

**IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TYLER DIVISION**

CHEETAH OMNI LLC,

Plaintiff,

vs.

ALCATEL-LUCENT INC., ET AL.,

Defendants.

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CASE NO. 6:11-CV-390

MEMORANDUM OPINION AND ORDER

This Memorandum Opinion construes the disputed claim terms in U.S. Patent Nos. 6,882,771 (“the ‘771 Patent”), 7,116,862 (“the ‘862 Patent”), 7,339,714 (“the ‘714 Patent”), 6,856,459 (“the ‘459 Patent”), and 6,940,647 (“the ‘647 Patent”). Additionally, Defendants’ Motion for Summary Judgment of Indefiniteness (Docket No. 205) is **DENIED**.

BACKGROUND

The Plaintiff Cheetah Omni LLC (“Cheetah”) sued the following defendants for infringement of the ‘771, ‘862, ‘714, ‘459, and ‘647 Patents: Alcatel-Lucent USA Inc.; Ciena Corp.; Fujitsu Network Communications, Inc.; Tellabs, Inc.; Nokia Siemens Networks US LLC; Huawei Technologies USA, Inc.; and Futurewei Technologies, Inc.¹ The ‘862 Patent is a continuation of the ‘771 Patent, and the two Patents share a common specification. The ‘771 and ‘862 Patents are directed towards a multiple band optical communication system that provides amplitude equalization. The ‘647 Patent is a continuation of the ‘459 Patent, and they share a common specification. The ‘459 and ‘647 Patents are directed towards controlling the

¹ This order refers to all defendants collectively as “Defendants.”

polarization of an optical signal. The ‘714 Patent is directed towards a system that processes light using variable blazed diffraction grating.

APPLICABLE LAW

“It is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). In claim construction, courts examine the patent’s intrinsic evidence to define the patented invention’s scope. *See id.*; *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed. Cir. 2004); *Bell Atl. Network Servs., Inc. v. Covad Commc’ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). This intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1314; *C.R. Bard, Inc.*, 388 F.3d at 861. Courts give claim terms their ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the entire patent. *Phillips*, 415 F.3d at 1312–13; *Alloc, Inc. v. Int’l Trade Comm’n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003).

The claims themselves provide substantial guidance in determining the meaning of particular claim terms. *Phillips*, 415 F.3d at 1314. First, a term’s context in the asserted claim can be very instructive. *Id.* Other asserted or unasserted claims can also aid in determining the claim’s meaning because claim terms are typically used consistently throughout the patent. *Id.* Differences among the claim terms can also assist in understanding a term’s meaning. *Id.* For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id.* at 1314–15.

“[C]laims ‘must be read in view of the specification, of which they are a part.’” *Id.* (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc)).

“[T]he specification ‘is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.’” *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *see also Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). This is true because a patentee may define his own terms, give a claim term a different meaning than the term would otherwise possess, or disclaim or disavow the claim scope. *Phillips*, 415 F.3d at 1316. In these situations, the inventor’s lexicography governs. *Id.* Also, the specification may resolve ambiguous claim terms “where the ordinary and accustomed meaning of the words used in the claims lack sufficient clarity to permit the scope of the claim to be ascertained from the words alone.” *Teleflex, Inc.*, 299 F.3d at 1325. But, “[a]lthough the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims.” *Comark Commc’ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)); *see also Phillips*, 415 F.3d at 1323. The prosecution history is another tool to supply the proper context for claim construction because a patent applicant may also define a term in prosecuting the patent. *Home Diagnostics, Inc., v. Lifescan, Inc.*, 381 F.3d 1352, 1356 (Fed. Cir. 2004) (“As in the case of the specification, a patent applicant may define a term in prosecuting a patent.”).

Although extrinsic evidence can be useful, it is “less significant than the intrinsic record in determining the legally operative meaning of claim language.” *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc.*, 388 F.3d at 862). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises may provide definitions that are too broad or

may not be indicative of how the term is used in the patent. *Id.* at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert’s conclusory, unsupported assertions as to a term’s definition is entirely unhelpful to a court. *Id.* Generally, extrinsic evidence is “less reliable than the patent and its prosecution history in determining how to read claim terms.” *Id.*

Defendants also contend that some claims at issue are invalid for indefiniteness. A claim is invalid under 35 U.S.C. § 112(b) if it fails to particularly point out and distinctly claim the subject matter that the applicant regards as the invention. The party seeking to invalidate a claim under 35 U.S.C. § 112(b) as indefinite must show by clear and convincing evidence that one skilled in the art would not understand the scope of the claim when read in light of the specification. *Intellectual Prop. Dev., Inc. v. UA-Columbia Cablevision of Westchester, Inc.*, 336 F.3d 1308, 1319 (Fed. Cir. 2003).

CLAIM TERMS

1. The ‘771 Patent

“multiple band optical communication system”

Cheetah contends no construction is necessary. Defendants propose “two or more communication wavelength bands, such as the long (“L”), conventional (“C”) or short (“S”) bands or other wavelength bands with wavelengths outside of the L, C or S bands.”

Cheetah makes two arguments to support its position. First, it argues the phrase “multiple band optical communication system” is not limiting because it is located in the preamble. Docket No. 197 (“Brief”) at 2. Cheetah contends the phrase introduces the Claim, not limits it. *Id.* Second, Cheetah argues even if the phrase is limiting, Defendants’ construction improperly requires a system capable of processing two or more communication bands. *Id.* at 3. Cheetah

asserts the system need only process one band. In support, it cites three different limitations within Claim 15 it contends do not require processing two or more communication bands. *Id.* For example, the Claim recites a plurality of amplifiers each operable to receive “at least one” communication band. *See* ‘771 Patent, Claim 15, at 43:3–5. Cheetah contends Defendants’ construction would change “at least one” to “at least two.” Brief at 3.

Defendants argue the phrase must be treated as limiting. Defendants contend that without the phrase “multiple band,” the amplifier limitation could encompass a system where each amplifier is operable to receive and amplify the same band. Docket No. 206 (“Response”) at 6–7. However, this would render the phrase “each operable to receive and amplify at least one of a plurality of communication bands” superfluous. *Id.* at 7. Thus, “multiple band” must be limiting to give meaning to the entire amplifier limitation. *Id.*

Additionally, Defendants contend “multiple band” is limiting because it recites additional structures highlighted by the specification. *Id.* The specification teaches the system can be used with the conventional band wavelength as well as the long and short wavelengths. ‘771 Patent, at 1:41–49. Because the ‘771 Patent’s Background discusses the use of three different bands, the system must be a “multiple band” system. Response at 7.

There is no specific test to determine whether a preamble is limiting. *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002). Instead, the determination must be made on a case-by-case basis in light of the claim as a whole. *Corning Glass Works v. Sumitomo Elec. U.S.A., Inc.*, 868 F.2d 1251, 1257 (Fed. Cir. 1989). A preamble is limiting if it recites “essential structure of steps, or if it is necessary to give life, meaning, and vitality to the claim.” *Catalina Mktg.*, 289 F.3d at 808 (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)) (internal quotations omitted). A preamble is

not limiting when it merely states a purpose or intended use for the invention. *Id.* Thus, the dispositive issue is whether “multiple band optical communication system” recites an essential structure or merely an intended use.

When Claim 15 is viewed in its entirety, “multiple band optical communication system” recites an essential structure. At the outset, the Claim commences with “a *multiple* band optical communication system.” ‘771 Patent, Claim 15, at 43:1 (emphasis added). “Multiple” is generally understood to mean “more than one.” *See* AMERICAN HERITAGE COLLEGE DICTIONARY 896 (3d ed. 1997). While Cheetah attempts to downplay the significance of “multiple,” the patentee made a deliberate choice to include it during prosecution. If the patentee intended to claim a system covering one communication band, it is unlikely to have introduced the Claim as a “multiple band” system. The patentee’s multiple band intention is further highlighted by distinguishing Claim 1. Claim 1 recites “an optical system” in its preamble; it does not contain the “multiple band” language found in Claim 15. *See* ‘771 Patent, Claim 1, at 41:39. Reading Claim 15 in light of Claim 1, the patentee intended for a “multiple band optical communication system” to require two or more bands. *See Phillips*, 415 F.3d at 1314 (“Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.”); *cf. August Tech Corp. v. Camtek, Ltd.*, 655 F.3d 1278, 1284 (Fed. Cir. 2011) (“Reading this otherwise renders any difference between the singular and the plural terms superfluous.”).

Cheetah argues the claimed structure encompasses a system capable of processing only one communication band. Brief at 3. The Claim recites that a plurality of amplifiers are operable to receive and amplify “at least one” of a plurality of communication bands. ‘771 Patent, Claim 15, at 43:3–5. It also recites a demultiplexer operable to separate “one or more” communication bands. ‘771 Patent, Claim 15, at 43:21–23. Thus, Cheetah argues “multiple band” cannot be

limiting because the Claim recites structure that can be satisfied with a single band. Brief at 3. However, interpreting “multiple bands” as limiting is not inconsistent with the recited claim structure. Although the Claim specifies only those elements required to process signals in one communication band, inherent in the claim language is that the system is capable of processing signals in multiple bands. Further, all the Claim language cited by Cheetah also covers multi-band communication systems.

The specification further supports a multi-band construction. In particular, it contrasts the ‘771 Patent with prior art systems limited to a single band of wavelengths. *See* ‘771 Patent, at 1:33–35 (“No system has emerged that provides cost effective attenuation in multiple wavelength systems.”); 1:40–43 (“Existing optical communication systems have typically been limited to using the convention (“C”) band of wavelengths to communicate optical signals.”). It also describes “the present invention” as a method and apparatus to provide gain equalization “in a multiple wavelength optical signal.” ‘771 Patent, at 1:59–61.

For all these reasons, “multiple band optical communication system” is limiting. “Multiple band optical communication system” is “two or more communication wavelength bands.”²

“the first part”

Cheetah proposes “at least a portion of the first signal part that was output from the beam splitter.” Defendants propose “the undivided first signal part that was output from the beam splitter.”

