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

SAINT LAWRENCE COMMUNICATIONS LLC,	§	
	§	
v.	§	CASE NO. 2:15-CV-349-JRG
	§	Lead Case
ZTE CORPORATION, et al.	§	
	§	
SAINT LAWRENCE COMMUNICATIONS LLC,	§	
	§	
v.	§	CASE NO. 2:15-CV-351-JRG
	§	Consolidated with Case No. 2:15-CV-349
MOTOROLA MOBILITY LLC, et al.	§	

CLAIM CONSTRUCTION
MEMORANDUM AND ORDER

On June 29, 2016, the Court held a hearing to determine the proper construction of the disputed claim terms in United States Patents No. 6,795,805, 6,807,524, 7,151,802, 7,191,123, and 7,260,521. After the June 29, 2016, the Court further permitted additional briefing regarding certain terms. *See* July 22, 2016 Order, Dkt. No. 100. After considering the arguments made by the parties at the hearing and in the parties' claim construction briefing (Dkt. Nos. 69, 70, 71, 121 & 122;[1] *see* Civil Action No. 2:15-CV-349, Dkt. Nos. 71, 74, 76, 206, 210 & 212), the Court issues this Claim Construction Memorandum and Order.

[1] Citations to documents (such as the parties' briefs and exhibits) in this Claim Construction Memorandum and Order refer to the page numbers of the original documents rather than the page numbers assigned by the Court's electronic docket unless otherwise indicated. Shortly before the start of the June 29, 2016 hearing, the Court provided the parties with preliminary constructions with the aim of focusing the parties' arguments and facilitating discussion. The preliminary constructions were essentially the same as the constructions that are set forth below (except as to terms that were further addressed by supplemental briefing after the June 29, 2016

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hearing, *see* Dkt. Nos. 206, 210 & 212). The organization of the Court's preliminary constructions was based on the briefing in *Saint Lawrence Communications LLC v. HTC Corporation, et al.*, Civil Action No. 2:15-CV-919 (and the related Civil Action No. 2:15-CV-1510) (collectively, "*HTC*"). At the June 29, 2016 hearing, the parties in Civil Actions No. 2:15-CV-349 and 2:15-CV-351 did not state that any additional terms required construction. In light of this, and because the parties in all of the above-captioned cases presented substantially the same arguments as to substantially the same disputed terms, and because the parties agreed to hold a single claim construction hearing as to all of the above-captioned cases (*see* Civil Action No. 2:15-CV-349, Dkt. No. 95 at 3 n.2), this Claim Construction Memorandum and Order cites only the briefing in *HTC*. The *HTC* case has been stayed upon joint motion of the *HTC* parties announcing that a settlement agreement has been reached. *See* Dkt. Nos. 123 & 124. Thus, although citations to briefing herein refer to briefing filed in the *HTC* case, the present Claim Construction Memorandum and Order applies to only the above-captioned cases. Finally, although Plaintiff argues that various terms that were at issue in *HTC* are not at issue in *ZTE* (see Dkt. No. 216), the coordinated claim construction proceedings in *HTC* and *ZTE* warrant addressing all of the terms that were presented in those coordinated proceedings.

I. BACKGROUND

Plaintiff brings suit alleging infringement of United States Patents No. 6,795,805 ("the '805 Patent"), 6,807,524 ("the '524 Patent"), 7,151,802 ("the '802 Patent"), 7,191,123 ("the '123 Patent"), and 7,260,521 ("the '521 Patent") (collectively, the "patents-in-suit"). Plaintiff submits that "[a]ll five patents have been declared essential to the AMR-WB [(Adaptive Multi-Rate Wideband)] [audio coding] standard." Dkt. No. 70 at 1.

The '805 Patent, titled "Periodicity Enhancement in Decoding Wideband Signals," issued on September 21, 2004, and the Abstract states:

> An alternative approach by which periodicity enhancement of an excitation signal is achieved through filtering an innovative codevector by an innovation filter to reduce low frequency content of the innovative codevector and enhance the periodicity at low frequencies more than high frequencies.

The '524 Patent, titled "Perceptual Weighting Device and Method for Efficient Coding of Wideband Signals," issued on October 19, 2004, and the Abstract states (formatting of equations modified):

> A perceptual weighting device for producing a perceptually weighted signal in response to a wideband signal comprises a signal pre-emphasis filter, a synthesis filter calculator, and a perceptual weighting filter. The signal pre-emphasis filter enhances the high frequency content of the wideband signal to thereby produce a pre-emphasized signal. The signal pre-emphasis filter has a transfer function of the form: $P(z) = 1-\mu z^{-1}$, wherein μ is a pre-emphasis factor having a value located between 0 and 1. The synthesis filter calculator is responsive to the pre-emphasized signal for producing synthesis filter coefficients. Finally, the perceptual weighting filter processes the pre-emphasized signal in relation to the synthesis filter coefficients to produce the perceptually weighted signal. The perceptual weighting filter has a transfer function, with fixed denominator, of the form: $W(z) = A\,(z/\gamma_1) / (1-\gamma_2 z^{-1})$ where $0<\gamma_2<\gamma_1\leq 1$.

The '802 Patent, titled "High Frequency Content Recovering Method and Device for Over-Sampled Synthesized Wideband Signal," issued on December 19, 2006, and the Abstract states:

> In a method and device for recovering the high frequency content of a wideband signal previously down-sampled, and for injecting this high frequency content in an over-sampled synthesized version of the wideband signal to produce a fill-spectrum [*sic*, full-spectrum] synthesized wideband signal, a random noise generator produces a noise sequence having a given spectrum. A spectral shaping unit spectrally shapes the noise sequence in relation to linear prediction filter coefficients related to the down-sampled wideband signal. A signal injection circuit finally injects the spectrally-shaped noise sequence in the over-sampled synthesized signal version to thereby produce the full-spectrum synthesized wideband signal.

The '123 Patent, titled "Gain-Smoothing in Wideband Speech and Audio Signal Decoder," issued on March 13, 2007, and the Abstract states:

> The gain smoothing method and device modify the amplitude of an innovative codevector in relation to background noise present in a previously sampled wideband signal. The gain smoothing device comprises a gain smoothing calculator for calculating a smoothing gain in response to a factor representative of voicing in the sampled wideband signal, a factor representative of the stability of a set of linear prediction filter coefficients, and an innovative codebook gain. The gain smoothing device also comprises an amplifier for amplifying the innovative codevector with the smoothing gain to thereby produce a gain-smoothed innovative codevector. The function of the gain-smoothing device improves the perceived synthesized signal when background noise is present in the sampled wideband signal.

The '521 Patent, titled "Method and Device for Adaptive Bandwidth Pitch Search in Coding Wideband Signals," issued on August 21, 2007, and the Abstract states:

> An improved pitch search method and device for digitally encoding a wideband signal, in particular but not exclusively a speech signal, in view of transmitting, or storing, and synthesizing this wideband sound signal. The new method and device which achieve efficient modeling of the harmonic structure of the speech spectrum uses several forms of low pass filters applied to a pitch codevector, the one yielding higher prediction gain (i.e. the lowest pitch prediction error) is selected and the associated pitch codebook parameters are forwarded.

The '805 Patent, the '524 Patent, the '802 Patent, and the '521 Patent all list a foreign priority document dated October 27, 1998, namely Canadian Patent Application No. 2,252,170. The '123 Patent lists a foreign priority document dated November 18, 1999, namely Canadian Patent Application No. 2,290,037.

II. LEGAL PRINCIPLES

"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)). Claim construction is clearly an issue of law for the court to decide. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 970-71 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996). "In some cases, however, the district court will need to look beyond the patent's intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period." *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015) (citation omitted). "In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the 'evidentiary underpinnings' of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal." *Id.* (citing 517 U.S. 370).

To determine the meaning of the claims, courts start by considering the intrinsic evidence. *See Phillips*, 415 F.3d at 1313; *see also 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). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1314; *C.R. Bard*, 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; *accord 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 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.* at 1315 (quoting *Markman*, 52 F.3d at 979 (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.'" *Phillips*, 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *accord 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.* The specification may also resolve the meaning of 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*, 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)); *accord 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."). "[T]he prosecution history (or file wrapper) limits the interpretation of claims so as to exclude any interpretation that may have been disclaimed or disavowed during prosecution in order to obtain claim allowance." *Standard Oil Co. v. Am. Cyanamid Co.*, 774 F.2d 448, 452 (Fed. Cir. 1985).

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 (citations and internal quotation marks omitted). 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 are 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.*

The Supreme Court of the United States has "read [35 U.S.C.] § 112, ¶ 2 to require that a patent's claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014). "A determination of claim indefiniteness is a legal conclusion that is drawn from the court's performance of its duty as the construer of patent

claims." *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347 (Fed. Cir. 2005) (citations and internal quotation marks omitted), *abrogated on other grounds by Nautilus,* 134 S. Ct. 2120.

III. THE PARTIES' STIPULATED TERMS

In their Amended Joint Claim Construction and Prehearing Statement, the parties have stated: "At this time, there are no agreed upon constructions." Dkt. No. 61 at 1.

IV. DISPUTED TERMS ALLEGED TO BE MEANS-PLUS-FUNCTION

Many of the disputed terms are terms that Defendants allege are means-plus-function terms that lack corresponding structure and are therefore indefinite. In light of this, rather than addressing terms on a patent-by-patent basis, the Court first addresses the terms as to which there is a means-plus-function allegation and then addresses terms as to which there is no such allegation, below.

(1) The Parties' Positions

Plaintiff argues that for all of the terms that defendants allege are indefinite under 35 U.S.C. § 112, ¶ 6, "sufficient structure is recited in the corresponding patent specification and/or the claim language itself." Dkt. No. 70 at 3.

Defendants respond that "mathematical formulas are mere abstractions; they have no structure and cannot implement themselves." Dkt. No. 69 at 5. Defendants further explain: "Formulae require specialized hardware circuits, or if implemented through software, a processor or other computing machine with specialized programming, to serve their intended purpose." *Id.* Defendants then submit that "[t]he asserted patents here do not identify any computer or processor." *Id.* at 6.

Plaintiff replies that "despite the fact that five different examiners reviewed the specifications, [Defendants] contend[] that *no* person skilled in the art would understand that the patents' digital data compression and decompression algorithms are performed on a computer." Dkt. No. 71 at 1. Plaintiff also argues that "[Defendants'] assumption that those functions could be implemented in *analog* circuitry is incorrect." *Id.* at 5 (citing Dkt. No. 71-8, May 26, 2016 Ogunfunmi Suppl. Decl. at ¶ 9).

At the June 29, 2016 hearing, Defendants urged that disclosure of a general-purpose processor or computer is not implicit in the specification because the claimed functionality could be performed by special-purpose hardware, such as an application-specific integrated circuit, a digital signal processor, or a field-programmable gate array.

