

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

FRAUNHOFER-GESELLSCHAFT ZUR)
FÖRDERUNG DER ANGEWANDTEN)
FORSCHUNG E.V.,)

Plaintiff,)

v.)

SIRUS XM RADIO INC.,)

Defendant.)

Civil Action No. 17-184-JFB-SRF

REPORT AND RECOMMENDATION

I. INTRODUCTION

In this patent infringement action filed by plaintiff Fraunhofer-Gesellschaft Zur Förderung der angewandten Forschung e.V. (“Fraunhofer”) against defendant Sirius XM Radio Inc. (“SXM”), Fraunhofer alleges infringement of United States Patent Nos. 6,314,289 (“the ’289 patent”), 6,931,084 (“the ’1084 patent”), 6,993,084 (“the ’3084 patent”), 7,061,997 (“the ’997 patent”) (collectively, the “Asserted Patents”), which are directed to apparatuses and methods used to receive and decode encoded satellite signals, identify “channel fading” effects, and correct for those offsets using a channel decoder. Presently before the court is the matter of claim construction.¹ This decision sets forth the court’s recommendations of constructions for the disputed claim terms discussed in the briefing and at the *Markman* hearing held on April 4, 2018.²

¹ The briefing and other filings made in support of the parties’ claim construction positions are found at D.I. 112, D.I. 114, D.I. 115, D.I. 116, D.I. 117, D.I. 136, D.I. 137, D.I. 138, D.I. 139, D.I. 148, and D.I. 149.

² The procedural history of the case is set forth at § II.B, *infra*.

II. BACKGROUND

A. Parties

Fraunhofer is an applied research organization in Europe, encompassing over sixty institutes and research units which develop real-world innovations in the fields of health, communications, security, transportation, and energy for both privately and publicly funded projects. (D.I. 1 at ¶ 1) In 1996, Fraunhofer developed patented technology related to multicarrier modulation (the “MCM technologies”) for use in satellite radio broadcasting. (*Id.* at ¶¶ 4, 20) MCM is a method of transmitting data by splitting it into several components and sending each of the components over separate carrier signals. (*Id.* at ¶ 4)

SXM is a Delaware corporation headquartered in New York. (*Id.* at ¶ 10) SXM was formed in 2008 when XM Satellite Radio, Inc., which developed the Digital Audio Radio Services System (the “XM DARS System”), merged with SXM Satellite Radio, which developed its own satellite radio system. (*Id.* at ¶¶ 22, 26) SXM offers the XM DARS System on a subscription basis to more than 30.6 million customers. (*Id.* at ¶ 31) SXM also develops and supplies the equipment needed to use the XM DARS System, selling satellite radios directly to consumers and businesses, including auto makers. (*Id.* at ¶ 32)

B. Procedural Posture

Fraunhofer filed suit against SXM on February 22, 2017, alleging that SXM infringes the ’289, ’1084, ’3084, and ’997 patents. (D.I. 1) On August 10, 2017, Judge Bataillon referred this action to the undersigned magistrate judge for all dispositive and non-dispositive matters on all issues, including claim construction, except for summary judgment motions, *Daubert* motions, and pretrial motions *in limine*. (D.I. 51) The parties completed briefing on claim construction of

the '289, '1084, '3084, and '997 patents on March 16, 2018. (D.I. 115; D.I. 116; D.I. 136; D.I. 138)

On March 29, 2018, the court issued a Report and Recommendation granting SXM's motion to dismiss. (D.I. 146) A *Markman* hearing was held on April 4, 2018. (4/4/18 Tr.) Fraunhofer filed objections to the Report and Recommendation on April 12, 2018. (D.I. 154) On August 23, 2018, the assigned District Judge issued a Memorandum and Order overruling Fraunhofer's objections. (D.I. 175) Fraunhofer filed its notice of appeal to the Federal Circuit on September 17, 2018. (D.I. 182) On October 17, 2019, the Federal Circuit vacated-in-part the ruling of the District Judge and remanded the case for further proceedings. *Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V. v. Sirius XM Radio Inc.*, 940 F.3d 1372 (Fed. Cir. 2019).

III. LEGAL STANDARD

A. General Principles of Claim Construction

Construing the claims of a patent presents a question of law, although subsidiary fact finding is sometimes necessary. *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 837-38 (2015) (citing *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 977-78 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370, 388-90 (1996)). "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) (internal quotation marks omitted). "[T]here is no magic formula or catechism for conducting claim construction." *Id.* at 1324. Instead, the court may attach the appropriate weight to appropriate sources "in light of the statutes and policies that inform patent law." *Id.*

The words of the claims “are generally given their ordinary and customary meaning,” which is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application.” *Phillips*, 415 F.3d at 1312-13 (internal citations and quotation marks omitted). “[T]he ordinary meaning of a claim term is its meaning to the ordinary artisan after reading the entire patent.” *Id.* at 1321 (internal quotation marks omitted); *see also Eon Corp. IP Holdings v. Silver Spring Networks, Inc.*, 815 F.3d 1314, 1320 (Fed. Cir. 2016). Claim terms are typically used consistently throughout the patent, and “usage of a term in one claim can often illuminate the meaning of the same term in other claims.” *Phillips*, 415 F.3d at 1314 (observing that “[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment . . . [b]ecause claim terms are normally used consistently throughout the patent . . .”).

It is likewise true that “[d]ifferences among claims can also be a useful guide For example, the presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.” *Id.* at 1314-15 (internal citation omitted). This “presumption is especially strong when the limitation in dispute is the only meaningful difference between an independent and dependent claim, and one party is urging that the limitation in the dependent claim should be read into the independent claim.” *SunRace Roots Enter. Co., Ltd. v. SRAM Corp.*, 336 F.3d 1298, 1303 (Fed. Cir. 2003) (citing *Ecolab Inc. v. Paraclipse, Inc.*, 285 F.3d 1362, 1375 (Fed. Cir. 2002)).

Other intrinsic evidence, including the patent 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.” *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). “[T]he specification may reveal a special definition given to a claim term by the

patentee that differs from the meaning it would otherwise possess. In such cases, the inventor's lexicography governs." *Phillips*, 415 F.3d at 1316 (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). It bears emphasis that "[e]ven when the specification describes only a single embodiment, the claims of the patent will not be read restrictively unless the patentee has demonstrated a clear intention to limit the claim scope using words or expressions of manifest exclusion or restriction." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004) (internal quotation marks omitted). The specification "is not a substitute for, nor can it be used to rewrite, the chosen claim language." *SuperGuide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004).

In addition to the specification, a court "should also consider the patent's prosecution history, if it is in evidence." *Markman*, 52 F.3d at 980. The prosecution history, which is also "intrinsic evidence," "consists of the complete record of the proceedings before the PTO [Patent and Trademark Office] and includes the prior art cited during the examination of the patent." *Phillips*, 415 F.3d at 1317. "[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be." *Id.*

A court also may rely on "extrinsic evidence," which "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Markman*, 52 F.3d at 980. For instance, technical dictionaries can assist the court in determining the meaning of a term to those of skill in the relevant art because such dictionaries "endeavor to collect the accepted meanings of terms used in various fields of science and technology." *Phillips*, 415 F.3d at 1318. In addition, expert testimony can be useful "to

ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field.” *Id.* Nonetheless, courts must not lose sight of the fact that “expert reports and testimony [are] generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in intrinsic evidence.” *Id.* (“[C]onclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court.”). Overall, while extrinsic evidence may be useful to the court, it is less reliable than intrinsic evidence, and its consideration “is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence.” *Id.* at 1318-19.

Finally, “[t]he construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” *Renishaw PLC v. Marposs Societa’ Per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998). It follows that a claim interpretation which excludes the products the patents were designed to cover is rarely the correct interpretation. *Osram GmbH v. Int’l Trade Comm’n*, 505 F.3d 1351, 1358 (Fed. Cir. 2007).

B. Construction of Means-Plus-Function Limitations

Means-plus-function limitations permit a patentee to claim an element of the invention in terms of the element’s function without reciting the corresponding structure in the claim itself:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

35 U.S.C. § 112, ¶ 6. If a claim term does not use the word “means,” there is a presumption that means-plus-function claiming does not apply. *See Williamson v. Citrix Online, LLC*, 792 F.3d

1339, 1349 (Fed. Cir. 2015); *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1369 (Fed. Cir. 2002). The presumption may be overcome if the claim term recites a function without reciting sufficiently definite structure for performing that function. *See Williamson*, 792 F.3d at 1349. Courts may consider both intrinsic and extrinsic evidence to determine whether a claim limitation is “so devoid of structure that the drafter constructively engaged in means-plus-function claiming.” *Inventio AG v. ThyssenKrupp Elevator Americas Corp.*, 649 F.3d 1350, 1357 (Fed. Cir. 2011), *rev’d on other grounds*, *Williamson*, 792 F.3d at 1349.