The parties disagree whether “the first part” refers to an “undivided signal” or “at least a portion of” a signal. Cheetah takes the view “the first part” may be just a portion of the signal

² The Court adopts the first portion of Defendants’ proposed construction, but it does not adopt the rest. Defendants’ remaining construction containing examples of wavelength bands is overly limiting and would not aid a jury in understanding the phrase.

output from the beam splitter. Brief at 3. Claim 8 recites “communicating at least a portion of the first part” to a plurality of attenuators. ‘771 Patent, Claim 8, at 42:31–32. The Claim then recites “communicating at least the first part” toward a mirror of a MEMS device. ‘771 Patent, Claim 8, at 42:33–36. Cheetah asserts the attenuators cannot communicate a greater portion of the signal than they received. Brief at 4. Since the attenuators only received “a portion of the first part,” they could not communicate an “undivided” signal towards the mirrors. *Id.* Thus, “first part” cannot mean the “undivided” first part. *Id.* Additionally, Cheetah represents that the word “undivided” does not appear in the specification. *Id.*

Defendants argue the plain language of the claim supports their construction. Response at 2. They contend the “first part” refers to the first signal part split by the beam splitter, not some portion of that signal. *Id.* Defendants argue use of the word “the” to describe “the first part” is limiting, as opposed to a more general word like “a” or “an.” *Id.* In Defendants’ view, “a first part” could be divided, but “the first part” must be undivided. *Id.*

Second, Defendants argue use of the phrase “a portion” of the first part indicates the first part must be undivided. *Id.* at 3. The Claim recites “a portion of the first part,” then recites “at least the first part” in the next limitation. ‘771 Patent, Claim 8, at 42:26–32. Since these terms appear in consecutive limitations, Defendants argue they must have different meanings. Brief at 3. Further, Defendants contend the specification supports their construction. *Id.* Defendants argue Cheetah’s construction is flawed because every embodiment illustrates an undivided signal communicated to a moveable mirror. *Id.* Accordingly, the Claims require the moveable mirror to receive the entire undivided portion of the first signal. *Id.*

“The first part” is the entire first part of the optical signal separated by the beam splitter. The language of both Claim 8 and 15 supports this construction. Claim 8 specifically

distinguishes between “the first part” and “at least a portion of the first part.” *See* ‘771 Patent, Claim 8, at 42:27–32. It recites “the first part” and “a portion of the first part” in consecutive limitations, indicating “the first part” alone must mean more than just a portion of the first part. *See Bancorp Servs., L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1373 (Fed. Cir. 2004) (noting use of two different terms in close proximity gives rise to an inference the terms have different meanings). Cheetah’s construction also renders “a portion of” in Claim 8 superfluous. If “the first part” meant “at least a portion of the first part,” it would be redundant to include “at least a portion of” in the Claim. *See Mangosoft, Inc. v. Oracle Corp.*, 525 F.3d 1327, 1330 (Fed. Cir. 2008). Using Cheetah’s construction, Claim 8 would read, “at least a portion of at least a portion of the first signal part.” *See* ‘771 Patent, Claim 8, at 42:31–32. This cannot be a correct reading of the Claim. By using the phrase “at least a portion of the first part” in the Claim, the patentee indicated “the first part” is the entire first signal part output from the beam splitter.

Claim 15 also supports this construction. A beam splitter receives an optical input signal and divides it into first and second parts. ‘771 Patent, Claim 15, at 43:7–11. A moveable mirror receives the first part of the input signal, then reflects it towards an output. *Id.* at 43:24–27. The output uses the reflected signal to create an output signal of varying amplitude. *Id.* at 43:27–30. Absent from the Claim is any indication “the first part” is ever subdivided. “The first part” is created when the input signal is split by the beam splitter, and the Claim never indicates the first part is somehow divided into a smaller portion. Thus, the most logical reading of the Claim is “the first part” is the entire portion of the first output from the beam splitter.

“The first part” is “the undivided first signal part that was output from the beam splitter.”

“[the gain equalizer operable to...] selectively introduce attenuation or gain into the at least one of the plurality of amplified wavelengths”

Cheetah proposes “selectively introduce attenuation or selectively introduce gain.” Defendants propose “the gain equalizer operable to...select between introducing attenuation and gain.”

The parties dispute whether the Claim requires a gain equalizer to be capable of providing either attenuation or gain, or whether the Claim covers a scenario where a gain equalizer is only capable of providing one or the other. Cheetah argues the plain meaning of the language indicates the gain equalizer can either selectively introduce attenuation or selectively introduce gain. Cheetah contends the word “selectively” means to choose the *amount* of attenuation or the amount of gain; selectively does not mean to choose between attenuation and gain. Docket No. 211 (“Reply”) at 2. In support, Cheetah cites a passage in the specification teaching regulating the “intensity or attenuation of [the] output signal.” See ‘771 Patent, at 12:41–44. Cheetah also asserts the specification discloses multiple embodiments with gain equalizers that can only provide attenuation. Brief at 5. Under Defendants’ construction, these embodiments would not be covered by the Claim. *Id.* Thus, Cheetah argues it has presented the most logical reading of the Claim language. *Id.*

Defendants argue the gain equalizer must have the ability to introduce both attenuation and gain. Response at 4. Under Cheetah’s construction, the gain equalizer need only be able to introduce one or the other. *Id.* Defendants contend the word “selectively” requires selecting or choosing between multiple options. *Id.* If the Claim only required introducing attenuation or gain, “selectively” would be read out of the claim. *Id.* Such a construction would be improper because the Claim recites two potential choices for the gain equalizer to select between. *Id.* at 5. Further, Defendants assert their construction is correct even though it does not encompass all

embodiments disclosed in the specification. *Id.* Defendants allege “no case holds that each claim must cover every embodiment.” *Id.*

Claim 15 recites “to selectively introduce attenuation or gain....” ‘771 Patent, Claim 15, at 43:18–20. Under Cheetah’s construction, this limitation could be met by a system capable of introducing only attenuation or a system capable of introducing only gain. However, this construction would read the word “selectively” out of the Claim. *See Merck & Co., Inc. v. Teva Pharm. USA, Inc.*, 395 F.3d 1364, 1372 (Fed. Cir. 2005) (“A claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so.”). Such a construction would be identical to a claim reading “to introduce attenuation or gain.”

Cheetah counters by arguing “selectively” means to select the *amount* of attenuation or gain to be introduced in the signal, not to select between introducing attenuation or introducing gain. Reply at 2. In support, it cites a passage in the specification teaching that the intensity or attenuation of an output signal can be regulated by controlling the movement of the mirror. *See* ‘771 Patent, at 12:41–44. The flaw in this argument is the word “selectivity” indicates a choice between multiple options. Select means “to take as a choice from among several.” AMERICAN HERITAGE COLLEGE DICTIONARY 1235 (3d ed. 1997). It is more logical to read the Claim as selecting between introducing attenuation or gain than to read the Claim as selecting the amount of attenuation or gain to be introduced.

Cheetah also argues Defendants’ construction is improper because it excludes embodiments disclosed in the specification. Brief at 5. However, although claim terms should generally be interpreted to include disclosed embodiments, *see Oatey Co. v. IPS Corp.*, 514 F.3d 1271, 1276 (Fed. Cir. 2008), not every claim must cover every disclosed embodiment. *Baran v. Med. Device Techs., Inc.*, 616 F.3d 1309, 1316 (Fed. Cir. 2010); *Helmsderfer v. Bobrick*

Washroom Equip., Inc., 527 F.3d 1379, 1383 (Fed. Cir. 2008). Claim 15 is the only claim containing the phrase “selectively introduce attenuation or gain.” See ‘771 Patent, Claim 15. Thus, while Claim 15 does not cover an embodiment where the gain equalizer is only capable of introducing attenuation, there may be other claims covering such an embodiment.

The gain equalizer of Claim 15 must be capable of introducing both attenuation and gain. “[The gain equalizer operable too...] selectively introduce attenuation or gain into the at least one of the plurality of amplified wavelengths” is “the gain equalizer operable to...select between introducing attenuation or gain.”

“reflecting the first part...toward an output to form an output signal”

Both sides agree no construction is necessary. Brief at 5; Response at 1 n.3.

“to form”

Both sides agree no construction is necessary. Brief at 7; Response at 1 n.3.

“displacing the movable mirror to cause a change in the amplitude of the output signal” and “the amplitude of the output signal varying depending on the displacement of the moveable mirror layer”

Cheetah proposes “moving the movable mirror to cause a change in the amplitude of the output claim signal” and “the amplitude of the output signal changes based on the position of the movable mirror.” Defendants argue the phrase is indefinite. In the alternative, Defendants argue the phrase should be construed pursuant to §112(f).

Use of the term “means” in a claim limitation creates a rebuttal presumption the limitation is a means-plus-function limitation governed by 35 U.S.C. § 112(f). *Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 1361 (Fed. Cir. 2000). If the claim limitation recites sufficient structure to perform the recited function, the presumption has been overcome, and 35 U.S.C. § 112(f) does not apply. *Id.* Conversely, absence of the word “means” creates a rebuttable presumption that § 112(f) does not apply. *Id.* This presumption may be rebutted if the claim

limitation does not recite sufficient structure to perform the claimed function. *Id.*; *York Prods., Inc. v. Cent. Tractor Farm & Family Ctr.*, 99 F.3d 1568, 1574 (Fed. Cir. 1996); *Wenger Mfg., Inc. v. Coating Sys., Inc.*, 239 F.3d 1225, 1236 (Fed. Cir. 2001). Courts evaluate whether a claim limitation falls within the ambit of 35 U.S.C. § 112(f) from the perspective of one of ordinary skill in the art. *Apex Inc. v. Raritan Computer, Inc.*, 324 F.3d 1364, 1374 (Fed. Cir. 2003); *see also Phillips*, 415 F.3d at 1312–13.

