

**THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION**

OYSTER OPTICS, LLC,	§	
	§	
v.	§	CASE NO. 2:16-CV-1302-JRG
	§	
CORIAN T AMERICA INC., et al.,	§	
	§	

CLAIM CONSTRUCTION
MEMORANDUM AND ORDER

Before the Court is Plaintiff Oyster Optics LLC’s (“Plaintiff’s or “Oyster’s”) Opening Claim Construction Brief (Dkt. No. 157). Also before the Court are Defendants Cisco Systems, Inc., Fujitsu Network Communications, Inc., Huawei Technologies Co., Ltd., Huawei Technologies USA Inc., Infinera Corporation, Coriant (USA) Inc., Coriant North America, LLC, Coriant Operations, Inc., and Alcatel-Lucent USA Inc.’s (“Defendants”) Responsive Claim Construction Brief (Dkt. No. 165) and Plaintiffs’ reply (Dkt. No. 167).

The Court held a claim construction hearing on November 20, 2017.

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I. BACKGROUND

Plaintiff brings suit alleging infringement of United States Patents No. 6,469,816 (“the ’816 Patent”), 6,476,952 (“the ’952 Patent”), 6,594,055 (“the ’055 Patent”), 7,099,592 (“the ’592 Patent”), 7,620,327 (“the ’327 Patent”), 8,374,511 (“the ’511 Patent”), 8,913,898 (“the ’898 Patent”), and 9,363,012 (“the ’012 Patent”) (collectively, “the patents-in-suit”). (See Dkt. No. 157, Exs. 1–8.) Plaintiff submits that the patents-in-suit are “generally directed towards systems and methods for transporting information by modulating light waves transmitted and received across transparent optical fibers.” (Dkt. No. 157, at 2.)

The parties have submitted that the patents-in-suit can be classified into two groups: the “Group 1 Patents” (United States Patents No. 6,469,816, 6,476,952, 6,594,055, and 7,099,592); and the “Group 2 Patents” (United States Patents No. 7,620,327, 8,374,511, 8,913,898, and 9,363,012). (Dkt. No. 157, at 2; Dkt. No. 165, at 1 n.1.)

The ’816 Patent of Group 1, for example, titled “Phase-Modulated Fiber Optic Telecommunications System,” issued on October 22, 2002, and bears a filing date of May 24, 2001. The Abstract of the ’816 Patent states:

A fiber optic data transmission system has a transmitter having a laser emitting a continuous wave light, a phase modulator phase modulating the continuous wave light so as to create an optical signal bearing information in phase-modulated form, and a telecommunications optical fiber connected to at least one receiver, the phase-modulator being connected to the telecommunications fiber so that the phase-modulated information optical signal is transmitted over the telecommunications fiber without recombining with the continuous wave light.

The ’327 Patent of Group 2, for example, titled “Fiber Optic Telecommunications Card With Energy Level Monitoring,” issued on November 17, 2009, and bears a filing date of July 3, 2002. The Abstract of the ’327 Patent states:

A transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber. The card has

transmitter for transmitting data over the first optical fiber, the transmitter having a laser and a modulator, a fiber output optically connected to the laser for connecting the first optical fiber to the card, a fiber input for connecting the second optical fiber to the card, a receiver optically connected to the fiber input for receiving data from the second optical fiber, and an OTDR optically connected between the transmitter and the fiber output or between the receiver and the fiber input. An energy level detector is also provided between the receiver and the fiber input.

II. LEGAL PRINCIPLES

It is understood that “[a] claim in a patent provides the metes and bounds of the right which the patent confers on the patentee to exclude others from making, using or selling the protected invention.” *Burke, Inc. v. Bruno Indep. Living Aids, Inc.*, 183 F.3d 1334, 1340 (Fed. Cir. 1999). Claim construction is clearly an issue of law for the court to decide. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970–71 (Fed. Cir. 1995) (en banc), *aff’d*, 517 U.S. 370 (1996).

“In some cases, however, the district court will need to look beyond the patent’s intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period.” *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015) (citation omitted). “In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the ‘evidentiary underpinnings’ of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal.” *Id.* (citing 517 U.S. 370).

To ascertain the meaning of claims, courts look to three primary sources: the claims, the specification, and the prosecution history. *Markman*, 52 F.3d at 979. The specification must contain a written description of the invention that enables one of ordinary skill in the art to make and use the invention. *Id.* A patent’s claims must be read in view of the specification, of which

they are a part. *Id.* For claim construction purposes, the description may act as a sort of dictionary, which explains the invention and may define terms used in the claims. *Id.* “One purpose for examining the specification is to determine if the patentee has limited the scope of the claims.” *Watts v. XL Sys., Inc.*, 232 F.3d 877, 882 (Fed. Cir. 2000).

Nonetheless, it is the function of the claims, not the specification, to set forth the limits of the patentee’s invention. Otherwise, there would be no need for claims. *SRI Int’l v. Matsushita Elec. Corp.*, 775 F.2d 1107, 1121 (Fed. Cir. 1985) (en banc). The patentee is free to be his own lexicographer, but any special definition given to a word must be clearly set forth in the specification. *Intellicall, Inc. v. Phonometrics, Inc.*, 952 F.2d 1384, 1388 (Fed. Cir. 1992). Although the specification may indicate that certain embodiments are preferred, particular embodiments appearing in the specification will not be read into the claims when the claim language is broader than the embodiments. *Electro Med. Sys., S.A. v. Cooper Life Sciences, Inc.*, 34 F.3d 1048, 1054 (Fed. Cir. 1994).

This Court’s claim construction analysis is substantially guided by the Federal Circuit’s decision in *Phillips v. AWH Corporation*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In *Phillips*, the court set forth several guideposts that courts should follow when construing claims. In particular, the court reiterated that “the claims of a patent define the invention to which the patentee is entitled the right to exclude.” *Id.* at 1312 (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To that end, the words used in a claim are generally given their ordinary and customary meaning. *Id.* The ordinary and customary meaning of a claim term “is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Id.* at 1313. This principle of patent law flows naturally from the

recognition that inventors are usually persons who are skilled in the field of the invention and that patents are addressed to, and intended to be read by, others skilled in the particular art. *Id.*

Despite the importance of claim terms, *Phillips* made clear that “the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.* Although the claims themselves may provide guidance as to the meaning of particular terms, those terms are part of “a fully integrated written instrument.” *Id.* at 1315 (quoting *Markman*, 52 F.3d at 978). Thus, the *Phillips* court emphasized the specification as being the primary basis for construing the claims. *Id.* at 1314–17. As the Supreme Court stated long ago, “in case of doubt or ambiguity it is proper in all cases to refer back to the descriptive portions of the specification to aid in solving the doubt or in ascertaining the true intent and meaning of the language employed in the claims.” *Bates v. Coe*, 98 U.S. 31, 38 (1878). In addressing the role of the specification, the *Phillips* court quoted with approval its earlier observations from *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998):

Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim. The construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.

Phillips, 415 F.3d at 1316. Consequently, *Phillips* emphasized the important role the specification plays in the claim construction process.

The prosecution history also continues to play an important role in claim interpretation. Like the specification, the prosecution history helps to demonstrate how the inventor and the United States Patent and Trademark Office (“PTO”) understood the patent. *Id.* at 1317. Because

the file history, however, “represents an ongoing negotiation between the PTO and the applicant,” it may lack the clarity of the specification and thus be less useful in claim construction proceedings. *Id.* Nevertheless, the prosecution history is intrinsic evidence that is relevant to the determination of how the inventor understood the invention and whether the inventor limited the invention during prosecution by narrowing the scope of the claims. *Id.*; see *Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1350 (Fed. Cir. 2004) (noting that “a patentee’s statements during prosecution, whether relied on by the examiner or not, are relevant to claim interpretation”).

Phillips rejected any claim construction approach that sacrificed the intrinsic record in favor of extrinsic evidence, such as dictionary definitions or expert testimony. The *en banc* court condemned the suggestion made by *Texas Digital Systems, Inc. v. Telegenix, Inc.*, 308 F.3d 1193 (Fed. Cir. 2002), that a court should discern the ordinary meaning of the claim terms (through dictionaries or otherwise) before resorting to the specification for certain limited purposes. *Phillips*, 415 F.3d at 1319–24. According to *Phillips*, reliance on dictionary definitions at the expense of the specification had the effect of “focus[ing] the inquiry on the abstract meaning of words rather than on the meaning of claim terms within the context of the patent.” *Id.* at 1321. *Phillips* emphasized that the patent system is based on the proposition that the claims cover only the invented subject matter. *Id.*

Phillips does not preclude all uses of dictionaries in claim construction proceedings. Instead, the court assigned dictionaries a role subordinate to the intrinsic record. In doing so, the court emphasized that claim construction issues are not resolved by any magic formula. The court did not impose any particular sequence of steps for a court to follow when it considers disputed claim language. *Id.* at 1323–25. Rather, *Phillips* held that a court must attach the

appropriate weight to the intrinsic sources offered in support of a proposed claim construction, bearing in mind the general rule that the claims measure the scope of the patent grant.

The Supreme Court of the United States has “read [35 U.S.C.] § 112, ¶ 2 to require that a patent’s claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014). “A determination of claim indefiniteness is a legal conclusion that is drawn from the court’s performance of its duty as the construer of patent claims.” *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347 (Fed. Cir. 2005) (citations and internal quotation marks omitted), *abrogated on other grounds by Nautilus*, 134 S. Ct. 2120.

III. AGREED TERMS

In their August 10, 2017 Joint Claim Construction Chart and Prehearing Statement (Dkt. No. 145, at 2–3) and their October 18, 2017 Joint Claim Construction Chart (Dkt. No. 168, Ex. A), the parties have set forth agreements as to the following terms in the patents-in-suit:

<u>Term</u>	<u>Agreement</u>
“means for transporting the optical signal” (’055 Patent)	This claim term is governed by 35 U.S.C. §112(6). Function: “transporting the optical signal” Corresponding Structure Disclosed in the Specification: optical fiber (2:39–41); optical fiber 20 (Fig. 1, 4:35–38, 4:54–55).
“the optical signals” (’511 Patent, Claims 1, 9)	“the optical signal transmitted by the transmitter”

“the phase-modulated optical signals” (’511 Patent, Claim 9)	“the phase-modulated optical signal transmitted by the transmitter”
“an electric signal” (’511 Patent, Claims 1, 9)	“an electrical signal”
“the electrical signal” (’511 Patent, Claims 1, 9)	“an electric signal” is the antecedent basis for the term “the electrical signal”
“the electrical signal after filtering” (’511 Patent, Claims 2, 10)	“the filtered electrical signal”
“the electrical signal after scaling is compared” (’511 Patent, Claims 5, 13)	“the filtered and scaled electrical signal”
“filtering the electrical signal to produce an average optical power” (’511 Patent, Claims 1, 9)	“filtering the electrical signal from the photodetector to provide the average optical power of the optical signals”
“the second optical signal” (’898 Patent, Claims 1, 4, 9, 14, 18, 23)	“a second optical signal” is antecedent for “the second optical signal”

IV. DISPUTED TERMS

A. “phase modulate”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“alter the phase of light to create an optical signal having a phase that is representative of data” ¹	“alter the phase of light while keeping the amplitude of the light constant to create an optical signal having a phase that is representative of data”

(Dkt. No. 157, at 8; Dkt. No. 165, at 10; Dkt. No. 168, Ex. B, at 1–2, 9, 15, 21, 23, 25, 31 & 35.)

The parties submit that “phase modulate,” and similar terms, appear in Claims 1, 9, and 11 of the ’012 Patent, Claims 1 and 27 of the ’055 Patent, Claims 3, 14, 16, and 25 of the ’327 Patent, Claim 9 of the ’511 Patent, Claims 1, 5, 10, 13, and 14 of the ’592 Patent, Claims 1, 4, 7, 12, and 19 of the ’816 Patent, Claims 3, 4, 17, and 18 of the ’898 Patent, and Claims 1, 4, 5, and 12–14 of the ’952 Patent. (See Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff argues that Defendants’ proposal of “keeping the amplitude of the light constant” should be rejected because “the claims make clear that the amplitude can change during phase modulation.” (Dkt. No. 157, at 9.) Plaintiff also argues that disclosures in the specifications demonstrate that “the patents explicitly contemplate changing the amplitude as well as the phase of the light.” (*Id.*, at 10.)

Defendants respond that “Defendants’ construction is the plain meaning in the context of the patents at the time of the invention, as confirmed by evidence cited by Plaintiff.” (Dkt. No. 165, at 10.) Defendants also argue that “the specifications uniformly and exclusively refer to

¹ Plaintiff previously proposed: “No construction necessary. In the alternative, if construed: alter the phase of light to create an optical signal having a phase that is a function of data.” (Dkt. No. 145, at 4.)

the amplitude of the light as constant during phase modulation; they tout the benefits of that characteristic to the invention; they disparage prior art, like the '615 patent, that combine both amplitude and phase variations and call such a system an 'amplitude modulation system'; and they never refer to the invention as combining amplitude and phase modulation, much less call such a combination 'phase modulation.'" (*Id.*, at 16–17.) For example, Defendants argue that "[i]f the signal's amplitude were to vary with the data, that would frustrate the object of the invention of providing a secure phase modulated optical data transmission." (*Id.*, at 13.)

Plaintiff replies by emphasizing claim differentiation as to dependent Claim 6 of the '816 Patent. (Dkt. No. 167, at 5.)