To construe a means-plus-function claim term, the court must first determine the claimed function. The second step is to “identify the corresponding structure in the written description of the patent that performs that function.” *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1332 (Fed. Cir. 2006) (internal citation omitted). Means-plus-function claims are statutorily limited to the structure disclosed in the patent specification that corresponds to the claimed function. *See Med. Instrumentation & Diagnostics Corp. v. Elekta AB*, 344 F.3d 1205, 1219 (Fed. Cir. 2003). The identified structure is required to “permit one of ordinary skill in the art to ‘know and understand what structure corresponds to the means limitation.’” *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1340 (Fed. Cir. 2008) (quoting *Biomedino, LLC v. Waters Techs. Corp.*, 490 F.3d 946, 950 (Fed. Cir. 2007)). Otherwise, the term is invalid. *Id.*

In cases where the claimed invention is computer-implemented, the structure identified in the specification must be more than a general purpose computer or microprocessor, which “can be programmed to perform very different tasks in very different ways.” *Aristocrat Techs. Austl. Pty Ltd. v. Int’l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008). Instead, a computer-implemented means-plus-function term must generally disclose a computer programmed to carry out an algorithm, in which case “the disclosed structure is not the general purpose computer, but

rather the special purpose computer programmed to perform the disclosed algorithm.” *Id.* (quoting *WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999)); *see also Harris Corp. v. Ericsson Inc.*, 417 F.3d 1241, 1253 (Fed. Cir. 2005). An exception to this rule arises when the claimed functions “can be achieved by any general purpose computer without special programming.” *In re Katz Interactive Call Processing Patent Litig.*, 639 F.3d 1303, 1316 (Fed. Cir. 2011). This exception is a “narrow” one that applies “only in the rare circumstances where any general-purpose computer without any special programming can perform the function.” *Ergo Licensing, LLC v. CareFusion 303, Inc.*, 673 F.3d 1361, 1364-65 (Fed. Cir. 2012).

IV. CONSTRUCTION OF DISPUTED TERMS

A. The ’289 Patent

The ’289 patent, entitled “Apparatus and Method for Transmitting Information and Apparatus and Method for Receiving Information,” relates to the transmission of information from satellites or terrestrial repeaters to receivers over channels that utilize time diversity and space diversity to reduce the effects of channel fading³ or shadowing during transmission. (’289 patent, Abstract) The ’289 patent is directed to encoding digital signals for reduced-power broadcasting over two communication channels, where the original data can be retrieved even if only one of the channels is available. (’289 patent, col. 4:36-6:51)

³ Channel fading refers to changes in the physical environment that affect wireless systems, including “both relative movement between transmitter and receiver and moving scatters/reflectors in the surrounding space,” such as buildings or tunnels that disrupt transmission and cause a channel to fade. (’289 patent, col. 1:27-31; 4/4/18 Tr. at 43:6-24)

1. **“means for transmitting the output bits of the first portion via a first channel and the output bits of the second portion via a second channel, the second channel being spatially different from the first channel” (’289 patent, claim 2)**

Fraunhofer	SXM	Court
<p>Definite</p> <p>Function: transmitting the output bits of the first portion via a first channel and the output bits of the second portion via a second channel</p> <p>Structure: two transmitters</p>	<p>35 U.S.C. § 112, ¶ 6</p> <p>Indefinite</p> <p>Alternative proposed construction:</p> <p>Function: sending one signal comprising a first portion of output bits via a first channel and a second signal comprising the second portion of output bits via a second channel, the second channel being spatially different from the first channel</p> <p>Structure: two transmitters consisting of (1) two satellites, (2) two terrestrial repeaters, or (3) a satellite and a terrestrial repeater, with one of the transmitter having a delay stage</p>	<p>Function: transmitting the output bits of the first portion via a first channel and the output bits of the second portion via a second channel</p> <p>Structure: two transmitters</p>

The parties agree that the disputed term is governed by § 112, ¶ 6. The parties’ revised joint claim construction chart reflects that the parties do not fully agree on the claimed function of the term. (D.I. 112 at 2) Despite certain differences between the proposals, SXM indicates in its opening brief that the parties “further agree on the function – transmitting bits across channels.” (D.I. 115 at 6) In its responsive brief, however, SXM contends that “Fraunhofer . . . erroneously advocates for a claimed function that fails to align with the claim language” by omitting the requirement that “the second channel being spatially different from the first

channel.” (D.I. 136 at 1-2) The parties did not directly address their dispute regarding the claimed function during oral argument.

I recommend that the court adopt Fraunhofer’s proposed function for the “means for transmitting” term because it is consistent with the claim language. Claim 2 of the ’289 patent requires a “means for transmitting the output bits of the first portion via a first channel and the output bits of the second portion via a second channel, the second channel being spatially different from the first channel.” (’289 patent, col. 13:56-59) SXM’s proposed function modifies the claim language by referencing “signals” without including specific citations to the intrinsic record in support of the modification. Although SXM advocates for the inclusion of the last clause, “the second channel being spatially different from the first channel,” in the claimed function, this clause modifies the first and second channels, as opposed to providing additional clarity regarding the claimed function of transmitting.

Turning to the corresponding structure of the limitation, I recommend that the court adopt Fraunhofer’s proposed construction, which is consistent with the intrinsic record. The parties’ primary dispute centers on whether the corresponding structure necessarily incorporates a “delay stage.” The parties both identify the structure as two transmitters, but SXM further limits the structure by requiring particular types of transmitters “consisting of (1) two satellites, (2) two terrestrial repeaters, or (3) a satellite and a terrestrial repeater, with one of the transmitter [sic] having a delay stage.” (D.I. 112 at 2)

Contrary to SXM’s proposal, neither the claim language nor the specification requires such a narrow definition of the corresponding structure. Immediately following the disputed “means for transmitting” term, claim 2 describes the means for transmitting as “including a first

transmitter and a second transmitter spaced apart from the first transmitter.”⁴ (’289 patent, col. 13:60-62) Claim 2’s description of two transmitters as the corresponding structure finds further support in the specification, which expressly provides that “the transmitting means 140 comprise two transmitters positioned in different locations, to obtain space diversity.” (’289 patent, col. 8:12-14) The specification’s acknowledgement that “the transmitting means 140 may comprise one transmitter, e.g., one satellite and a delay stage,” uses the permissive term “may,” and cites “one satellite and a delay stage” as examples of the transmitter’s composition, as opposed to required components of the transmitter. (*Id.*, col. 8:1-2) Under these circumstances, incorporating the additional limitation of the delay stage into the undisputed structure of the two transmitters would improperly import a limitation from a preferred embodiment into the claim language. *See Comark Commc’ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1186-87 (Fed. Cir. 1998) (emphasizing that “limitations from the specification are not to be read into the claims.”).

The specification’s repeated references to “time and/or space diversity” illustrate the patentee’s intention to leave open the option of claiming either time diversity or space diversity, without an absolute requirement that both be present. (’289 patent, Abstract; col. 5:66-67; col. 6:34-36) In accordance with the ordinary meaning of “and/or,” the specification provides that the channels may allow: (1) time diversity, (2) space diversity, or (3) time and space diversity. (4/4/18 Tr. at 36:1-5; D.I. 148, Ex. A at 206:14-209:2) The delay stage is associated with time diversity, and not space diversity. (’289 patent, col. 2:47-51) Thus, SXM’s proposal to require a delay stage would preclude the claim scope of transmitters providing only for space diversity. The intrinsic record does not adequately support SXM’s proposed limitation. For example, the

⁴ Due to the express provision of structure in claim 2, Fraunhofer suggests a § 112, ¶ 6 analysis may not be necessary in this instance. (4/4/18 Tr. at 26:22-24)

specification in some instances describes transmitters focused on space diversity without reference to the delay stage, providing that, “by means of the provision of two transmitters, i.e., the first satellite 140a and the second satellite 140b, space diversity or spatial diversity is implemented into the inventive transmission receiving system.” (4/4/18 Tr. at 52:3-8; ‘289 patent, col. 8:42-45) Although Figure 2 incorporates a delay stage in its illustration of a preferred embodiment, nothing in the written description pertaining to Figure 2 requires that the delay stage be part of the transmitters in all cases. (‘289 patent, Fig. 2; col. 8:12-14)

SXM’s proposed construction identifying the “delay stage” as a required component of the claimed transmitter also violates the doctrine of claim differentiation. Dependent claim 5 provides that the transmitter of independent claim 2 “further includes delay means for delaying the second portion of output bits transmitted via the second channel such that time diversity is obtained.” (‘289 patent, col. 14:15-18) However, independent claim 2 does not identify the delay stage as a required component of the transmitter. Applying SXM’s proposed construction, and interpreting claim 2 to include the requirement of a delay stage, would therefore render dependent claim 5 wholly duplicative of independent claim 2. *See Andersen Corp. v. Fiber Composites, LLC*, 474 F.3d 1361, 1369 (Fed. Cir. 2007) (stating that “different words or phrases used in separate claims are presumed to indicate that the claims have different meanings and scopes.”); *Wenger Mfg., Inc. v. Coating Machinery Sys., Inc.*, 239 F.3d 1225, 1233 (Fed. Cir. 2001) (“Under the doctrine of claim differentiation, each claim in a patent is presumptively different in scope.”).