As explained in the Indefiniteness Section, this Claim is not indefinite. *See infra*. In the alternative, Defendants argue the phrases should be construed pursuant to § 112(f). Defendants contend the claimed function is changing the amplitude of the output signal, and the corresponding structures are two moveable mirrors and a beam splitter. Response at 8. However, the Claims are not drafted in means-plus-function form. The Claims never use the word “means,” and the Claims tie specific results to specific structures. *See CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1369 (Fed. Cir. 2002) (“A claim term that does not use “means” will trigger the rebuttable presumption that [§ 112(f)] does not apply.”). Both phrases recite changing or varying the amplitude of a signal by displacing a moveable mirror. ‘771 Patent, Claim 8, at 42:39–40; ‘771 Patent, Claim 15, at 43:28–30. Recitation of the moveable mirror resolves the issue. *See Mass. Ins. of Tech. v. Abacus Software*, 462 F.3d 1344, 1353 (Fed. Cir. 2006) (discussing the requirement that a claim recite sufficiently definite structure). The Claims do not recite “a means for changing the amplitude of a signal.” Instead, they provide a specific structure to change the signal’s amplitude. *See Personalized Media Commc’ns, LLC v. Int’l Trade Comm’n*, 161 F.3d 696, 704 (Fed. Cir. 1998). Thus, the Claims should not be construed pursuant to § 112(f).

Defendants never address Cheetah’s proposed constructions, and Cheetah’s constructions accurately reflect the language of the Claim. *See* Response at 8. Accordingly, Cheetah’s constructions are adopted. “Displacing the moveable mirror to cause a change in the amplitude of the output signal” is “moving the moveable mirror to cause a change in the amplitude of the output signal.” “The amplitude of the output signal varying depending on the displacement of the moveable mirror layer” is “the amplitude of the output signal changes based on the position of the moveable mirror.”

2. The ‘862 Patent

“the optical signal”

Cheetah proposes “the optical signal wavelengths to be processed.” Defendants propose “the undivided optical signal communicated by the light pipe.”

Cheetah argues its construction is dictated by the Claim language. Brief at 10. Claims 1 and 18 both recite “an optical signal for processing, the optical signal comprising a plurality of wavelengths.” *Id.* Thus, Cheetah believes “the optical signal” must be “an optical signal for processing.” *Id.* Further, the optical signal is comprised of a “plurality of wavelengths.” *Id.* at 11. Cheetah combines these two elements into its proposed construction—“the optical signal wavelengths to be processed.” *Id.* Cheetah also questions Defendants’ inclusion of the word “undivided.” *Id.* By including “undivided” in the definition, Defendants make “the optical signal” ambiguous. *Id.* For example, Cheetah argues it is ambiguous whether a signal that has not been divided by the beam splitter but has decreased amplitude would still be “undivided.” Reply at 3. Lastly, Cheetah asserts that “undivided” does not appear in the Claims or specification of the ‘862 Patent. Brief at 11.

Defendants argue the antecedent basis for “the optical signal” is “an optical signal” recited earlier in the Claims. Response at 11. Accordingly, Defendants assert their construction merely defines “the optical signal” as the previously-recited signal. *Id.* Defendants contend the word “undivided” does not add a limitation. *Id.* Instead, it clarifies “the optical signal” is the same signal referenced earlier in the claim, not a different signal or portion of the signal. *Id.* According to Defendants, Cheetah’s construction does not clarify which signal “the optical signal” references. *Id.* Further, Defendants challenge Cheetah’s inclusion of “processed.” *Id.* Defendants argue there are multiple processing operations performed on the optical signal in the Claims. *Id.* Thus, “processed” is ambiguous because it could refer to multiple operations. *Id.*

There is no requirement the optical signal be “undivided” before it is communicated by the light pipe. The Claim recites “a light pipe operable to communicate an optical signal for processing,” then “an optical signal separator operable to receive the optical signal communicated by the light pipe.” ‘862 Patent, Claim 1, at 41:63–67. Defendants’ construction merely restates the Claim language and adds the word “undivided” to it.³

“Undivided” only adds ambiguity to the Claim. Under Defendants’ construction, it is unclear whether an optical signal would be “undivided” when it reaches the separator if the signal had been attenuated. Defendants’ construction seems to require the optical signal to maintain its intensity to be considered “undivided.” However, the Claims contain no such requirement. Accordingly, an optical signal is not required to be “undivided.”

³ Defendants note “the optical signal” is separated into “at least a first part and a second part” by the “first beam splitter coupled to the optical signal separator.” See ‘862 Patent, Claim 1, at 42:1–4. However, the fact that the signal is separated by the beam splitter into at least two parts does not require the input to the beam splitter to be “undivided.” It is clear from the Claim language the optical signal is separated at some point, but there is no requirement that the signal be undivided *before* that separation. Defendants’ proposed construction does not make this distinction.

Neither side's remaining constructions add anything to the definition of "optical signal" not already present elsewhere in the Claim. Defendants argue an optical signal must be "communicated by the light pipe," but this limitation is already included in the Claims. *See* '862 Patent, Claim 1, at 41:67; Claim 18, at 43:43. There is no need to include this limitation in the definition when the limitation must still be met to satisfy the Claims. Thus, it would be redundant to include "communicated by the light pipe" in the construction.

Cheetah argues optical signal means "the optical signal wavelengths to be processed." Similarly, this construction merely imports limitations already present in the Claims. The Claims require an optical signal "comprising a plurality of wavelengths," then describe in detail how the optical signal is processed. *See* '862 Patent, Claim 1, at 41:64–65; Claim 18, at 43:40–41. There is no need to further include these limitations in the definition of "optical signal." *See DSW, Inc. v. Shoe Pavilion, Inc.*, 537 F.3d 1342, 1347 (Fed. Cir. 2008) ("Absent contravening evidence from the specification or prosecution history, plain and unambiguous claim language controls the construction analysis.").

"Optical signal" requires no construction.

"the amplitude of the MEMS output signal capable of being varied depending on the movement of the moveable mirror" and "the amplitude of the MEMS output signal capable of being changed by moving the moveable mirror"

Cheetah proposes "the amplitude of the output signal changes based on the position of the moveable mirror." Defendants do not propose a construction, instead arguing the phrase is indefinite. In the alternative, Defendants argue the phrase should be governed by § 112(f).

Cheetah argues its proposed construction simplifies the claim language without changing its meaning. Brief at 11–12. Defendants argue the phrase is indefinite because it fails to recite sufficient structure to perform the claimed function. Response at 10. In particular, Defendants contend a moveable mirror cannot change the amplitude of an optical signal. *Id.*

These terms are very similar to the “displacing the moveable mirror” terms of the ‘771 Patent.⁴ *See supra*. The Claims are not indefinite for the reasons set forth in the Indefiniteness Section, *see infra*, and the Claims are not governed by § 112(f) for the reasons set forth above in the “displacing the moveable mirror” section. *See supra*.

These phrases require no construction. Cheetah’s proposed construction adds little to define these phrases that is not already apparent from the Claim language itself. The Claim language is straightforward—“the amplitude of the MEMS output signal capable of being varied depending on the movement of the moveable mirror.” ‘862 Patent, Claim 1, at 42:12–15; Claim 18; 44:13–15. From the Claim language, it is apparent the amplitude of the MEMS output signal can be varied by moving a mirror. Any further construction is unnecessary. *See VirnetX Inc. v. Mitel Networks Corp.*, 2012 WL 3135639, at *6 (E.D. Tex. Aug. 1, 2012) (Davis, J.) (finding a “readily understandable” term did not require construction).

“The amplitude of the MEMS output signal capable of being varied depending on the movement of the moveable mirror” and “the amplitude of the MEMS output signal capable of being changed by moving the moveable mirror” require no construction.

“the MEMS output signal”

This term is uncontested. Defendants propose, and Cheetah accepts, “the optical signal as reflected off the moveable mirror.” *See Reply* at 4.

“to communicate the optical signal to the MEMS device”

Cheetah argues no construction is necessary. Defendants propose “to communicate the undivided optical signal communicated by the light pipe to the MEMS device.”

Construction of this term is governed by the Court’s construction of “the optical signal.” Defendants’ construction merely replaces “the optical signal” with “the undivided optical signal

⁴ Defendants make nearly identical arguments in both sections. *Compare* Response at 8, *with id.* at 10.

communicated by the light pipe,” its proposed construction for optical signal. Thus, resolution of “the optical signal” resolves the dispute regarding this term.

The Court previously determined an optical signal does not have to be “undivided” and rejected Defendants’ inclusion of “communicated by the light pipe.” *See supra*. Accordingly, Defendants’ construction including those terms in this definition is improper.

“To communicate the optical signal to the MEMS device” requires no construction.

“receive the portion of first part of the optical [input] signal” and “receiving at least the first portion of optical signal wavelengths”

Cheetah contends no construction is necessary. Defendants propose “receive the undivided portion of first part of the optical [input] signal [reflected by the moveable mirror] and “receiving at least the undivided first portion of optical signal wavelengths [reflected by the moveable mirror].”

Once again, the parties’ central dispute is whether the optical signal must be “undivided,” an issue previously decided by the Court. *See supra*. Accordingly, Defendants’ construction including this term is improper.

“Receive the portion of the first part of the optical [input] signal” and “receiving at least the first portion of optical signal wavelengths” require no construction.

3. The ‘714 Patent

“modulate” terms

The parties request construction of several “modulate” terms: unmodulated optical signal, unmodulated, to modulate, modulated, and modulation. Construction of each term hinges on the same issue—whether the process of modulating an optical signal adds information to the signal, or whether the signal carries information before it is modulated. Cheetah argues an optical signal

must always carry information, while Defendants argue an unmodulated optical signal does not carry information. Because the terms all present the same issue, they will be analyzed jointly.

For “unmodulated optical signal,” Cheetah proposes “light beam carrying information that has not been processed by the array of optical signal processing devices.” Defendants propose “a light beam that does not carry information.” For “unmodulated,” Cheetah proposes “not processed by the array of optical signal processing devices.” Defendants propose “not carrying information.” For “to modulate,” Cheetah proposes “to process by the array of optical signal processing devices.” Defendants propose “vary to carry information.” For “modulated,” Cheetah proposes “processed by the array of optical signal processing devices.” Defendants propose “varied to carry information.” For “modulation,” Cheetah proposes “processing by the array of optical signal processing devices.” Defendants propose “varying to carry information.”