(2) Analysis

The specification repeatedly discloses processing, computing, and calculating. *See, e.g.*, '805 Patent at 1:39 ("the sampled speech signal is processed"), 1:42-43 ("a linear prediction (LP) synthesis filter is computed . . ."), 1:65 ("the synthesis output is computed"), 2:11-13 ("In wideband speech/audio applications, the sound signal is band-limited to 50–7000 Hz and sampled at *16000 samples/sec*.") (emphasis added), 7:16 ("The input speech is processed . . . ."), 8:1 ("compute"), 9:13 ("compute"), 9:60 ("computed"), 10:24 ("computed"), 11:29 ("compute"), 12:22 ("computed"), 13:61 ("processed"), 13:64 ("processed"), 14:62 ("processed"), 15:1 ("calculated"), 15:39 ("calculated"), 15:48 ("computed") & 15:51 ("computed"); '123 Patent at 2:17-18 ("fixed-point implementation of the algorithm[s]") & 8:38-39 ("single-precision arithmetic").[2]

[2] Plaintiff submits (Dkt. No. 69 at 4 n.1):

> "Fixed-point" computing refers to the representation of fractional numbers in a computer with a fixed decimal point (e.g., 1.234). *See* Ex. A [(*IEEE Standard*

Also, the Background of the Invention explains that the claimed invention is used in the context of computer networks and telecommunications. For example, the patents-in-suit refer to "*digital* wideband speech/audio *encoding* techniques with a good subjective quality/*bit rate* trade-off" for "teleconferencing, multimedia, and wireless applications, as well as Internet and packet network applications." '805 Patent at 1:12-17 (emphasis added); *see id.* at 1:26-28 ("A speech encoder converts a speech signal into a *digital bitstream* . . . ."); *see also* '123 Patent at 5:31-34 ("Fig. 5 is a simplified, schematic block diagram of a *cellular communication system* in which the wideband encoder of Fig. 1 and the wideband decoder of Fig. 2 can be used.") (emphasis added).

Further, processors appear to be present with, for example, the "speech encoding device 100," "speech decoding device 200," "transmitter 406," "receiver 410," "transmitter 414," and "receiver 418." *See, e.g.,* '805 Patent at 5:32, 5:37, 5:51, 5:56, 6:20-22 & 13:37-40.

Finding adequate disclosure of a computer or processor in this context is supported by decisions of the Court of Appeals for the Federal Circuit:

> Clearly, a unit which receives digital data, performs complex mathematical computations and outputs the results to a display must be implemented by or on a general or special purpose computer (although it is not clear why the written description does not simply state "computer" or some equivalent phrase). To bolster this result, we note that, in the medical imaging field, it is well within the realm of common experience that computers are used to generate images for display by mathematically processing digital input.

In re Dossel, 115 F.3d 942, 946-47 (Fed. Cir. 1997); *see Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1379-80 (Fed. Cir. 1999) (discussing *In re Dossel*); *see also Intel Corp. v.*

> *Dictionary of Electrical and Electronics Terms* (4th ed. 1988))] at 377 ("fixed-point"). In "floating-point" computing, fractional numbers are represented by a form of scientific notation (*e.g.*, 1234×10^{-3}). *See id.* at 380 ("floating-point"). "Single-precision" arithmetic refers to "the use of a single computer word to represent a number." *See id.* at 905 ("single precision").

VIA Techs., Inc., 319 F.3d 1357, 1366 (Fed. Cir. 2003) (discussing *In re Dossel*); *Aristocrat Techs. Australia Pty Ltd. v. Multimedia Games, Inc.*, 266 F. App'x 942, 946 (Fed. Cir. Feb. 22, 2008) ("The law does not require that structure be explicitly identified as long as a person of ordinary skill in the art would understand what structure is identified in the specification.") (citing *Atmel*); *HTC Corp. v. IPCom GmbH*, 667 F.3d 1270, 1279 (Fed. Cir. 2012) ("Although the specification here does not literally disclose a processor and transceiver, a person skilled in the art would understand that a mobile device [(cellular telephone)] would have to contain a processor and transceiver."); *Manual of Patent Examining Procedure* § 2181(II)(A) (9th ed., Mar. 2014) ("The disclosure of the structure (or material or acts) may be implicit or inherent in the specification if it would have been clear to those skilled in the art what structure (or material or acts) corresponds to the means- (or step-) plus-function claim limitation.") (citing *In re Dossel*).

Defendants have cited *Fujitsu Ltd. v. Tellabs Operations, Inc.*, in which the Northern District of Illinois rejected a patentee's argument that a single disclosure of reduction in "processing load" was sufficient disclosure of a processor. 782 F. Supp. 2d 625, 645-649 (N.D. Ill. 2011). In particular, *Fujitsu* distinguished *In re Dossel* and found that the phrase "processing load" could have meaning in the context of special-purpose hardware rather than necessarily a computer or general-purpose processor. *See id.* at 646-47, 650-51. *Fujitsu* also found that in *In re Dossel* a computer "was the only structure that could have performed the described functions . . . ." *Fujitsu*, 782 F. Supp. 2d at 650-51 (citing *In re Dossel*, 115 F.3d 942 (Fed. Cir. 1997). First, *Fujitsu* is not binding authority upon this Court. Second, *Fujitsu* is distinguishable because here the specifications are replete with disclosures of calculation, computation, and processing, such as set forth above.

Further, Defendants' general reliance upon *Ergo Licensing* is unavailing because the court there based its indefiniteness finding upon "fail[ure] to disclose a corresponding algorithm." *Ergo Licensing, LLC v. CareFusion 303, Inc.*, 673 F.3d 1361, 1364 (Fed. Cir. 2012). Defendants' reliance upon *Biomedino* is similarly unavailing. *See Biomedino, LLC v. Waters Techs Corp.*, 490 F.3d 946, 953 (Fed. Cir. 2007) ("a bare statement that known techniques or methods can be used does not disclose structure").

Based on the disclosures in the patents-in-suit, examples of which are cited above, and based on the above-cited authorities, the Court hereby expressly rejects Defendants' argument that the terms at issue are indefinite based on lack of disclosure of a computer or processor upon which algorithms can operate.

The Court therefore turns to construction of the following disputed terms, on a term-by-term basis, bearing in mind that "[p]recedent and practice permit a patentee to express [a] procedural algorithm in any understandable terms including as a mathematical formula, in prose, or as a flow chart, or in any other manner that provides sufficient structure." *Typhoon Touch Techs., Inc. v. Dell, Inc.*, 659 F.3d 1376, 1385 (Fed. Cir. 2011); *see Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1312 (Fed. Cir. 2012) (similar); *see also Media Rights Techs., Inc. v. Capital One Fin. Corp.*, 800 F.3d 1366, 1374 (Fed. Cir. 2015) (similar).

A. "means for calculating a periodicity factor in response to the pitch codevector and the innovative codevector"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
The parties agree that this term is subject to 35 U.S.C. § 112(6). Function: "calculating a periodicity factor in response to the pitch codevector and the innovative codevector" Structure, material, or acts: "A computer performing the following algorithm: $\alpha=0.125(1+r_v)$ or $\alpha=qR_p$ bounded by $\alpha<q$ or $\sigma=0.25(1+r_v)$ or $\sigma=2qR_p$ bounded by $\sigma<2q$[,] or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 4-5 (formatting modified); *id.*, Ex. B at 3; Dkt. No. 73, App'x B at 19-20. The parties submit that this term appears in Claims 2 and 22 of the '805 Patent. Dkt. No. 61, Ex. A at 4; *id.*, Ex. B at 3; Dkt. No. 73, App'x B at 19.

Plaintiff argues that the specification discloses an algorithm. Dkt. No. 70 at 4-5. A patent may disclose multiple "alternative structures for performing the claimed function," and the Court may identify those alternatives rather than attempt to formulate a single claim interpretation to cover multiple alternatives. *Ishida Co., Ltd. v. Taylor*, 221 F.3d 1310, 1316 (Fed. Cir. 2000).

Here, the specification discloses that "several methods can be used." '805 Patent at 14:41; *see id.* at 14:39-15:62.

Based on this disclosure in the specification, the Court hereby finds that the claimed function is **"calculating a periodicity factor in response to the pitch codevector and the innovative codevector"** and the corresponding structure is **"a processor configured such that:**

Method 1: $\alpha=qR_p$ bounded by $\alpha<q$, and $\sigma=2qR_p$ bounded by $\sigma<2q$; or Method 2: $\alpha=0.125(1+r_v)$, and $\sigma=0.25(1+r_v)$; and equivalents thereof."

B. "means for calculating a [first] factor representative of voicing in the wideband signal in response to at least one second wideband signal encoding parameter of said set"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is subject to 35 U.S.C. § 112(6). Function: "calculating a factor representative of voicing in the wideband signal in response to at least one second wideband signal encoding parameter of said set" Structure, materials, or acts: "A computer performing the following algorithm: $r_v=(E_v-E_c)/(E_v+E_c)$ or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 29; *id.*, Ex. B at 12; Dkt. No. 73, App'x B at 27-28. The parties submit that these terms appear in Claims 21, 23, 25, 26, 28, 30, 31, 33, 34, and 102 of the '123 Patent. Dkt. No. 61, Ex. A at 29; *id.*, Ex. B at 12; Dkt. No. 73, App'x B at 27-28.

Plaintiff argues that the specification discloses an algorithm. Dkt. No. 70 at 5. The specification sets forth the applicable mathematical relationship. *See, e.g.,* '123 Patent at 15:33-37.

The Court hereby finds that the claimed function is **"calculating a factor representative of voicing in the wideband signal in response to at least one second wideband signal encoding parameter of said set"** and the corresponding structure is **"a processor configured such that $r_v=(E_v-E_c)/(E_v+E_c)$; and equivalents thereof."**

C. "means for determining a distance measure giving a similarity between adjacent, successive linear prediction filters computed during encoding of the wideband signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Function: "determining a distance measure giving a similarity between adjacent, successive linear prediction filters computed during encoding of the wideband signal" Structure, material, acts: $D_s = \sum_{i=1}^{p-1} (isp_i{}^{(n)} - isp_t{}^{(n-1)})^2$	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. B at 11; Dkt. No. 73, App'x B at 25. The parties submit that this term appears in Claims 30 and 31 of the '123 Patent. Dkt. No. 61, Ex. B at 11; Dkt. No. 73, App'x B at 25.

Plaintiff argues that the specification discloses an algorithm. Dkt. No. 70 at 5-6.

Defendants respond that the formula identified by Plaintiff in its Appendix 1 "appear[s] nowhere in the '123 patent and is therefore not clearly linked to the recited function of these claims." Dkt. No. 74 at 11 n.6. "Additionally," Defendants argue, "neither the formula identified by [Plaintiff], nor the formula recited in claim 31 of the '123 patent could be implemented as subscript t and ispSUBi(n-1) are undefined in the patent."