The parties dispute whether the doctrine of claim differentiation applies to means-plus-function limitations. In *Wenger Manufacturing, Inc. v. Coating Machinery Systems, Inc.*, the Federal Circuit addressed this issue and concluded that,

[a]lthough the judicially created doctrine of claim differentiation cannot override the statutory requirements of § 112, ¶ 6 . . . it does not necessarily follow that means-plus-function limitations must be interpreted without regard to other claims. Claim differentiation . . . is clearly applicable when there is a dispute over whether a limitation found in a dependent claim should be read into an independent claim, and that limitation is the only meaningful difference between the two claims.

239 F.3d 1225, 1233 (Fed. Cir. 2001). The Federal Circuit directly addressed its prior ruling in *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1538 (Fed. Cir. 1991), which observed that “one cannot escape [the] mandate [of § 112, ¶ 6] by merely adding a claim or claims specifically reciting such structure or structures.” *Id.* at 1234 (internal quotation marks omitted). While recognizing that “the stringencies of a means-plus-function limitation are not to be avoided by the mere addition of a dependent claim that recites the corresponding structure disclosed in the specification,” the *Wenger* court emphasized that “*Laitram* does not stand for the broader proposition . . . that a means-plus-function limitation must be interpreted without regard to other claims.” *Id.* Specifically, the Federal Circuit noted that “the examination of other claims in a patent may provide guidance and context for interpreting a disputed means-plus-function limitation, especially if they recite additional functions.” *Id.*

Similar to the circumstances before the court in *Wenger*, dependent claim 5 of the '289 patent recites the additional function of “delaying the second portion of output bits transmitted via the second channel such that time diversity is obtained.” ('289 patent, col. 14:16-18; 4/4/18 Tr. at 32:2-18) Consequently, application of the doctrine of claim differentiation to the means-plus-function limitation at issue is appropriate in this instance. As previously discussed, the specification identifies the corresponding structure for the “means for transmitting” term as two transmitters. ('289 patent, col. 8:12-14) Thus, this case does not present the circumstance

cautioned against in *Laitram* in which the drafter attempted to avoid the requirement that the structure be identified in the specification by instead incorporating it into a dependent claim.

For the foregoing reasons, I recommend that the court adopt Fraunhofer's proposed construction of the "means for transmitting" term.

2. "the step of transmitting being carried out by a first transmitter and a second transmitter spaced apart from the first transmitter" ('289 patent, claim 19)

Fraunhofer	SXM	Court
Not subject to 35 U.S.C. § 112, ¶ 6	35 U.S.C. § 112, ¶ 6	Not subject to 35 U.S.C. § 112, ¶ 6
Definite	Indefinite	No construction required
No construction required	Alternative proposed construction: Function: sending one signal comprising a first portion of output bits via a first channel and a second signal comprising the second portion of output bits via a second channel, the second channel being spatially different from the first channel Structure: two transmitters consisting of (1) two satellites, (2) two terrestrial repeaters, or (3) a satellite and a terrestrial repeater, with one of the transmitter having a delay stage	

The parties disagree regarding whether this method claim term should be governed by § 112, ¶ 6 as a step-plus-function term and, if so, what accompanying structure is disclosed in the specification. According to Fraunhofer, the term is presumptively not a step-plus-function claim term because it does not include the words "step for." (D.I. 116 at 6) In response, SXM alleges

that § 112, ¶ 6 applies, notwithstanding the language used, because the claim term fails to recite sufficiently definite structure for performing the claimed function. (D.I. 115 at 8)

I recommend that the court adopt Fraunhofer's proposed construction. Contrary to SXM's arguments in favor of its proposed construction, the Federal Circuit has held that method claims should not be construed pursuant to § 112, ¶ 6 simply because they have "essentially the same language as" a means-plus-function apparatus claim. *O.I. Corp. v. Tekmar Co.*, 115 F.3d 1576, 1583 (Fed. Cir. 1997). Instead, "[e]ach claim must be independently reviewed in order to determine if it is subject to the requirements of section 112, ¶ 6." *Id.* Thus, SXM's efforts to blur the distinction between claim 2 and claim 19 are insufficient to invoke § 112, ¶ 6 in construing claim 19.

In method claims, the words "step for" signal the patentee's intent to invoke § 112, ¶ 6, but even then, step-plus-function claiming under § 112, ¶ 6 only applies if "steps plus function *without acts* are present." *Masco Corp. v. United States*, 303 F.3d 1316, 1326 (Fed. Cir. 2002) (citing *Greenberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580, 1583 (Fed. Cir. 1996); *O.I. Corp.*, 115 F.3d at 1582). "[A]n element in a combination method or process claim may be recited as a step for performing a specified function without the recital of acts in support of the function." *O.I. Corp.*, 115 F.3d at 1583. The language of claim 19 in the '289 patent does not give rise to a presumption of step-plus-function claiming in light of the Federal Circuit's holding that the "step of" language, as in the claim term before the court, is not equivalent to the "step for" language required for application of the presumption under § 112, ¶ 6. *See Masco*, 303 F.3d at 1326-27 ("Neither of these claims employs the 'step for' language that signals the drafter's intent to invoke § 112, paragraph 6; rather, the claims employ the term 'steps of.' Thus, there is no presumption that these limitations are in step-plus-function format.").

Moreover, SXM has failed to demonstrate that § 112, ¶ 6 should apply in the absence of the presumption. Similar to the circumstances in *Masco*, the language of claim 19 conveys the affirmative act of “transmitting,” further establishing that § 112, ¶ 6 does not apply. *Id.* at 1328 (“ ‘[T]ransmitting’ . . . is an act, since it describes how the function of the ‘transmitting a force’ limitation is accomplished.”). SXM’s reliance on the Federal Circuit’s decision in *Seal-Flex, Inc. v. Athletic Track & Court Construction* is misplaced where, as here, the method claim element recites acts for performing the underlying function. 172 F.3d 836, 849-50 (Fed. Cir. 1999).

SXM also contends that, even if the “step of transmitting” term in claim 19 is not subject to § 112, ¶ 6, a delay stage should be part of the construction because the specification is clear that the “present invention” requires use of a delay stage. (D.I. 115 at 8-9) (citing *Verizon Servs. Corp. v. Vonage Holdings Corp.*, 503 F.3d 1295, 1308 (Fed. Cir. 2007) and *Honeywell Int’l, Inc. v. ITT Indus.*, 452 F.3d 1312, 1318-19 (Fed. Cir. 2006)). However, as discussed in the analysis set forth at § IV.A.1, *supra*, the incorporation of a requirement for a delay stage in the manner advocated by SXM would be inconsistent with other portions of the specification. Where, as here, “other portions of the intrinsic evidence do not support applying the limitation to the entire patent,” the Federal Circuit has held that “use of the phrase ‘present invention’ or ‘this invention’ is not always so limiting.” *Absolute Software, Inc. v. Stealth Signal, Inc.*, 659 F.3d 1121, 1136 (Fed. Cir. 2011).

For these reasons, I recommend that the court adopt Fraunhofer’s proposed construction.

3. “receiving means for receiving the first portion of bits via a first channel and the second portion of bits via a second channel” (’289 patent, claims 10, 13)

Fraunhofer	SXM	Court
<p>Function: receiving the first portion of bits via a first channel and the second portion of bits via a second channel</p> <p>Structure: a receiver</p>	<p>35 U.S.C. § 112, ¶ 6</p> <p>Function: receiving a first signal comprising a first portion of bits via a first channel and a second signal comprising a second portion of bits via a second channel</p> <p>Structure: a terrestrial receiver with a delay stage that may be configured to buffer the portion of bits received via one channel relative to the portion of bits received from the second channel to compensate for the delay imposed by the delay stage in the transmitter on the portion of bits received via the second channel</p>	<p>Function: receiving the first portion of bits via a first channel and the second portion of bits via a second channel</p> <p>Structure: a receiver</p>

The parties agree that the disputed term is governed by § 112, ¶ 6. The parties’ revised joint claim construction chart reflects that the parties do not fully agree on the claimed function of the term. (D.I. 112 at 3) Despite certain differences between the proposals, SXM indicates in its opening brief that the parties “further agree on the function – i.e., for receiving the bits of information.” (D.I. 115 at 9) In its responsive brief, SXM accuses Fraunhofer of seeking “to confuse the issue by erroneously claiming that the parties have a substantive dispute over the claimed function – they do not.” (D.I. 136 at 5-6) During oral argument, counsel for Fraunhofer characterized the additional language in SXM’s proposed function as “superfluous,” and counsel for SXM reiterated that the additional language in its proposed function was “not the meat of the

dispute here,” and was intended to clarify the claim language for the court and the jury. (4/4/18 Tr. at 68:24-69:5; 73:9-18)

I recommend that the court adopt Fraunhofer’s proposed function because it is consistent with the claim language. Claims 10 and 13 of the ’289 patent require a “receiving means for receiving the first portion of bits via a first channel and the second portion of bits via a second channel, the second channel being spatially different from the first channel.” (’289 patent, col. 15:44-46; col. 16:11-13) SXM’s proposed function modifies the claim language by referencing “signals” without including specific citations to the intrinsic record in support of the modification.