This Court construed several terms of the ‘714 Patent in a previous Cheetah case. *Cheetah Omni LLC v. Samsung Elecs. Am., Inc.*, 2009 WL 5196721 (E.D. Tex. Dec. 21, 2009) (Davis, J.), *aff’d* 2010 WL 4008194 (Fed. Cir. Oct. 12, 2010) (“Samsung”). One previously construed term was “optical signal.” In *Samsung*, the parties agreed an “unmodulated optical signal” was an optical signal that had not been processed by the array of optical signal processing devices. *Id.* at *2. However, the parties disagreed over the construction of “optical signal.” *Id.* The Court determined optical signal meant “light beam carrying information.” *Id.* at *3. In the present case, neither Cheetah nor the Defendants argue the Court’s construction of “optical signal” in *Samsung* was incorrect. *See* Brief at 14; Response at 14. Rather, they debate the impact of the modifier “unmodulated.”⁵ *See id.*

Cheetah’s proposed construction of “unmodulated optical signal” is identical to the *Samsung* construction. Cheetah contends an unmodulated optical signal cannot be a light beam

⁵ The Court in *Samsung* only construed “optical signal.” It did not construe “unmodulated optical signal.”

that does not carry information because an optical signal is a light that carries information. Brief at 15. Cheetah asserts an optical signal always contains information, even before modulation, so an unmodulated signal still carries information. *Id.* at 17.

Defendants argue an unmodulated optical signal does not carry information; instead, modulation adds information to the signal. Response at 13. Defendants contend this construction is consistent with *Samsung's* construction that an optical signal is a “light beam carrying information.” *Id.* at 14. Defendants contend use of the word “unmodulated” before optical signal indicates a particular light wave does not yet carry information. *Id.* According to Defendants, an unmodulated optical signal does not carry information, but a modulated signal does. *Id.* Lastly, Defendants argue Cheetah’s construction is circular because a signal entering an array of signal processing devices is always unmodulated, even if it was modulated by a previous array of signal processing devices. *Id.* at 15.

The optical signals are modulated when they are processed by the rotatable mirrors. In Claims 1 and 18, an optical divider receives an unmodulated optical signal, then separates it into first and second signal parts. ‘714 Patent, Claim 1, at 23:19–22; Claim 18, at 25:40–42. Because the input optical signal is unmodulated, the first and second signal parts are also unmodulated. The first signal part does not become modulated until it is applied to the array of signal processing devices. *See* ‘714 Patent, Claim 1, at 23:31. The Claims recite that the array of signal processing devices comprises rotatable mirrors. *Id.* at 23:38–46. This is further supported by the specification. For example, Figure 1 discloses rotatable mirrors processing the optical signal by redirecting the reflected signal.

Each rotatable mirror contains at least two reflective surfaces. *See* ‘714 Patent, Figure 1; *Id.* at 3:23–25 (describing a “plurality of strips”). When an optical signal strikes the reflective

strips, it produces at least one output ray for each strip. *Id.* at 4:40–44. The reflective strips are laterally offset from each other. *Id.* at 4:47. Accordingly, each ray experiences a different propagation path length, which results in a phase difference between the two output rays. *Id.* at 4:46–51. This phase difference can be varied by changing the angle θ by which the reflective strips are rotated. *Id.* at 4:51–54.

Changes in phase difference control the intensity of the output data. *Id.* at 8:39–42. The specification teaches configuring the path difference so the apparatus can be operated to switch between constructive interference and destructive interference. Such a configuration operates as a binary switch.⁶ *Id.* at 11:56–60. When the path difference is configured to create constructive interference, the system will provide a maximum output. *Id.* When the path difference is configured to create destructive interference, the system will provide a minimum output. *Id.* In this configuration, the “information” contained in the output signal is either a “high” or a “low” (i.e. a digital 1 or 0). This is not a system where the modulating step plays a passive role in transmitting information. Instead, modulation actually creates the information contained in the output signal.⁷

⁶ The specification’s extensive discussion of “switching speed” supports this conclusion. For example, it expressly recognizes modulation can be used to provide binary switching when it refers to the switching speed of “electro-absorption modulators.” ‘714 Patent, at 12:21–24. It further compares “the present invention” to switching modulators. *Id.* at 12:25–26. Lastly, it discusses the impact of information packet size and data rate on switching speed. *Id.* at 12:18–21. If the ‘714 Patent’s phase shift modulation did not act as a binary switch, all the discussion regarding switching speed would be irrelevant.

⁷ The ‘714 Patent describes a type of “modulation” (i.e., phase shift modulation) that differs from more commonly used frequency modulation (FM) and amplitude modulation (AM). In FM, an information signal of 1s and 0s is used to “modulate” a carrier wave to change its frequency between f_1 and f_2 , according to the pattern of 1s and 0s. Similarly, in AM, an information signal of 1s and 0s is used to “modulate” a carrier wave to change its amplitude between A_1 and A_2 , according to the pattern of 1s and 0s. A receiver (FM or AM) demodulates the received carrier wave to extract the original pattern of 1s and 0s of the information signal.

In the modulation scheme of the ‘714 Patent, a carrier wave is not phase-shifted in response to an information signal and its pattern of 1s and 0s. Instead, two lightwave signals are phase-shifted relative to one another in response to an information signal having a pattern of 1s and 0s such that, when they are combined (interference), there are corresponding changes in the intensity of an output lightwave signal. These changes in intensity reproduce the information signal content pattern. Thus, the output lightwave signal is “modulated” in its intensity according to the information signal.

For the above reasons, modulating an optical signal adds information to the signal. Accordingly, an unmodulated signal does not yet carry information. This construction is consistent with the technical definition of modulation. Modulation is “a controlled variation with time of any property of a wave for the purpose of transferring information.” IEEE 1000: THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS 703 (7th ed. 2000). Like amplitude and frequency, phase is a property of a wave. The ‘714 Patent uses modulation to vary the phase of a wave. This phase shift leads to either constructive or destructive interference, and the interference creates the information to be transferred. Moreover, using phase shift modulation to vary the intensity of an optical signal is well-known in the art. *See Mach-Zehnder Optical Modulator*, U.S. Patent No. 6,400,490 (filed Nov. 22, 2000) (discussing the state of the prior art).

This construction is not inconsistent with the *Samsung* construction of “optical signal.” In *Samsung*, the Court construed “optical signal” to mean “light beam carrying information.” *Samsung*, 2009 WL 5196721, at *3. However, *Samsung* only construed “optical signal,” not the entire phrase “unmodulated optical signal.” *Id.* While “optical signal” alone may be generally assumed to mean a light beam carrying information, this assumption is negated by the word “unmodulated.” The modifier “unmodulated” means the signal does not yet carry information. The ‘714 Patent uses the modulation process to create information. An unmodulated signal is one that has not gone through the modulation process, so the system has not created any information for the signal to carry. Accordingly, it is consistent with *Samsung* to construe “unmodulated optical signal” differently than *Samsung* construed “optical signal.”

“Unmodulated optical signal” is “a light beam that does not carry information.” “Unmodulated” means “not carrying information.” “To modulate” means “vary to carry

information.” “Modulated” means “varied to carry information.” “Modulation” means “varying to carry information.”

“[array of] optical signal processing devices”

The parties agree “array” means “a plurality of devices arranged in a regular pattern.” However, they dispute the construction of “optical signal processing devices.” Cheetah proposes “devices that process the optical signal.” Defendants argue the phrase does not require construction.

In *Samsung*, the Court construed “an array of optical signal processing devices” to mean “a plurality of devices arranged in a regular pattern that process the optical signal.” *Samsung*, 2009 WL 5196721, at *5. Cheetah’s proposed construction is nearly verbatim to the *Samsung* construction, and neither party presented any reason for the Court to depart from its prior construction. *See* Brief at 18; Response at 13 n.12. Accordingly, for the reasons set forth in *Samsung*, the Court adopts Cheetah’s construction.

“Optical signal processing devices” are “devices that process the optical signal.”

“located on one or more semiconductor substrates”

The parties agree no construction is necessary. Brief at 19; Response at 13 n.12.

“semiconductor substrates”

Cheetah argues no construction is necessary. Cheetah believes the term should be given its plain and ordinary meaning, which Cheetah asserts is “a substrate made of semiconductor material, such as silicon.” Defendants propose “foundational material having resistivity between a metal and an insulator.”

Cheetah asserts its construction is supported by the specification. Brief at 20. Cheetah cites a passage disclosing a substrate that “comprises a semiconductor substrate formed, for

example, from silicon.” *See* ‘714 Patent, at 3:25–28. The specification also notes other materials in addition to silicon could be used as a substrate. *Id.* Cheetah further argues that Defendants’ construction adds ambiguity because a jury will not understand “resistivity between a metal and an insulator.” Brief at 21. Cheetah asserts the concept of resistivity is never mentioned in the ‘714 Patent, so it would be improper to use that construction. *Id.*

Defendants contend Cheetah’s construction merely rearranges the words of the term without providing any guidance to the jury. Response at 16. On the contrary, Defendants argue their definition comports with the plain meaning of the term. *Id.* In support, Defendants cite a technical treatise defining semiconductor as “an electrical conductor, with resistivity in the range between metals and insulators, in which the electric-charge-carrier concentration increases with increasing temperature over some temperature range.” Response, Ex. 3 (citing IEEE 1000: THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS 1022 (7th ed. 2000)). Defendants also cite a previous Markman opinion from this Court construing “semiconductor substrate” as “a semiconducting base material having resistivity between a metal and an insulator.” *See Lonestar Inventions LP v. Nintendo of Am., Inc.*, 2009 WL 1011734, at *2 (E.D. Tex. Apr. 14, 2009) (Davis, J.). Further, Defendants argue that the specification defines a substrate as a foundational or base material. Response at 16. Thus, inclusion of “foundational material” in their proposed construction is proper. *Id.*

Defendants’ construction is proper. The word “semiconductor” has a well-known meaning in the art—it is a material having a resistivity somewhere between that of a conductor and an insulator. *See* IEEE 1000: THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS 1022 (7th ed. 2000); *Seoul Semiconductor Co. v. Nichia Corp.*, 596 F. Supp. 2d 1005, 1012 (E.D. Tex. 2009); *Lonestar Inventions*, 2009 WL 1011734, at *2. Cheetah argues the definition should

not include “resistivity” because a jury would not understand resistivity. Brief at 21. However, the concept of resistivity is inherent within “semiconductor” because “resistivity” and “semiconductor” are two sides of the same coin. A material is classified as a semiconductor only if its resistivity falls within a certain range. A person of ordinary skill could not determine whether a material is a semiconductor without knowing the material’s resistivity. Alternatively, if a person of ordinary skill knew a material’s resistivity, he could determine whether the material was a semiconductor. Thus, any definition of semiconductor must include a discussion of resistivity.

