeding. *See also AC Techs. S.A. v. Amazon.com, Inc.*, 912 F.3d 1358 (Fed. Cir. 2019) (“[N]either § 314(b)’s timing requirements nor § 314(d)’s limits on appealability alter the Board’s statutory obligation to rule on all claims and grounds presented in the petition.”) (citing *SAS Institute*, 138 S. Ct. at 1356).

Here, the Board’s decision on whether to institute review (Paper 12) was issued on February 28, 2018. The subsequent order (Paper 15) correcting the scope of review, dated May 7, 2018, did not change the fact that the Board decided on February 28, 2018, to institute review.

3.

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. 64. Patent Owner asserts:

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. We do not address this argument. As the Supreme Court has cautioned, “[c]onstitutional questions obviously are unsuited to resolution in administrative hearing procedures and, therefore, access to the courts is essential to the decision of such questions.” *Califano v. Sanders*, 430 U.S. 99, 109 (1977).

III. ORDER

It is

ORDERED that, based on a preponderance of the evidence, claims 1–7 and 9–15 of U.S. Patent No. 8,374,511 B2 are held to be unpatentable;

FURTHER ORDERED that, based on a preponderance of the evidence, claims 8 and 16 of U.S. Patent No. 8,374,511 B2 have not been shown to be unpatentable; and

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

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Patent 8,374,511 B2

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