Turning to the corresponding structure of the limitation, I recommend that the court adopt Fraunhofer’s proposed structure, which is consistent with the intrinsic record. The parties both identify the structure as a receiver. The parties’ primary dispute centers on whether the corresponding structure necessarily incorporates a “delay stage” configured in accordance with a specific algorithm. (D.I. 112 at 3) For the reasons previously stated at § IV.A.1, *supra*, the court declines to recommend a construction including the “delay stage” requirement proposed by SXM. The specification identifies the corresponding structure for the receiving means as the receiver. (’289 patent, col. 8:16-20)

I recommend that the court decline to incorporate the algorithm cited by SXM as part of the corresponding structure. The relevant case authorities suggest that a court may only read an algorithm into the claims after making a threshold finding that the terms are computer-implemented by a generic computer or microprocessor. *See Mobile Telecommc’ns Techs., LLC v. LG Elecs. Mobilecomm USA, Inc.*, 2015 WL 2250418 (E.D. Tex. May 13, 2015) (declining to incorporate an algorithm into the corresponding structure where the specification linked the

claimed function to a receiver instead of a general purpose computer). The “receiver” structure corresponding to the disputed claim term in this instance does not appear to constitute a general purpose computer or microprocessor. *See WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999) (“In a means-plus-function claim, in which the disclosed structure is a computer, or microprocessor, programmed to carry out an algorithm, the disclosed structure is not the general purpose computer but rather the special purpose computer programmed to perform the claimed algorithm.”). Consequently, I recommend that the court adopt Fraunhofer’s proposed construction.

4. “channel” (’289 patent, claims 1, 2, 3, 5, 6, 9, 10, 11, 13, 14, 17, 18, 19, 20, 22, 23, 26, 27, 28, 30, 31, 32, 35)

Fraunhofer	SXM	Court
No construction required Alternatively: communication link or connection between two or more points, such as an uplink and/or downlink	a line of sight connection between a transmitter and a receiver	a line of sight connection between a transmitter and a receiver

I recommend that the court adopt SXM’s proposed construction. SXM’s proposal is consistent with the definitional language set forth in the specification, which expressly states that, “[a]s usual, a channel between the transmitter and the receiver is defined by the line of sight connection between the transmitter and the receiver.” (’289 patent, col. 7:60-62) In describing the background of the invention, the specification reiterates that “a channel between a sender, e.g., a satellite, and a receiver, i.e. a mobile or stationary receiver, is characterized by the line of visual contact (line of sight) between the sender and the receiver.” (’289 patent, col. 1:19-23) The description of the prior art further supports SXM’s contention that its proposed construction of “channel” is consistent with the understanding of a person of ordinary skill in the art: “The first channel is defined by the line of sight between the first transmitter and the receiver . . .

whereas the second channel is defined by the line of sight between the second transmitter 66b and the car that comprises the receiving section 70.” (’289 patent, col. 2:37-41) The specification offers no alternative means of connection in the transmission of satellite radio signals.

Fraunhofer asks the court to reject SXM’s proposal, alleging that it would render independent claims 2 and 19 more narrow than dependent claims 3 and 20. (D.I. 116 at 5) However, the language of claims 3 and 20 further narrows the term “channel” even under SXM’s construction.⁵ Dependent claim 3 defines the term “channel” as follows: “the first channel is defined by an uplink connection from earth to the first satellite and a downlink connection from the first satellite to a receiver on earth, and such that the second channel is defined by a [sic] uplink connection from earth to the second satellite and a downlink connection from the second satellite to the receiver on earth.” (’289 patent, col. 14:3-9) Thus, claim 3 addresses a more specific situation than the usage of the term in the independent claim, because the channel in claim 3 adds a second component between an uplink and a satellite. Fraunhofer offers no explanation as to how this additional detail precludes the use of a line of sight connection between two points.

B. The ’1084 Patent

The ’1084 patent, entitled “Differential Coding and Carrier Recovery for Multicarrier Systems,” relates to a method and apparatus for performing modulation and de-modulation in multi-carrier modulation (“MCM”) systems. (’1084 patent, col. 1:8-10) The method and apparatus of the ’1084 patent perform an echo phase offset correction when decoding

⁵ Moreover, incorporating the definitional language of dependent claim 3 into independent claim 2 would present issues regarding the doctrine of claim differentiation.

information encoded onto carriers of MCM symbols in MCM systems. ('1084 patent, col. 1:13-17)

1. “symbol” ('1084 patent, claims 1, 9)

Fraunhofer	SXM	Court
encoded representation of binary information	a component of a received signal that has an absolute value, i.e. magnitude, and a phase; the symbol may be represented by a complex vector that has a real part and an imaginary part	encoded representation of binary information

I recommend that the court adopt Fraunhofer’s proposed construction, which is consistent with the intrinsic record. The specification characterizes symbols as representations of binary information, explaining that “[i]n a MCM transmission system binary information is represented in the form of a complex spectrum, i.e. a distinct number of complex subcarrier symbols in the frequency domain.” ('1084 patent, col. 1:30-33) The specification further describes the “information of a MCM symbol” as being “encoded between active carriers, respectively.” (*Id.*, col. 7:31-32) Thus, Fraunhofer’s proposed construction provides additional clarification of the claim term in a manner that is consistent with the specification and not redundant of the claim language.

SXM’s proposal includes definitional language that is redundant of language in the claims and improperly imports limitations from the specification in a manner inconsistent with the use of the term in the intrinsic record. For example, the “absolute value” concept appears in the express language of the claim: “A method of performing an echo phase offset correction . . . further comprising a step of comparing an absolute value of a symbol associated with a respective decoded phase shift with a threshold, wherein only phase shifts having associated

therewith symbols having an absolute value exceeding said threshold are used in said step of averaging said echo phase offsets.” (’1084 patent, col. 15:16-35) Incorporating the term “absolute value” into the definition of the claim term, in accordance with SXM’s proposal, would therefore be redundant. *See Symantec Corp. v. Acronis, Inc.*, 2013 WL 752472, at *2 (N.D. Cal. Feb. 27, 2013) (declining to adopt the plaintiff’s proposed construction “because it is redundant given the surrounding words of the claim—that is, the surrounding claim language already specifies that the intermediate storage device stores data storage blocks prior to storage on the backup storage device.”). The same is true of the “phase” language. (4/4/18 Tr. at 142:13-17)

SXM’s proposed construction also attempts to alter the “and/or” phraseology used in conjunction with the “phase modulation” by omitting the “or.” The effect of SXM’s proposal is to define “phase” as a required component of the symbol, in contravention of the consistent use of the “and/or” language in the ’1084 patent’s specification. (’1084 patent, col. 2:29-40; col. 2:50-55) Given that this restriction is contradicted by the express language in the specification, I recommend that the court reject SXM’s proposed construction.

SXM also fails to provide adequate support for its description of the symbol as being represented by a complex vector. As suggested by Fraunhofer, the use of the word “complex” to modify “symbol” in portions of the specification suggests that references to a “symbol” by itself do not require the symbol to be a complex vector. (D.I. 116 at 11; ’1084 patent, col. 1:32; col. 7:55-56; col. 8:28-29; col. 10:62) In its brief, SXM contends that “a symbol can be represented by a complex number/vector.” (D.I. 115 at 14) SXM’s proposed construction uses similarly permissive language, explaining that “the symbol may be represented by a complex vector.” SXM thus appears to concede that the specification does not require the claimed symbol to be a

complex vector. Its efforts to nonetheless import the word “complex” as a definitional modifier of the term “symbol” are likely to introduce ambiguity to the claim language under the circumstances. For these reasons, I recommend that the court adopt Fraunhofer’s proposed construction.

2. “a phase difference between simultaneous carriers having different frequencies” (’1084 patent, claims 1, 4, 9, 12)

Fraunhofer	SXM	Court
No construction required Alternatively: a phase difference between subcarriers with different frequencies in the same MCM symbol	the difference in the phase of two symbols on adjacent carriers on different frequencies	a phase difference between subcarriers with different frequencies in the same MCM symbol

I recommend that the court adopt Fraunhofer’s proposed alternative construction, which is consistent with the intrinsic record. The specification provides that, “[w]hen using non-differential mapping the information carried on a sub-carrier is independent of information transmitted on any other subcarrier, and the other subcarrier may differ either in frequency, i.e. the same MCM symbol, or in time, i.e. adjacent MCM symbols.” (’1084 patent, col. 2:64-3:2; Fig. 1) Fraunhofer’s proposed construction thus clarifies that “simultaneous carriers” are subcarriers in the same MCM symbol.

SXM’s proposal improperly imports limitations from the specification into the claim language, and violates the doctrine of claim differentiation. Nothing in the specification requires that the claimed subcarriers must be “adjacent” in frequency, so long as the carriers have “different frequencies.”⁶ (’1084 patent, col. 5:47-48) The requirement for adjacency appears in

⁶ In support of its inclusion of an adjacency requirement, SXM cites a portion of the specification describing “a phase offset between two neighboring symbols” which remains “[a]fter differential

dependent claim 2, which requires that the “step of differential phase decoding comprises the step of differential phase decoding phase shifts based on a phase difference between simultaneous carriers which are adjacent in the frequency axis direction.” (’1084 patent, col. 15:36-40) To incorporate the adjacency requirement of the dependent claims into the language of independent claim 1 would therefore violate the doctrine of claim differentiation. *See Phillips*, 415 F.3d at 1315 (“[T]he presence of a dependent claim that adds a particular limitation gives rise to a presumption that the limitation in question is not present in the independent claim.”). Consequently, I recommend that the court adopt Fraunhofer’s proposed construction of the term.