Cheetah also challenges Defendants’ inclusion of “foundational” in the definition of “substrate.” However, “foundational” accurately reflects how the ‘714 Patent uses the word “substrate.” *See* ‘714 Patent, at 3:23–24; 5:47–50. Figures 1–6 demonstrate the substrate is a base material upon which other components are placed. For example, the Patent teaches anchoring reflective strips to the substrate at “anchor points.” *Id.* at 6:51–52. The anchor points connect the reflective strips to the substrate. *See id.*, Fig. 2. There is also discussion about the spacing between the substrate and the reflective strips. *See id.* at 6:20–22. This further emphasizes the “substrate” is a foundational or building-block type material.

“Semiconductor substrates” are “foundational materials having resistivity between a metal and an insulator.”

“the array of optical signal processing devices...comprising a plurality of at least partially reflective mirrors” and “at least some of the optical signal processing devices comprise...a plurality of at least partially reflective mirrors”

These terms do not require construction because Cheetah accepted Defendants’ construction. Reply at 5. Accordingly, these terms mean “at least some of the optical signal processing devices individually include at least two partially reflective mirrors.”

“at least some of the mirrors are operable to undergo a partial rotation in response to the control signal”

Cheetah argues no construction is necessary. Defendants propose “two or more of the mirrors are operable to undergo a partial rotation in response to the same control signal.”

Cheetah contends Defendants’ construction improperly inserts the word “same” into the Claims. Brief at 22. Cheetah argues it is well-settled law the word “a” in a claim means “one or more,” not “only one.” Reply at 6 (citing *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1342–43 (Fed. Cir. 2008)). Defendants counter that the mirrors must rotate in response to a single control signal. Response at 18. The Claim recites a control signal is received from a controller, after which the mirrors rotate “in response to the control signal.” ‘714 Patent, Claim 1, at 23:32–34; 23:41–43. Defendants assert that the antecedent basis for “the control signal” is the “control signal received from the controller.” Response at 19. Defendants argue because all mirrors rotate in response to the control signal received from the controller, all mirrors must rotate in response to the same control signal. *Id.* Defendants contend this construction is further supported by Claim 5, which recites “rotating at least some of the mirrors in response to one or more control signals.” ‘714 Patent, Claim 5, at 24:17–20. Defendants argue this language indicates that when the patentee intended for the mirrors to rotate in response to multiple control signals, it explicitly said so. Response at 19.

The Claim language specifies the mirrors rotate in response to “a control signal” received from “a controller.” ‘714 Patent, Claim 1, at 23:32–34. The general rule of claim construction is “a” means “one or more,” and Defendants have not demonstrated the general rule does not apply here. *See Baldwin Graphic Sys.*, 512 F.3d at 1342 (noting subsequent use of “the” does not change the general rule that “a” means “one or more”); *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000). Under Defendants’ construction, each mirror must be rotated

at the same angle in response to the same signal. However, the Claims can be satisfied when different signals are applied to each mirror. For example, consider an embodiment where a control signal from a controller is split into multiple signals. Each split signal is amplified and applied separately as a control signal to separate rotatable mirrors. This embodiment would satisfy the Claim language because the mirrors would rotate in response to the control signal from the controller, but the split control signal applied to rotate one mirror would not be “the same” split control signal applied to rotate a second mirror.

Defendants’ argument regarding Claim 5 is also unpersuasive. Defendants argue because Claim 5 recites “one or more control signals” and Claims 1 and 18 recite “the control signal,” “the control signal” must be a single signal. Response at 19. This construction is not mandated by case law. Claims 1, 5, and 18 are all independent claims, so the doctrine of claim differentiation does not apply. Claim differentiation refers to the presumption an independent claim should not be construed to require a limitation added by a dependent claim. *Curtiss–Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380 (Fed. Cir. 2006). Here, all three Claims are independent. Further, there is nothing improper about construing two different terms in similar manners. *See id.* Applicants can use “different terms to define the exact same subject matter,” so two claims with different terminology can cover the same scope. *Id.*; *see Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed. Cir. 1991) (“Claim differentiation is a guide, not a rigid rule.”).

The mirrors need not rotate in response to the “same” signal. “At least some of the mirrors are operable to undergo a partial rotation in response to the control signal” requires no further construction.

“receiving at least the portion of the first signal part at the an array of optical signal processing devices”

Cheetah argues no construction is necessary. Defendants propose “receiving at least the undivided portion of the first signal part reflected by the moveable reflector at the array of signal processing devices.”

Cheetah contends Defendants improperly added the word “undivided” to the claim without any support from the specification. Brief at 23. Cheetah argues Defendants’ construction is ambiguous because it is unclear what an “undivided” signal is. Reply at 6. Defendants argue their construction clarifies that the array of optical signal processing devices receives the same signal received by the moveable reflector, not some divided portion of the signal. Response at 20. Defendants further assert that under Cheetah’s construction, this term could encompass a situation where the array of optical signal processing devices receives a different signal than the one received by the moveable reflector. *Id.*

Claim 5 is a method claim. The Claim recites “receiving at least a portion of the first signal part at a moveable reflector,” then “reflecting the first signal part to an array of optical signal processing devices.” ‘714 Patent, Claim 5, at 24:1–3. In the next limitation, it recites the disputed phrase, “Receiving at least the portion of the first signal part at the an array of optical signal processing devices.” *Id.* at 24:4–5. From the Claim language, it is clear the optical signal processing devices receive the signal reflected by the moveable reflector. As Defendants contend in their briefing, the signal received by the processing devices is the same signal as the one processed by the moveable mirror.

Although it is the same signal, there is no requirement the optical signal processing devices receive the same *undivided* signal reflected by the moveable reflector. The Claim uses the open-ended word “comprising,” indicating it covers all methods that perform the recited

steps, even if the methods contain additional steps. *Id.* at 23:65; *see CIAS, Inc. v. Alliance Gaming Corp.*, 504 F.3d 1356, 1360 (Fed. Cir. 2007). Defendants did not identify any disclaimer in the Patent of an additional level of separation between the reflector and the array of optical signal processing devices. *See* Response at 19–20. Thus, the Claim also covers a method where the first signal portion is further separated into subparts between the reflector and the array. *See Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501 (Fed. Cir. 1997). The optical signal processing devices must still receive the whole of the first signal portion, but there is no requirement that it receives an undivided whole.

“Receiving at least the portion of the first signal part at the an array of optical signal processing devices” requires no further construction.

4. The ‘459 and ‘647 Patents

“polarization controller,” “controlling the state of polarization,” and “polarization adjustment device”

Cheetah argues no construction is necessary. Defendants propose “[a device that is capable of] aligning the polarization of one or more optical signals from an input state of polarization to any desired output state of polarization.”

First, Cheetah contends the clauses are in the preambles of the Claims, so they are not limiting. Second, Cheetah argues Defendants’ constructions are redundant because they import into the preamble several limitations already contained in the body of the Claims. Brief at 23. Cheetah also argues the subject matter of the Claims is clear from the bodies of the Claims, so the Claims can be interpreted without a limiting preamble. Reply at 6. Lastly, Cheetah challenges Defendants’ inclusion of “any desired output state” in their construction. *Id.* at 7. Cheetah contends Defendants manipulated the Claim language by changing “a” desired output state to “any” desired output state. *Id.*

Defendants argue “polarization controller” and “controlling the state of polarization” are limiting phrases because they define the subject matter of the Claims. Response at 21. Defendants contend the components recited in the Claims have numerous uses. *Id.* For example, the same components in virtually identical configurations can form polarization controllers, variable attenuators, optical switches, gain equalizers, and add/drop multiplexers. *Id.* Thus, Defendants believe “polarization controller” and “controlling the state of polarization” must be limiting to specify the functionality of the claimed components. *Id.*

Defendants also argue the intrinsic evidence supports “any desired output state.” *Id.* Defendants note Claim 17 recites “desired output state of polarization,” which Defendants contend places restrictions on the output state of polarization. *See* ‘459 Patent, Claim 17, at 47:48–49. Defendants also cite testimony from Dr. Islam stating the Claims place no limits on the output state of polarization. Response at 22. Accordingly, Defendants contend the Claims cover any output state of polarization. *Id.*

The disputed terms do not add any clarity or limitation to the Claims that is not already present in the bodies of the Claims. First, neither “polarization controller” nor “controlling the state of polarization” is used in the body of a Claim. *See* ‘459 Patent, Claim 1, at 46:7–25; Claim 17, at 47:39–55. Thus, neither term provides a necessary antecedent basis for a later element. Second, Defendants’ construction characterizes these terms according to their functional capability. However, their functional capability is specified by recited elements in the Claims. For example, part of Defendants’ proposed construction is “aligning the polarization of one or more optical signals,” but the “aligning” limitation is directly recited in the Claim. *See* ‘459 Patent, Claim 1, at 46:23.

Defendants' proposed "any desired output state of polarization" is improper. *See* Response at 20 (emphasis added). The Claims specify "an output state of polarization." '459 Patent, Claim 1, at 46:24. There is no reason to require "any desired" output state when the Claims only require "an" output state. While the specification teaches certain embodiments align to "any" state of polarization, the "any" requirement is not present in the Claim. *See, e.g.,* '459 Patent, at 21:1–11 (describing "one particular embodiment"). It would be improper to import "any" from the specification when the Claims recite different language. *See Computer Docket Station Corp. v. Dell, Inc.*, 519 F.3d 1366, 1374 (Fed. Cir. 2008).

Defendants also argue the preambles are limiting because the same components in virtually identical configurations form polarization controllers, variable attenuators, optical switches, gain equalizers, and add/drop multiplexers. Response at 21. This assertion is not supported by the specification. The specification contains specific sections titled "Variable Attenuation," "Optical Switching," and "Polarization Controllers." '459 Patent, at 16:43; 17:18; 20:25. The Variable Attenuation and Optical Switching sections describe "particular aspect[s]" of the invention, while the Polarization Controllers section describes the invention of the whole. *Id.* at 16:44; 17:19. Variable attenuators and optical switches are components of the larger polarization controller. Nowhere is there a description of "the same components in virtually identical configurations" forming or being used to form anything other than a polarization controller.