The specification sets forth the applicable mathematical relationship. *See, e.g.,* '123 Patent at 16:6-15. As to Defendants' arguments, the subscript "t" appears to be a typographical error in Plaintiff's materials,[3] and "ispSUBi$^{(n-1)}$" in Claim 31 can be readily understood as referring to "isp$_i^{(n-1)}$." *See id.*

[3] The parenthetical appears as "$isp_i{}^{(n)} - isp_t{}^{(n-1)}$" in Appendix 1 to Plaintiff's opening brief but appears as "$isp_i{}^{(n)} - isp_i{}^{(n-1)}$" in the specification. *Compare* Dkt. No. 70, App'x 1 at 3 *with* '123 Patent at 16:6-15. Plaintiff's use of "t" instead of "i" appears to be a typographical error.

The Court therefore hereby finds that the claimed function is **"determining a distance measure giving a similarity between adjacent, successive linear prediction filters computed during encoding of the wideband signal"** and the corresponding structure is **"a processor configured such that $D_s = \sum_{i=1}^{p-1}(isp_i^{(n)} - isp_i^{(n-1)})^2$ where p is the order of the LP filter 206; and equivalents thereof."**

D. "means for calculating a factor representative of stability of said wideband signal in response to at least one second wideband signal encoding parameter of said set"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is subject to 35 U.S.C. § 112(6). Function: "calculating a factor representative of stability of said wideband signal in response to at least one second wideband signal encoding parameter of said set" Structure, material, or acts: "A computer performing the following algorithm: θ=1.25–D_s/400000.0 or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 30; *id.*, Ex. B at 12; Dkt. No. 73, App'x B at 29. The parties submit that this term appears in Claim 103 of the '123 Patent. Dkt. No. 61, Ex. A at 30; *id.*, Ex. B at 12; Dkt. No. 73, App'x B at 29.

Plaintiff argues that the specification discloses an algorithm. Dkt. No. 70 at 6. The specification sets forth the applicable mathematical relationship. *See, e.g.,* '123 Patent at 15:62-64 & 16:21-31.

The Court hereby finds that the claimed function is **"calculating a factor representative of stability of said wideband signal in response to at least one second wideband signal**

encoding parameter of said set" and the corresponding structure is **"a processor configured such that $\theta = 1.25 - D_s/400000.0$ bounded by $0 \leq \theta \leq 1$; and equivalents thereof."**

E. "means for calculating a smoothing gain based on said first and second factors"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Subject to 35 U.S.C. § 112(6). Function: "calculating a smoothing gain based on said first and second factors" Structure, material, or acts: "A computer performing the following algorithm: $\lambda=0.5(1-r_v)$, $S_m=\lambda\theta$, if $g < g-1$ then $g0=g*1.19$ bounded by $g0 \leq g-1$, and if $g \geq g-1$ then $g0=g/1.19$ bounded by $g0 \geq g-1$, $g_s=S_m*g_0+(1-S_m)*g$, or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 23 (formatting modified); *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 21-22. The parties submit that this term appears in Claims 21, 23, 25, 26, 28, 30, 31, 33, and 34 of the '123 Patent. Dkt. No. 61, Ex. A at 23; *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 21-22.

Plaintiff argues that the specification discloses an algorithm. Dkt. No. 70 at 6-7. The specification sets forth the applicable mathematical relationship. *See, e.g.,* '123 Patent at 16:45-68 & Fig. 5.

The Court hereby finds that the claimed function is **"calculating a smoothing gain based on said first and second factors"** and the corresponding structure is **"a processor configured such that $S_m=\lambda\theta$ and $g_s = S_m*g_0 + (1-S_m)*g$, wherein if $g < g-1$ then $g_0 = g*1.19$ bounded by $g_0 \leq g-1$, and wherein if $g \geq g-1$ then $g_0 = g/1.19$ bounded by $g_0 \geq g-1$; and equivalents thereof."**

F. "means for calculating a smoothing gain using a non linear operation based on said voicing representative factor"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is subject to 35 U.S.C. § 112(6). Function: "calculating a smoothing gain using a non linear operation based on said voicing representative factor" Structure, material, or acts: "A computer performing the following algorithm: $\lambda=0.5(1-r_v)$, $S_m=\lambda\theta$, if g < g–1 then g0=g*1.19 bounded by g0≤g–1, and if g≥g–1 then g0=g/1.19 bounded by g0≥g–1, $g_s=S_m*g_0+(1-S_m)*g$, or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 29-30 (formatting modified); *id.*, Ex. B at 12; Dkt. No. 73, App'x B at 28. The parties submit that this term appears in Claim 102 of the '123 Patent. Dkt. No. 61, Ex. A at 29-30; *id.*, Ex. B at 12; Dkt. No. 73, App'x B at 28.

The specification sets forth the applicable mathematical relationship. *See, e.g.,* '123 Patent at 16:45-68 & Fig. 5.

The Court hereby finds that the claimed function is **"calculating a smoothing gain using a non linear operation based on said voicing representative factor"** and the corresponding structure is **"a processor configured such that $S_m=\lambda\theta$ and $g_s = S_m*g_0 + (1-S_m)*g$, wherein if g < g–1 then g_0 = g*1.19 bounded by $g_0 \leq$ g–1, and wherein if g ≥ g–1 then g_0 = g/1.19 bounded by $g_0 \geq$ g–1; and equivalents thereof."**

G. "means for calculating a smoothing gain using a non linear operation based on said stability representative factor"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is subject to 35 U.S.C. 112(6). Function: "calculating a smoothing gain using a non linear operation based on said stability representative factor" Structure, material, or acts: "A computer performing the following algorithm: $\lambda=0.5(1-r_v)$, $S_m=\lambda\theta$, if $g < g-1$ then $g0=g*1.19$ bounded by $g0 \leq g-1$, and if $g \geq g-1$ then $g0=g/1.19$ bounded by $g0 \geq g-1$, $g_s=S_m*g_0+(1-S_m)*g$, or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 31; *id.*, Ex. B at 12; Dkt. No. 73, App'x B at 29-30. The parties submit that this term appears in Claim 103 of the '123 Patent. Dkt. No. 61, Ex. A at 31; *id.*, Ex. B at 12; Dkt. No. 73, App'x B at 29-30.

The specification sets forth the applicable mathematical relationship. *See, e.g.,* '123 Patent at 16:45-68 & Fig. 5.

The Court hereby finds that the claimed function is **"calculating a smoothing gain using a non linear operation based on said stability representative factor"** and the corresponding structure is **"a processor configured such that $S_m=\lambda\theta$ and $g_s = S_m*g_0 + (1-S_m)*g$, wherein if $g < g-1$ then $g_0 = g*1.19$ bounded by $g_0 \leq g-1$, and wherein if $g \geq g-1$ then $g_0 = g/1.19$ bounded by $g_0 \geq g-1$; and equivalents thereof."**

H. "means for finding an innovative codevector in an innovative codebook in relation to an index k of said innovative codebook"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is not subject to 35 U.S.C. § 112(6) as the claim recites sufficient structure to perform the recited function. Alternatively, if the Court finds that 35 U.S.C. § 112(6) applies: Function: "finding an innovative codevector in an innovative codebook in relation to an index k of said innovative codebook" Structure, materials, or acts: "innovative codebook or equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 25; *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 23-24. The parties submit that this term appears in Claims 26 and 28 of the '123 Patent. Dkt. No. 61, Ex. A at 25; *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 23.

Plaintiff argues that the specification discloses an algorithm. Dkt. No. 70 at 7.

"[T]he word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies," and Plaintiff has not overcome the presumption. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015).

The parties do not appear to dispute the claimed function. As for the corresponding structure, the specification cites several United States Patents as disclosing how "the innovative codebook search is performed in module 110 by means of an algebraic codebook." '123 Patent at 14:28-41 & 15:3-9 (citing U.S. Patents No. 5,444,816, 5,699,482, 5,701,392 & 5,754,976).

The bare "module 110" is inadequate disclosure of structure for performing the claimed function, and reliance on material outside of the specification is generally insufficient to satisfy

the corresponding structure requirement under 35 U.S.C. § 112, ¶ 6. *See Default Proof Credit Card Sys., Inc. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291, 1301 (Fed. Cir. 2005) ("material incorporated by reference cannot provide the corresponding structure necessary to satisfy the definiteness requirement for a means-plus-function clause").

The case of *Otto Bock HealthCare LP v. Ossur HF*, however, discusses "using a U.S. patent application incorporated by reference to define structure for the purpose of 35 U.S.C. § 112, ¶ 6." *Otto Bock HealthCare LP*, 557 F. App'x 950, 955-56 (Fed. Cir. Feb. 18, 2014) ("In fact, 37 C.F.R. 1.57(d) specifically envisions using a U.S. patent application incorporated by reference to define structure for the purpose of 35 U.S.C. § 112, ¶ 6."). *Otto Bock* can be distinguished in some circumstances because "the parties in that case did not dispute whether the specification of the patent-in-suit disclosed a corresponding structure for the claimed function. Rather, the parties disputed the scope of the corresponding structure." *Mobile Telecomm. Techs., LLC v. Blackberry Corp.*, No. 3:12-CV-1652, Dkt. No. 244 (N.D. Tex. May 8, 2015) (Lynn, J.) (citations omitted).

Here, as noted above, the '123 Patent discloses that "the innovative codebook search is performed in module 110 *by means of an algebraic codebook*." '123 Patent at 14:28-30 (emphasis added). Thus, the specification itself discloses an "algebraic codebook" as corresponding structure. The above-noted patents cited by the specification provide additional disclosure regarding algebraic codebooks. *See* U.S. Patent No. 5,701,392 at 1:63-2:5 ("A second type of codebooks are [*sic*] the algebraic codebooks. By contrast with the stochastic codebooks, algebraic code books are not random and require no substantial storage. An algebraic codebook is a set of indexed codevectors of which the *amplitudes and positions of the pulses of the* k^{th} *codevector can be derived from a corresponding index k through a rule* requiring no, or minimal,

physical storage. Therefore, the size of algebraic codebooks is not limited by storage requirements. Algebraic codebooks can also be designed for efficient search.") (emphasis added); *see also* United States Patents No. 5,444,816, 5,699,482, 5,701,392 & 5,754,976.

The Court therefore hereby finds that this is a means-plus-function term, the claimed function is **"finding an innovative codevector in an innovative codebook in relation to an index k of said innovative codebook,"** and the corresponding structure is **"an algebraic codebook; and equivalents thereof."**

I. "means for finding a codevector in relation to at least one first wideband signal encoding parameter of said set"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Subject to 35 U.S.C. § 112(6). Function: "finding a codevector in relation to at least one first wideband signal encoding parameter of said set" Structure, materials, or acts: "codebook or equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 21-22; *id.*, Ex. B at 9; Dkt. No. 73, App'x B at 20-21. The parties submit that this term appears in Claims 21, 23, 25, 26, 28, 30, 31, 33, 34, 102, and 103 of the '123 Patent. Dkt. No. 61, Ex. A at 21-22; *id.*, Ex. B at 9; Dkt. No. 73, App'x B at 20-21.