3. “means for determining an echo phase offset for each decoded phase shift comprising means for eliminating phase shift uncertainties related to the transmitted information from said decoded phase shift” (’1084 patent, claim 9)

Fraunhofer	SXM	Court
Definite	35 U.S.C. § 112, ¶ 6	(determining an echo phase offset)
(determining an echo phase offset)	Indefinite	Function: determining an echo phase offset for each decoded phase shift
Function: determining an echo phase offset for each decoded phase shift	Alternative proposed construction:	Structure: a discarding unit and a computing unit in an MCM receiver
Structure: a discarding unit and a computing unit in an MCM receiver	Function: determining an echo phase offset for each decoded phase shift by eliminating phase shift uncertainties related to the transmitted information from said decoded phase shift	(eliminating phase shift uncertainties)
(eliminating phase shift uncertainties)	Structure: a discarding unit that performs a (1) “(.)”	Function: eliminating phase shift uncertainties related to the transmitted information from said decoded phase shift
Function: eliminating phase shift uncertainties related to		

demapping in the frequency axis direction at the receiver.” (’1084 patent, col. 6:31-33) However, SXM fails to establish that this limitation must be present in all embodiments of the claimed invention. (4/4/18 Tr. at 149:14-18)

the transmitted information from said decoded phase shift	operation, or (2) modulo-4 operation	Structure: a discarding unit in an MCM receiver
Structure: a discarding unit in an MCM receiver		

The parties agree that the disputed term is governed by § 112, ¶ 6. Despite certain differences between the parties' proposals regarding the claimed function in the joint claim construction chart, counsel represented at oral argument that the parties essentially agree on the claimed function. (D.I. 112 at 4-5; 4/4/18 Tr. at 158:14-19) With respect to the corresponding structure, the parties further agree that the "discarding unit" performs the function of "eliminating phase shift uncertainties." However, Fraunhofer contends that the algorithm included in SXM's proposed construction is unnecessary because the discarding unit is not a general purpose computer or microprocessor programmed to carry out an algorithm. (4/4/18 Tr. at 167:4-168:5)

I recommend that the court adopt Fraunhofer's proposed structure for the "means for determining an echo phase offset" term because it is consistent with the intrinsic record. The specification explains:

From the output of the de-mapper 142 which contains an echo phase offset as shown for example in FIG. 3A, the phase shifts related to transmitted information must first be discarded. To this end, the output of the de-mapper 142 is applied to a discarding unit 500. In case of a DQPSK mapping, the discarding unit can perform a "(.)⁴" operation. The unit 500 projects all received symbols into the first quadrant. Therefore, the phase shifts related to transmitted information is eliminated from the phase shifts representing the subcarrier symbols. The same effect could be reached with a modulo-4 operation.

(1084 patent, col. 10:3-14) This passage identifies the discarding unit as the required structure to perform the claimed function. Although the passage also identifies the algorithms cited by SXM in support of its proposed construction, the passage describes each of those algorithms in permissive terms. (*Id.*) (explaining that "the discarding unit can perform a "(.)⁴" operation

The same effect could be reached with a modulo-4 operation.”). “[A] court may not import functional limitations that are not recited in the claim, or structural limitations from the written description that are unnecessary to perform the claimed function.” *Wenger Mfg., Inc. v. Coating Machinery Sys., Inc.*, 239 F.3d 1225, 1233 (Fed. Cir. 2001) (citing *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999)); see also *JVW Enters., Inc. v. Interact Access., Inc.*, 424 F.3d 1324, 1330-31 (Fed. Cir. 2005). Because nothing in the specification suggests that the algorithms cited by SXM are required to perform the claimed function, the court cannot properly import these limitations from the specification into the claim language.

SXM has not adequately established that the discarding unit and computing unit referenced in Fraunhofer’s proposed corresponding structure are general purpose computers or microprocessors. The specification provides that the discarding unit forms a specific function. (’1084 patent, col. 10:3-7) The specification further links the “computing unit” to the claimed function of “determining an echo phase offset,” explaining how the absolute value and the argument of a differentially decoded symbol is computed following the discarding unit. (’1084 patent, col. 10:15-31) The specification does not indicate that the algorithms are required to perform the recited function, as indicated by the permissive language used in discussing the algorithms. See *Mobile Telecommc’ns Techs., LLC v. LG Elecs. Mobilecomm USA, Inc.*, 2015 WL 2250418 (E.D. Tex. May 13, 2015) (declining to incorporate an algorithm into the corresponding structure where the specification linked the claimed function to a receiver instead of a general purpose computer). For these reasons, I recommend that the court adopt Fraunhofer’s proposed construction.

4. “means for correcting each decoded phase shift based on said averaged offset” (’1084 patent, claim 9)

Fraunhofer	SXM	Court
<p>Function: correcting each decoded phase shift based on said averaged phase offset</p> <p>Structure: a phase rotation unit in an MCM receiver</p>	<p>35 U.S.C. § 112, ¶ 6</p> <p>Function: correcting each decoded phase shift based on the mean offset</p> <p>Structure: a phase rotation unit connected to a hold unit that corrects each decoded phase shift using the mean offset by performing the calculation</p> $v'_k = v_k \cdot e^{-j\theta}$ <p>where v'_k designates the K phase corrected differently decoded symbols for the input into the soft-metric calculations, and v_k designates the input symbols</p> <p>Alternative proposed construction (for claim 1): correcting each decoded phase shift using the mean offset</p>	<p>Function: correcting each decoded phase shift based on said averaged phase offset</p> <p>Structure: a phase rotation unit in an MCM receiver</p>

The parties agree that the disputed term is governed by § 112, ¶ 6. The parties’ revised joint claim construction chart reflects that the parties do not fully agree on the claimed function of the term. (D.I. 112 at 5) SXM indicated in its briefing and at oral argument that the average to be calculated is the mean value, in accordance with the specification. (D.I. 115 at 18; 4/4/18 Tr. at 178:11-179:8) I recommend that the court adopt Fraunhofer’s proposal for the claimed function, which more closely tracks the claim language “correcting each decoded phase shift based on said averaged phase offset.” (’1084 patent, col. 16:46-47) SXM has offered no proof

that the concepts of “average” and “mean” are universally equivalent and, in fact, the evidence suggests that “average” is a broader concept. (D.I. 138, Exs. D-E)

The parties also dispute the corresponding structure, as SXM again seeks to incorporate an algorithm into the claim limitation. Similar to the dispute regarding the previous term, there is no evidence or support for the notion that a “phase rotation unit in an MCM receiver” is a general-purpose computer or processor. Moreover, the equation cited by SXM is described as a “first embodiment” in the specification, and it would therefore be improper to import the limitation from the specification into the claims. (’1084 patent, col. 10:1-2) For these reasons, I recommend that the court adopt Fraunhofer’s proposed construction.

C. The ’3084 Patent

The ’3084 patent, entitled “Coarse Frequency Synchronisation in Multicarrier Systems,” is directed to a method and apparatus for generating a signal having a frame structure, and detection of amplitude-modulated reference symbols. (’3084 patent, Abstract; col. 1:6-12) Frame synchronization is a process whereby a communication system that transmits and receives information in frames can determine where a frame begins to process the transmitted information. (D.I. 117 at ¶¶ 112-119) In the ’3084 patent, a signal is generated that includes a reference symbol that is known by the receiver and is part of the transmitted frame structure. (’3084 patent, col. 4:18-23) When the receiver obtains the transmitted signal with the frames and identifies the known reference symbol, frame synchronization is achieved and further processing may be performed by the receiver to process the transmitted information. (’3084 patent, col. 2:3-8; 6:55-8:50)

1. [preambles] ('3084 patent, claims 1, 6, 9, 18, 24, 28, 32, 41)

Fraunhofer	SXM	Court
Preambles of independent claims are limiting	Preambles are limiting except for the portions reciting multi-carrier modulated signal.	Preambles are limiting except for the portions reciting multi-carrier modulated signal.

I recommend that the court adopt SXM's proposal, and conclude that the preambles of the independent claims are limiting except with respect to the phrase "multi-carrier modulated signal" in claims 6 and 28 of the '3084 patent. (4/4/18 Tr. at 137:10-18) The Federal Circuit has held that a preamble is not limiting if it states "a purpose or intended use for the invention," and the body of the claim "defines a structurally complete invention." *Poly-Am., L.P. v. GSE Lining Tech., Inc.*, 383 F.3d 1303, 1310 (Fed. Cir. 2004) (quoting *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). However, the preamble may limit the claim "if it recites essential structure or steps, or if it is 'necessary to give life, meaning, and vitality' to the claim." *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)).