At the November 20, 2017 hearing, the parties presented oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Claims 1 and 6 of the '816 Patent, for example, recite (emphasis added):

1. A fiber optic data transmission system comprising:
a transmitter having a laser emitting a continuous wave light,
a phase modulator *phase modulating* the continuous wave light as a function of an electronic input data stream and of an electronic feedback loop with a feedback time delay, the electronic feedback loop being fed back to the electronic input data stream, so as to create an optical signal bearing information in *phase-modulated* form, and
a telecommunications optical fiber connected to at least one receiver, the phase-modulator being connected to the telecommunications fiber so that the *phase-modulated* information optical signal is transmitted over the telecomm[un]ications fiber without recombining with the continuous wave light, the receiver including an interferometer having a first fiber arm and a second fiber arm and having an interferometric delay being a function of the feedback time delay.

* * *

6. The system as recited in claim 1 *wherein an amplitude of the phase-modulated optical signal is constant.*

The doctrine of claim differentiation thus weighs against Defendants’ proposal that a “phase modulated” signal must have constant amplitude. *See, e.g., Liebel-Flarsheim Co. v. Medrad, Inc.*, 348 F.3d 898, 910 (Fed. Cir. 2004) (“[W]here the limitation that is sought to be ‘read into’ an independent claim already appears in a dependent claim, the doctrine of claim differentiation is at its strongest.”); *Wenger Mfg., Inc. v. Coating Mach. Sys., Inc.*, 239 F.3d 1225, 1233 (Fed. Cir. 2001) (“Claim differentiation, while often argued to be controlling when it does not apply, is clearly applicable when there is a dispute over whether a limitation found in a dependent claim should be read into an independent claim, and that limitation is the only meaningful difference between the two claims.”).

Plaintiff has also cited Claim 14 of the ’327 Patent, which recites an energy level detector including a threshold “indicating a drop in amplitude of a phase-modulated signal.” Plaintiff argues that this claim would be non-sensical under Defendants’ proposed construction. Plaintiff’s argument is unavailing, however, in light of disclosure that detecting a drop in amplitude can be useful in the context of a signal that normally has constant amplitude. *See* ’327 Patent at 4:43–47 (“The phase-modulated signals have the advantage that breach detection by the energy level detector work [*sic*] more effectively, since the amplitude of the optical signal is constant and thus a drop in the optical signal level is more easily detected.”).

Also of note, Claim 5 of the ’592 Patent appears to present a choice of *either* amplitude modulation *or* phase modulation (emphasis added):

5. The card as recited in claim 4 further comprising a switch for switching between an *amplitude-modulated mode* and a *phase-modulated mode*.

See ’898 Patent at 4:44–45 (“The transceiver of the present invention preferably operates in a phase-modulated *mode . . .*”) (emphasis added). This recital of “switching between” appears to imply a selection, at any given time, of either one or the other (not both at the same time).

Plaintiffs have further pointed out that Claims 1, 15, 17, and 27 of the '055 Patent, all of which are independent claims, already expressly recite phase-modulated optical signals that are “free of amplitude modulation as a function of the input electronic data stream.” Given that the parties have proposed constructions for “‘phase modulate’ and grammatical variations” (Dkt. No. 157, at 8) across all of the patents-in-suit (presumably for the sake of simplicity and efficiency, which are commendable objectives), any redundancy that may arise in certain claims as a result of proceeding in this fashion does not warrant rejecting a construction. *See 01 Communique Lab., Inc. v. LogMeIn, Inc.*, 687 F.3d 1292, 1296 (Fed. Cir. 2012) (noting absence of “any authority for the proposition that construction of a particular claim term may not incorporate claim language circumscribing the meaning of the term”).

Turning to the specifications, the patentee disclosed that “[c]ontroller 18 is also programmable to control the optical *power* output of the light emitted by laser 12” ('816 Patent at 3:66–67), which Plaintiff’s expert opines amounts to a disclosure of changing amplitude. (Dkt. No. 157-22, Sept. 15, 2017 Lebbly Decl., at ¶ 29.) Read in context, however, this disclosure refers not to amplitude modulation but rather to an ability to minimize transmission power:

Light emitted from laser 12 is depolarized by a depolarizer 14 and passes through a phase modulator 16, for example a Mach-Zender phase modulator. An electronic controller 18, for example a PLC, controls phase modulator 16. Controller 18 is also programmable to control the optical power output of light emitted by laser 12. *Preferably, the power output is set as low as possible for a given optical span, while maintaining a low bit error rate. This reduces the light available for any tap.*

'816 Patent at 3:62–4:3 (emphasis added).

Likewise, although Plaintiff cites disclosure in the '898 Patent regarding amplitude modulation, this disclosure expressly distinguishes phase modulation from amplitude modulation, explaining that constant amplitude is an “advantage” of “phase-modulated signals”:

The transceiver of the present invention preferably operates in a phase-modulated mode, though conventional amplitude-modulated transmitters and receivers, including those using return-to-zero type signals, for example, may also be used. The *phase-modulated signals* have the advantage that breach detection by the energy level detector work[s] more effectively, since the *amplitude of the optical signal is constant and thus a drop in the optical signal level is more easily detected*.

'898 Patent at 4:44–52 (emphasis added). The '816 Patent likewise contrasts phase modulation and amplitude modulation:

By sending the data in *phase-modulated form, as opposed to amplitude modulated form*, the data is [sic] must be read by an interferometer receiver. The use of such a receiver is easy to detect.

'816 Patent at 3:20–23 (emphasis added).

Plaintiff properly submits that courts generally “do not import limitations into claims from examples or embodiments appearing only in a patent’s written description, even when a specification describes very specific embodiments of the invention or even describes only a single embodiment, unless the specification makes clear that the patentee . . . intends for the claims and the embodiments in the specification to be strictly coextensive.” *JVW Enters., Inc. v. Interact Accessories, Inc.*, 424 F.3d 1324, 1335 (Fed. Cir. 2005) (citation and internal quotation marks omitted).

Here, however, the specifications disparage amplitude-modulated optical signals as being easily tapped. For example, the '816 Patent discloses:

Amplitude-modulated optical signals, with their ease of detection from a photodiode, require that only a small amount of energy be tapped and passed through the photodiode in order to be converted into a tapped electronic data stream.

* * *

U.S. Pat. No. 6,072,615 purports to describe a method for generating return-to-zero optical pulses using a phase modulator and optical filter. The RZ-pulse optical signal transmitted over the fiber is easily readable by a detector. The system is an *amplitude-modulated* system.

U.S. Pat. No. 5,606,446 purports to describe an optical telecommunications system employing multiple phase-compensated optical signals. Multiple interferometric systems are combined for the purpose of multiplexing various payloads on the same optical transmission path. The patent attempts to describe a method for providing fiber usage diversity using optical coherence length properties and a complex transmit/receive system. Each transmitter has a splitter, a plurality of fibers and a plurality of phase modulators to create the multiplexed signal, which is then demultiplexed at the receiver. This system is complex and expensive. Moreover, each phase-modulated light path is combined with a continuous wavelength base laser light path when sent over a telecommunications line, so that *amplitude-modulated* signals result.

As with U.S. Pat. No. 5,606,446, U.S. Pat. No. 5,726,784 discloses creating an amplitude-modulated data stream by combining a phase-modulated light path with a continuous wave base laser light path.

'816 Patent at 1:38–43 & 2:16–39 (emphasis added).

The “present invention,” by contrast, uses a signal that can be received only with an appropriate interferometer:

With the system of the present invention, the receiver functions as an interferometer. An attempt to read the optical signal in the fiber, for example from a tap, requires knowledge of the delay and the creation of a precise physical delay path in the interferometer.

Id. at 2:48–53. Again, the patentee’s disclosures contrast phase modulation and amplitude modulation:

The present invention thus permits a card-based phase modulated transmission system, which can provide for more secure data transmission than existing amplitude-based cards.

* * *

Because the transmitter is typically transmitting in secure mode using a continuous wave laser, the energy level read by the detector should be constant. When a drop in the energy level is detected, which may indicate a tap, the card may provide an alarm signal

'592 Patent at 2:41–44 & 2:64–3:2.

“To find disavowal of claim scope through disparagement of a particular feature, we ask whether the specification goes well beyond expressing the patentee’s preference . . . [such that] its repeated derogatory statements about [a particular embodiment] reasonably may be viewed as a disavowal.” *Openwave Sys., Inc. v. Apple Inc.*, 808 F.3d 509, 513 (Fed. Cir. 2015) (citations and internal quotation marks omitted); *see id.* at 517 (“There is no doubt a high bar to finding disavowal of claim scope through disparagement of the prior art in the specification.”).

As a general matter, Defendants have not shown that phase modulation and amplitude modulation are necessarily mutually exclusive. In other words, Defendants have not shown that using phase modulation necessarily precludes using amplitude modulation. (See Dkt. No. 157-22, Sept. 15, 2017 Lebby Decl., at ¶ 27; *see also* Dkt. No. 157, Ex. 9, *Fiber Optics Standard Dictionary* 742 (3d ed. 1997) (“phase modulation: Angle modulation in which the phase angle of a carrier, such as an electronic, radio, or optical carrier, is caused to depart from its reference value by an amount proportional to the instantaneous value of the modulating signal.”); *id.*, Ex. 10, *The Authoritative Dictionary of IEEE Standards Terms* 816 (7th ed. 2000) (similar).) Thus, although the evidence cited by Defendants confirms that a phase modulation limitation cannot be met by amplitude modulation, Defendants have not shown that using phase modulation necessarily *precludes* using amplitude modulation.

Defendants have also cited a treatise that Plaintiff’s expert has cited (Dkt. No. 157-22, Sept. 15, 2017 Lebby Decl., at ¶ 27), which states that “[i]n the case of PSK [(phase shift keying)] format, the optical bit stream is generated by modulating the phase . . . while the

amplitude . . . [is] kept constant.” (Dkt. No. 165, Ex. J, Govind P. Agrawal, *Fiber-Optic Communication Systems* 246–47 (1997); *id.* at 14 (“PSK” is phase modulation “applied in the digital case”)). This is extrinsic evidence, however, and is therefore of somewhat limited weight. *See Phillips*, 415 F.3d at 1317 (“while extrinsic evidence can shed useful light on the relevant art, we have explained that it is less significant than the intrinsic record in determining the legally operative meaning of claim language”) (citations and internal quotations marks omitted).

Nonetheless, the specification explains that the desired benefits of phase modulation are obtained only in the *absence* of amplitude modulation. *See* ’898 Patent at 4:44–52 (quoted above). This comports with the patentee’s above-quoted disparagement of prior art references that the patentee explained combined phase modulation with amplitude modulation, which the patentee disparaged as being “amplitude-modulated.” *See* ’816 Patent at 2:32–35 (“each phase-modulated light path is combined with a continuous wavelength base laser light path when sent over a telecommunications line, so that amplitude-modulated signals result”); *see also id.* at 2:36–39 (similar). Further, as to Plaintiff’s claim differentiation arguments:

Although claim differentiation is a useful analytic tool, it cannot enlarge the meaning of a claim beyond that which is supported by the patent documents, or relieve any claim of limitations imposed by the prosecution history.

Fenner Investments, Ltd. v. Cellco P’ship, 778 F.3d 1320, 1327 (Fed. Cir. 2015).

Thus, on balance, in light of the disparagement of prior art involving amplitude modulation, and in light of the disclosures of the advantages of using phase modulation instead of amplitude modulation, the “phase modulate” terms should be interpreted so as to exclude amplitude modulation.

The Court therefore hereby construes “**phase modulate**” (and similar terms identified by the parties) to mean “**alter the phase of light while keeping the amplitude of the light constant to create an optical signal having a phase that is representative of data.**”

B. “output for altering the phase of the phase modulator”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“converted signal used to alter the phase of light in the phase modulator” ²	“converted signal used to modulate the phase of light in the phase modulator”

(Dkt. No. 157, at 11; Dkt. No. 165, at 31; Dkt. No. 168, Ex. B, at 35.) The parties submit that this term appears in Claim 1 of the ’952 Patent. (See Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff argues that “[t]he Court should reject Defendants’ attempt to rewrite the claim with the narrower term ‘modulate’ because there is no express definition or clear and unambiguous disclaimer that could justify replacing the plain and ordinary word ‘alter’ in the claim, with a different term, as Defendants propose.” (Dkt. No. 157, at 11.) Plaintiff also argues that its proposal “is consistent with the specification.” (*Id.*, at 12.)

Defendants respond that “[t]he claim language and the specification confirm that the whole point of the invention is to use the output to modulate the light and not merely to alter some aspect of a phase unrelated to the phase modulation claimed.” (Dkt. No. 165, at 31.) Further, Defendants argue, “[t]he claim language also indicates there is no other alteration occurring.” (*Id.*, at 32.)

Plaintiff replies that “Defendants fail to point to any disclaimer or lexicography requiring such a narrowing construction.” (Dkt. No. 167, at 7.) Plaintiff also argues that “Defendants

² Plaintiff previously proposed: “No construction necessary. In the alternative, if construed: converted signal used to alter the phase of light in the phase modulator.” (Dkt. No. 145, at 7.)

make attorney arguments, with no supporting evidence, that modulation is the only form of alteration that would work for the claimed invention,” and Plaintiff submits that Defendants “have failed to rebut Dr. Lebby’s expert testimony.” (*Id.*)

At the November 20, 2017 hearing, the parties presented no oral arguments as to this disputed term. (*See* Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Claim 1 of the ’952 Patent recites (emphasis added):

1. A fiber optic data transmission system comprising:
 - a transmitter having a laser emitting a continuous wave light, the transmitter including a phase modulator phase modulating the continuous wave light and a control circuit controlling the phase modulator as a function of an electronic input data stream having a time delay, so as to create a phase-modulated optical signal;
 - an optical fiber transmitting the phase-modulated optical signal; and
 - a receiver, the receiver including an interferometer for receiving the phase-modulated optical signal, the interferometer having a first arm and a second arm, the second arm being longer than the first arm, the interferometer having an interferometric delay corresponding to the time delay and a phase difference imparted by the first and second arms, the control circuit imparting a phase to represent a binary zero or one as a function of the phase difference, the control circuit including a digital-to-analog converter having an *output for altering the phase of the phase modulator*.