"Polarization controller," "controlling the state of polarization," and "polarization adjustment device" require no construction.

“optical signal” and “input optical signal”

Cheetah proposes “light beam carrying information.” Defendants initially proposed “light beam modulated to carry information,” then stated in their Response the terms did not require construction. Response at 20 n.16.

Cheetah argues the Court should adopt the same construction of “optical signal” it adopted for “the optical signal” in the ‘714 Patent. Brief at 24. Cheetah also argues Defendants’ use of “modulated” is improper. *Id.* Cheetah contends “modulated” improperly implies “that some other, undefined and unclaimed, system added modulation.” *Id.* Defendants do not substantively address the term “optical signal.” Rather, Defendants “agree that the following phrases in [the ‘459 and ‘647] patents need not be construed: ‘input optical signal” and ‘optical signal.’” Response at 20 n.16. It is unclear whether Defendants “agree” with Cheetah’s construction or believe the terms require no construction.

The ‘714 Patent is not related to the ‘459 and ‘647 Patents. While the patents include similar subject matter, neither side presented any reason why a construction from the ‘714 Patent would also govern the ‘459 and ‘647 Patents. There is no requirement in the ‘459 and ‘647 Patents that an optical signal carry information. The Claims recite “to receive an input optical signal” and “receiving an optical signal.” ‘459 Patent, Claim 1, at 46:9; Claim 17, at 47:41. There is no further limiting language requiring the received optical signal to carry information. *See id.* Instead, the Claims merely recite an “optical signal.” Cheetah did not provide any additional support that an optical signal must carry information.

“Optical signal” and “input optical signal” are “light beam capable of carrying information.”

“at least three stages of phase shifters each operable to introduce a phase shift”

Cheetah proposes “[at least three] stages that cause the phase between two waves to change.” Defendants propose “at least three stages of phase shifters, each stage of phase shifters operable to introduce a variable change in the phase of one polarization mode relative to the phase of the other polarization mode.”

Cheetah argues its construction tracks the plain meaning of the phrase, while Defendants’ construction adds unnecessary confusion. Brief at 25. Cheetah asserts that “polarization modes” are not a part of this phrase, so they should not be included in the construction. *Id.* Additionally, Cheetah contends the phrase “variable change” is ambiguous and does not appear in either Patent. *Id.*

Defendants make two arguments in support of their construction. First, they argue Cheetah’s construction vitiates the “each operable” limitation. Response at 22. Defendants believe under Cheetah’s construction, each stage of phase shifter does not have to contribute to the overall phase shift. *Id.* Second, Defendants argue the phase shift must be “variable.” *Id.* Defendants assert that during prosecution of the ‘459 Patent, Cheetah narrowed its claims to avoid a prior art reference containing fixed phase shifts. *Id.* at 23. Defendants argue this narrowing amendment creates a presumption of prosecution history estoppel with regard to fixed phase shifts. *Id.*

Both sides agree each stage must be at least capable of introducing phase shift. Response at 22; Reply at 7. Thus, the only real dispute is whether the phase shift must be “variable.” Defendants argue Cheetah is estopped from arguing against variable phase shifting because of statements Cheetah made during prosecution. Response at 23. This argument fails for several reasons. At the outset, none of the file wrapper statements cited by Defendants address Claim 1.

See id. Instead, they address independent Claim 41. Claim 41 and Claim 1 are not interchangeable. Claim 1 contains important limitations not present in Claim 41—Claim 1 recites a first polarization beam splitter and a second polarization beam splitter. ‘459 Patent, Claim 1, at 46:8–11. Second, Claim 1 does not contain the amended language of Claim 41. *See* ‘459 Patent, Claim 41, at 50:7–20. Claim 1 does not require “at least one stage [to be] operable to change the phase shift in less than one milli-second.” *See id.* at 50:17–20. If the Claim 41 rejection also applied to Claim 1, as Defendants contend, Claim 1 would not have been patentable over the prior art without the “milli-second” limitation.

Lastly, even the cited prosecution history language does not require a variable change limitation for *all* stages. Instead, the Claim requires a non-fixed change for only “at least one stage.” *See* Response at 23. Defendants’ construction ignores Claim 41’s mitigating “at least one” language. *See* ‘459 Patent, Claim 41, at 50:17–20. It would be a misreading of Claim 41 to say all stages must be “variable” when the variation is limited to “at least one” stage. Further, even if the language from Claim 41 imposed a variable change requirement for all stages, the cited language of Claim 41 is not present in Claim 1. ‘459 Patent, Claim 1. Thus, there is no basis to adopt Defendants’ construction based on the prosecution history of Claim 41.

“At least three stages of phase shifters each operable to introduce a phase shift” is “at least three stages of phase shifters, each capable of introducing a change in phase.”⁸

“phase shift between the first and second principal modes” and “phase shift between the first and second modes of polarization”

Cheetah proposes “a change in phase of one polarization mode relative to the other.” Defendants propose “change in the phase difference between one mode of polarization and the other mode of polarization of the optical signal.

⁸ Cheetah proposed this construction during oral argument. *See* Cheetah’s Claim Construction Slides, at 29.

Cheetah argues its construction tracks the plain meaning of the phrases. *See* Brief at 26 (citing Hecht, UNDERSTANDING FIBER OPTICS (4th ed. 2002)). Cheetah also argues Defendants’ construction introduces new concepts not found in the claims. *Id.* For example, Defendants change “phase shift” to “change in the phase difference” without any support from the specification. *Id.* Cheetah argues under Defendants’ construction, two in-phase waves would not be covered by the Claims. *Id.* Defendants counter that their construction removes any ambiguities from the Claim language. Response at 24. Defendants also assert that their construction “does not exclude the situation where two modes of polarization travel in phase.” *Id.*

The parties’ debate over this term is largely semantic. Cheetah was initially concerned Defendants’ construction would exclude the scenario where two modes of polarization travel in phase. Brief at 26. However, Defendants clarified in their Response their construction does not exclude two modes traveling in phase. Response at 24. Instead, in that scenario, Defendants contend the phase difference would be zero. *Id.* After Defendants’ clarification, Cheetah stated “there is no substantive dispute between the parties as to the meaning of these terms,” and the parties did not address the term at the claim construction hearing. Reply at 8.

Neither side’s proposed construction is entirely accurate. Though Defendants state their construction does not exclude waves traveling “in phase,” it requires a tortured reading to reach that result. Including “phase difference” in the definition implies the two waves are not “in phase.” Waves that are “in phase” are characterized as “in phase”—they are not characterized as “out-of-phase” with “zero phase difference.” To illustrate this point, consider the opposite scenario. Waves that are not in phase are characterized as “out-of-phase.” No person of ordinary

skill would characterize two out-of-phase waves as “in phase with a phase difference.” Thus, it is not proper to include “phase difference” in the construction.

Cheetah’s construction is overly narrow. Cheetah proposes “a change in phase of one polarization mode relative to the other.” This construction does not appear to cover the scenario where the phases of both waves are adjusted. Rather, Cheetah’s construction indicates only one wave’s phase may be changed at a time. The Patents do not contain this limitation. *See, e.g.*, ‘459 Patent, at 21:46–52. Accordingly, Cheetah’s construction is too restrictive.

“Phase shift between the first and second principal modes” and “phase shift between the first and second modes of polarization” are “a change in the phase relation between two in-phase or two out-of-phase optical signal polarization modes.”

“beam splitter”

Cheetah proposes “an optical device that splits light into two or more parts.” Defendants propose “a device that passes a first copy of an optical signal in one direction and a second copy of the optical signal in another direction, each copy of the optical signal having at least substantially equal quantities of wavelength.”

Defendants argue Cheetah’s construction is overly broad. Response at 24. Defendants contend Cheetah’s construction encompasses devices that are not beam splitters, such as demultiplexers and filters. *Id.* at 25. Defendants advocate for a narrower construction. Defendants argue the specification describes a beam splitter as a device that passes “a first copy of an optical signal in one direction and a second copy of the optical signal in another direction.” *Id.* Thus, “beam splitter” must be construed more restrictively than “a device that splits light into two or more parts.” *Id.* Defendants also contend “copy” describes a signal having substantially

equal quantities of wavelength. *See* ‘459 Patent, at 9:27–33. Therefore, Defendants believe the second half of their construction is appropriate. Response at 26.

Cheetah contends its construction “is an accurate description of a beam splitter.” Brief at 27. Cheetah believes Defendants’ construction improperly narrows “beam splitter” to a single example from the specification. *Id.* The passage cited by Defendants contains the word “may,” which Cheetah contends indicates a beam splitter is not limited to the recited structure. *Id.* Cheetah also challenges the second half of Defendants’ construction. *Id.* Cheetah asserts that a beam splitter need not make copies of the optical signal. *Id.* at 28. Instead, the beam splitter could separate the signal by wavelength. *Id.* Thus, the “at least substantially equal quantities of wavelength” limitation is improper. *Id.*

Both sides dispute the interpretation of the following passage from the specification:

Beam splitter *may* comprise any structure or combination of structures operable to pass a first copy of an optical signal in one direction and a second copy of the optical signal in another direction.

‘459 Patent, at 9:18–21 (emphasis added). Defendants present the more reasonable reading. The word “may” does not describe the operation of a beam splitter. Instead, “may” refers to the physical structure of the beam splitter. A beam splitter “may” comprise any structure or combination of structures, but any beam splitter structure must be “operable to pass a first signal copy of an optical signal in one direction and a second copy of the optical signal in another direction.” *See id.* This sentence indicates a beam splitter is more refined than something that merely splits light into two or more parts. Cheetah’s construction to the contrary is too expansive.

The second half of Defendants’ construction is too restrictive. Defendants model their construction on a passage in the specification stating “copy” is “used to describe optical signals that are at least substantial copies of the input optical signal.” ‘459 Patent, at 9:27–31. However,

the same paragraph teaches that “various ratios other than 50/50 could be used consistent with the present invention,” and it discloses embodiments with “uneven distributions of intensities.” ‘459 Patent, at 9:31–39. Thus, while the specification contains some limiting language about the similarity of a “copy,” it also contains incompatible language about a broader understanding of “copy.” Thus, there is no absolute requirement that a copy be “substantially equal.” The second half of Defendants’ construction will not be adopted.