The reference to "generating a multi-carrier modulated signal" in the preamble of claims 6 and 28 does not give life, meaning, and vitality to the claim in this instance. The law is well-established that a preamble is limiting when limitations in the body of the claim rely upon and derive antecedent basis from the preamble. *See Eaton Corp. v. Rockwell Int'l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003) ("When limitations in the body of the claim rely upon and derive antecedent basis from the preamble, then the preamble may act as a necessary component of the claimed invention."). The references to a "multi-carrier modulated signal" in the preambles of independent claims 6 and 28 provide an antecedent basis for the corresponding dependent claims 7 and 29, which explain that "said multi-carrier modulated signal is an orthogonal frequency

division multiplex signal.” (’3084 patent, col. 16:23-25; col. 18:62-64) However, the bodies of independent claims 6 and 28 do not refer to a “multi-carrier modulated signal.” Consequently, the preamble language does not provide an antecedent basis for anything within independent claims 6 or 28. *See Graphics Properties Holdings, Inc. v. ASUS Computer Int’l, Inc.*, C.A. No. 12-210-LPS *et al.*, 2014 WL 4929340, at *17 (D. Del. Sept. 29, 2014) (concluding that language appearing only in the preamble, and not the body of the asserted claim, “does not necessarily limit the claim.”) (citing *Aspex Eyewear, Inc. v. Marchon Eyewear, Inc.*, 672 F.3d 1335, 1347 (Fed. Cir. 2012) (holding that, “as a general rule[,] preamble language is not treated as limiting.”)).

Fraunhofer cites no authority in support of its argument that the recitation of a “multi-carrier modulated signal” in the preamble may provide the antecedent basis for references to a “multi-carrier modulated symbol” in the body of independent claims 6 and 28. For these reasons, I recommend that the court adopt SXM’s proposal.

2. “generating said reference symbol by performing an amplitude modulation of a bit sequence, an envelope of the amplitude modulated bit sequence defining a reference pattern of said reference symbol” (’3084 patent, claim 6)

Fraunhofer	SXM	Court
Definite	35 U.S.C. § 112, ¶ 6	Definite
Not subject to 35 U.S.C. § 112, ¶ 6	Indefinite	Not subject to 35 U.S.C. § 112, ¶ 6
No construction required	Alternative proposed construction: Function: generating a reference symbol Structure: a binary array of length 92 stored in memory with the sequence	No construction required

```

hin = [0 1 1 0 1 1 0 1 0 1 1 0 1 0 1 0
       0 0 1 1 1 0 0 0 0 0 0 0 0 1 1 0
       1 1 1 1 1 0 0 0 1 1 1 0 0 0 0 0
       0 0 1 1 1 0 1 1 1 0 0 1 1 0 1 1
       1 0 1 1 0 1 0 1 0 1 1 0 1 1 0 1
       1 0 1 0 0 0 0 1 0 1 1 0]

```

with a modulator to convert this array into a second array of length 92 stored in memory with values

```

i_q = [0.5 1.5 1.5 0.5 1.5 1.5 0.5 1.5 0.5 1.5 1.5 0.5 1.5
       0.5 1.5 0.5 0.5 0.5 1.5 1.5 0.5 0.5 0.5 0.5 0.5
       0.5 0.5 0.5 1.5 1.5 0.5 1.5 1.5 1.5 1.5 0.5 0.5
       0.5 1.5 1.5 1.5 0.5 0.5 0.5 0.5 0.5 0.5 1.5 1.5
       1.5 0.5 1.5 1.5 1.5 0.5 0.5 1.5 1.5 0.5 1.5 1.5
       0.5 1.5 0.5 0.5 1.5 0.5 1.5 0.5 1.5 1.5 0.5 1.5
       0.5 1.5 0.5 1.5 0.5 0.5 0.5 0.5 1.5 0.5 1.5 0.5]

```

an interpolator to convert the second array into a third array i_q_int of length 184 stored in memory with values

```

i_q_int = [0.0000 1.0000 1.0000 1.7071 1.5000 0.8708 0.9403
           0.8971 1.0000 1.7017 1.5000 0.8108 0.5000 1.0502
           0.5000 1.0000 0.5000 0.8108 1.5000 1.7017 1.5000
           0.8108 0.5000 1.0000 1.5000 1.5000 0.5000 0.9403
           0.5000 1.1424 0.5000 0.7825 1.5000 0.4209 0.5000
           0.0000 1.5000 1.5000 1.5000 1.5000 1.5000 1.0000
           0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000
           0.5000 0.5000 0.4000 1.5000 0.5000 0.5000 0.5000
           0.5000 0.5000 1.5000 1.7512 1.5000 0.8571 0.5000
           0.5000 1.5000 1.6471 1.5000 0.4000 1.5000 1.4777
           1.5000 1.0000 1.5000 0.5000 0.5000 0.4226 0.5000
           0.4226 0.5000 0.5000 1.5000 1.5000 1.5000 1.5000
           1.5000 1.0000 0.5000 0.5000 0.5000 0.5000 0.5000
           0.5000 1.0000 1.5000 1.5000 1.5000 1.0000 1.5000
           0.5000 0.5000 0.5000 1.5000 1.0000 1.0000 1.5000
           1.5000 1.0000 0.5000 0.5000 0.5000 0.5000 1.5000
           1.7154 1.5000 0.5000 0.5000 0.5000 1.5000 1.5000
           0.5000 1.6028 1.5000 0.5000 0.5000 0.5000 1.5000
           1.7017 1.5000 0.8108 0.5000 1.5000 1.5000 0.5000
           0.5000 0.5000 1.5000 1.5000 0.5000 0.8108 1.5000
           1.7017 1.5000 0.8571 0.5000 0.5000 0.5000 1.5000
           1.5000 0.5000 1.0000 1.5000 1.1424 0.5000 0.5000
           0.5000 0.5000 1.5000 1.5000 1.5000 1.5000 0.5000
           0.5000]

```

and a computing device for computing the amplitude of the reference symbol by performing the calculation

$$amp_int = i_q_int + j * i_q_int$$

	with amp_int being the reference symbol inserted periodically into the signal after the guard interval insertion	
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I recommend that the court adopt Fraunhofer’s proposal and conclude that no construction is necessary. This result is supported by the intrinsic evidence. There is no presumption that § 112, ¶ 6 applies because the claim language does not use the “step for” signal words that would otherwise give rise to the presumption, and it explicitly recites the act of “generating.” See *Masco Corp. v. U.S.*, 303 F.3d 1316, 1327 (Fed. Cir. 2002); *St. Clair Intellectual Property Consultants, Inc. v. Canon, Inc.*, 2004 WL 1941340, at *26 (D. Del. Aug. 31, 2004) (declining to construe the term in step-plus-function format where the claim did not use the words “step for,” and “recite[d] the definite act of ‘generating an analog image signal . . .’”). The claim term on its face explains how the reference symbol is generated via “amplitude modulation of a bit sequence, an envelope of the amplitude modulated bit sequence defining a reference pattern of said reference symbol.” (’3084 patent, col. 16:11-14)

SXM attempts to import an algorithm into the claim language that is only associated with a preferred embodiment, even though the specification does not limit the invention to those sequences. (’3084 patent, col. 14:11-67; 4/4/18 Tr. at 90:18-91:12) The intrinsic record does not require the incorporation of this algorithm into all embodiments for performing the claimed function. SXM instead relies on its expert’s declaration and testimony in support of its argument that a generic amplitude modulator cannot perform the claimed functionality without the associated algorithm from the specification. (D.I. 117 at ¶¶ 120-130; D.I. 148, Ex. A at 192:17-193:10) However, the court cannot properly incorporate limitations into the claims based only on a preferred embodiment and expert testimony, which is considered less reliable than intrinsic evidence in the claim construction framework. See *Phillips*, 415 F.3d at 1318 (“We have viewed

extrinsic evidence in general as less reliable than the patent and its prosecution history in determining how to read claim terms [E]xtrinsic evidence consisting of expert reports and testimony is generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in intrinsic evidence.”). This is particularly true where, as here, the expert testimony represented that the claims were not required to be performed on a general purpose computer or processor, and affirmatively stated that other bit sequences could satisfy the claims. (D.I. 148, Ex. A at 202:21-203:7; 226:5-11)

3. “means for generating said reference symbol comprising an amplitude modulator for performing an amplitude modulation of a bit sequence” ('3084 patent, claim 28)

Fraunhofer	SXM	Court
Definite	35 U.S.C. § 112, ¶ 6	Not subject to 35 U.S.C. § 112, ¶ 6
Not subject to 35 U.S.C. § 112, ¶ 6	Indefinite	
Alternatively,	Alternative proposed construction:	
Function: generating said reference symbol	Function: generating a reference symbol	
Structure: an amplitude modulator in an MCM transmitter	Structure: a binary array of length 92 stored in memory with the sequence $h_{in} = \begin{bmatrix} 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 0 & 1 & 1 & 0 & 1 & 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$ with a modulator to convert this array into a second array of length 92 stored in memory with values $l_{in} = \begin{bmatrix} 0.5 & 1.5 & 1.5 & 0.5 & 1.5 & 1.5 & 0.5 & 1.5 & 0.5 & 1.5 & 1.5 & 0.5 & 1.5 \\ 0.5 & 1.5 & 0.5 & 0.5 & 0.5 & 1.5 & 1.5 & 1.5 & 0.5 & 0.5 & 0.5 & 0.5 & 0.5 \\ 0.5 & 0.5 & 0.5 & 1.5 & 1.5 & 0.5 & 1.5 & 1.5 & 1.5 & 1.5 & 0.5 & 0.5 & 0.5 \\ 0.5 & 1.5 & 1.5 & 1.5 & 0.5 & 0.5 & 0.5 & 0.5 & 0.5 & 0.5 & 0.5 & 1.5 & 1.5 \\ 1.5 & 0.5 & 1.5 & 1.5 & 1.5 & 0.5 & 0.5 & 1.5 & 1.5 & 0.5 & 1.5 & 1.5 & 1.5 \\ 0.5 & 1.5 & 0.5 & 0.5 & 1.5 & 0.5 & 1.5 & 0.5 & 1.5 & 1.5 & 0.5 & 1.5 & 1.5 \\ 0.5 & 1.5 & 0.5 & 1.5 & 0.5 & 0.5 & 0.5 & 0.5 & 1.5 & 0.5 & 1.5 & 1.5 & 0.5 \end{bmatrix}$	