The specification discloses:

Depending on the controller output, phase modulator 16 either imparts a certain phase shift to the non-information bearing light to represent a binary zero or another certain degree phase shift (for example 180 degrees different from the first certain phase shift) on the light passing through phase modulator 16 to represent a binary one, thus creating an optical signal 22, which represents a stream of binary bits.

* * *

D-A converter 234 provides a voltage output corresponding to the digital input A4, which then controls the phase modulator 16. The phase modulator 16 shifts the optical signal by an amount proportional to the voltage applied over a full 360-degree range.

'952 Patent at 5:25–31 & 8:33–35.

Plaintiff argues that “just because a phase is ‘altered’ does not necessarily mean it is ‘modulated.’ Whether an alteration results in a modulation depends on whether the output corresponds to a stream of binary bits.” (Dkt. No. 157, at 12.) In other words, Plaintiff argues, the phase can be altered without necessarily encoding data or otherwise “modulating.”

Defendants have emphasized that the claim recites “a control circuit controlling the phase modulator as a function of an electronic input data stream,” arguing that the “output for altering the phase of the phase modulator” is therefore necessarily based on the data stream. (Dkt. No. 165, at 31–32; *see* '952 Patent at 8:31–34 (“D-A converter 234 provides a voltage output corresponding to the digital input A4, which then controls the phase modulator 16.”))

On balance, the claim language cited by Defendants does not demonstrate that “altering” necessarily means “modulating,” and no relevant disclaimer or definition is evident in the specification. On the contrary, the disclosure cited by Defendants appears to relate to “phase compensation” rather than to modulation. *See* '952 Patent at 8:3–54; *see also id.* at 8:55–59 (“The transmitter 10 with compensation circuit 210 thus provides that *the phase for each bit is rotated slightly*, so that when the signals are passed through interferometer 40, a binary zero results in zero voltage and a binary one in a detectable voltage at photodetector 38.”) (emphasis added). The Court therefore hereby expressly rejects Defendants’ proposed construction.

The Court accordingly hereby construes **“output for altering the phase of the phase modulator”** to mean **“converted signal used to alter the phase of light in the phase modulator.”**

C. “energy level detector”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“device to measure optical power” ³	“device for optical tap detection”

(Dkt. No. 157, at 12; Dkt. No. 165, at 6; Dkt. No. 168, Ex. B, at 5–6, 14, 23, 28, 30 & 32.) The parties submit that this term appears in Claim 13 of the ’012 Patent, Claims 19 and 20 of the ’816 Patent, Claims 3 and 17 of the ’592 Patent, Claims 1, 13, 14, 24, 25, and 35 of the ’327 Patent, and Claims 1, 2, 5, 7, 12–16, 19, 21, 24, and 25 of the ’898 Patent. (See Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff argues that “the term ‘energy level detector’ has a straightforward, plain and ordinary meaning: a device to measure optical power,” and “[o]ne skilled in the art would not have understood the term to be limited to devices used only for ‘tap detection,’ as the Defendants’ proposal requires.” (Dkt. No. 157, at 13 (citations omitted).) Plaintiff also notes that Claim 5 of the ’816 Patent expressly recites a “tap detection monitor.” (*Id.*) Plaintiff urges that “[n]owhere do the patents or their file histories disclaim other types of energy level detectors that serve purposes other than tap detection.” (*Id.*)

Defendants respond that “[t]he intrinsic evidence confirms that the ‘energy level detector’ is a device for optical tap detection, which is a central piece of the invention’s solution for securing optical fiber communications.” (Dkt. No. 165, at 6.) In particular, Defendants submit that statements in the Summary of the Invention sections of the patents-in-suit “would resonate with a POSITA [(person of ordinary skill in the art)], because such a person would know that mere optical power measuring and phase modulation were known in the art.” (*Id.*, at 7.)

³ Plaintiff previously proposed: “No construction necessary.” (Dkt. No. 145, at 4.)

Plaintiff replies that “Defendants have not shown—and cannot show—any express relinquishment in the intrinsic record here.” (Dkt. No. 167, at 1.) Plaintiff also argues that “[b]ecause one claim uses the term ‘energy level detector’ and another otherwise similar claim uses the term ‘tap detection monitor,’ there is a strong presumption that the two terms mean different things.” (*Id.*, at 2.)

At the November 20, 2017 hearing, the parties presented oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Claim 19 of the ’816 Patent, for example, recites (emphasis added):

19. A fiber optic data transmission system comprising:
- a transmitter having a laser emitting a continuous wave light, a phase modulator phase modulating the continuous wave light so as to create an optical signal bearing information in phase-modulated form, and an electronic control circuit for controlling the phase modulator, the electronic control circuit including an electronic input data stream, an exclusive-or gate and having a feedback loop with a feedback time delay, the electronic input data stream and the feedback loop passing through the exclusive-or gate;
 - a receiver, the receiver including an interferometer having a first fiber arm and a second fiber arm and having an interferometric delay being a function of the feedback time delay;
 - a telecommunications optical fiber connected to the receiver, the phase-modulator being connected to the telecommunications fiber so that the phase-modulated information optical signal is transmitted over the telecommunications fiber without recombining with the continuous wave light; and
 - an *energy level detector* detecting an energy level of the phase-modulated optical signal in the optical fiber.

Thus, nothing in the claim recites or implies that the “energy level detector” must be “for optical tap detection” rather than potentially for some other purpose.

Admittedly, the specification explains optical tap detection as an objective. See ’898 Patent at 3:9–11 (“The present invention thus permits a card-based transmission system incorporating an energy level detector for optical tap detection.”); see also *id.* at 1:52–53

(“Existing amplitude modulated systems have the disadvantage that the fiber can be easily tapped and are not secure.”). In some circumstances, description of the “present invention” can limit the scope of the claims. See *Regents of the Univ. of Minn. v. AGA Med. Corp.*, 717 F.3d 929, 936 (Fed. Cir. 2013) (“When a patent . . . describes the features of the ‘present invention’ as a whole, this description limits the scope of the invention.”) (quoting *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed. Cir. 2007)); see also *Honeywell Int’l, Inc. v. ITT Indus., Inc.*, 452 F.3d 1312, 1318 (Fed. Cir. 2006); *Nystrom v. TREX Co., Inc.*, 424 F.3d 1136, 1144–45 (Fed. Cir. 2005) (construing the term “board” to mean “wood cut from a log” in light of the patentee’s consistent usage of the term and noting that the patentee “is not entitled to a claim construction divorced from the context of the written description and prosecution history”); *Wi-LAN USA, Inc. v. Apple Inc.*, 830 F.3d 1374, 1382 (Fed. Cir. 2016), *cert. denied*, 137 S. Ct. 1213 (2017) (“Consistent use of a term in a particular way in the specification can inform the proper construction of that term.”).

Here, however, the specifications refer to a “tap” as merely a *possible* cause of a drop in energy level:

A detector 32, for example a light energy detector, monitors the light energy in the fiber 20 via the light energy coupled to the detector by splitter 31, the light energy being a function of the amplitude. If the amplitude drops, *most likely* from a tap, the detector alerts the receiver

’816 Patent at 4:37–42 (emphasis added); see ’592 Patent at 2:63–3:2 (“Preferably, an energy level detector is also provided on the card for measuring light energy in a fiber. . . . When a drop in the energy level is detected, which *may* indicate a tap, the card may provide an alarm signal.”) (emphasis added); see also *Liebel-Flarsheim*, 358 F.3d at 908 (“The fact that a patent asserts that an invention achieves several objectives does not require that each of the claims be construed as limited to structures that are capable of achieving all of the objectives.”).

Further, also of some weight, whereas Claim 19 of the '816 Patent recites “an *energy level detector* detecting an energy level of the phase-modulated optical signal in the optical fiber,” Claim 5 of the '816 Patent recites “a *tap detection monitor* monitoring an amplitude of the phase-modulated information optical signal.” This specific recital of a “tap detection monitor” in one of the claims suggests that the term “energy level detector” is not so limited. *See Tandon Corp. v. U.S. Int'l Trade Comm'n*, 831 F.2d 1017, 1023 (Fed. Cir. 1987) (“There is presumed to be a difference in meaning and scope when different words or phrases are used in separate claims.”); *see also CAE Screenplates, Inc. v. Heinrich Fiedler GmbH & Co. KG*, 224 F.3d 1308, 1317 (Fed. Cir. 2000) (“In the absence of any evidence to the contrary, we must presume that the use of these different terms in the claims connotes different meanings.”).

Defendants have cited disclosure in the '898 Patent of “an energy level or tap detector 33” as evidence that these terms are synonymous ('898 Patent at 4:66–5:1), but a better reading is simply that the “detector 33” may or may not be a “tap” detector. *See id.*; *see also* '898 Patent at 5:11–6:20 (“the circuit of FIG. 3 may be configured to monitor in real time the optical power at the receiver 11 for excess light or too little light to indicate a *potential optical tap*, tamper or *other degradation* of the optical signal”) (emphasis added).

Further, Defendants have cited Claims 1 and 14 of the '898 Patent, arguing that the recited “thresholds” would be rendered “virtually devoid of meaning” under Plaintiff’s proposed construction. (Dkt. No. 165, at 9.) No such problem is evident. That is, Defendants have failed to demonstrate that “thresholds” would lack meaning in the context of, for example, “other degradation” rather than necessarily a tap. *See* '898 Patent at 6:17–20.

Finally, Defendants have argued claim differentiation as to Claims 12, 23, and 24 of the '327 Patent and Claims 12 and 24 of the '898 Patent, which are dependent claims that recite

“measuring optical power.” First, claim differentiation is “a guide, not a rigid rule” and does not override the other evidence discussed above. *Wi-LAN*, 830 F.3d at 1391 (citation and internal quotation marks omitted). Second, “measuring optical power” is broader than Defendants’ proposed construction rather than narrower, so Defendants’ proposal would appear to render these dependent claims superfluous. Thus, Defendants have failed to demonstrate that the doctrine of claim differentiation applies and, even if the doctrine applies, the doctrine is unpersuasive here.

There thus being no definition, disclaimer, or consistent context that would warrant imposing the limitation proposed by Defendants, the Court hereby expressly rejects Defendants’ proposed construction. *See Phillips*, 415 F.3d at 1323 (“we have expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment”). Instead, Plaintiff’s proposal of measuring “optical power” is consistent with disclosures in the patents-in-suit. *See* ’898 Patent at 6:17–20 (“monitor in real time the optical power”); *see also* ’816 Patent at 3:66–67 (“Controller 18 is also programmable to control the optical power output of light emitted by laser 12.”); Dkt. No. 165, at 4 (“monitoring and adjusting optical power levels throughout a transmission system was standard”).⁴

The Court therefore hereby construes **“energy level detector”** to mean **“device to measure optical power.”**

⁴ Plaintiff has also cited *Inter Partes Review* (“IPR”) proceedings in which Defendant Cisco Systems, Inc. stated that “a POSITA would understand that a circuit to measure optical power is an ‘energy level detector.’” (Dkt. No. 157, Ex. 11, at 6.) Plaintiff’s reliance on these proceedings is unpersuasive because of the broader claim construction standard applied in IPR proceedings. *See In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1276–78 (Fed. Cir. 2015), *aff’d*, *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131 (2016).

D. “tap” / “tapping” / “tapped”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
No construction necessary. If construed, “removing or extracting a portion of an optical signal from an optical fiber or other communications route.” ⁵	“surreptitious breach of an optical signal” ⁶

(Dkt. No. 157, at 14; Dkt. No. 165, at 17; Dkt. No. 168, Ex. B, at 1 & 25.) The parties submit that this term appears in Claims 1, 3, 5, 12, 13, 16, and 17 of the ’012 Patent and Claim 19 of the ’592 Patent. (See Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff argues that to a person of ordinary skill in the art, “the term ‘tap’ and its grammatical variations (‘tapping’ and ‘tapped’) were simple, known terms used in the field of optical communications at the time of the invention of the asserted patents.” (Dkt. No. 157, at 14 (citation omitted).) Plaintiff urges that “the patentee never unambiguously disclaimed any part of the plain and ordinary meaning of this term.” (*Id.*) Further, Plaintiff argues that “Defendants’ proposal is so narrow that it would exclude embodiments taught in the patent specifications.” (*Id.*, at 15.)

Defendants respond that their proposal “is consistent with the security focus of the invention discussed above and with the use of the term in the specification.” (Dkt. No. 165, at 17.)

Plaintiff replies that Defendants’ proposal “conflicts with the plain meaning of the term,” the specification discloses not only security benefits but also other benefits, and “Defendants’

⁵ Plaintiff previously proposed only: “No construction necessary.” (Dkt. No. 145, at 10.)

⁶ Defendants previously proposed: “illicit breach of an optical signal within an optical fiber that connects a transmitter with a receiver.” (Dkt. No. 145, at 10.)

argument also conflicts with embodiments in the specification that Defendants ignore.” (Dkt. No. 167, at 4.)