This term presents substantially the same dispute as to corresponding structure as the term "means for finding an innovative codevector in an innovative codebook in relation to an index k of said innovative codebook," addressed above.

The Court accordingly finds that the claimed function is **"finding a codevector in relation to at least one first wideband signal encoding parameter of said set"** and the corresponding structure is **"an algebraic codebook; and equivalents thereof."**

J. "means for calculating a second factor representative of stability of said wideband signal in response to at least one third wideband signal encoding parameter of said set"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Subject to 35 U.S.C. § 112(6). Function: "calculating a second factor representative of stability of said wideband signal in response to at least one third wideband signal encoding parameter of said set" Structure, material, or acts: "A computer performing the following algorithm: $\theta=1.25–D_s/400000.0$ or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 22; *id.*, Ex. B at 9-10; Dkt. No. 73, App'x B at 21. The parties submit that this term appears in Claims 21, 23, 25, 26, 28, 30, 31, 33, and 34 of the '123 Patent. Dkt. No. 61, Ex. A at 22; *id.*, Ex. B at 9-10; Dkt. No. 73, App'x B at 21.

The specification sets forth the applicable mathematical relationship. *See, e.g.*, '123 Patent at 15:62-64 & 16:21-31.

The Court hereby finds that the claimed function is **"calculating a second factor representative of stability of said wideband signal in response to at least one third wideband signal encoding parameter of said set"** and the corresponding structure is **"a processor configured such that $\theta = 1.25 – D_s/400000.0$ bounded by $0 \leq \theta \leq 1$; and equivalents thereof."**

K. "means for calculating an energy of the corresponding pitch prediction error"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Subject to 35 U.S.C. § 112(6). Function: "calculating an energy of the corresponding pitch prediction error" Structure, material, or acts: "A computer performing the following algorithm: $E=\|\|x-by_T\|\|^2$ or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 35; *id.*, Ex. B at 15; Dkt. No. 73, App'x B at 31. The parties submit that this term appears in Claim 8 of the '521 Patent. Dkt. No. 61, Ex. A at 35; *id.*, Ex. B at 15; Dkt. No. 73, App'x B at 31.

Plaintiff argues that the specification discloses an algorithm. Dkt. No. 70 at 8. The specification sets forth the applicable mathematical relationship. *See, e.g.,* '521 Patent at 10:54-64 & 12:26-35.

The Court hereby finds that the claimed function is **"calculating an energy of the corresponding pitch prediction error"** and the corresponding structure is **"a processor configured such that $E=||x-by_T||^2$; and equivalents thereof."**

L. "means for amplifying the found codevector with said smoothing gain to thereby produce said gain-smoothed codevector"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
Subject to 35 U.S.C. § 112(6). Function: "amplifying the found codevector with said smoothing gain to thereby produce said gain-smoothed codevector" Structure, material, acts: "amplifier 232 or equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 23-24; *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 22-23. The parties submit that this term appears in Claims 21, 23, 25, 26, 28, 30, 31, 33, 34, 102, and 103 of the '123 Patent. Dkt. No. 61, Ex. A at 23-24; *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 22.

Claim 21 of the '123 Patent, for example, recites (emphasis added):

> 21. A device for producing a gain-smoothed codevector during decoding of an encoded wideband signal from a set of wideband signal encoding parameters, said device comprising:
> means for finding a codevector in relation to at least one first wideband signal encoding parameter of said set;
> means for calculating a first factor representative of voicing in the wideband signal in response to at least one second wideband signal encoding parameter of said set;
> means for calculating a second factor representative of stability of said wideband signal in response to at least one third wideband signal encoding parameter of said set;
> means for calculating a smoothing gain based on said first and second factors; and
> *means for amplifying the found codevector with said smoothing gain to thereby produce said gain-smoothed codevector*.

The claimed function is "amplifying the found codevector with said smoothing gain to thereby produce said gain-smoothed codevector." As for the proper corresponding structure, the specification discloses:

> Finally, the smoothed fixed codebook gain gs is calculated in gain smoothing calculator 228 . . . . The smoothed gain gs is then used for scaling the innovative codevector ck in *amplifier 232*.

'123 Patent at 16:62-67 (emphasis added); *see id.* at Fig. 2 (illustrating element 232). The corresponding structure disclosed in the specification is thus "amplifier 232." *See id.*

The Court accordingly hereby finds that the claimed function is **"amplifying the found codevector with said smoothing gain to thereby produce said gain-smoothed codevector"** and the corresponding structure is **"amplifier 232; and equivalents thereof."**

M. "means for calculating said periodicity factor α using the relation: $\alpha = 0.125 (1 + r_v)$, where $r_v = (E_v – E_c) / (E_v + E_c)$ where E_v is the energy of the pitch codevector and E_c is the energy of the innovative codevector"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is not subject to 35 U.S.C. § 112(6) as the claim recites sufficient structure to perform the recited function. Alternatively, if the Court finds that 35 U.S.C. § 112(6) applies: Function: "calculating said periodicity factor α" Structure, material, or acts: "A computer performing the following algorithm: $\alpha=0.125(1+r_v)$, where $r_v=(E_v – E_c)/(E_v + E_c)$ where E_v is the energy of the pitch codevector and E_c is the energy of the innovative codevector, or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 5; *id.*, Ex. B at 3; Dkt. No. 73, App'x B at 20. The parties submit that this term appears in Claims 6 and 26 of the '805 Patent. Dkt. No. 61, Ex. A at 5; *id.*, Ex. B at 3; Dkt. No. 73, App'x B at 20.

Plaintiff argues that "[b]ecause th[is] . . . term[] recite[s] sufficient structure (corresponding algorithm) in the claim itself, [Plaintiff] respectfully submits that th[is] . . . term[] [is] not subject to § 112(6)." Dkt. No. 70 at 9.

Defendants respond that "[t]he inclusion of mathematical formulas (or 'algorithms,' as [Plaintiff] calls them) in these claim terms does not specify the underlying structure that actually performs operations in accordance with those formulas." Dkt. No. 69 at 12. In particular, Defendants argue that this term "specifies a relation for calculating the periodicity factor α, but it is silent on what actually performs the calculation. That is, the limitations do not identify specific circuitry or a programmed processor." *Id.*

"[T]he word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies," and Plaintiff has not overcome the presumption. *Williamson*, 792 F.3d at 1348. Although the disputed term sets forth a mathematical relationship, the claims do not themselves recite a processor.

The Court therefore hereby finds that this is a means-plus-function term, the claimed function is **"calculating said periodicity factor α,"** and the corresponding structure is **"a processor configured such that $\alpha = 0.125(1+r_v)$, where $r_v = (E_v – E_c)/(E_v + E_c)$ where E_v is the energy of the pitch codevector and E_c is the energy of the innovative codevector; and equivalents thereof."**

N. "means for finding a codevector in a codebook in relation to said at least one first wideband signal encoding parameter"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is not subject to 35 U.S.C. § 112(6) as the claim recites sufficient structure to perform the recited function. Alternatively, if the Court finds that 35 U.S.C. § 112(6) applies: Function: "finding a codevector in a codebook in relation to said at least one first wideband signal encoding parameter" Structure, materials, or acts: "codebook or equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 24; *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 23. The parties submit that this term appears in Claim 23 of the '123 Patent. Dkt. No. 61, Ex. A at 24; *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 23.

Plaintiff argues that "[b]ecause th[is] . . . term[] recite[s] sufficient structure (corresponding algorithm) in the claim itself, [Plaintiff] respectfully submits that th[is] . . . term[] [is] not subject to § 112(6)." Dkt. No. 70 at 9.

Defendants respond that "[t]he inclusion of mathematical formulas (or 'algorithms,' as [Plaintiff] calls them) in these claim terms does not specify the underlying structure that actually performs operations in accordance with those formulas." Dkt. No. 69 at 12.

"[T]he word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies," and Plaintiff has not overcome the presumption. *Williamson*, 792 F.3d at 1348.

This term presents substantially the same dispute as to corresponding structure as the term "means for finding an innovative codevector in an innovative codebook in relation to an index k of said innovative codebook," addressed above.

The Court accordingly finds that this is a means-plus-function term, the claimed function is **"finding a codevector in a codebook in relation to said at least one first wideband signal encoding parameter,"** and the corresponding structure is **"an algebraic codebook; and equivalents thereof."**

O. "means for computing a voicing factor r_v by means of the following relation: $r_v = (E_v – E_c) / (E_v+E_c)$"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is not subject to 35 U.S.C. § 112(6) as the claim recites sufficient structure to perform the recited function. Alternatively, if the Court finds that 35 U.S.C. § 112(6) applies: Function: "computing a voicing factor r_v" Structure, material, or acts: "A computer performing the following algorithm: $r_v=(E_v– E_c)/(E_v+E_c)$, or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 25; *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 24. The parties submit that this term appears in Claims 26 and 28 of the '123 Patent. Dkt. No. 61, Ex. A at 25; *id.*, Ex. B at 10; Dkt. No. 73, App'x B at 24.

Plaintiff argues that "[b]ecause th[is] . . . term[] recite[s] sufficient structure (corresponding algorithm) in the claim itself, [Plaintiff] respectfully submits that th[is] . . . term[] [is] not subject to § 112(6)." Dkt. No. 70 at 9.

Defendants respond that "[t]he inclusion of mathematical formulas (or 'algorithms,' as [Plaintiff] calls them) in these claim terms does not specify the underlying structure that actually performs operations in accordance with those formulas." Dkt. No. 69 at 12.

"[T]he word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies," and Plaintiff has not overcome the presumption. *Williamson*, 792 F.3d at 1348. Although the disputed term sets forth a mathematical relationship, the claims do not themselves recite a processor.

The Court therefore hereby finds that this is a means-plus-function term, the claimed function is **"computing a voicing factor r_v,"** and the corresponding structure is **"a processor configured such that $r_v=(E_v–E_c)/(E_v+E_c)$; and equivalents thereof."**

P. "means for computing a factor λ using the following relation: $\lambda = 0.5\ (1–r_v)$"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is not subject to 35 U.S.C. § 112(6) as the claim recites sufficient structure to perform the recited function. Alternatively, if the Court finds that 35 U.S.C. § 112(6) applies: Function: "computing a factor λ" Structure, material, or acts: "A computer performing the following algorithm: $\lambda=0.5(1–r_v)$ or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 25-26; *id.*, Ex. B at 10-11; Dkt. No. 73, App'x B at 24-25. The parties submit that this term appears in Claim 28 of the '123 Patent. Dkt. No. 61, Ex. A at 25-26; *id.*, Ex. B at 10-11; Dkt. No. 73, App'x B at 24-25.

Plaintiff argues that "[b]ecause th[is] . . . term[] recite[s] sufficient structure (corresponding algorithm) in the claim itself, [Plaintiff] respectfully submits that th[is] . . . term[] [is] not subject to § 112(6)." Dkt. No. 70 at 9.