	<p>an interpolator to convert the second array into a third array i_q_int of length 184 stored in memory with values</p> <pre> i_q_int = [0.9000 1.0635 1.9000 1.7103 1.5000 0.8700 0.9000 0.5971 1.9000 1.7917 1.5000 0.8108 0.5000 1.0562 1.5000 1.0492 0.5000 0.8100 1.5000 1.5000 1.5000 0.5000 0.5000 1.0450 1.5000 0.5971 0.5000 0.0000 1.5000 1.1424 0.5000 0.2800 0.5000 0.4200 0.5000 0.5907 1.5000 1.5700 1.5000 1.5700 1.5000 1.0000 0.5000 0.5000 0.5000 0.5775 0.5000 0.4000 0.5000 0.4900 0.5000 0.4000 0.5000 0.5125 0.5000 0.5000 0.5000 0.5000 1.5000 1.7512 1.5000 0.8571 0.5000 0.5000 1.5000 1.6470 1.5000 0.4000 1.5000 1.4777 1.5000 1.0000 1.5000 0.5070 0.5000 0.4000 0.5000 0.4220 0.5000 0.5000 1.5000 1.5700 1.5000 1.5700 1.5000 1.0000 0.5000 0.3800 0.5000 0.5125 0.5000 0.4000 0.5000 0.4000 0.5000 0.5125 0.5000 0.5000 0.5000 1.0000 1.5000 1.5000 1.5000 1.0000 1.5000 0.5000 0.5000 0.5000 1.5000 1.0000 1.5000 1.5000 1.5000 1.0000 0.5000 0.2800 0.5000 0.5000 1.5000 1.7151 1.5000 0.5000 0.5000 0.5000 1.5000 1.6000 1.5000 1.0000 1.5000 0.5000 0.5000 0.5000 1.5000 1.7017 1.5000 0.8108 0.5000 1.3400 1.5000 0.5000 0.5000 0.5000 1.5000 1.0400 0.5000 0.8100 1.5000 1.7017 1.5000 0.5000 0.5000 0.5000 1.5000 1.7000 1.5000 0.5000 0.5000 0.5000 1.5000 1.7017 1.5000 0.8170 0.5000 1.0000 1.5000 1.1424 0.5000 0.5000 0.5000 0.5700 0.5000 0.3400 0.5000 1.1424 1.5000 1.0000 0.0000 1.5000 1.1200 0.5000 1.0000 0.5000 0.5000]</pre> <p>and a computing device for computing the amplitude of the reference symbol by performing the calculation</p> $amp_int = i_q_int + j * i_q_int$ <p>with amp_int being the reference symbol inserted periodically into the signal after the guard interval insertion</p>	
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I recommend that the court adopt Fraunhofer’s proposal that § 112, ¶ 6 does not apply in this instance, despite the presumption arising from the use of the “means for” language, because the claim itself recites sufficient structure to perform the claimed function. *See Net MoneyIN, Inc. v. Verisign, Inc.*, 545 F.3d 1359, 1366 (Fed. Cir. 2008) (“The presumption [of means-plus-function formatting] is rebutted, however, ‘if the claim itself recites sufficient structure to perform the claimed function.’” (quoting *Enviroco Corp. v. Clestra Cleanroom, Inc.*, 209 F.3d 1360, 1364 (Fed. Cir. 2000))). Specifically, claim 28 recites “an amplitude modulator” as the corresponding structure. (’3084 patent, col. 18:48-50) This result is consistent with the

specification, which explains that “the present invention provides an apparatus for generating a signal having a frame structure . . . the apparatus comprising an amplitude modulator for performing an amplitude modulation of a bit sequence” (’3084 patent, col. 5:38-44)

SXM’s proposal seeks to include additional detail to the corresponding structure by incorporating an algorithm from a preferred embodiment. (’3084 patent, col. 14:11-13; col. 7:12-14) The intrinsic record does not require the incorporation of this algorithm into all embodiments for performing the claimed function. SXM instead relies on its expert’s declaration and testimony in support of its argument that a generic amplitude modulator cannot perform the claimed functionality without the associated algorithm from the specification. (D.I. 117 at ¶¶ 120-130; D.I. 148, Ex. A at 192:17-193:10) However, the court cannot properly incorporate limitations into the claims based only on a preferred embodiment and expert testimony, which is considered less reliable than intrinsic evidence in the claim construction framework. *See Phillips*, 415 F.3d at 1318 (“We have viewed extrinsic evidence in general as less reliable than the patent and its prosecution history in determining how to read claim terms . . . [E]xtrinsic evidence consisting of expert reports and testimony is generated at the time of and for the purpose of litigation and thus can suffer from bias that is not present in intrinsic evidence.”). This is particularly true where, as here, the expert testimony represented that the claims were not required to be performed on a general purpose computer or processor, and affirmatively stated that other bit sequences could satisfy the claims. (D.I. 148, Ex. A at 202:21-203:7; 226:5-11; 4/4/18 Tr. at 93:5-17)

Fraunhofer has adequately established that the disclosed structure is not merely a general-purpose computer or microprocessor, but rather an amplitude modulator in an MCM transmitter. *See Mobile Telecommunications Techs., LLC v. LG Elecs. Mobilecomm USA, Inc.*, 2015 WL

2250418, at *17 (E.D. Tex. May 13, 2015) (“Because the specification links the claimed function to [the receiver, display and storage logic section, and display] rather than to a general-purpose computer, no algorithm is required.”). For these reasons, I recommend that the court adopt Fraunhofer’s proposal.

D. The ’997 Patent

The ’997 patent, entitled “Method and Apparatus for Fine Frequency Synchronization in Multi-Carrier Demodulation Systems,” discloses a mechanism for a receiver to correct “a frequency offset” that occurs during an MCM transmission that causes the phases of symbols to change or shift. (’997 patent, Abstract) The ’997 patent pertains to a method and apparatus for the detection and correction of desynchronization between transmitter and receiver oscillators. (’997 patent, col. 6:4-13)

1. [preambles] (’997 patent, claims 1, 4)

Fraunhofer	SXM	Court
Preambles of independent claims are limiting	Preambles of independent claims not limiting.	Preambles of independent claims are limiting

I recommend that the court adopt Fraunhofer’s proposal, which is consistent with the intrinsic record and the relevant case authorities. SXM alleges that the preambles of the independent claims are limiting except with respect to “each symbol being differentially coded in the direction of the frequency axis” in claim 1 of the ’997 patent, and “each symbol being defined by phase differences between simultaneous carriers having different frequencies” in claim 4 of the ’997 patent. (4/4/18 Tr. at 182:2-11) The parties’ dispute is focused on the distinction between the time domain and frequency domain, and the impact of statements made during prosecution of the ’997 patent on the significance of the disputed preamble language to the meaning of the claim.

The Federal Circuit has held that a preamble is not limiting if it states “a purpose or intended use for the invention,” and the body of the claim “defines a structurally complete invention.” *Poly-Am., L.P. v. GSE Lining Tech., Inc.*, 383 F.3d 1303, 1310 (Fed. Cir. 2004) (quoting *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997)). “Language in a claim preamble is of no significance to claim construction where the preamble does not limit the claim.” *Univ. of S. Fla., Bd. of Trustees v. United States*, 2018 WL 1981111, at *12 (Fed. Cl. Apr. 27, 2018) (citing *Schumer v. Lab. Computer Sys., Inc.*, 308 F.3d 1304, 1310 (Fed. Cir. 2002)). However, the preamble may limit the claim “if it recites essential structure or steps, or if it is ‘necessary to give life, meaning, and vitality’ to the claim.” *Catalina Mktg. Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (quoting *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305 (Fed. Cir. 1999)). “A preamble meets these requirements when the prosecution history reveals that its limitations were ‘patentably significant.’” *Kraft Food Grp. Brands LLC v. TC Heartland, LLC*, C.A. No. 14-028-LPS, 2016 WL 873435, at *10 (D. Del. Mar. 7, 2016) (citing *Marrin v. Griffin*, 599 F.3d 1290, 1294 (Fed. Cir. 2010)).