At the November 20, 2017 hearing, the parties presented no oral arguments as to these disputed terms. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Claim 1 of the ’012 Patent, for example, recites (emphasis added):

1. A telecommunications monitoring method, comprising:
 - receiving an incoming optical signal at a downstream termination point, located within an optical multiplexor box, of an optical fiber;
 - splitting, within the optical multiplexor box, the incoming optical signal into a data optical signal and a test optical signal;
 - tapping the data optical signal to produce a *tapped* optical signal;
 - processing, within the optical multiplexor box, the data optical signal to produce a data electrical signal indicative of data encoded in the incoming optical signal;
 - processing the *tapped* optical signal to produce an electrical signal indicative of a power of the data optical signal; and
 - performing, by an optical time-domain reflectometer (OTDR) module within the optical multiplexor box, OTDR monitoring of an optical fiber selected from: an incoming optical fiber associated with the incoming optical signal and an outgoing optical fiber associated with an outgoing optical signal.

Nothing in this claim suggests that the tapping is “surreptitious” or that there is otherwise anything nefarious about any part of the claimed method. Also, Defendants’ have argued that “tapping” necessarily occurs outside of the recited optical multiplexor box, but the optical data signal that is tapped is created by “splitting, *within the optical multiplexor box*, the incoming optical signal into a data optical signal and a test optical signal.” Thus, the context provided by the claim indicates that the “tapping” occurs within the optical multiplexor box (or, at least, does not necessarily occur outside of the optical multiplexor box), which weighs against Defendants’ proposal of requiring a “surreptitious breach.”

These findings are also consistent with the technical dictionary definition submitted by Plaintiff. (Dkt. No. 157, Ex. 9, *Fiber Optics Standard Dictionary* 1002 (3d ed. 1997) (“To remove a part of the signal energy from a line, such as a wire, coaxial cable, or an optical fiber. *Note*: Tapping may be authorized for purposes of establishing a signal line, or it may be clandestine, though clandestine tapping of optical fiber is difficult to accomplish and easily detected.”); *see Phillips*, 415 F.3d at 1318 (“We have especially noted the help that technical dictionaries may provide to a court to better understand the underlying technology and the way in which one of skill in the art might use the claim terms. Because dictionaries, and especially technical dictionaries, endeavor to collect the accepted meanings of terms used in various fields of science and technology, those resources have been properly recognized as among the many tools that can assist the court in determining the meaning of particular terminology to those of skill in the art of the invention.”) (citation and internal quotation marks omitted).)

Defendants have cited disclosures that refer to tapping in the context of security. *See, e.g.*, ’012 Patent at 1:52–53 (“Existing amplitude modulated systems have the disadvantage that the fiber can be easily tapped and are not secure.”); *id.* at 3:10–12 (“optical tap detection, which can provide for more secure data transmission”). Still, these disclosures are not inconsistent with the above-quoted technical dictionary definition, which notes that tapping may be “clandestine” or may be “authorized.” (Dkt. No. 157, Ex. 9, *Fiber Optics Standard Dictionary* 1002 (3d ed. 1997).) Moreover, as discussed above, Claim 1 of the ’012 Patent provides context that weighs against limiting tapping to a security context. Defendants’ reliance upon an extrinsic general-purpose dictionary definition of “tap” is likewise unpersuasive. (*See* Dkt. No. 165, Ex. A, *Random House Webster’s Unabridged Dictionary* 1942 (2d ed. 2001) (“to connect into secretly so as to receive the message or signal being transmitted”); *see also Phillips*, 415 F.3d at 1322

(“A claim should not rise or fall based upon the preferences of a particular dictionary editor, or the court’s independent decision, uninformed by the specification, to rely on one dictionary rather than another.”))

Finally, Defendants’ proposal of requiring a “breach” is in conflict with the apparent disclosure of a distinction between a “tap” and a “breach.” See ’012 Patent at 2:50–54 (“a degradation of the optical fiber system, which may indicate a fiber *breach* or a fiber *tap*”) (emphasis added); see also *id.* at 3:9–13 (“The present invention thus permits a card-based transmission system incorporating an energy level detector for optical *tap detection*, which can provide for more secure data transmission than existing amplitude-based cards along with *breach localization* services from the OTDR.”) (emphasis added); *id.* at 5:9–10 (“determining the location of a breach or tap”). Plaintiff’s technology tutorial suggests that a “breach” may be a break in the optical fiber, such as might be caused accidentally by construction equipment, and this is a plausible interpretation, at least to the extent of finding that Defendants’ proposal of a “breach” might tend to confuse rather than clarify the scope of the claims. See Pl.’s Technology Tutorial, at slides 37 & 46.

The Court therefore hereby expressly rejects Defendants’ proposed construction. As to the proper construction, Plaintiff’s proposal of “from an optical fiber or other communications route” is amorphous and is unnecessary, and Plaintiff’s proposals of both “removing” and “extracting” appear to be redundant with one another. Further, although each side has proposed a single construction for all three of these disputed terms, a separate construction for each term will be clearer and will minimize grammatical inconsistencies.

The Court accordingly hereby construes these disputed terms as set forth in the following chart:

<u>Term</u>	<u>Construction</u>
“tap”	“extract a portion of an optical signal”
“tapping”	“extracting a portion of an optical signal”
“tapped”	“a portion that has been extracted from an optical signal”

E. “receiver”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
No construction necessary.	“receiver without a demodulator” ⁷

(Dkt. No. 145, at 8; Dkt. No. 157, at 16; Dkt. No. 165, at 19; Dkt. No. 168, Ex. B, at 14, 20 & 30.) The parties submit that this term appears in Claims 1, 14, 25, and 36 of the ’327 Patent, Claims 1 and 9 of the ’511 Patent, and Claims 1 and 14 of the ’898 Patent. (See Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff argues that “[a]t the time of the invention, a POSITA would have recognized the term ‘receiver’ as a well-known device, with a straightforward plain and ordinary meaning in the context of optical networks,” and “nowhere in th[e] intrinsic record does the patentee disclaim the use of any particular type of ‘receiver.’” (Dkt. No. 157, at 16 & 17 (citations omitted).)

Plaintiff also argues that “to the extent that Defendants’ proposed construction is meant to

⁷ Defendants previously proposed: “‘photodiode or other photodetector that converts an optical signal to an electrical signal’ OR ‘receiver, excluding receivers that include a demodulator to demodulate the optical signal to produce output data.’” (Dkt. No. 145, at 8.) Defendants have stated that “[r]esponsive to Plaintiff’s arguments, Defendants have simplified their proposed construction to crystallize the single issue in dispute: the impact of the prosecution disclaimer.” (Dkt. No. 165, at 19 n.9.)

exclude transceiver cards that contain a demodulator from the scope of the asserted claims, that would be inconsistent with the claims, as understood by a POSITA.” (*Id.*, at 18 (citation omitted).)

Defendants respond that “[d]uring prosecution of the Group 2 patents, . . . the applicant clearly and unmistakably disclaimed a receiver that has a demodulator.” (Dkt. No. 165, at 19.) Defendants argue that the Court should reject Plaintiff’s reliance upon the “conclusory, unsupported, and unqualified legal opinion of [Plaintiff’s] technical expert.” (*Id.*, at 22.)

Plaintiff replies that Defendants have failed to show any disclaimer. (Dkt. No. 167, at 7.) In particular, Plaintiff argues: “Contrary to Defendants’ argument, the patentee did not ‘acquiesce’ in the rejection of its proposed claims on enablement grounds. Rather, patentee broadened the claims, to cover additional types of receivers, and argued that these broader claims met the enablement requirement.” (Dkt. No. 167, at 8.) Alternatively, Plaintiff argues that “even if Defendants were correct that there was a disclaimer of scope of the term ‘receiver’ in the ’898 patent prosecution, that disclaimer should not apply to the ’327 and ’511 patent claims.” (*Id.*, at 9.)

At the November 20, 2017 hearing, the parties presented oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

The specification refers to “optical modulation”:

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.

’327 Patent at 4:64–67. As a threshold matter, to whatever extent Defendants are arguing that the specification lacks sufficient disclosure of a demodulator, such arguments may perhaps bear

upon enablement or written description but do not appear to be relevant to the present claim construction proceedings. *See Phillips*, 415 F.3d at 1327 (“we have certainly not endorsed a regime in which validity analysis is a regular component of claim construction”).

Instead, here, the dispute is whether the prosecution history contains a disclaimer or disavowal. The parties have reached agreement that the term “receiver” does not itself require construction, but the parties dispute whether the scope of this term is limited by the prosecution history. (*See* Dkt. No. 165, at 21.) “As a basic principle of claim interpretation, prosecution disclaimer promotes the public notice function of the intrinsic evidence and protects the public’s reliance on definitive statements made during prosecution.” *Omega Eng’g Inc. v. Raytek Corp.*, 334 F.3d 1314, 1324 (Fed. Cir. 2003).

Defendants submit that, during prosecution of the ’898 Patent, the patentee proposed several claims that recited “a receiver having a demodulator.” (Dkt. No. 165, Ex. N, Feb. 5, 2013 Preliminary Amendment, at 3, 5, 6, & 7.) For example, then-pending application claim 18 recited “a receiver having a demodulator configured to receive a second optical signal from the second optical fiber and demodulate the second optical signal to output data.” (*Id.*, at 3.) The examiner rejected these claims, asserting a failure to satisfy the enablement requirement of 35 U.S.C. § 112, ¶ 1 as to “a receiver having a demodulator.” (*Id.*, Ex. O, June 26, 2013 Office Action, at 3.) The patentee then amended the claims by striking the phrase “having a demodulator” (as well as the word “demodulate,” which appeared in the same limitation) and thereby leaving only “a receiver.” (*Id.*, Ex. P, Oct. 21, 2013 Response to Non-Final Office Action, at 2, 4, 6 & 7.) The patentee did so without any substantive explanation other than asserting that “[a]mended claims 18, 31, 45, and 53 comply with the requirements of Section 112 (pre-AIA), first paragraph.” (*Id.*, at 8.)

Nonetheless, the patentee linked the amendment to the rejection and made no attempt to argue that the rejection was improper or to argue that the original claim scope was fully enabled:

Claims 18, 31, 45, and 53 were rejected under 35 U.S.C. §112 (pre-AIA), first paragraph, as failing to comply with the enablement requirement. Assignee has amended claims 18, 31, 45, and 53. Amended claims 18, 31, 45, and 53 comply with the requirements of Section 112 (pre-AIA), first paragraph. Accordingly, Assignee respectfully requests the Office to reconsider and withdraw the Section 112 (pre-AIA), first paragraph rejection of claims 18, 31, 45, and 53.

Id. Following this amendment, the examiner evidently ceased asserting the rejection.

Plaintiff argues that in the absence of any argument or explicitly narrowing amendment, there can be no disclaimer. Instead, Plaintiff argues, the patentee simply broadened the scope of the claim and asserted that the claims satisfied the enablement requirement, and the examiner did not reassert the enablement rejection because the rejection had simply been wrong all along. (See Dkt. No. 157-22, Sept. 15, 2017 Lebby Decl., at ¶ 40.)

The better reading of this prosecution history in light of relevant authority, however, is that the amendment amounted to “acquiescence in the examiner’s rejection” such that the patentee cannot “obtain scope that was requested during prosecution, rejected by the Examiner, and then withdrawn by the applicant.” *UCB, Inc. v. Yeda Research & Dev. Co., Ltd.*, 837 F.3d 1256, 1260, 1261 (Fed. Cir. 2016) (“Although each claim in a patent warrants independent consideration in light of its particular facts and history, *the general rule is that a patent applicant cannot later obtain scope that was requested during prosecution, rejected by the Examiner, and then withdrawn by the applicant.*”) (emphasis added); see *Aylus Networks, Inc. v. Apple Inc.*, 856 F.3d 1353, 1359 (Fed. Cir. 2017) (noting that disclaimer “can occur through amendment or argument”).

Plaintiff has cited *Massachusetts Institute of Technology v. Shire Pharmaceuticals, Inc.*, which involved amendments that were rejected and then withdrawn. 839 F.3d 1111, 1120–22

(Fed. Cir. 2016) (“Had the examiner actually agreed with MIT’s arguments and allowed the proposed amendments, the claims could well have a different claim scope. But the examiner did not, and MIT took a different approach.”). Here, by contrast, the examiner rejected the claims and then the patentee amended the claims to address the rejection. (*Id.*, Ex. P, Oct. 21, 2013 Response to Non-Final Office Action, at 8.) *MIT* is therefore distinguishable.

The Court thus finds a disclaimer as to the ’898 Patent. The disputed term also appears in claims of the ’327 Patent and the ’511 Patent. The ’898 Patent is a continuation of the ’511 Patent, which in turn is a continuation of the ’327 Patent. Both the ’327 Patent and the ’511 Patent had already issued at the time of the above-discussed October 21, 2013 Response to Non-Final Office Action during prosecution of the ’898 Patent.

Several authorities have applied disclaimers from a parent patent to a child patent, or between sibling patents. See *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1334 (Fed. Cir. 2003) (finding disclaimer applicable to child patent because “we presume, unless otherwise compelled, that the same claim term in the same patent or related patents carries the same construed meaning”); see also *Alloc*, 342 F.3d at 1372 (similar); *Elkay Mfg. Co. v. Ebco Mfg. Co.*, 192 F.3d 973, 980 (Fed. Cir. 1999) (“When multiple patents derive from the same initial application, the prosecution history regarding a claim limitation in any patent that has issued applies with equal force to *subsequently* issued patents that contain the same claim limitation.”) (emphasis added).