Defendants respond that "[t]he inclusion of mathematical formulas (or 'algorithms,' as [Plaintiff] calls them) in these claim terms does not specify the underlying structure that actually performs operations in accordance with those formulas." Dkt. No. 69 at 12.

"[T]he word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies," and Plaintiff has not overcome the presumption. *Williamson*, 792 F.3d at 1348. Although the disputed term sets forth a mathematical relationship, the claim does not itself recite a processor.

The Court therefore hereby finds that this is a means-plus-function term, the claimed function is **"computing a factor λ,"** and the corresponding structure is **"a processor configured such that $\lambda=0.5(1-r_v)$; and equivalents thereof."**

Q. "means for calculating an Imimitance [*sic*, Immitance] Spectral Pair distance measure between the Immitance Spectral Pairs in a present frame n of the wideband signal and the Immitance Spectral Pairs of a past frame n-1 of the wideband signal . . ."

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is not subject to 35 U.S.C. § 112(6) as the claim recites sufficient structure to perform the recited function. Alternatively, if the Court finds that 35 U.S.C. § 112(6) applies: Function: "calculating an Im[]mitance Spectral Pair distance measure between the Immitance Spectral Pairs in a present frame n of the wideband signal and the Immitance Spectral Pairs of a past frame n-1 of the wideband signal" Structure, material, or acts: "A computer performing the following algorithm: $D_s = \sum_{i=1}^{p-1} (isp_i{}^{(n)} - isp_t{}^{(n-1)})^2$ where p is the order of the linear prediction filters or equivalents thereof."[4]	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 27; *id.*, Ex. B at 11; Dkt. No. 73, App'x B at 25-26. The parties submit that this term appears in Claim 31 of the '123 Patent. Dkt. No. 61, Ex. A at 27; *id.*, Ex. B at 11; Dkt. No. 73, App'x B at 25-26.

The full disputed term is: "means for calculating an Imimitance [*sic*, Immitance] Spectral Pair distance measure between the Immitance Spectral Pairs in a present frame n of the wideband

[4] In the parenthetical "$isp_i{}^{(n)} - isp_t{}^{(n-1)}$," Plaintiff's use of "t" instead of "i" appears to be a typographical error. *See* '123 Patent at Cl. 31; *see also id.* at 16:6-15. Because this typographical error is readily evident, the Court rejects Defendants' suggestion that subscript "t" is "undefined in the patent." Dkt. No. 69 at 10 n.5.

signal and the Immitance Spectral Pairs of a past frame n-1 of the wideband signal through the following relation: $D_s = \sum_{i=1}^{p-1}(isp_i{}^{(n)} - isp_i{}^{(n-1)})^2$ where p is the order of the linear prediction filters."

Plaintiff argues that "[b]ecause th[is] . . . term[] recite[s] sufficient structure (corresponding algorithm) in the claim itself, [Plaintiff] respectfully submits that th[is] . . . term[] [is] not subject to § 112(6)." Dkt. No. 70 at 9.

Defendants respond that "[t]he inclusion of mathematical formulas (or 'algorithms,' as [Plaintiff] calls them) in these claim terms does not specify the underlying structure that actually performs operations in accordance with those formulas." Dkt. No. 69 at 12.

"[T]he word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies," and Plaintiff has not overcome the presumption. *Williamson*, 792 F.3d at 1348. Although the disputed term sets forth a mathematical relationship, the claim does not itself recite a processor.

The Court therefore hereby finds that this is a means-plus-function term, the claimed function is **"calculating an Immitance Spectral Pair distance measure between the Immitance Spectral Pairs in a present frame n of the wideband signal and the Immitance Spectral Pairs of a past frame n-1 of the wideband signal,"** and the corresponding structure is **"a processor configured such that $\boldsymbol{D_s = \sum_{i=1}^{p-1}(isp_i{}^{(n)} - isp_i{}^{(n-1)})^2}$ where p is the order of the linear prediction filters; and equivalents thereof."**

R. "means for calculating a gain smoothing factor S_m based on both the first λ and second θ factors through the following relation: $S_m = \lambda\theta$"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is not subject to 35 U.S.C. § 112(6) as the claim recites sufficient structure to perform the recited function. Alternatively, if the Court finds that 35 U.S.C. § 112(6) applies: Function: "calculating a gain smoothing factor S_m based on both the first λ and second θ factors" Structure, material, or acts: "$S_m=\lambda\theta$"	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. B at 11-12; Dkt. No. 70, App'x 1 at 3; Dkt. No. 73, App'x B at 27. The parties submit that this term appears in Claims 33 and 34 of the '123 Patent. Dkt. No. 61, Ex. B at 11-12; Dkt. No. 73, App'x B at 27.

Plaintiff argues that "[b]ecause th[is] . . . term[] recite[s] sufficient structure (corresponding algorithm) in the claim itself, [Plaintiff] respectfully submits that th[is] . . . term[] [is] not subject to § 112(6)." Dkt. No. 70 at 9.

Defendants respond that "[t]he inclusion of mathematical formulas (or 'algorithms,' as [Plaintiff] calls them) in these claim terms does not specify the underlying structure that actually performs operations in accordance with those formulas." Dkt. No. 69 at 12.

"[T]he word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies," and Plaintiff has not overcome the presumption. *Williamson*, 792 F.3d at 1348. Although the disputed term sets forth a mathematical relationship, the claims do not themselves recite a processor.

The Court therefore hereby finds that this is a means-plus-function term, the claimed function is **"calculating a gain smoothing factor S_m based on both the first λ and second θ factors,"** and the corresponding structure is **"a processor configured such that $S_m = \lambda\theta$; and equivalents thereof."**

S. "means for calculating said pitch gain $b^{(j)}$ using the relation: $b^{(j)}=x^t y^{(j)}/||y^{(j)}||^2$"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is not subject to 35 U.S.C. § 112(6) as the claim recites sufficient structure to perform the recited function. Alternatively, if the Court finds that 35 U.S.C. § 112(6) applies: Function: "calculating said pitch gain $b^{(j)}$" Structure, material, or acts: "A computer performing the following algorithm: $b^{(j)} = x^t y^{(j)}/||y^{(j)}||^2$ where j=0, 1, 2, . . . , K, and K corresponds to a number of signal paths, and where x is said pitch search target vector and $y^{(j)}$ is said convolved pitch codevector or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 35; *id.*, Ex. B at 14-15; Dkt. No. 73, App'x B at 30-31. The parties submit that this term appears in Claims 6 and 7 of the '521 Patent. Dkt. No. 61, Ex. A at 35; *id.*, Ex. B at 14-15; Dkt. No. 73, App'x B at 30.

Plaintiff argues that "[b]ecause th[is] . . . term[] recite[s] sufficient structure (corresponding algorithm) in the claim itself, [Plaintiff] respectfully submits that th[is] . . . term[] [is] not subject to § 112(6)." Dkt. No. 70 at 9.

Defendants respond that "[t]he inclusion of mathematical formulas (or 'algorithms,' as [Plaintiff] calls them) in these claim terms does not specify the underlying structure that actually performs operations in accordance with those formulas." Dkt. No. 69 at 12.

"[T]he word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies," and Plaintiff has not overcome the presumption. *Williamson*, 792 F.3d at 1348. Although the disputed term sets forth a mathematical relationship, the claims themselves do not recite a processor.

The Court therefore hereby finds that this is a means-plus-function term, the claimed function is **"calculating said pitch gain $b^{(j)}$,"** and the corresponding structure is **"a processor configured such that $b^{(j)} = x^t y^{(j)}/||y^{(j)}||^2$ where j=0, 1, 2, . . . , K, and K corresponds to a number of signal paths, and where x is said pitch search target vector and $y^{(j)}$ is said convolved pitch codevector; and equivalents thereof."**

T. "means for comparing the energies of said pitch prediction errors of the different signal paths and for choosing as the signal path having the lowest calculated pitch prediction error the signal path having the lowest calculated energy of the pitch prediction error"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
This term is not subject to 35 U.S.C. § 112(6) as the claim recites sufficient structure to perform the recited function. Alternatively, if the Court finds that 35 U.S.C. § 112(6) applies: Function: "comparing the energies of said pitch prediction errors of the different signal paths and choosing as the signal path having the lowest calculated pitch prediction error" Structure, material, or acts: "A computer performing the following algorithm: choosing the signal path having the lowest calculated energy of the pitch prediction error or equivalents thereof."	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 36; *id.*, Ex. B at 15; Dkt. No. 73, App'x B at 32. The parties submit that this term appears in Claim 8 of the '521 Patent. Dkt. No. 61, Ex. A at 36; *id.*, Ex. B at 15; Dkt. No. 73, App'x B at 32.

Plaintiff argues that "[b]ecause th[is] . . . term[] recite[s] sufficient structure (corresponding algorithm) in the claim itself, [Plaintiff] respectfully submits that th[is] . . . term[] [is] not subject to § 112(6)." Dkt. No. 70 at 9.

Defendants respond that "[t]he inclusion of mathematical formulas (or 'algorithms,' as [Plaintiff] calls them) in these claim terms does not specify the underlying structure that actually performs operations in accordance with those formulas." Dkt. No. 69 at 12.

"[T]he word 'means' in a claim element creates a rebuttable presumption that § 112, para. 6 applies," and Plaintiff has not overcome the presumption. *Williamson*, 792 F.3d at 1348. Although the disputed term sets forth an algorithm, the claim does not itself recite a processor.

The Court therefore hereby finds that this is a means-plus-function term, the claimed function is **"comparing the energies of said pitch prediction errors of the different signal paths and choosing the signal path having the lowest calculated pitch prediction error,"** and the corresponding structure is **"a processor configured for choosing the signal path having the lowest calculated energy of the pitch prediction error; and equivalents thereof."**

U. "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured to filter the noise w_g through a bandwidth expanded version of the same LP synthesis filter used in the down-sampled domain (1/Â(z/0.8)), and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 15; *id.*, Ex. B at 7-8; Dkt. No. 73, App'x B at 1; Dkt. No. 89, Ex. A at p. 6 of 11; Dkt. No. 122, App'x at p. 6 of 11. The parties submit that this term appears in Claims 1, 2, 3, 8, and 49 of the '802 Patent. Dkt. No. 61, Ex. A at 15; *id.*, Ex. B at 7-8; Dkt. No. 73, App'x B at 1.

(1) The Parties' Positions

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350).

Defendants also argue that Plaintiff "has not identified an algorithm that performs the claimed function," and whereas "the claimed function requires shaping the spectrum of 'the noise sequence,'" "the specification recites no structure for performing this function." Dkt. No. 121 at 2-3.

Plaintiff replies that "Defendants antecedent basis argument misreads the claim, which recites shaping 'the *spectrum* of the noise sequence.'" Dkt. No. 122 at 6.

In sur-reply, Defendants submit expert opinion that there is no algorithm. *See* Dkt. No. 212 at 3; *see also id.* at Ex. C, Sept. 6, 2016 Clements Decl.