“Beam splitter” is “a device that passes a first copy of an optical signal in one direction and a second copy of the optical signal in another direction.”

“beam splitter that is shared” and “sharing a beam splitter”

Cheetah contends no construction is necessary. Defendants propose “a beam splitter that is shared between one phase shifter and at least one other, *i.e.*, different, phase shifter.”

Cheetah argues Defendants’ construction is improperly narrow. Brief at 28. Cheetah contends Defendants’ construction excludes the embodiment disclosed in Figure 7c, which discloses a “folded” configuration where the first and third stages use the same physical structure. *Id.* at 29. Cheetah argues the first and third stages of Figure 7c are “optically different,” even though they are not “physically different.” *Id.* Cheetah believes a shared beam splitter can satisfy the Claims using the same physical structure as long as the structure appears optically different at different times. *Id.* Thus, Defendants’ “different” construction is improper. Reply at 9.

Defendants argue the plain language of the Claims supports their construction. Response at 26. Claim 1 recites a beam splitter that is shared with at least one other phase shifter. ‘459 Patent, Claim 1, at 46:15–17. Defendants argue this phrase indicates multiple phase shifters are required. Response at 27. Thus, any construction allowing the same physical structure to be

considered “optically different” renders the “one other” limitation superfluous. *Id.* Defendants also argue their proposed construction does not exclude the embodiment illustrated in Figure 7c. *Id.* However, Defendants believe a modified version of Figure 7c (as illustrated in their Response) would not satisfy the Claim language. *Id.*

Apparatus Claim 1 and method Claim 17 must be evaluated separately. Both sides spent considerable briefing addressing whether their proposed constructions covered the embodiment disclosed in Figure 7c. However, Claim 1 does not cover Figure 7c regardless of the “shared” limitation because Claim 1 requires multiple polarization beam splitters. Claim 1 recites, in addition to a shared beam splitter, first and second polarization beam splitters. *See* ‘459 Patent, Claim 1, at 46:17–20. Figure 7c only contains one polarization beam splitter 658. ‘459 Patent, at 22:50. Thus, Claim 1 does not read on the embodiment disclosed in Figure 7c. Instead, Claim 1 reads on Figure 7b, which contains two polarization beam splitters 618 and 619. *See* ‘459 Patent, at 21:46; 22:21. For this reason, any analysis of Figure 7c with regards to Claim 1 would be inappropriate.

Claim 1 recites “at least three stages of phase shifters” with “at least one phase shifter comprising a beam splitter that is shared with at least one other of the phase shifters.” ‘459 Patent, Claim 1, at 46:12–17. From the plain language of the Claim, it is apparent “one phase shifter” must share a beam splitter with “one other” phase shifter. “Other” indicates two distinct, separate phase shifters are required. Cheetah argues this phrase can be satisfied by the same physical shifter because the shifter would appear optically different to the light. There is no support for this reading. It would be illogical to read “one other” as “the same physical structure appearing optically different.” Thus, Defendants’ construction requiring a “different” phase shifter is proper.

The disputed phrase appears in a different context in Claim 17. Claim 17 is a method claim, and it does not contain the limitation requiring multiple polarization beam splitters. *See* ‘459 Patent, Claim 17. Accordingly, unlike Claim 1, Figure 7c is relevant to Claim 17. Claim 17 also contains a second subtle distinction from Claim 1. Claim 1 requires “at least three stages of phase *shifters*,” while Claim 17 requires “at least three stages of phase *shift*.” Compare ‘459 Patent, Claim 1, at 46:12; with Claim 17, at 47:50 (emphasis added). Claim 17 does not require three separate phase shift structures—it only requires three separate phase shift stages. Therefore, the beam splitter sharing in Claim 17 only requires the beam splitter to be shared between two phase shift stages of operation, not two phase shifters. There is no language in the Claim limiting a shifter to only one stage of operation. Thus, Claim 17 reads on Figure 7c because two phase shift stages of operation can be carried out by the same phase shift structure.

Defendants’ “different” construction is appropriate for the same reasons as Claim 1. Claim 17 recites “at least one phase shift stage sharing a beam splitter with at least one other phase shift stage.” ‘459 Patent, Claim 17, at 47:52–53. The only reasonable interpretation of this passage is that the two phase shift stages must be “different.”

“Beam splitter that is shared” is “a beam splitter that is shared between one phase shifter and at least one other, *i.e.*, different, phase shifter.” “Sharing a beam splitter” is “a beam splitter that is sharing between one phase shift operation and at least one other, *i.e.*, different, phase shift operation.”

“partially transmitting mirror”

Cheetah proposes “a surface or collection of surfaces that both reflects and transmits the incident optical signal, such as a partially silvered mirror or a mirror made from one or more

layers of a dielectric coating.” Defendants propose “a surface or collection of surfaces that is not substantially reflective, but both reflects and transmits the incident optical signal.”

Both side’s constructions contain the phrase “a surface or collection of surfaces that both reflects and transmits the incident optical signal.” *See* Response at 28 (“The parties agree a partially transmitting mirror both reflects and transmits the incident optical signal.”). However, they disagree over the remaining portions of the construction. Brief at 30. Cheetah contends its construction adds examples from the specification for clarity. *Id.* Cheetah argues the examples will help a jury understand the types of surfaces capable of reflecting and transmitting an optical signal. *Id.* Cheetah also argues “not substantially reflective” is too narrow. *Id.* Cheetah contends it would exclude the “50/50 beam splitter” disclosed in the specification, a mirror where half the incident light is reflected. *Id.*

Defendants’ argue Cheetah’s construction includes examples that are not necessarily partially transmitting mirrors. Response at 28. Defendants contend not all partially silvered mirrors or mirrors having one or more layers of dielectric coating are partially transmitting mirrors. *Id.* at 29. Defendants argue some partially silvered mirrors reflect part of the incident optical signal and absorb the remainder. *Id.* Thus, while not all the signal is reflected, none is reflected. *Id.* Defendants contend this structure would be substantially reflective but would fail to meet the partially transmitted requirement. *Id.* Thus, they argue Cheetah’s examples are too broad. *Id.*

“Partially transmitting mirror” has an intuitive meaning—a mirror that transmits some, but not all.⁹ Defendants’ “not substantially reflective” introduces unnecessary subjectivity into the phrase. “Partially” has a binary element—a mirror either transmits something, or it does not.

⁹ A mirror that absorbs some of the signal and reflects the rest would not be “partially transmitting” because none of the signal would be transmitted.

A mirror is partially transmitting if it transmits some light, and it is not partially transmitting if it transmits no light. There is no further subjective element in the term. *See* ‘459 Patent, Claim 1, at 46:20–21. Defendants provided no support for “not substantially reflective,” and such a limitation is not required by the Patent. All that is required is some transmission of light. There is no quantitative requirement beyond that.

Cheetah’s proposed examples are too broad to be included in the construction. The specification discloses partially silvered mirrors and mirrors made from one or more layers of a dielectric coating as examples of partially transmitting mirrors. ‘459 Patent, at 9:21–26. However, there is no requirement either of these comply with the required functionality of partially transmitting the optical signal.¹⁰ If, for example, a partially silvered mirror does not transmit some of the optical signal, it would not satisfy the Claim language. The proper test is whether the partially silvered mirror both reflects and transmits the incident optical signal, regardless of its name. Therefore, Cheetah’s examples are not appropriate for the construction.

“Partially transmitting mirror” is “a surface or collection of surfaces that both reflects and transmits the incident optical signal.”

INDEFINITENESS TERMS

“moveable mirror”

Defendants argue the asserted claims of the ‘771 and ‘862 Patents are indefinite because they fail to recite sufficient structure to perform the claimed functionality. Docket No. 205 (“Indefiniteness Brief”) at 10. All asserted claims in these two Patents rely on a “moveable mirror” to change the amplitude of an optical signal. *Id.* at 10–11. However, Defendants contend a moveable mirror alone cannot change a signal’s amplitude. *Id.* at 11. Accordingly, the asserted

¹⁰ Partially silvered mirrors and mirrors having one or more layers of a dielectric coating are listed as examples of beam splitters, not partially transmitting mirrors. ‘459 Patent, at 9:21–25.

claims are indefinite for failing to recite sufficient structure to perform the claimed functionality. *Id.* (citing *Markem-Imaje Corp. v. Zipher Ltd.*, 2012 WL 3263517 (D.N.H. Aug. 9, 2012)).

Cheetah contends the Claims recite sufficient structure. Docket No. 213 (“Indefiniteness Response”) at 12. Cheetah argues the Patents are not limited to structures that vary a signal’s amplitude using only a mirror. *Id.* Instead, a mirror can change the amplitude of a signal when the signal is combined with a second signal. *Id.* Cheetah also asserts moving a mirror can change the angle at which the signal strikes the beam splitter. *Id.* at 15. Thus, Cheetah argues the claims are not indefinite. *Id.* at 16.

Defendants moved for summary judgment of indefiniteness. They did not move for summary judgment of no enablement, nor did they move for summary judgment of lack of written description. Defendants’ briefing repeatedly conflates the legal standards of these distinct issues. *Compare* Indefiniteness Brief at 1 (“The claims...are indefinite because they fail to recite sufficient structure to perform the claimed functions.”), with *Honeywell Int’l, Inc. v. Int’l Trade Comm’n*, 341 F.3d 1332, 1341 (Fed. Cir. 2003) (“An inoperable claim construction would render the claim invalid for lack of enablement rather than for indefiniteness.”). To prove indefiniteness, a defendant must show by clear and convincing evidence one skilled in the art would not understand the scope of the claim. *See Intellectual Prop. Dev.*, 336 F.3d at 1319. Defendants did not meet this burden.