At least one authority applied a disclaimer to a related patent that issued prior to the prosecution history that included the disclaimer, but that related patent was a sibling (or, arguably, a cousin), not a parent. See *Microsoft*, 357 F.3d at 1349–50. Defendants have cited no

binding or persuasive precedent that applied a disclaimer to a parent patent, and the Court finds none.

Admittedly, at least one authority has found that later prosecution history can be “relevant” to earlier claims. *Absolute Software, Inc. v. World Computer Sec. Corp.*, No. A-09-CV-142-LY, 2014 WL 496879, at *8 (W.D. Tex. Feb. 6, 2014). Also, the *Microsoft* case itself noted:

We rejected the argument that the patentee was bound, or estopped, by a statement made in connection with a later application on which the examiner of the first application could not have relied. We did not suggest, however, that such a statement of the patentee as to the scope of the disclosed invention would be irrelevant. Any statement of the patentee in the prosecution of a related application as to the scope of the invention would be relevant to claim construction, and the relevance of the statement made in this instance is enhanced by the fact that it was made in an official proceeding in which the patentee had every incentive to exercise care in characterizing the scope of its invention.

Microsoft, 357 F.3d at 1350 (discussing *Georgia-Pacific Corp. v. United States Gypsum Co.*, 195 F.3d 1322 (Fed. Cir. 1999)).

Here, however, the enablement rejection and the responsive amendments were specific to the claims of the ’898 Patent. In sum, Defendants have failed to demonstrate that the disclaimer in the prosecution history of the ’898 Patent should be applied to the earlier-issued ’327 Patent and ’511 Patent.

Finally, as noted above, the parties agree that no further construction of the term “receiver” itself is necessary. (See Dkt. No. 165, at 21 (Defendants stated that “although *the meaning of the term ‘receiver’ itself need not be construed*, the Court should give effect to the disclaimer by construing the term to mean a “receiver without a demodulator.”) (emphasis added).)

The Court accordingly hereby construes “**receiver**” as set forth in the following chart:

<u>Term</u>	<u>Construction</u>
“receiver” (’898 Patent)	“receiver without a demodulator”
“receiver” (’327 Patent and ’511 Patent)	“receiver” (plain meaning)

F. “the optical signals”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
No construction necessary. Alternatively: “the optical data signals received on the fiber input from the second optical fiber” ⁸	“transmitting optical signals” is antecedent for “the optical signals”, <i>otherwise</i> Indefinite.

(Dkt. No. 157, at 18; Dkt. No. 165, at 22; Dkt. No. 168, Ex. B, at 14.) The parties submit that this term appears in Claims 1, 14, 25, and 36 of the ’327 Patent. (See Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff argues that “the entire, expressly claimed context is instructive and makes clear that Oyster’s proposed construction is correct.” (Dkt. No. 157, at 19.) Plaintiff also argues that Defendants’ proposed interpretation “is confusing and does not help the trier of fact because it is unclear,” and “Defendants’ proposal can be interpreted in more than one way.” (*Id.*) Plaintiff also submits that “in all embodiments of the ’327 patent, including in particular Figures 2 and 3 and their corresponding specification descriptions, a POSITA would understand that the patent teaches that the transceiver is not receiving the same signal it is sending out.” (*Id.*, at 21 (citation omitted).) Further, Plaintiff highlights that, during prosecution, the patentee explained that “‘the optical signals’ added to the claims were measured for telecommunications, not for ‘diagnostics’

⁸ Plaintiff previously proposed only: “No construction necessary.” (Dkt. No. 145, at 8.)

...” (*Id.*, at 22.) Finally, Plaintiff argues that Defendants’ indefiniteness argument fails because the scope of the claims is reasonably ascertainable. (*Id.*, at 23.)

Defendants respond that “[t]he claim language at issue has a clear antecedent basis,” and “there is no error on the face of the claims.” (Dkt. No. 165, at 22.) As to Plaintiff’s alternative proposal, Defendants respond that “Plaintiff’s construction would insert a new word (‘the optical *data* signals’) leaving the claim limitation without clear antecedent basis.” (*Id.*, at 24–25.)

Plaintiff replies that “Defendants seek to rewrite these claims by invoking a hyper-technical application of the rule of antecedent basis.” (Dkt. No. 167, at 10.) Plaintiff also argues that the prosecution history cited by Defendants does not require that the energy level detector must measure optical signals that were transmitted by the transmitter on the same card. (*Id.*, at 11.) Plaintiff concludes that “under the correct understanding of the claims, there is no ambiguity.” (*Id.*, at 12.)

At the November 20, 2017 hearing, the parties presented oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Claim 1 of the ’327 Patent, for example, recites (emphasis added):

1. A transceiver card for a telecommunications box for transmitting data over a first optical fiber and receiving data over a second optical fiber, the card comprising:
 - a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, a modulator, and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting *optical signals* for telecommunication as a function of the input data;
 - a fiber output optically connected to the laser for connecting the first optical fiber to the card;
 - a fiber input for connecting the second optical fiber to the card;
 - a receiver optically connected to the fiber input for receiving data from the second optical fiber; and

an energy level detector optically connected between the receiver and the fiber input to measure an energy level of *the optical signals*, wherein the energy level detector includes a plurality of thresholds.

At first blush, the claim appears to expressly set forth antecedent basis for “the optical signals,” namely the “optical signals” recited as part of “the transmitter transmitting optical signals for telecommunication as a function of the input data.”

Plaintiff counters that “the optical signals” are signals received in the preceding limitation, which recites “a receiver optically connected to the fiber input for receiving data from the second optical fiber.” No explicit antecedent basis is present in this regard, and Defendants have emphasized that the Federal Circuit “has repeatedly held that courts may not redraft claims to cure a drafting error made by the patentee, whether to make them operable or to sustain their validity.” *Lucent Techs., Inc. v. Gateway, Inc.*, 525 F.3d 1200, 1215 (Fed. Cir. 2008). But although this limitation recites “receiving data,” not receiving optical signals, the data is received from an *optical* fiber.

On balance, optical signals are implicit in the “receiver” limitation because this limitation recites receiving data “from the second optical fiber.” The second optical fiber necessarily conveys optical signals so that data can be received from the second optical fiber as recited in the claim. *See, e.g.*, ’327 Patent at 4:48–49 (“Optical signals are received at an input 109B of connector 109 from fiber 111.”). And perhaps most importantly, as to the energy level detector that is recited for measuring an energy level of “the optical signals,” this energy level detector is “between the receiver and the fiber input,” and that “fiber input” is, in turn, recited as being “for receiving data from the second optical fiber.”

Thus, although the proper antecedent basis for the phrase “the optical signals” is not explicit, the claim is nonetheless readily understandable. *See Microprocessor Enhancement*

Corp. v. Texas Instruments Inc., 520 F.3d 1367, 1376 (Fed. Cir. 2008) (noting “the well-settled rule that claims are not necessarily invalid for a lack of antecedent basis”); *see also Bose Corp. v. JBL, Inc.*, 274 F.3d 1354, 1359 (Fed. Cir. 2001) (noting that the Manual of Patent Examining Procedure provides an example that “the limitation ‘the outer surface of said sphere’ would not require an antecedent recitation that the sphere have an outer surface”).

Also of note, Plaintiff’s interpretation of the disputed term is consistent with disclosed embodiments. (See ’327 Patent at 5:6–7, 5:28–32 & Figs. 2 & 3; *see also* Dkt. No. 157-22, Sept. 15, 2017 Lebbby Decl., at ¶¶ 79–88; *Globetrotter*, 362 F.3d at 1381 (“[a] claim interpretation that excludes a preferred embodiment from the scope of the claim ‘is rarely, if ever, correct’”) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996)).)

Defendants’ proposed construction, by contrast, would appear to result in inoperability and is therefore disfavored. *See AIA Eng’g Ltd. v. Magotteaux Int’l S/A*, 657 F.3d 1264, 1278 (Fed. Cir. 2011) (“a construction that renders the claimed invention inoperable should be viewed with extreme skepticism”) (citation and internal quotation marks omitted).

The prosecution history cited by Defendants does not compel otherwise and does not contain any definitive statements to the contrary. (See Dkt. No. 165, Ex. Q, Feb. 13, 2009 Response to Office Action, at 2, 4, 7 & 10.) The patentee amended claims so as to recite “transmitting optical signals” as well as to recite that the energy level detector is “to measure an energy level of the optical signals,” and the patentee stated:

Without prejudice to a continuation application, however, applicants have amended the claims to recite “a transmitter for transmitting data over the first optical fiber, the transmitter having a laser, ~~and a modulator~~, and a controller receiving input data and controlling the modulator as a function of the input data, the transmitter transmitting optical signals for telecommunication as a function of

the input data” and “an energy level detector” to measure an energy level of the transmitted optical signals.

(*Id.*, at 10 (patentee indicated deletions with strikethrough and additions with underlining).)

Defendants have argued that this prosecution history supports Defendants’ argument that the antecedent basis for “the optical signals” is explicit and is the “transmitt[ed] optical signals” recited earlier in each claim.

A reasonable reading of this passage in the context of the claim language, however, is that “the transmitted optical signals” are the signals being received by the receiver (having been transmitted elsewhere), not the signals being transmitted by the recited transmitter. *See id.*; *see also Golight, Inc. v. Wal-Mart Stores, Inc.*, 355 F.3d 1327, 1332 (Fed. Cir. 2004) (“Because the statements in the prosecution history are subject to multiple reasonable interpretations, they do not constitute a clear and unmistakable departure from the ordinary meaning of the term. . . .”); *Tech. Properties Ltd. LLC v. Huawei Techs. Co.*, 849 F.3d 1349, 1357–58 (Fed. Cir. 2017) (“If the challenged statements are ambiguous or amenable to multiple reasonable interpretations, prosecution disclaimer is not established.”).

This reading is reinforced by the paragraph that follows the above-reproduced passage, distinguishing the “Darcie” reference as disclosing measuring the energy level of a “*diagnostic signal*” rather than “optical signals for *telecommunication*” as recited in the claims. (*See* Dkt. No. 165, Ex. Q, Feb. 13, 2009 Response to Office Action, at 10.)

Likewise, although Defendants have argued that the claim is unclear because there could be multiple optical signals received on the second optical fiber, the above-discussed context provided by the claim language demonstrates that “the optical signals” are data signals. *See Phillips*, 415 F.3d at 1314 (“the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms”) (quoting *ACTV*,

Inc. v. Walt Disney Co., 346 F.3d 1082, 1088 (Fed. Cir. 2003)); *see also Nautilus*, 134 S. Ct. at 2129.⁹

The Court therefore hereby construes **“the optical signals”** to mean **“the optical data signals received on the fiber input from the second optical fiber.”**

G. “line card”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
No construction necessary.	“card having a transceiver”

(Dkt. No. 145, at 10; Dkt. No. 157, at 24; Dkt. No. 165, at 27; Dkt. No. 168, Ex. B, at 2.) The parties submit that this term appears in Claims 9 and 11–17 of the ’012 Patent. (*See* Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff argues that to a person of ordinary skill in the art at the relevant time, “the term ‘line card’ had a known, plain and ordinary meaning, encompassing any printed circuit board that has the function of dealing with a line of a telecommunications system.” (Dkt. No. 157, at 24 (citation omitted).) Plaintiff urges that “[b]ecause the plain and ordinary meaning of line card is exactly consistent with the intrinsic and extrinsic evidence, this Court need not construe it.” (*Id.*) Plaintiff likewise argues: “The patentee did not offer an expressly different or more limited usage of ‘line card,’ or act as a lexicographer for that term. In particular, the patentee did not expressly and unambiguously state that ‘line card’ must (though it may) contain a combined transmitter and receiver, as Defendants’ proposal wrongly requires.” (*Id.*)

⁹ Plaintiff has also cited IPR proceedings (*see* Dkt. No. 167, Ex. 21, at 6, 35 & 38), but Plaintiff’s reliance on these proceedings is unpersuasive because of the broader claim construction standard applied in IPR proceedings. *See In re Cuzo Speed*, 793 F.3d at 1276–78.

Defendants respond that “[t]he claim term ‘line card’ appears nowhere in the Group 2 specification,” and “[t]he Group 2 specification makes clear that the alleged invention is directed to a transceiver card having both transmit and receive functions.” (Dkt. No. 165, at 27 & 28.)

Plaintiff replies that Defendants’ attempt to import limitations from the specification should be rejected. (Dkt. No. 167, at 12.)

At the November 20, 2017 hearing, the parties presented no oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Claim 9 of the ’012 Patent, for example, recites (emphasis added):

9. A telecommunications signal processing method, comprising:
receiving, by an optical *line card*, a phase modulated optical signal at a downstream termination point of an optical fiber, wherein the optical signal includes a data optical signal of a first wavelength multiplexed with a test optical signal of a second wavelength;
de-multiplexing the data optical signal and the test optical signal;
detecting data encoded in the data optical signal;
performing, by the optical *line card*, optical time-domain reflectometer (OTDR) monitoring of the test optical signal.

Defendants have not identified anything in the claim language that recites or implies that a “line card” must include a transceiver rather than, for example, merely a receiver. Plaintiff has submitted the un rebutted opinion of its expert that, historically, it has not been uncommon for receivers and transmitters to be provided on separate cards. (Dkt. No. 157-22, Sept. 15, 2017 Leiby Decl., at ¶ 44; see *Teva*, 135 S. Ct. at 841.)

As to the prosecution history, the patentee stated:

Although the term “line card” is exceedingly well known in the telecommunication industry and is clearly applicable to the transceiver cards described in the specification, as one of ordinary skill in the field of telecommunication networks would readily recognize, the proposed amendments are requested in view of the specification’s more frequent use of the term “transceiver card.”