(2) Analysis

Williamson, in an *en banc* portion of the decision, abrogated prior statements that the absence of the word "means" gives rise to a "strong" presumption against means-plus-function treatment. 792 F.3d at 1348-49 (citation omitted). *Williamson* also abrogated prior statements that this presumption "is not readily overcome" and that this presumption cannot be overcome "without a showing that the limitation essentially is devoid of anything that can be construed as structure." *Id.* (citations omitted). In a subsequent part of the decision (not considered *en banc*), *Williamson* affirmed the district court's finding that the term "distributed learning control module" was a means-plus-function term that was indefinite because of lack of corresponding structure, and in doing so *Williamson* stated that "'module' is a well-known nonce word." *Id.*

at 1350. Further, *Williamson* identified "mechanism," "element," and "device" as other "nonce" words. *Id.*

Williamson also noted that "the essential inquiry is not merely the presence or absence of the word 'means' but whether the words of the claim are understood by persons of ordinary skill in the art to have a sufficiently definite meaning as the name for structure." *Id.* at 1348.

Here, the disputed term recites a "unit," and the term is otherwise arranged in means-plus-function format. At the June 29, 2016 hearing, Plaintiff did not attempt to distinguish the above-discussed portions of *Williamson* and did not otherwise attempt to substantively rebut Defendants' argument that 35 U.S.C. § 112, ¶ 6 applies.

In some circumstances, modifiers can impart sufficient structural meaning so as to avoid means-plus-function treatment. *See id.* at 1351 ("the presence of modifiers can change the meaning of 'module'"). No such language is evident here. Further, "the claim does not describe how the '. . . [device]' interacts with other components . . . in a way that might inform the structural character of the limitation-in-question or otherwise impart structure to the '. . . [device]' as recited in the claim." *Id.*

The Court thus concludes that the disputed term is a means-plus-function term subject to 35 U.S.C. § 112, ¶ 6. As to corresponding structure, the specification discloses:

> The scaled noise sequence w_g produced in gain adjusting module 214 is . . . given by:
>
> $$w_g = g_t w.$$
>
> When the tilt is close to zero, the scaling factor g_t is close to 1, which does not result in energy reduction. When the tilt value is 1, the scaling factor g_t results in a reduction of 12 dB in the energy of the generated noise.
>
> Once the noise is properly scaled (w_g), it is brought into the speech domain using the spectral shaper 215. In the preferred embodiment, this is achieved by filtering the noise w_g through a bandwidth expanded version of the same LP synthesis

> filter used in the down-sampled domain (1/Â(z/0.8)). The corresponding bandwidth expanded LP filter coefficients are calculated in spectral shaper 215.

'802 Patent at 19:21-35. Although this disclosure refers to filtering the "w_g" noise rather than the "w" noise, this disclosure is nonetheless reasonably linked to the claimed function of "shaping the spectrum of the noise sequence." Defendants' expert opines that "[t]here are many ways to expand a bandwidth of this filter, but the patent specification does not adequately describe any method to be used." Dkt. No. 121-1, Aug. 22, 2016 Clements Decl. at ¶ 14. Such arguments may perhaps bear upon enablement or written description but are not relevant or persuasive as to the present claim construction proceedings. *See also* Dkt. No. 122, Ex. G, Aug. 29, 2016 Ogunfunmi Decl. at ¶ 4 ("For any given sampling rate, there is only one filter that meets the above description of being the bandwidth expanded version of *the same* LP synthesis filter used in the down-sampled domain.").

The Court accordingly hereby finds that the present disputed term is a means-plus-function term, the function is **"shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal,"** and the corresponding structure is **"a processor configured to filter the noise w_g through a bandwidth expanded version of the same LP synthesis filter used in the down-sampled domain (1/Â(z/0.8)), and equivalents thereof."**

V. "gain adjustment module, responsive to said white noise sequence and a set of gain adjusting parameters, for producing a scaled white noise sequence"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured such that $w_g = g_t w$ and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: a processor configured to produce scaled white noise sequence wg by "The vector s' is filtered through the deemphasis filter D(z) (module 207) to obtain the vector s_d, which is passed through the high-pass filter 208 to remove the unwanted frequencies below 50 Hz and further obtain s_h." ('802, 17:43-46.) "The tilt factor is computed in module 212 as the first correlation coefficient of the synthesis signal s_h and it is given by $$tilt = \frac{\sum_{n=1}^{N-1} s_h(n) s_h(n-1)}{\sum_{n=0}^{N-1} s_h^2(n)}$$ conditioned by tilt >= 0 and tilt >= rv." ('802, 18:44-55.) "[D]eriv[ing] the scaling factor g_t from the amount of high frequency contents [with one of] two methods … based on the tilt of signal described above. Method 1: The scaling factor gt is derived from the tilt by gt = 1-tilt bounded by $0.2 \leqq [1\text{-tilt}] \leqq 1.0$ … Method 2: The tilt factor g_t is first restricted to be larger or equal to zero, then the scaling factor is derived from the til[t] by $g_t = 10^{-0.6tilt}$ The scaled noise sequence wg produced in gain adjusting module 214 is therefore given by: $w_g = g_t w$." (19:5-24.)

Dkt. No. 61, Ex. A at 16-17; *id.*, Ex. B at 8-9; Dkt. No. 73, App'x B at 1; Dkt. No. 89, Ex. A at p. 6 of 11; Dkt. No. 121 at 4-5; Dkt. No. 122, App'x at p. 6 of 11. The parties submit that this term appears in Claims 3 and 8 of the '802 Patent. Dkt. No. 61, Ex. A at 16-17; *id.*, Ex. B at 8-9; Dkt. No. 73, App'x B at 1.

(1) The Parties' Positions

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). In particular, Defendants argue that this term merely replaces "means" with "module" and recites a function performed by the module. Dkt. No. 69 at 14.

Defendants also argue that Plaintiff's alternative proposal "identifies multiplying by a scaling factor g_t – but fails to provide the algorithm used to generate this scaling factor." Dkt. No. 121 at 5.

Plaintiff replies that "Defendants add algorithms for *other* claim elements." Dkt. No. 122 at 6.

In sur-reply, Defendants argue that "[t]he spectral tilt calculation is *required* to calculate gain," and Defendants submit an expert declaration in this regard. Civil Action Nos. 2:15-CV-349, Dkt. No. 212 at 3; *see id.*, Ex. C, Sept. 6, 2016 Clements Decl. at ¶ 14.

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "producing a scaled white noise sequence."

As to corresponding structure, the specification discloses:

> Different methods can be used to derive the scaling factor g_t from the amount of high frequency contents. In this invention, two methods are given based on the tilt of signal described above.
>
> Method 1:
> The scaling factor g_t is derived from the tilt by
>
> g_t = 1-tilt bounded by $0.2 \leqq g_t \leqq 1$.
>
> For strongly voiced signal where the tilt approaches 1, g_t is 0.2 and for strongly unvoiced signals g_t becomes 1.0.
>
> Method 2:
> The tilt factor g_t is first restricted to be larger or equal to zero, then the scaling factor is derived from the tilt by
>
> $g_t = 10^{-0.6\text{tilt}}$
>
> The scaled noise sequence w_g produced in gain adjusting module 214 is therefore given by:
>
> $w_g = g_t w$.

'802 Patent at 19:5-24.

Whereas Defendants argue that the corresponding structure must include the two above-quoted methods for deriving g_t, the claimed function pertains not to how g_t is derived but rather to how g_t is used to obtain w_g. *See, e.g., Northrop Grumman Corp. v. Intel Corp.*, 325 F.3d 1346, 1352 (Fed. Cir. 2003) ("Under section 112, paragraph 6, structure disclosed in the specification is 'corresponding' structure only if the specification or the prosecution history clearly links or associates that structure to the function recited in the claim. . . . A court may not import into the claim features that are unnecessary to perform the claimed function.") (citations and internal quotation marks omitted).

The Court accordingly hereby finds that the present disputed term is a means-plus-function term, the function is **"producing a scaled white noise sequence,"** and the

corresponding structure is **"a processor configured such that $w_g = g_t w$ and equivalents thereof."**

W. "convolution unit for convolving the pitch codevector with a weighted synthesis filter impulse response signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured to convolve the vectors $v_f^{(j)}$ with the impulse response h to obtain the vectors $y^{(j)}$, where j = 0, 1, 2, . . . , K, and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 34; *id.*, Ex. B at 14; Dkt. No. 73, App'x B at 1; Dkt. No. 89, Ex. A at p. 6 of 11; Dkt. No. 122, App'x at p. 6 of 11. The parties submit that this term appears in Claims 5, 6, and 7 of the '521 Patent. Dkt. No. 61, Ex. A at 34; *id.*, Ex. B at 14; Dkt. No. 73, App'x B at 1.

(1) The Parties' Positions

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Defendants also argue that "[t]his term is indefinite for reasons similar to [the 'spectral shaping unit' term] above." Dkt. No. 121 at 6.

Plaintiff replies: "Defendants' argument that 'convolving refers to a broad class of different possible algorithms' is incorrect. The convolution of sampled signals is an established mathematical operation . . . . Regardless of the way that one convolves the pitch codevector with the impulse response signal, the output will always be the same." Dkt. No. 122 at 7.

In sur-reply, Defendants submit expert opinion that there is no algorithm. *See* Dkt. No. 212 at 3; *see also id.* at Ex. C, Sept. 6, 2016 Clements Decl.

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "convolving the pitch codevector with a weighted synthesis filter impulse response signal."

As to corresponding structure, the specification discloses:

> The different vectors $v_f^{(j)}$ are convolved in respective modules $304^{(j)}$, where j=0, 1, 2 . . . , K, with the impulse response h to obtain the vectors $y^{(j)}$, where j=0, 1, 2, . . . , K.

'521 Patent at 12:23-26. Although Defendants argue that "convolving refers to a broad class of different possible algorithms" (Dkt. No. 121 at 6 (citing Dkt. No. 121-1, Aug. 22, 2016 Clements Decl. at ¶¶ 22-23)), Plaintiff's expert has persuasively opined that "[t]he result of 'convolving' two signals is absolute and fixed, just as the result of multiplying two values is absolute and fixed." Dkt. No. 122, Ex. G, Aug. 29, 2016 Ogunfunmi Decl. at ¶ 6.

The Court therefore hereby finds that the present disputed term is a means-plus-function term, the function is **"convolving the pitch codevector with a weighted synthesis filter impulse response signal,"** and the corresponding structure is **"a processor configured to convolve the vectors $v_f^{(j)}$ with the impulse response h to obtain the vectors $y^{(j)}$, where j = 0, 1, 2, . . . , K, and equivalents thereof."**

X. "pitch search unit for producing pitch codebook parameters"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6). Alternatively: The corresponding structure comprises the combined corresponding structures identified for ["pitch codebook search device responsive to the perceptually weighted signal and linear prediction synthesis filter coefficients for producing the pitch codevector and an innovative search target vector" (Claims 10, 28 of the '521 Patent) and "pitch analysis device responsive to the pitch codevector for selecting, from said sets of pitch codebook parameters, the set of pitch codebook parameters associated to the signal path having the lowest calculated pitch prediction error" (Claims 10, 28 of the '521 Patent)] below.	Indefinite This term is subject to 35 U.S.C. § 112(6).