The crux of Defendants’ argument is the asserted claims are functional and should be interpreted pursuant to § 112(f). The limitation in question reads:

a micro-electro-optic system (MEMS) device comprising a moveable mirror operable to receive the first part of the optical input signal from the first beam splitter and to reflect the first part of the input signal toward an output to form an output signal, the amplitude of the output signal varying depending on the displacement of the moveable mirror layer;

‘771 Patent, Claim 1, at 41:50–56. According to Defendants, the function of the MEMS device is to vary the amplitude of the output signal. Based on this view, Defendants argue a moveable mirror is insufficient structure to perform the claimed functionality because a moveable mirror alone cannot change the amplitude of an optical signal.

Defendants’ flaw is they read the MEMS device limitation as defining the MEMS device in terms of its function. However, what Defendants point to in the Claims is not a function but a structure. *See Inventio AG v. ThyssenKrupp Elevator Am. Corp.*, 649 F.3d 1350, 1356 (Fed. Cir. 2011) (noting § 112(f) only applies to “purely functional limitations that do not provide the structure that performs the recited function”). The moveable mirror is not used to change a signal’s amplitude. The mirror simply performs the function of receiving the input signal and reflecting it towards the output. Defendants’ argument would rewrite the limitation to say “forming an optical output signal.” However, the claim language only specifies the MEMS device produces the first part of the input signal—the output signal is formed later, at the output stage. Because the MEMS device limitation is not defined in terms of its function, there is no basis to construe the Claims under § 112(f). *See Lighting World, Inc. v. Birchwood Lighting, Inc.*, 382 F.3d 1354, 1358 (Fed. Cir. 2004) (addressing the “strong” presumption that a claim without the word “means” should not be analyzed under § 112(f)).

The asserted Claims need not recite a second mirror and combiner to be definite. The Claims all recite a MEMS device “comprising” a moveable mirror to receive the input optical signal. The word “comprising” is dispositive of the issue. Comprising indicates an open-ended claim, so further structures (including a second mirror and combiner) are not excluded from the scope of the Claims. *See In re Crish*, 393 F.3d 1253, 1257 (Fed. Cir. 2004). Thus, the Claims do

not lack sufficient structure to perform the claimed functionality. Because the Claims used the word “comprising,” the additional structure need not be recited in the claim language.

Ultimately, Defendants’ argument can be reduced to the fact they do not believe the asserted claims actually perform the claimed functionality. However, if a claim’s meaning is clear, the claim is definite, regardless of whether the parties disagree over its outcome. *See Energizer Holdings, Inc. v. Int’l Trade Comm’n*, 435 F.3d 1366, 1371 (Fed. Cir. 2006) (quoting *Exxon Research & Eng’g Co. v. United States*, 265 F.3d 1371, 1375 (Fed. Cir. 2001)) (“If the meaning of the claim is discernible, even though the task may be formidable and the conclusion may be one over which reasonable persons will disagree, we have held the claim sufficiently clear to avoid invalidity on indefiniteness grounds.”); *Miles Labs., Inc. v. Shandon Inc.*, 997 F.3d 870, 875 (Fed. Cir. 1993). It is clear from the claim language a moveable mirror reflects the first portion of the signal. This is sufficient to overcome Defendants’ burden to show by clear and convincing evidence the Claims are indefinite for lack of structure.

“the portion of the first part”

Defendants also argue certain claims of the ‘862 Patent are invalid because there is no antecedent basis for “the portion of the first part.” Indefiniteness Brief at 14. Defendants argue the Claims recite “the portion,” but the Claims never introduce “the portion” with “a portion.” *Id.* Because there is no literal antecedent basis for “the portion,” the Claims are indefinite. *Id.* at 15.

Cheetah contends the word “the” appears in the Claims because of an inadvertent drafting error. Indefiniteness Response at 17. Cheetah asserts “the portion of the first part” originally had an antecedent basis, but that basis was removed in an amendment. *Id.* at 18–19. When the Claims were amended, the prosecuting attorney neglected to change “the” to “a.” *Id.* Cheetah argues the Claims are not indefinite when the phrase is read “a portion of the first part.” *Id.*

As long as a claim term has a “reasonably ascertainable meaning,” it is not indefinite. *Energizer Holdings*, 435 F.3d at 1370. There is no requirement a term have an explicit antecedent basis—an antecedent basis may be present by implication. *See Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 434 F.3d 1293, 1319 (Fed. Cir. 2005); *Bose Corp. v. JBL, Inc.*, 274 F.3d 1354, 1359 (Fed. Cir. 2001) (“The failure to provide explicit antecedent basis for terms does not always render a claim indefinite. If the scope of a claim would be reasonably ascertainable by those skilled in the art, then the claim is not indefinite.”). Whether a term’s meaning is reasonably ascertainable is determined in the context of the patent. *Energizer Holdings*, 435 F.3d at 1370.

Claim 1 of the ‘862 Patent, which is illustrative of other Claims, reads in part:

a micro-electro-optic system (MEMS) device operable to receive at least the first part of the optical signal, the MEMS device comprising a moveable mirror operable to receive *the portion of the first part* of the optical signal and to reflect the portion of the first part to form a MEMS output signal having an amplitude, the amplitude of the MEMS output signal capable of being varied depending on the movement of the moveable mirror;

‘862 Patent, Claim 1, at 42:7–15 (emphasis added). Use of the word “the” (instead of “a,” as Cheetah represents was intended) does not render the Claims indefinite. A beam splitter receives a portion of an optical signal, then separates the signal into first and second parts. *Id.* at 42:1–6. The first part is then sent to a MEMS device. *Id.* at 42:7–8. Within the MEMS device, a moveable mirror receives “the portion of the first part of the optical signal,” then reflects it to form a MEMS output signal. *Id.* at 42:10–12. From the Claim language, it is clear “the portion of the first part” refers to some subset of the “first part.” The only reasonable interpretation of the Claim is the moveable mirror receives something less than the whole “first part” of the signal. The MEMS device receives the “first part” of the signal, then some portion of the first part is transmitted to the moveable mirror. A lack of explicit antecedent basis does not inhibit this

understanding in any way. Because these claims have a reasonably ascertainable meaning, they are not indefinite for lack of antecedent basis.¹¹ *See Energizer Holdings*, 435 F.3d at 1370.

CONCLUSION

For the foregoing reasons, the Court interprets the claim language in this case in the manner set forth above. For ease of reference, the Court's claim interpretations are set forth in a table in Appendix A. Defendants' Motion for Summary Judgment of Indefiniteness (Docket No. 205) is **DENIED**.

So ORDERED and SIGNED this 11th day of April, 2013.

A handwritten signature in black ink, appearing to read 'Leonard Davis', written over a horizontal line.

LEONARD DAVIS
UNITED STATES DISTRICT JUDGE

¹¹ Defendants' briefing asserts that Dr. Islam, the inventor of the '771 and '862 Patents, "became a patent agent and started studying Defendants' products" during prosecution. Indefiniteness Brief at 5. Defendants then suggest Dr. Islam drafted the claims to cover Defendants' products. *See id.* at 5–8. Regardless of the veracity of this assertion, there is no restriction against drafting claims targeted at a competitor. *Kingsdown Med. Consultants, Ltd. v. Hollister Inc.*, 863 F.2d 867, 874 (Fed. Cir. 1988); *see PIN/NIP, Inc. v. Platte Chem. Co.*, 304 F.3d 1235, 1247 (Fed. Cir. 2002). Dr. Islam's subjective motivation has no bearing on whether a person of ordinary skill would understand the claims.

Appendix A

Claim Term	Court's Construction
Multiple band optical communication system	Two or more communication wavelength bands
The first part	The undivided first signal part that was output from the beam splitter
[the gain equalizer operable to...] selectively introduce attenuation or gain into the at least one of the plurality of amplified wavelengths	The gain equalizer operable to...select between introducing attenuation or gain
Reflect[ing] the first part...toward an output to form an output signal	No construction necessary
To form	No construction necessary
Displacing the moveable mirror to cause a change in the amplitude of the output signal; the amplitude of the output signal varying depending on the displacement of the moveable mirror layer	Moving the movable mirror to cause a change in the amplitude of the output signal; the amplitude of the output signal changes based on the position of the moveable mirror
The optical signal ('862 Patent)	No construction necessary
The amplitude of the MEMS output signal capable of being varied depending on the movement of the movable mirror; the amplitude of the MEMS output signal capable of being changed by moving the moveable mirror	No construction necessary
The MEMS output signal	The optical signal as reflected off the moveable mirror
To communicate the optical signal to the MEMS device	No construction necessary
Receive the portion of the first part of the optical [input] signal; receiving at least the first portion of optical signal wavelengths	No construction necessary
Unmodulated optical signal	A light beam that does not carry information
Unmodulated	Not carrying information
To modulate; modulated; modulation	Var[y/ied/ying] to carry information
[array of] optical signal processing devices	No construction necessary
Located on one or more semiconductor substrates	No construction necessary
Semiconductor substrates	Foundation materials having resistivity between a metal and an insulator

Claim Term	Court's Construction
The array of optical signal processing devices...comprising a plurality of at least partially reflective mirrors; at least some of the optical signal processing devices comprise...a plurality of at least partially reflective mirrors	At least some of the optical signal processing devices individually include at least two partially reflective mirrors
At least some of the mirrors are operable to undergo a partial rotation in response to the control signal	No construction necessary
Receiving at least the portion of the first signal part at the an array of optical signal processing devices	No construction necessary
Polarization controller; controlling the state of polarization	No construction necessary
Optical signal; input optical signal ('459 and '647 Patents)	Light beam capable of carrying information
At least three stages of phase shifters each operable to introduce a phase shift	At least three stages of phase shifters, each capable of introducing a change in phase
Phase shift between the first and second principal modes; phase shift between the first and second modes of polarization	A change in the phase relation between two in-phase or two out-of-phase optical signal polarization modes
Beam splitter	A device that passes a first copy of an optical signal in one direction and a second copy of the optical signal in another direction
Beam splitter that is shared ('459 Patent, Claim 1 and '647 Patent, Claim 1)	A beam splitter that is shared between one phase shifter and at least one other, <i>i.e.</i> , different, phase shifter
Sharing a beam splitter ('459 Patent, Claim 17)	A beam splitter that is shared between one phase shift operation and at least one other, <i>i.e.</i> , different, phase shift operation
Partially transmitting mirror	A surface or collection of surfaces that both reflects and transmits the incident optical signal