(Dkt. No. 157, Ex. 16, Mar. 30, 2016 Proposed Amendment Under 37 CFR 1.312, at 10.)

Although this passage could perhaps be interpreted as meaning that the patentee used “line card” and “transceiver card” synonymously, an equally plausible reading is that “line card” is a broader term that encompasses “transceiver card.” On balance, no disclaimer is evident. *See Golight*, 355 F.3d at 1332 (“Because the statements in the prosecution history are subject to multiple reasonable interpretations, they do not constitute a clear and unmistakable departure from the ordinary meaning of the term. . . .”); *see also Tech. Properties*, 849 F.3d at 1357–58 (“If the challenged statements are ambiguous or amenable to multiple reasonable interpretations, prosecution disclaimer is not established.”).

This remains true even though the specification discloses transceiver cards. *See* ’012 Patent at 2:24–36 (“An object of the present invention is to provide a transceiver card . . .”), 2:64–67 (“The transceiver card of the present invention . . .”) & 4:55–64 (“transceiver card 1”). This specific feature of particular disclosed embodiments should not be imported into the claims. *See Phillips*, 415 F.3d at 1323.¹⁰

The Court therefore hereby expressly rejects Defendants’ proposed construction. Nonetheless, although Plaintiff has proposed that “line card” should be given its plain meaning, “some construction of the disputed claim language will assist the jury to understand the claims.” *TQP Dev., LLC v. Merrill Lynch & Co., Inc.*, No. 2:08-CV-471, 2012 WL 1940849, at *2 (E.D. Tex. May 29, 2012) (Bryson, J., sitting by designation).

¹⁰ Likewise, the context provided by the claims is not overridden by Plaintiff’s expert’s comment that “I believe these patents teach that a line card would have both a transmit and receive function.” (Dkt. No. 165, Ex. I, Sept. 6, 2017 Lebby dep. at 91:12–14.)

The Court accordingly hereby construes “**line card**” to mean “**card having a transmitter, a receiver, or both.**”

H. “OTDR”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“Optical Time-Domain Reflectometer, a device that can monitor an optical fiber by measuring the time for a light wave to reflect back from a potential fault in the optical fiber” ¹¹	“fault detection device that uses non-data bearing, discrete high power pulses via a dedicated transmitter and receiver separate from the data transmitter and receiver”

(Dkt. No. 157, at 25; Dkt. No. 165, at 26; Dkt. No. 168, Ex. B, at 1; Dkt. No. 168, Ex. B, at 15, 20, 21 & 32.) The parties submit that this term appears in Claims 13, 24, 35, and 39 of the ’327 Patent, Claims 8 and 16 of the ’511 Patent, Claims 13 and 25 of the ’898 Patent, and Claims 1, 5, 9, 11, 14, 16, and 17 of the ’012 Patent. (See Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff argues that “OTDR” was a well-known acronym at the time of the inventions, and Plaintiff submits that the specification is consistent with the well-known meaning. (Dkt. No. 157, at 25.) Plaintiff likewise argues that “[n]owhere in the claims, patent specification or file history does the patentee offer a specific or different definition of ‘OTDR’ or else act as a lexicographer for that term.” (*Id.*) As to Defendants’ proposal, Plaintiff argues that “[t]he various additional attributes that Defendants add to their proposed construction, such as ‘non-data bearing, discrete . . . pulses’ or a ‘separate’ and ‘dedicated’ transmitter and receiver, would effectively limit the term to just one example from the specifications.” (*Id.*, at 26 (citing ’898 Patent at 2:36–42).)

¹¹ Plaintiff previously proposed: “optical time-domain reflectometer.” (Dkt. No. 145, at 8.)

Defendants respond that “Plaintiff’s proposed construction should be rejected as impermissibly broad because it does not describe the device disclosed by applicant.” (Dkt. No. 165, at 26.) Defendants explain that “Plaintiff’s proposed construction describes one capability of an OTDR . . . but does not describe the device itself.” (*Id.*, at 27.) Defendants submit that “Defendants’ proposed construction of OTDR comes directly from the specification and incorporated prior art,” and “[n]owhere in the ’012 patent does the applicant disclose the OTDR signal as bearing data.” (*Id.*, at 26.)

Plaintiff replies that Defendants’ attempt to import limitations from the specification should be rejected. (Dkt. No. 167, at 13.)

At the November 20, 2017 hearing, the parties presented oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Claim 13 of the ’327 Patent, for example, recites (emphasis added):

13. The card as recited in claim 1 further comprising a first splitter splitting the optical signal to the energy level detector, and a second splitter for an *OTDR*.

Plaintiff’s expert has opined that “OTDR” was understood by persons of ordinary skill in the art at the time of the claimed invention. (Dkt. No. 157-22, Sept. 15, 2017 Lebby Decl., at

¶ 41.) The specification is consistent with Plaintiff’s expert’s opinion in this regard:

Several companies currently provide OTDR (optical time-domain reflectometers) which can monitor an optical fiber and determine if [*sic*] the presence of and location of a break in the fiber. Such companies include Youth Communication Co. with the MW Series Mini-OTDR and OTDR modules from Tekronix Communications.

These detectors however are expensive and must be applied to the fiber away from the box.

U.S. Pat. No. 5,777,727 discloses details of OTDR technology and is hereby incorporated by reference herein.

'327 Patent at 2:4–13. The specification also discloses specific preferred features of the OTDR:

Preferably, the OTDR operates at a wavelength that is different than the wavelength used for data transmission and is connected in the optical circuit via a wavelength division multiplexed coupler. By operating the OTDR at a wavelength different than the wavelength used for data transmission, the OTDR may be allowed to continuously operate without disruption of the data traffic.

Id. at 2:30–36. These specific features of particular preferred embodiments should not be imported into the claims. *See Phillips*, 415 F.3d at 1323.

Likewise, Defendants have cited the Summary of the Present Invention section of the specification:

An object of the present invention is to provide a transceiver card for providing secure optical data transmission over optical fiber. Another alternate or additional object of the present invention is to provide for replacement of existing cards with a transceiver card permitting ODTR [*sic*, OTDR] and tapping detection capabilities.

'327 Patent at 2:18–23. This disclosure of “object[s]” of the invention does not warrant limiting the scope of “OTDR.” *See, e.g., Liebel-Flarsheim*, 358 F.3d at 908 (“The fact that a patent asserts that an invention achieves several objectives does not require that each of the claims be construed as limited to structures that are capable of achieving all of the objectives.”).

Finally, Defendants have cited the incorporated-by-reference “Sato” reference, United States Patent No. 5,777,727, which discloses “[a]n OTDR method” that “applies light pulses, having a strong intensity, to one end of a measuring optical fiber.” *Sato* at 1:11–13.

Nonetheless, Defendants have not identified any statements in *Sato*, or elsewhere, that would warrant limiting OTDR to using “discrete high power pulses via a dedicated transmitter and receiver separate from the data transmitter and receiver,” as Defendants have proposed. Instead, these appear to be specific features of particular embodiments. *See Phillips*, 415 F.3d at 1323.

The Court therefore hereby construes “OTDR” to mean “**Optical Time-Domain Reflectometer, a device that monitors an optical fiber by measuring the time for a light wave to reflect back from a potential fault in the optical fiber.**”

I. “arm” and “path”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
No construction necessary.	“optical connection through a splitter, fiber and coupler of an interferometer”

(Dkt. No. 145, at 4; Dkt. No. 157, at 26.) Plaintiff has submitted that these terms appear in Claims 1 and 19 of the ’816 Patent, Claims 1, 2, 9–11, 14, 19, 22, and 27 of the ’055 Patent, and Claims 1, 4, 11, and 13 of the ’952 Patent. (Dkt. No. 157, at 26.)

Plaintiff has argued that “the term ‘arm’ was a well-known, simple term at the time of the invention,” and “[i]t needs no construction.” (Dkt. No. 157, at 26 (citation omitted).) Plaintiff has also argued that “[Defendants’] proposed importation of a ‘fiber’ is inconsistent with the language in various claims, which recite a ‘fiber arm,’” and Plaintiff has submitted that “Defendants’ proposal conflicts with how a POSITA would understand the term.” (*Id.*, at 27.)

These terms are not addressed in Defendants’ response brief, Plaintiff’s reply brief, or the parties’ Joint Claim Construction Chart. (See Dkt. Nos. 165 & 167; *see also* Dkt. No. 168, Ex. B.) At the November 20, 2017 hearing, the parties presented no oral arguments as to these terms. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

The Court therefore concludes that the terms “arm” and “path” are no longer being presented for construction, and the Court accordingly does not further address these terms.

J. “path length difference”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“difference in the length of the path” ¹²	“difference in the physical length of the path”

(Dkt. No. 157, at 28; Dkt. No. 165, at 33; Dkt. No. 168, Ex. B, at 9.) The parties submit that this term appears in Claims 1 and 27 of the ’055 Patent. (See Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff urges that its proposal “is consistent with the plain and ordinary meaning of the term and with the various ways a POSITA would have understood a path-length difference could be achieved.” (Dkt. No. 157, at 28 (citation omitted).) Plaintiff argues that Defendants’ proposal of “physical” should be rejected because “the optical path length depends not only on the physical distance through the medium but also the medium’s composition, as light travels at slightly different speeds in media having different properties (i.e., different refractive indices).” (*Id.* (citation omitted).)

Defendants respond that “the claim is clear on its face—after all, length means length,” and “[t]he specification *only* discloses a difference in the physical lengths of the two paths.” (Dkt. No. 165, at 34.) Defendants emphasize that “[n]owhere in the claims, specification, or figures is there any explanation of how the disclosed system could operate without a physical path length difference.” (*Id.*, at 35.) Defendants also note that Claim 9 of the ’055 Patent expressly refers to “distance.” (*Id.*) Finally, Defendants urge that “Plaintiff’s hypothesis about first and second paths having different refractive indices is not discussed anywhere in the patents.” (*Id.*, at 36.)

¹² Plaintiff previously proposed: “No construction necessary. In the alternative, if construed: difference in the length of the path.” (Dkt. No. 145, at 4.)

Plaintiff replies that the difference in length “can result from a physical length difference or an optical path length difference (with the same physical lengths) resulting from different speeds of light traveling through various media.” (Dkt. No. 167, at 14.) Plaintiff argues that the Court should reject Defendants’ effort to limit the claim to embodiments disclosed in the specification. (*Id.*) Plaintiff also notes that Claim 9 of the ’055 Patent, cited by Defendants, itself recites “the distance being a function of the delay and the *speed of light in the fiber.*” (*Id.* (emphasis Plaintiff’s).)

At the November 20, 2017 hearing, the parties presented no oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Claim 1 of the ’055 Patent, for example, recites (emphasis added):

1. A fiber optic data transmission system comprising:
 - a transmitter having a light source producing light, a phase modulator for phase modulating the light source, and a controller for controlling the phase modulator as a function of an input electronic data stream and a second electronic data stream having a delay, the controller having a controller output electronic data stream of a plurality of bits, each bit being either a binary zero or a binary one, the phase modulator creating a phase-modulated optical signal, for each bit the phase modulator imparting on the light for each binary zero of the controller output electronic data stream either a first phase corresponding to the binary zero or a second phase offset 180 degrees from the first phase corresponding to the binary one so as to create the phase-modulated optical signal, the transmitter having an optical output for the phase-modulated optical signal, the phase-modulated optical signal at the optical output being free of amplitude modulation as a function of the input electronic data stream;
 - an optical fiber receiving the optical signal; and
 - a receiver receiving the optical signal from the optical fiber, the receiver having a splitter for splitting the optical signal into a first path and a second path, with a *path length difference* between the first path and second path being a function of the delay in the second electronic data stream.

The specification discloses:

Preferably, the path length difference between the first path length and second path length is a function of the delay and the speed of the light in the fiber. The

distance delays the light traveling in the second path with respect to light in the first path by a second delay, the second delay preferably being equal to the delay imposed at the controller.

'055 Patent at 3:27–32 (emphasis added). Defendants have cited a disclosed example of a “delay loop” that is “3 feet long,” which thus evidently refers to a physical length of fiber:

The interferometer 40 preferably has the delay loop 46, which may be a long section of optical fiber for example 3 feet long. The loop may be coiled depending upon its bending capability, and retained in the coil with a fastening device such as spindle 47, which may for example be made of plastic. Loop 46 also may extend around the perimeter of card 1, so as to gain greater length, but is preferably retained with a fastening device such as clips or in some similar fashion.

'592 Patent at 5:10–12; *see* '055 Patent at 5:32–33 (“Second fiber 45 includes a delay fiber 46 which may include a fiber loop of a desired length.”) & Fig. 3 (illustrating delay fiber 46 as a coil); *see also id.* at 5:27–54 (this disclosure appears to assume that the speed of light in the “second fiber” (which includes the “delay loop”) is the same as the speed of light in the “first fiber”).

Plaintiff’s expert has opined that “optical length” can vary depending on the refractive index of the material used. (Dkt. No. 157-22, Sept. 15, 2017 Lebby Decl., at ¶ 62; *see id.* at ¶ 64 (“path length differences can be created by selection [*sic*] optical properties of the media through which two beams traverse to create and [*sic*] difference in the optical path length even if there is no difference in the physical path length”).)

This understanding is reinforced by Claim 9 of the '055 Patent, which both sides have cited and which recites (emphasis added):

9. The system as recited in claim 1 wherein the second path length is longer than the first path length by a *distance*, the distance being a function of the delay and the *speed of light in the fiber*.

Claim 9 thus demonstrates that the “speed of light in the fiber” can be varied, such that two fibers of the same length could have different delays.