Dkt. No. 61, Ex. A at 37; *id.*, Ex. B at 15; Dkt. No. 73, App'x B at 1-2; Dkt. No. 89, Ex. A at p. 6 of 11; Dkt. No. 121 at 7; Dkt. No. 122, App'x at p. 6 of 11. The parties submit that this term appears in Claims 10 and 28 of the '521 Patent. Dkt. No. 73, App'x B at 1-2.

(1) The Parties' Positions

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Defendants also argue that this term is indefinite because it is made up of other indefinite terms. Dkt. No. 121 at 9.

Plaintiff replies that "Defendants seek to add algorithms for other claim elements." Dkt. No. 122 at 9.

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "convolving the pitch codevector with a weighted synthesis filter impulse response signal."

As to corresponding structure, the disputed term appears in Claim 10 of the '521 Patent, which recites in relevant part:

> d) a pitch search unit for producing pitch codebook parameters, said pitch search unit comprising:
>
> i) said pitch codebook search device responsive to the perceptually weighted signal and the linear prediction synthesis filter coefficients for producing the pitch codevector and an innovative search target vector; and
>
> ii) said pitch analysis device responsive to the pitch codevector for selecting, from said sets of pitch codebook parameters, the set of pitch codebook parameters associated to the signal path having the lowest calculated pitch prediction error

The disputed term is recited as "comprising" the "pitch codebook search device" and the "pitch analysis device," which are distinct disputed terms addressed herein. The corresponding structure for the "pitch search unit for producing pitch codebook parameters" thus simply comprises the corresponding structure for those constituent terms. No further construction of the present disputed term is necessary.

Y. "signal fragmenting device for receiving an encoded wideband speech signal and extracting from said encoded wideband speech signal at least pitch codebook parameters, innovative codebook parameters, and synthesis filter coefficients"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured to demultiplex the long-term prediction (LTP) parameters T, b, and j per subframe; the innovation codebook index k and gain g per subframe; and the short-term prediction parameters (STP) Â(z) per frame; and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component for receiving an encoded wideband speech signal and extracting from said encoded wideband speech signal at least pitch codebook parameters, innovative codebook parameters, and synthesis filter coefficients

Dkt. No. 61, Ex. A at 12-13; *id.*, Ex. B at 4; Dkt. No. 73, App'x B at 2; Dkt. No. 89, Ex. A at p. 7 of 11; Dkt. No. 122, App'x at p. 7 of 11. The parties submit that this term appears in Claims 21, 22, 23, and 26 of the '805 Patent. Dkt. No. 73, App'x B at 2.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

As to Plaintiff's alternative proposal, Defendants argue that "[t]he term 'demultiplex' is a broad functional term that does not provide a person of skill in the art with any algorithm (step-by-step procedure) – for performing the claimed [extracting] function." Dkt. No. 121 at 10 (citation and internal quotation marks omitted). Further, Defendants argue, "[Plaintiff's] construction also fails to identify any algorithm for the 'receiving' function." *Id.*

Plaintiff replies that "[t]he '805 Patent discloses 'digital input 222 (input stream to the demultiplexer 217)' and specifies that '[d]emultiplexer 217 extracts the synthesis model parameters from the binary information received from a digital input channel.'" Dkt. No. 122 at 7-8.

In sur-reply, Defendants submit expert opinion that there is no algorithm. *See* Dkt. No. 212 at 3; *see also id.* at Ex. C, Sept. 6, 2016 Clements Decl.

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "receiving an encoded wideband speech signal and extracting from said encoded wideband speech signal at least pitch codebook parameters, innovative codebook parameters, and synthesis filter coefficients."

As to corresponding structure, the specification discloses:

> Demultiplexer 217 extracts the synthesis model parameters from the binary information received from a digital input channel. From each received binary frame, the extracted parameters are:
>
> the short-term prediction parameters (STP) Â(z) (once per frame);
>
> the long-term prediction (LTP) parameters T, b, and j (for each subframe); and
>
> the innovation codebook index k and gain g (for each subframe).

’805 Patent at 13:41-50; *see id.* at 7:1-7 (“List of Transmitted Parameters”).

Defendant has urged that the disclosed “[d]emultiplexer 217” is a “black box” that is insufficient structure. Dkt. No. 121 at 10 (quoting *Blackboard, Inc. v. Desire2Learn Inc.*, 574 F.3d 1371, 1383 (Fed. Cir. 2009)).

Plaintiff’s expert has persuasively opined, however, that “a person of ordinary skill in the art would readily understand what multiplexing and demultiplexing mean in the context of digital bit streams,” and “[a] person of ordinary skill in the art would readily understand how to multiplex the disclosed parameters into a digital bit stream and how to subsequently extract those parameters from the digital bit stream.” Dkt. No. 122, Ex. G, Aug. 29, 2016 Ogunfunmi Decl. at ¶ 7; *see Typhoon Touch*, 659 F.3d at 1385 (“the amount of detail that must be included in the specification depends on the subject matter that is described and its role in the invention as a whole, in view of the existing knowledge in the field of the invention”).

Finally, to whatever extent Defendant maintains that Plaintiff’s proposed corresponding structure fails to disclose necessary structure for “receiving,” no specialized structure is necessary for performing this “receiving” function. *See In re Katz Interactive Call Processing Patent Litig.*, 639 F.3d 1303, 1316 (Fed. Cir. 2011) (“Absent a possible narrower construction of the terms ‘processing,’ ‘receiving,’ and ‘storing,’ . . . those functions can be achieved by any general purpose computer without special programming. As such, it was not necessary to disclose more structure than the general purpose processor that performs those functions.”).

The Court therefore hereby finds that the present disputed term is a means-plus-function term, the function is **“receiving an encoded wideband speech signal and extracting from said encoded wideband speech signal at least pitch codebook parameters, innovative codebook parameters, and synthesis filter coefficients,”** and the corresponding structure is **“a processor**

configured to demultiplex the long-term prediction (LTP) parameters T, b, and j per subframe, the innovation codebook index k and gain g per subframe, and the short-term prediction parameters (STP) Â(z) per frame; and equivalents thereof."

Z. "pitch codebook search device responsive to said perceptually weighted signal for producing pitch codebook parameters and an innovative search target vector"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured to find the parameters b, T and j which minimize the mean-squared error $e^{(j)} = \|x - b^{(j)}y^{(j)}\|^2$ and configured such that $x' = x\text{-}by_T$, and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component responsive to said perceptually weighted signal for producing pitch codebook parameters and an innovative search target vector

Dkt. No. 61, Ex. A at 11; *id.*, Ex. B at 6; Dkt. No. 73, App'x B at 2-3; Dkt. No. 89, Ex. A at pp. 7-8 of 11; Dkt. No. 122, App'x at pp. 7-8 of 11. The parties submit that this term appears in Claims 18 and 19 of the '524 Patent. Dkt. No. 61, Ex. A at 11; *id.*, Ex. B at 6; Dkt. No. 73, App'x B at 2-3.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

Defendants also argue that Plaintiff's alternative proposed construction "fails to provide an algorithm for producing either the pitch codebook parameters or an innovative search target vector 'responsive to the perceptually weighted signal,' which is the output of the 'Perceptual Weighting filter' 105." Dkt. No. 121 at 11. Further, Defendants argue, Plaintiff's proposed construction "fails to disclose how to 'find' these parameters, merely identifying desired *qualities* of b, T, and j – that the ones that are chosen should minimize the mean-squared-error – without any algorithm for finding these parameters." *Id.* at 11.

Plaintiff replies that "Defendants seek to add algorithms for other claim elements." Dkt. No. 122 at 9; *see id.* at 10.

In sur-reply, Defendants submit expert opinion that there is no algorithm. *See* Dkt. No. 212 at 3; *see also id.* at Ex. C, Sept. 6, 2016 Clements Decl.

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "producing pitch codebook parameters and an innovative search target vector."

As to corresponding structure, Plaintiff's proposal is supported by disclosures in the specification that are sufficiently linked to the claimed function. *See* '524 Patent at 12:43-59 & 13:1-12; *see also id.* at 8:59-65 ("In analysis-by-synthesis encoders, the optimum pitch and

innovation parameters are searched by minimizing the mean squared error between the input speech and synthesized speech in a perceptually weighted domain.").

The Court hereby finds that the present disputed term is a means-plus-function term, the function is **"producing pitch codebook parameters and an innovative search target vector,"** and the corresponding structure is **"a processor configured to find the parameters b, T and j which minimize the mean-squared error $e^{(j)} = ||x - b^{(j)}y^{(j)}||^2$ and configured such that $x' = x\text{-}by_T$, and equivalents thereof."**

AA. "innovative codebook search device, responsive to said synthesis filter coefficients and to said innovative search target vector, for producing innovative codebook parameters"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured to find the optimum excitation codevector c_k and gain g which minimize the mean-squared error $E = \|x'-gHc_k\|^2$, and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component responsive to said synthesis filter coefficients and to said innovative search target vector, for producing innovative codebook parameters

Dkt. No. 61, Ex. A at 11-12; *id.*, Ex. B at 6-7; Dkt. No. 73, App'x B at 3-4; Dkt. No. 89, Ex. A at p. 8 of 11; Dkt. No. 122, App'x at p. 8 of 11. The parties submit that this term appears in Claims 18 and 19 of the '524 Patent. Dkt. No. 61, Ex. A at 11-12; *id.*, Ex. B at 6-7; Dkt. No. 73, App'x B at 3.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting

Williamson, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

Defendants also argue that Plaintiff's alternative proposal "fails to disclose how to 'find' these innovative codebook parameters ck and g, merely identifying their desired *qualities* – that the ones that are 'found' should minimize the mean-squared-error – without any algorithm for doing this search." Dkt. No. 121 at 12. Further, Defendants argue, Plaintiff's proposal "fails to provide an algorithm for producing the innovative codebook parameters 'responsive to said synthesis filter coefficients.'" *Id.*

Plaintiff replies that Defendants' arguments should be rejected for the same reasons as for the term "pitch codebook search device responsive to the perceptually weighted signal and linear prediction synthesis filter coefficients for producing the pitch codevector and an innovative search target vector" that appears in Claims 10 and 28 of the '521 Patent. Dkt. No. 122 at 10.

In sur-reply, Defendants submit expert opinion that there is no algorithm. *See* Dkt. No. 212 at 3; *see also id.* at Ex. C, Sept. 6, 2016 Clements Decl.

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "producing innovative codebook parameters."

As to corresponding structure, Plaintiff's proposal is supported by disclosures in the specification that are sufficiently linked to the claimed function. *See* '524 Patent at 13:12-20. The opinion of Defendants' expert to the contrary is unpersuasive. *See* Dkt. No. 121-1, Aug. 22, 2016 Clements Decl. at ¶ 26.