In the present case, the preambles of claims 1 and 4 of the ’997 patent recite essential structure and steps relied upon during prosecution to distinguish the prior art. (D.I. 112, Ex. E at 11; Ex. F at 7-8) Specifically, the patentee distinguished the present invention over the Ahn reference in part by explaining that “[t]he Ahn patent is silent regarding a differential coding in the direction of the frequency axis, that is, it is silent regarding signals having symbols being defined by phase differences between simultaneous carriers having different frequencies as defined in the independent claims of the present application.” (D.I. 112, Ex. E at 11) The language used by the patentee during prosecution mirrors the preamble’s reference to “each symbol being differentially coded in the direction of the frequency axis” in claim 1 of the ’997

patent. ('997 patent, col. 21:45-47) Similarly, the patentee distinguished the invention over the Gledhill prior art reference by stating that “[t]he Gledhill et al patent does not disclose or suggest providing an OFDM signal in which each symbol is defined by phase differences between simultaneous carriers having different frequencies.” (D.I. 112, Ex. F at 8) This statement corresponds with the preamble language of claim 4 of the '997 patent, which states “each symbol being defined by phase differences between simultaneous carriers having different frequencies.” ('997 patent, col. 22:21-24)

SXM cites no authority in support of its contention that the statements made during prosecution of the patent must form the basis of the examiner’s ultimate allowance if the preamble is to be construed as not limiting. To the contrary, the relevant case authorities demonstrate that the patentee’s reliance upon the features recited in the preamble to overcome a rejection during prosecution is key to the inquiry of whether the preamble should be limiting. *See Kraft Foods*, 2016 WL 873435, at *10; *JobDiva, Inc. v. Monster Worldwide, Inc.*, 2014 WL 5034674, at *8 (S.D.N.Y. Oct. 3, 2014) (“[C]lear reliance on a preamble during patent prosecution transforms the preamble into a claim limitation. . . . [A] preamble phrase is not a claim limitation if *the applicant* did not rely on it to define the invention or to distinguish the prior art. . . .”).

SXM also argues that the disputed preamble language is entirely divorced from the body of the claims because the preamble language relates to coding and phase differences in the frequency domain, whereas the body of the claims relates to the processing of received signals in the time domain. According to SXM, where the preamble language is inconsequential to the performance of limitations in the body of the claim, the preamble should not be construed to limit the claim. *See Am. Med. Sys., Inc. v. Biolitec, Inc.*, 618 F.3d 1354, 1358-59 (Fed. Cir.

2010). However, as illustrated in Figure 2B of the '997 patent, the claim language referring to aspects of the time domain function occurs in the context of an encoding scheme on the frequency axis. ('997 patent, Fig. 2B) In this respect, the written description refutes SXM's assertion that the time domain and the frequency domain are fully separated. For these reasons, I recommend that the court adopt Fraunhofer's proposal with respect to the preambles of the '997 patent.

2. "phase differences between simultaneous carriers having different frequencies" ('997 patent, claim 4)

Fraunhofer	SXM	Court
No construction required Alternatively: phase differences between subcarriers with different frequencies in the same MCM symbol	the difference in the phase of two symbols on adjacent carriers having different frequencies	phase differences between subcarriers with different frequencies in the same MCM symbol

I recommend that the court adopt Fraunhofer's proposed alternative construction, which is consistent with the intrinsic record. SXM did not address this term in the context of the '997 patent in its briefing and, during oral argument, referred the court to the arguments presented in connection with the same term as it appears in the '1084 patent. (4/4/18 Tr. at 193:14-22) Having adopted Fraunhofer's proposed construction of the disputed term as it appears in the '1084 patent, and having been presented with no additional argument on the term, I recommend that the court adopt Fraunhofer's proposal.

3. “low path filter” (’997 patent, claim 7)

Fraunhofer	SXM	Court
Definite (should be corrected to “low pass filter”)	Indefinite	Indefinite

I recommend that the court adopt SXM’s proposal regarding the disputed term.

Fraunhofer asserts that claim 7 contains a typographical error that should be corrected by the court. However, the specification expressly defines the “low path filter” as “an impulse forming filter which is identical to an impulse forming filter in the MCM transmitter.” (’997 patent, col. 9:46-48) The specification separately describes a “low pass filter,” explaining that “[t]he loop filter 324 is a low pass filter for filtering superimposed interference portions of a higher frequency from the slowly varying error signal.” (*Id.* at col. 10:4-6) “A district court can correct a patent only if (1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims.” *Novo Indus., L.P. v. Micro Molds Corp.*, 350 F.3d 1348, 1357-58 (Fed. Cir. 2003). The court cannot appropriately correct the alleged error in the patent where, as here, both “low pass filter” and “low path filter” are described in the specification, and the correction is thus subject to reasonable debate. (4/4/18 Tr. at 195:13-196:4) For these reasons, I recommend that the court adopt SXM’s proposal.

V. CONCLUSION

For the reasons set forth above, I recommend that the court construe disputed terms as follows:

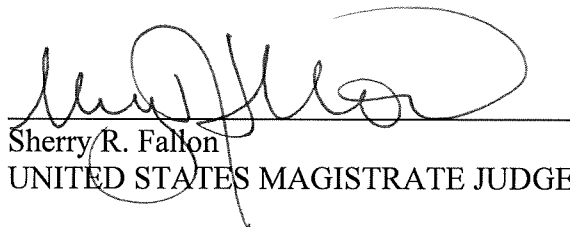
<u>Claim Term</u>	<u>Recommended Construction</u>
“means for transmitting the output bits of the first portion via a first channel and the output bits of the second portion via a second channel, the second channel being spatially different from the first channel” (’289 patent, claim 2)	Function: transmitting the output bits of the first portion via a first channel and the output bits of the second portion via a second channel Structure: two transmitters
“the step of transmitting being carried out by a first transmitter and a second transmitter spaced apart from the first transmitter” (’289 patent, claim 19)	Not subject to 35 U.S.C. § 112, ¶ 6 No construction required
“receiving means for receiving the first portion of bits via a first channel and the second portion of bits via a second channel” (’289 patent, claims 10, 13)	Function: receiving the first portion of bits via a first channel and the second portion of bits via a second channel Structure: a receiver
“channel” (’289 patent, claims 1, 2, 3, 5, 6, 9, 10, 11, 13, 14, 17, 18, 19, 20, 22, 23, 26, 27, 28, 30, 31, 32, 35)	a line of sight connection between a transmitter and a receiver
“symbol” (’1084 patent, claims 1, 9)	encoded representation of binary information
“a phase difference between simultaneous carriers having different frequencies” (’1084 patent, claims 1, 4, 9, 12)	a phase difference between subcarriers with different frequencies in the same MCM symbol
“means for determining an echo phase offset for each decoded phase shift comprising means for eliminating phase shift uncertainties related to the transmitted information from said decoded phase shift” (’1084 patent, claim 9)	(determining an echo phase offset) Function: determining an echo phase offset for each decoded phase shift Structure: a discarding unit and a computing unit in an MCM receiver (eliminating phase shift uncertainties) Function: eliminating phase shift uncertainties related to the transmitted information from said decoded phase shift Structure: a discarding unit in an MCM receiver

“means for correcting each decoded phase shift based on said averaged offset” (’1084 patent, claim 9)	Function: correcting each decoded phase shift based on said averaged phase offset Structure: a phase rotation unit in an MCM receiver
[preambles] (’3084 patent, claims 1, 6, 9, 18, 24, 28, 32, 41)	Preambles are limiting except for the portions reciting multi-carrier modulated signal.
“generating said reference symbol by performing an amplitude modulation of a bit sequence, an envelope of the amplitude modulated bit sequence defining a reference pattern of said reference symbol” (’3084 patent, claim 6)	Definite Not subject to 35 U.S.C. § 112, ¶ 6 No construction required
“means for generating said reference symbol comprising an amplitude modulator for performing an amplitude modulation of a bit sequence” (’3084 patent, claim 28)	Not subject to 35 U.S.C. § 112, ¶ 6
[preambles] (’997 patent, claims 1, 4)	Preambles of independent claims are limiting
“phase differences between simultaneous carriers having different frequencies” (’997 patent, claim 4)	phase differences between subcarriers with different frequencies in the same MCM symbol
“low path filter” (’997 patent, claim 7)	Indefinite

This Report and Recommendation is filed pursuant to 28 U.S.C. § 636(b)(1)(B), Fed. R. Civ. P. 72(b)(1), and D. Del. LR 72.1. The parties may serve and file specific written objections within fourteen (14) days after being served with a copy of this Report and Recommendation. Fed. R. Civ. P. 72(b)(2). The objections and responses to the objections are limited to ten (10) pages each. The failure of a party to object to legal conclusions may result in the loss of the right to de novo review in the District Court. *See Sincavage v. Barnhart*, 171 F. App’x 924, 925 n.1 (3d Cir. 2006); *Henderson v. Carlson*, 812 F.2d 874, 878-79 (3d Cir. 1987).

The parties are directed to the court's Standing Order For Objections Filed Under Fed. R. Civ. P. 72, dated October 9, 2013, a copy of which is available on the court's website, <http://www.ded.uscourts.gov>.

Dated: February 4, 2020



Sherry R. Fallon
UNITED STATES MAGISTRATE JUDGE