Further, referring back to above-reproduced Claim 1, the claim recites “path length difference between the first path and second path being a *function of the delay* in the second electronic data stream,” so the limitation at issue is focused on the appropriate delay rather than on any physical dimension. The above-discussed claims, the above-cited portions of the specifications, and the above-cited opinions of Plaintiff’s expert are therefore persuasive that the term “path length difference” is not necessarily limited to a difference in *physical* path length. (See also Dkt. No. 167, Ex. 22, Sept. 6, 2017 Lebby dep. at 232:12–18; see *Teva*, 135 S. Ct. at 841.)

The Court therefore hereby construes “**path length difference**” to mean “**difference in the delay caused by the path.**”

K. “the second arm being longer than the first arm”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
No construction necessary.	“the second arm being physically longer than the first arm”

(Dkt. No. 145, at 7; Dkt. No. 157, at 29; Dkt. No. 165, at 37; Dkt. No. 168, Ex. B, at 35.) The parties submit that this term appears in Claims 1 and 13 of the ’952 Patent. (See Dkt. No. 168, Ex. B.)

The parties submit that this disputed term presents essentially the same dispute as the term “path length difference,” which is addressed above. (Dkt. No. 157, at 29; Dkt. No. 165, at 37; Dkt. No. 167, at 15.) At the November 20, 2017 hearing, the parties presented no oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman*

Hearing, at 1.) For the same reasons set forth above as to the term “path length difference,” the Court hereby expressly rejects Defendants’ proposed construction.

The Court therefore hereby construes **“the second arm being longer than the first arm”** to mean **“the second arm causing more delay than the first arm.”**

L. “phase compensation circuit”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
“circuit that provides phase compensation” ¹³	“circuit that enables using an interferometer of any phase-difference”

(Dkt. No. 157, at 29; Dkt. No. 165, at 29; Dkt. No. 168, Ex. B, at 36.) The parties submit that this term appears in Claims 5, 7, 8, and 11–13 of the ’952 Patent. (See Dkt. No. 168, Ex. B.)

(1) The Parties’ Positions

Plaintiff argues: “In light of the specification, a POSITA would have understood that the patents used the term[s] ‘phase-compensation’ and ‘phase-compensation circuit’ in a manner that is consistent with its plain and ordinary meaning.” (Dkt. No. 157, at 29 (citation omitted).)

Plaintiff also argues that “Defendants are misinterpreting the specification because a POSITA would understand that the specification is describing that a phase-compensation circuit that [*sic*] may be used with an interferometer of any phase-difference, meaning it is possible to construct a phase-compensation circuit that is operable with any phase difference, not that one phase-compensation circuit must be operable with any phase difference.” (*Id.*, at 30.)

Defendants respond that “[t]he term ‘phase compensation circuit’ does not have an established meaning in the art.” (Dkt. No. 165, at 29.) Defendants argue that “[t]he specification of the ’952 patent makes clear that the ‘phase compensation circuit’ is a circuit that enables the

¹³ Plaintiff previously proposed: “No construction necessary. In the alternative, if construed: circuit that provides phase compensation.” (Dkt. No. 145, at 7.)

use of an interferometer of any phase-difference, not just a phase difference of 180 degrees.”
(*Id.*, at 30.)

Plaintiff replies that “Defendants’ proposed construction is narrowing because it requires that the circuit be operable with an interferometer of any phase difference, rather than a particular phase difference for which the circuit may have been designed.” (Dkt. No. 167, at 13–14.) Plaintiff submits that “Defendants rely only on a permissive, exemplary specification statement” that Plaintiff argues “impermissibly narrows the claim” and “conflicts with Dr. Lebby’s un rebutted testimony.” (*Id.*, at 14.)

At the November 20, 2017 hearing, at the Court’s request, the parties presented oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Claims 5 and 13 of the ’952 Patent recite (emphasis added):

5. The system as recited in claim 1 wherein the control circuit includes a *phase-compensation circuit* for rotating a phase imparted by the phase modulator by a predetermined amount.

* * *

13. A fiber optic data transmission system comprising:

a transmitter having a laser emitting a continuous wave light, the transmitter including a phase modulator phase modulating the continuous wave light and a control circuit controlling the phase modulator as a function of an electronic input data stream having a time delay, so as to create a phase-modulated optical signal;

an optical fiber transmitting the phase-modulated optical signal; and a receiver, the receiver including an interferometer for receiving the phase-modulated optical signal, the interferometer having a first arm and a second arm, the second arm being longer than the first arm, the interferometer having an interferometric delay corresponding to the time delay and a phase difference imparted by the first and second arms, the control circuit imparting a phase to represent a binary zero or one as a function of the phase difference,

the control circuit including a *phase-compensation circuit* for rotating a phase imparted by the phase modulator by a predetermined amount wherein the predetermined amount is a function of the phase difference imparted by the interferometer, the *phase compensation circuit* including an N-bit register storing the predetermined amount, an ALU for summing without carry the predetermined amount, and a delayed feedback exclusive[-]or gate having a gate output and receiving the input data stream as an input, and a most significant bit of an ALU output of the ALU being fed together with the gate output through an other exclusive-or gate.

At first blush, the specification appears to disclose that a phase compensation circuit must be usable with any phase difference:

The embodiment provided in FIG. 6 with the phase-compensation circuit 210 may be used with an interferometer of *any* phase-difference, and is preferred if additional security is desired. Each transmitter with controller circuit 218 thus may be synchronized or “married” to an interferometer having a unique phase difference PD between the two arms.

’952 Patent at 8:3–9 (emphasis added); *see id.* at 4:21–43 (“Preferably, correction information can be sent from the receiver to the transmitter via, for example, user defined bits in a data packet sent back to the transmitter. Thus, for example, if the signal modulation depth at the receiver photodiode began to degrade, the phase-compensation circuit could slightly alter the phase imparted by the transmitter.”); *see also id.* at 9:52–10:6 (“the receiver 30 can send back . . . a correction signal to the transmitter 10”).

On balance, however, Defendants have not shown that a *particular* phase compensation circuit must be able to compensate for *any* phase difference. To whatever extent such a feature is disclosed in the above-reproduced passage, this is a specific feature of particular disclosed embodiments that should not be imported into the claims. *See Phillips*, 415 F.3d at 1323.

Instead, as Plaintiff has argued, a particular phase compensation circuit may be designed to compensate for a particular phase difference. This interpretation is consistent with the recital in the above-reproduced claims of a “phase-compensation circuit for rotating a phase imparted

by the phase modulator by a *predetermined* amount.” This recital of “predetermined” can be readily understood as contemplating a *particular* phase difference (rather than requiring that the phase compensation circuit must be able to compensate for any phase difference). This interpretation is also consistent with disclosure regarding “construction”:

Exact determination of the imparted phase shift difference can be made by sending a CW signal through the interferometer *during construction*, for example a signal representing zeros, and resplicing the fiber to adjust the phase imparted by one the [*sic*] of the paths until a zero voltage is output at the detector 38.

However, it is also possible to avoid the physical work required to create a 180-degree phase shift in two ways: either by placing a phase-compensating phase modulator 310 in one arm of the interferometer 300, as shown in FIG. 9, or by a phase-compensation circuit 210 in the controller circuit 218, as shown in FIG. 6.

’952 Patent at 7:10–21 (emphasis added); *see id.* at 3:23–25 (“a phase compensator may be provided to compensate for a phase difference different than 180 degrees that results during manufacturing of the interferometer”).

The unrebutted opinion of Plaintiff’s expert is further persuasive in this regard:

. . . Defendants are misinterpreting the specification because one of ordinary skill in the art would understand that the specification is describing that a phase-compensation circuit that [*sic*] may be used with an interferometer of any phase-difference, meaning it is possible to construct a phase-compensation circuit that is operable with any phase difference, not that one phase-compensation circuit must be operable with any phase difference.

(Dkt. No. 157-22, Sept. 15, 2017 Lebbby Decl., at ¶ 77; *see Teva*, 135 S. Ct. at 841.)

The Court therefore hereby construes “**phase compensation circuit**” to mean “**circuit that provides a phase difference.**”

M. “means for phase modulating as a function of an input electronic data stream and a second electronic data stream having a delay, thus creating a phase modulated optical signal with encoded information for recovery”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
This is a means-plus-function term. Function: “phase modulating light as a function of an input electronic data stream and a second electronic data stream having a delay, thus creating a phase-modulated optical signal with encoded information for recovery” The corresponding disclosed structures are: an exclusive-OR gate (Fig. 2 element 118; 3:1–9; 4:62–65; 5:1–3) and a phase modulator (Fig. 1 element 16; 2:33–34; 3:50–51; 4:42–43).	This claim term is governed by 35 U.S.C. §112(6). Function: “phase modulating light as a function of an input electronic data stream and a second electronic data stream having a delay, thus creating a phase-modulated optical signal with encoded information for recovery” Corresponding Structure: controller 18 including a delayed feedback exclusive-OR gate 118 and a phase modulator 16 receiving the output of the controller 18. ‘055 pat. 4:41–5:7 (describing that phase modulator 16 shifts the phase of the light in response to controller 18, and that controller 18 implements “a delayed-feedback exclusive-OR gate”), Fig. 1 (illustrating phase modulator 16 coupled to controller 18), Fig. 2 (illustrating controller 18 with the delayed-feedback exclusive-OR gate 118).

(Dkt. No. 145, at 4–5; Dkt. No. 157, at 31; Dkt. No. 165, at 37; Dkt. No. 168, Ex. B, at 10–11.)

The parties submit that this term appears in Claim 27 of the ’055 Patent. (See Dkt. No. 168, Ex. B.)

The parties agree that this is a means-plus-function term, and the parties agree upon the claimed function. (Dkt. No. 157, at 31.) The parties dispute the proper corresponding structure.

(1) The Parties’ Positions

Plaintiff argues that Defendants propose including structures that are not necessary for performing the claimed function. (Dkt. No. 157, at 31.)

Defendants respond that “the controller is necessary and linked structure.” (Dkt. No. 165, at 37.)

Plaintiff replies that “Plaintiff’s position is that the *portion* of controller 18 (along with phase modulator 16) that is sufficient for performing the recited phase modulating function is the exclusive-OR gate (Fig. 2 element 118), but that Defendants’ wholesale reference to ‘controller 18’ drags in structure that is unrelated to the phase modulating function, namely the controller components that control laser 12.” (Dkt. No. 167, at 15–16.)

At the November 20, 2017 hearing, the parties presented no oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Title 35 U.S.C. § 112, ¶ 6 provides: “An 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.”

“Structure disclosed in the specification is ‘corresponding’ structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim.” *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303, 1311 (Fed. Cir. 2001) (citation and internal quotation marks omitted). The focus of the “corresponding structure” inquiry is not merely whether a structure is capable of performing the recited function, but rather whether the corresponding structure is “clearly linked or associated with the function.” *Id.* The corresponding structure “must include all structure that actually performs the recited function.” *Default Proof Credit Card Sys. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291, 1298 (Fed. Cir. 2005). “A court may not import into the claim features that are

unnecessary to perform the claimed function.” *Northrop Grumman Corp. v. Intel Corp.*, 325 F.3d 1346, 1352 (Fed. Cir. 2003) (citations and internal quotation marks omitted).

The specification discloses:

FIG. 1 shows a preferred embodiment of a secure telecommunications system 1 according to the present invention. The system 1 includes a transmitter 10, an optical fiber 20, and a receiver 30. Transmitter 10 includes a continuous wave coherent laser 12, for example a semiconductor laser emitting a narrow band of light at approximately 1550 nm, or at other wavelengths. Light emitted from laser 12 is depolarized by a depolarizer 14 and passes through a phase modulator 16, for example a Mach-Zender phase modulator. An *electronic controller 18*, for example a PLC, *controls phase modulator 16*. Controller 18 is also programmable to control the optical power output of light emitted by laser 12. Preferably, the power output is set as low as possible for a given optical span, while maintaining a low bit error rate. This reduces the light available for any tap.

Depending on the controller output, phase modulator 16 either imparts no phase shift to the light or a 180-degree phase shift on the light passing through phase modulator 16, thus creating an optical signal 22, which represents a stream of binary bits. Optical signal 22 is transmitted over fiber 20 to receiver 30. Receiver 30 includes a coupler/splitter 31, functioning as a splitter, a light monitoring detector 32, a coupler/splitter 34, functioning as a splitter, and a coupler/splitter 36, functioning as a coupler. The coupler 34 and splitter 36 together define part of an interferometer 40, as will be described with reference to FIG. 3.

FIG. 2 shows a schematic of part of the *circuitry of controller 18* of FIG. 1. *Input data* identified as DSI forms an input B of an exclusive-or gate 118. The other input A of the exclusive-or gate 118 is a feedback loop 119, which *feeds back the output* of exclusive-or gate 118, and *provides an electronic delay circuit 120*, which causes output OP to arrive at input A with a delay, for example, a certain number of bits later. Exclusive-or gate 118 thus is a delayed-feedback exclusive-or gate, which *outputs an output electronic data stream OP for controlling phase modulator 16*. *Phase modulator 16 phase modulates the light output from the laser 12 based on the electronic data stream OP*. Optical signal 22 in FIG. 1 thus corresponds to the data in electronic data stream OP.

’055 Patent at 4:41–5:7 (emphasis added); see *id.* at 2:34–38 (“The *controller* controls the phase modulator as a function of an input electronic data stream and a second electronic data stream

employing a delay, so as to create an encoded phase-modulated optical signal in the light passing through the phase modulator.”) (emphasis added).

Although Plaintiff has suggested that the corresponding structures are only the phase modulator and the exclusive-or gate, the claimed function requires phase modulating “as a function of an input electronic data stream and a second electronic data stream having a delay, thus creating a phase-modulated optical signal with encoded information for recovery.” The above-reproduced passage discloses controller 18 as controlling the phase modulator so as to accomplish this function.

The opinions of Plaintiff’s expert to the contrary are unpersuasive in light of the above-reproduced disclosure. (Dkt. No. 157-22, Sept. 15, 2017 Lebby Decl., at ¶ 92.) For example, Plaintiff’s expert opines that referring to the entire controller 18 would be incorrect because “[a]s shown in figure 1 [of the ’055 Patent], the controller controls not just the phase modulator 16, but also the laser 12.” (*Id.*) This opinion is unpersuasive because the structure linked to the claimed function is the “controller 18” without any suggestion that the “controller 18” could be subdivided. *See Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1220 (Fed. Cir. 2003) (“Precision in claiming is not an unreasonable price to pay to gain the benefits of claiming in functional terms under section 112, paragraph 6.”).

The corresponding structure therefore includes not only the phase modulator 16 but also the controller 18. As to Defendants’ proposal of referring to the exclusive-or gate 118, however, this structure is actually a substructure within controller 18, such as shown in Figure 2. Exclusive-or gate 118 therefore need not be expressly set forth as part of the corresponding structure. Indeed, doing so might give rise to an unintended implication that other disclosed portions of controller 18, such as electronic circuit delay 120, are not part of the corresponding

structure. Such an implication would be erroneous because the above-reproduced disclosure links the entire controller 18 to the claimed function. *See id.*

The Court therefore hereby finds that **“means for phase modulating as a function of an input electronic data stream and a second electronic data stream having a delay, thus creating a phase modulated optical signal with encoded information for recovery”** is a means-plus-function term governed by 35 U.S.C. § 112, ¶ 6, the claimed function is **“phase modulating light as a function of an input electronic data stream and a second electronic data stream having a delay, thus creating a phase-modulated optical signal with encoded information for recovery,”** and the corresponding structure is **“controller 18 and phase modulator 16; and equivalents thereof.”**

N. “means for receiving the optical signal from the transporting means”

Plaintiff’s Proposed Construction	Defendants’ Proposed Construction
This claim term is governed by 35 U.S.C. §112(6). Function: “receiving the optical signal from the transporting means” The corresponding disclosed structures are: the receivers described in columns 2 and 3 (2:34–64; 3:25–36; 3:55–60); and/or receiver 30 (4:54–60; 5:26–6:7; Figs. 1, 3).¹⁴	This claim term is governed by 35 U.S.C. §112(6). Function: “receiving the optical signal from the transporting means” Corresponding Structure: a receiver including an interferometer having a delay fiber, and an output detector. <i>See</i> ‘055 pat. 4:54–55 (“Optical signal 22 is transmitted over fiber 20 to receiver 30.”); <i>id.</i> at 4:37–38 (“The system 1 includes a transmitter 10, an optical fiber 20, and a receiver 30.”); 4:58–60, Abstract (“The receiver has a splitter for splitting the optical signal into a first path and a second path. The second path has a second path length longer than the first path length[.]”), 5:61–66 (describing output detector 38), 6:1–7 (“The interferometer 40 comprising coupler/splitter 34 and 36, fibers 43 and 45, delay fiber 46, and depolarizer 48 thus functions as an optical exclusive-or gate with one input leg delayed for signals arriving at input 41 of coupler 34. Interferometer 40 as a whole thus optically and physically “decodes” the signal OP produced by the delayed-feedback exclusive-or gate 118 of FIG. 2.”)

(Dkt. No. 145, at 5–6; Dkt. No. 165, at 38–39; Dkt. No. 168, Ex. B, at 11–12.) The parties submit that this term appears in Claim 27 of the ‘055 Patent. (*See* Dkt. No. 168, Ex. B.)

¹⁴ Plaintiff previously proposed: “This is not a means-plus-function term and requires no construction. If construed as a means-plus-function term, the function is receiving the optical signal from the transporting means, and the corresponding disclosed structures are: receiver (2:34–64; 3:25–36; 3:55–60); and receiver 30 (4:54–60; 5:26–6:7; Figs. 1, 3).” (Dkt. No. 145, at 5–6.)

The parties agree that this is a means-plus-function term, and the parties agree upon the claimed function. (Dkt. No. 157, at 33.) The parties dispute the proper corresponding structure.

(1) The Parties' Positions

Plaintiff argues that Defendants' proposal should be rejected because "Defendants conspicuously avoid citing the receiver disclosure (in columns 2 and 3) *that lacks a delay fiber.*" (Dkt. No. 157, at 33.)

Defendants respond that "the two 'embodiments' that Plaintiff proposes are not alternatives, but rather the same embodiment." (Dkt. No. 165, at 39.)

Plaintiff replies that "Defendants are incorrect, because their argument rests on the incorrect premise that the 'second path' described in the receiver embodiment in columns 2 and 3 is not structural." (Dkt. No. 167, at 16.)

At the November 20, 2017 hearing, the parties presented no oral arguments as to this disputed term. (See Dkt. No. 181, Joint Notice Regarding the *Markman* Hearing, at 1.)

(2) Analysis

Legal principles regarding means-plus-function terms are set forth as to the "means for phase modulating . . ." term, addressed above.

As a threshold matter, the parties appear to agree that the corresponding structure includes the receiver as disclosed in 4:54–6:7 of the '055 Patent. The parties have cited portions of columns 4, 5, and 6 of the '055 Patent disclosing a receiver with an interferometer that includes a delay fiber, as well as an output detector that produces signals in response to either detecting light or detecting no light. See '055 Patent at 4:37–38, 4:54–60 & 5:55–67. The parties dispute whether the disclosures in columns 2 and 3 of the '055 Patent set forth an alternative corresponding structure.

As to the disputed disclosures, the specification discloses:

The present invention provides a fiber optic data transmission system comprising a transmitter having a light source, a phase modulator for phase modulating the light source and a controller for the phase modulator. The controller controls the phase modulator as a function of an input electronic data stream and a second electronic data stream employing a delay, so as to create an encoded phase-modulated optical signal in the light passing through the phase modulator. *The system also includes an optical fiber receiving the optical signal and a receiver receiving the optical signal from the optical fiber. The receiver includes a splitter for splitting the optical signal into a first path and a second path. The second path has a second path length longer than the first path length, the second path length being a function of the delay in the second electronic data stream.* The receiver also includes a coupler for coupling the first path and the second path together so as to create an optical output signal.

With the system of the present invention, the receiver functions as an interferometer. An attempt to read the optical signal in the fiber, for example from a tap, requires knowledge of the delay and the creation of a precise physical delay path in the interferometer. Optical detectors with photodiodes do not have the bandwidth to measure the phase-modulated optical signal directly, since photodiodes are only capable of determining whether or not light is present.

The interferometer of the receiver of the present invention requires a significant amount of light to pass through the splitter and coupler, so that a tap would have to remove a significant amount of energy from the optical fiber in order to resolve the optical signal without a significant bit error rate. Detection of a tap on the system of the present invention, for example through a detection device reading a level of light energy in the fiber, becomes almost certain.

* * *

The receiver may include a detector for converting the output optical signal into an electronic output data stream. Preferably, *the path length difference between the first path length and second path length is a function of the delay and the speed of the light in the fiber. The distance delays the light traveling in the second path with respect to light in the first path by a second delay, the second delay preferably being equal to the delay imposed at the controller.* The second delay may vary slightly from the first delay, as long as the detector at the detector can read the output signal. The actual permissible difference will depend on the light source and any electronic filtering of the output signal.

* * *

In addition, the present invention also provides a receiver comprising an interferometer, the interferometer having a first path and a second path

propagating [*sic*, propagating] light at a delay with respect to the first path, the delay being a function of a delay imposed by a phase-modulator controller in a light-emitting transmitter.

'055 Patent at 2:31–64, 3:25–36 & 3:55–60 (emphasis added).

Plaintiff's expert opines, as to disclosures in columns 2 and 3 such as reproduced above, that "this description in the specification does not include a 'delay fiber.'" (See Dkt. No. 157-22, Sept. 15, 2017 Leiby Decl., at ¶ 96.) Admittedly, a patent may disclose multiple "alternative structures for performing the claimed function," and the Court may identify those alternatives rather than "attempt to craft a single claim construction to cover both embodiments." *Ishida Co., Ltd. v. Taylor*, 221 F.3d 1310, 1316 (Fed. Cir. 2000).

Yet, this disclosure sets forth a "second path" that "has a second path length longer than the first path length, the second path length being a function of the *delay* in the second electronic data stream." '055 Patent at 2:43–45 (emphasis added). This disclosure, which appears in the Summary of the Invention, aligns with the disclosures in columns 4, 5, and 6, which appear in the Detailed Description and which refer to a "delay fiber":

Optical signal 22 after passing splitter 31 then enters interferometer 40 at an input 41 of splitter 34. Splitter 34 splits the light entering input 41, so that the signal OP travels over both a first fiber 43 and a second fiber 45. A depolarizer 48 may depolarize light passing through fiber 43, preferably, or fiber 45 as an alternative. Second fiber 45 includes a *delay fiber 46* which may include a *fiber loop of a desired length*. Delay fiber 46 then provides an input to coupler 36 which recombines the delayed signal with the non-delayed signal propagating through fiber 43 and depolarizer 48 at output 42. The physical delay imposed by the interferometer 40 in the second light path through fiber 45, with its delay loop 46, with respect to light passing through the first light path through fiber 43 and depolarizer 48 is selected to match as closely as possible an electronic delay time ED imposed by electronic delay circuit 120 of the controller 18. If the first path in the interferometer 40 has a length L1 and the second path a length L2, *the length L2 is selected, preferably by sizing loop 46, as a function of L1, the speed of light v in fibers 43 and 45, the light propagation delay through the depolarizer 48, DPD, and the electronic delay time ED*. The speed of light in the fibers may be estimated as a function of the wavelength and the type of fiber used. The length L1 is known. When depolarizer 48 is in path 43, L2 is then chosen to

approximate, and preferably equal, the amount $(ED+DPD)*v+L1$. The actual permissible difference between the two amounts depends on the light source and the accuracy of any electronic filtering of the output signal.

* * *

The interferometer 40 comprising coupler/splitter 34 and 36, fibers 43 and 45, *delay fiber* 46, and depolarizer 48 thus functions as an optical exclusive-or gate with one input leg delayed for signals arriving at input 41 of coupler 34. Interferometer 40 as a whole thus optically and physically “decodes” the signal OP produced by the delayed-feedback exclusive-or gate 118 of FIG. 2.

Id. at 5:27–54 & 6:1–7 (emphasis added).

Bearing in mind that claims are construed “in the context of the entire patent,” the opinion of Plaintiff’s expert is unpersuasive. *Phillips*, 415 F.3d at 1313. In particular, as set forth above, the disclosure regarding a “delay” in the context of a “fiber” in column 2 aligns with the disclosure of a “delay fiber” in columns 5 and 6. That is, whereas column 2 refers to a “first path” and a “second path,” column 5 refers to “first fiber 43” and “second fiber 45,” the latter of which “includes a delay fiber 46 which may include a fiber loop of a desired length.” ’055 Patent at 5:32–33. Thus, on balance, Plaintiff has failed to demonstrate that the specification sets forth a distinct alternative embodiment that has no “delay fiber.”¹⁵

The Court having thus found that columns 2 and 3 do *not* disclose an alternative corresponding structure that lacks a delay fiber, the corresponding structure is the “receiver 30” disclosed in columns 4, 5, and 6 of the ’055 Patent.

The Court therefore hereby finds that “**means for receiving the optical signal from the transporting means**” is a means-plus-function term governed by 35 U.S.C. § 112, ¶ 6, the

¹⁵ Plaintiff has also cited IPR proceedings (*see* Dkt. No. 157, Ex. 20, at 23), but to whatever extent statements in IPR proceedings are inconsistent with Defendants’ present proposal, Plaintiff’s reliance on those proceedings is unpersuasive because of the broader claim construction standard applied in IPR proceedings. *See In re Cuozzo Speed*, 793 F.3d at 1276–78.

claimed function is “**receiving the optical signal from the transporting means,**” and the corresponding structure is “**receiver 30, and equivalents thereof.**”

V. CONCLUSION

The Court adopts the constructions set forth in this opinion for the disputed terms of the patent-in-suit, and in reaching conclusions the Court has considered and relied upon extrinsic evidence. The Court’s constructions thus include subsidiary findings of fact based upon the extrinsic evidence presented by the parties in these claim construction proceedings. *See Teva*, 135 S. Ct. at 841.

The parties are ordered that they may not refer, directly or indirectly, to each other’s claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the Court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

Within thirty (30) days of the issuance of this Memorandum Opinion and Order, the parties are hereby ORDERED, in good faith, to mediate this case with the mediator agreed upon by the parties. As a part of such mediation, each party shall appear by counsel and by at least one corporate officer possessing sufficient authority and control to unilaterally make binding decisions for the corporation adequate to address any good faith offer or counteroffer of settlement that might arise during such mediation. Failure to do so shall be deemed by the Court as a failure to mediate in good faith and may subject that party to such sanctions as the Court deems appropriate. No participant shall leave the mediation without the approval of the mediator.

Finally, the Court **DENIES AS MOOT** Plaintiff's Motion to Modify Date for Final Election of Asserted Claims (Dkt. No. 188).

So ORDERED and SIGNED this 5th day of December, 2017.



RODNEY GILSTRAP
UNITED STATES DISTRICT JUDGE