The Court hereby finds that the present disputed term is a means-plus-function term, the function is **"producing innovative codebook parameters,"** and the corresponding structure is **"a processor configured to find the optimum excitation codevector c_k and gain g which minimize the mean-squared error $E = \|x' - gHc_k\|^2$, and equivalents thereof."**

BB. "signal forming device for producing an encoded wideband [speech] signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured to multiplex the pitch codebook parameters T, b, and j; the innovation codebook parameters k and g; and the synthesis filter coefficients $\hat{A}(z)$; and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component for producing an encoded wideband [speech] signal

Dkt. No. 61, Ex. A at 12; *id.*, Ex. B at 7; Dkt. No. 73, App'x B at 4; Dkt. No. 89, Ex. A at 8-9; Dkt. No. 122, App'x at pp. 8-9 of 11. The parties submit that this term appears in Claims 18 and 19 of the '524 Patent and Claims 10 and 11 of the '521 Patent. Dkt. No. 61, Ex. A at 12; *id.*, Ex. B at 7; Dkt. No. 73, App'x B at 4.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

As to Plaintiff's alternative proposal, Defendants argue that "'multiplex' does not provide an algorithm, but describes a broad class of algorithms." Dkt. No. 121 at 12.

Plaintiff replies that "[t]he 'signal forming device' corresponds to the encoder's multiplexer 112 that multiplexes the parameters into a digital bit stream." Dkt. No. 122 at 7 (citing '524 Patent at 13:31-33).

In sur-reply, Defendants submit expert opinion that there is no algorithm. *See* Dkt. No. 212 at 3; *see also id.* at Ex. C, Sept. 6, 2016 Clements Decl.

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "producing an encoded wideband [speech] signal."

As to corresponding structure, the specification discloses:

> Referring to FIG. 1, the parameters b, T, j, Â(z), k and g are multiplexed through the multiplexer 112 before being transmitted through a communication channel.

'524 Patent at 13:31-33; *see* '521 Patent at 13:22-24 (same); *see also* '521 Patent at 12:45-56. Plaintiff's proposed corresponding structure is thus supported by disclosure that is sufficiently linked to the claimed function. The opinions of Defendants' expert to the contrary are unpersuasive. *See* Dkt. No. 121-1, Aug. 22, 2016 Clements Decl. at ¶ 28; *see also Typhoon Touch*, 659 F.3d at 1385 ("the amount of detail that must be included in the specification depends on the subject matter that is described and its role in the invention as a whole, in view of the existing knowledge in the field of the invention").

The Court therefore hereby finds that the present disputed term is a means-plus-function term, the function is **"producing an encoded wideband [speech] signal,"** and the corresponding structure is **"a processor configured to multiplex the pitch codebook parameters T, b, and j, the innovation codebook parameters k and g, and the synthesis filter coefficients Â(z); and equivalents thereof."**

CC. "signal fragmenting device for receiving an encoded version of a wideband signal previously down-sampled during encoding and extracting from said encoded wideband signal version at least pitch codebook parameters, innovative codebook parameters, and linear prediction filter coefficients"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured to demultiplex the long-term prediction (LTP) parameters T, b, and j per subframe; the innovation codebook index k and gain g per subframe; and the short-term prediction parameters (STP) Â(z) per frame; and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6) Alternatively, a distinct hardware component for receiving an encoded version of a wideband signal

Dkt. No. 61, Ex. B at 7; Dkt. No. 70, App'x 2 at 3; Dkt. No. 73, App'x B at 4-5; Dkt. No. 89, Ex. A at p. 7 of 11; Dkt. No. 122, App'x at p. 7 of 11. The parties submit that this term appears

in Claims 1, 2, 3, 8, and 49 of the '802 Patent. Dkt. No. 61, Ex. B at 7; Dkt. No. 73, App'x B at 4-5.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

As to Plaintiff's alternative proposal, Defendants argue that Plaintiff "fails to provide any algorithm for the receiving or extracting functions," and "the disclosure that [Plaintiff] purports to be an algorithm does not teach extracting 'linear prediction filter coefficients' as required by the claimed function." Dkt. No. 121 at 13.

Plaintiff replies that "[t]he '805 Patent discloses 'digital input 222 (input stream to the demultiplexer 217)' and specifies that '[d]emultiplexer 217 extracts the synthesis model parameters from the binary information received from a digital input channel.'" Dkt. No. 122 at 7-8.

In sur-reply, Defendants submit expert opinion that there is no algorithm. *See* Dkt. No. 212 at 3; *see also id.* at Ex. C, Sept. 6, 2016 Clements Decl.

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "receiving an encoded version of a wideband signal previously down-sampled during encoding and extracting from said encoded wideband signal version at least pitch codebook parameters, innovative codebook parameters, and linear prediction filter coefficients."

As to the corresponding structure, the specification discloses:

> Demultiplexer 217 extracts the synthesis model parameters from the binary information received from a digital input channel. From each received binary frame, the extracted parameters are:
>
> the short-term prediction parameters (STP) Â(z) (once per frame);
>
> the long-term prediction (LTP) parameters T, b, and j (for each subframe); and
>
> the innovation codebook index k and gain g (for each subframe).

'802 Patent at 14:64-15:7.

Plaintiff's proposed corresponding structure is thus supported by disclosure that is sufficiently linked to the claimed function. The opinions of Defendants' expert to the contrary are unpersuasive. *See* Dkt. No. 121-1, Aug. 22, 2016 Clements Decl. at ¶ 29; *see also Typhoon Touch*, 659 F.3d at 1385 ("the amount of detail that must be included in the specification depends on the subject matter that is described and its role in the invention as a whole, in view of the existing knowledge in the field of the invention"). Also, whereas Defendants argue that the structure identified by Plaintiff "does not teach extracting 'linear prediction filter coefficients' as required by the claimed function" (Dkt. No. 121 at 13), Plaintiff has persuasively argued that the

short-term prediction parameters Â(z) include linear prediction filter coefficients. *See* '802 Patent at 9:33; *see also id.* at 17:32 ("quantized LP coefficients Â(z)").

The Court therefore hereby finds that the present disputed term is a means-plus-function term and that the function is **"receiving an encoded version of a wideband signal previously down-sampled during encoding and extracting from said encoded wideband signal version at least pitch codebook parameters, innovative codebook parameters, and linear prediction filter coefficients,"** and the corresponding structure is **"a processor configured to demultiplex the long-term prediction (LTP) parameters T, b, and j per subframe, the innovation codebook index k and gain g per subframe, and the short-term prediction parameters (STP) Â(z) per frame; and equivalents thereof."**

DD. "signal synthesis device including a linear prediction filter for filtering said excitation signal in relation to said linear prediction filter coefficients to thereby produce a synthesized wideband signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component for filtering said excitation signal in relation to said linear prediction filter coefficients to thereby produce a synthesized wideband signal

Dkt. No. 61, Ex. A at 13; *id.*, Ex. B at 7; Dkt. No. 73, App'x B at 5. The parties submit that this term appears in Claims 1, 2, 3, 8, and 49 of the '802 Patent. Dkt. No. 61, Ex. A at 13; *id.*, Ex. B at 7; Dkt. No. 73, App'x B at 5.

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

Because the term itself recites a "linear prediction filter," this disputed term is not a means-plus-function term. *See, e.g.*, *Williamson*, 792 F.3d at 1348, 1350; *Greenberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580, 1583 (Fed. Cir. 1996). The Court hereby expressly rejects Defendants' indefiniteness arguments. The Court also hereby expressly rejects Defendants' alternative proposed construction, and no further construction is necessary, as likewise discussed as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signals," below.

The Court accordingly hereby construes **"signal synthesis device including a linear prediction filter for filtering said excitation signal in relation to said linear prediction filter coefficients to thereby produce a synthesized wideband signal"** to have its **plain meaning**.

EE. "pitch analysis device for producing a set of pitch codebook parameters"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6). To the extent the Court finds that § 112(6) applies to the preamble, the corresponding structure is "a processor configured (a) such that $v_T(n) = u(n-T)$ for n=0 . . . n=N-1 when T>N, and $v_T(n)$ is the available samples from the past excitation when T<N; (b) such that $e^{(j)} = \|x - b^{(j)}y^{(j)}\|^2$, where j = 0, 1, 2, . . . , K; (c) such that the pitch codevector is filtered with a frequency shaping filter; and (d) such that the parameters b, T and j are chosen based on the v_T or $v_f^{(j)}$ which minimizes the mean squared pitch prediction error; and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component for producing a set of pitch codebook parameters

Dkt. No. 61, Ex. A at 31; *id.*, Ex. B at 12-13; Dkt. No. 73, App'x B at 6; Dkt. No. 89, Ex. A at p. 2 of 11; Dkt. No. 12, App'x at pp. 2-3 of 11. The parties submit that this term appears in Claims 1, 2, 5, 6, 7, 8, 10, and 28 of the '521 Patent. Dkt. No. 61, Ex. A at 31; *id.*, Ex. B at 12-13; Dkt. No. 73, App'x B at 6.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

As to Plaintiff's alternative proposal, Defendants argue that "[e]ven if [Plaintiff's] proposed combination of multiple elements was acceptable, it is indefinite as it fails to inform one of ordinary skill in the art what will perform the recited function." Dkt. No. 121 at 14. Defendant urges that "[i]t is not enough for the patentee simply to state or later argue that persons of ordinary skill in the art would know what structures to use to accomplish the claimed function." *Id.*

Plaintiff replies that "the body of the claim itself provides a structurally-complete invention and the preamble term merely states the purpose of the invention. As a result, the preamble[] [is] non-limiting." Dkt. No. 122 at 1.[5]

(2) Analysis

> In general, a preamble limits the invention if it recites essential structure or steps, or if it is "necessary to give life, meaning, and vitality" to the claim. *Pitney Bowes*[*, Inc. v. Hewlett-Packard Co.*], 182 F.3d [1298,] 1305 [(Fed. Cir. 1999)]. Conversely, a preamble is not limiting "where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention." *Rowe v. Dror*, 112 F.3d 473, 478, 42 USPQ2d 1550, 1553 (Fed. Cir. 1997).

Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc., 289 F.3d 801, 808 (Fed. Cir. 2002); *see, e.g.*, *Eaton Corp. v. Rockwell Int'l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003) ("When limitations in

[5] In a sur-reply, Defendants have argued that Plaintiff waived this argument by failing to present it during initial claim construction disclosures and briefing or at the June 29, 2016 claim construction hearing. Civil Action Nos. 2:15-CV-349, Dkt. No. 212 at 1. As set forth in the Court's July 22, 2016 Order permitting additional proposals and briefing regarding the disputed terms at issue, "neither party disputes that the arguments in claim construction were focused on whether the specification adequately disclosed a computer or processor." Dkt. No. 100 at 2. For the same reasons that the Court permitted additional proposals and briefing, the Court permits Plaintiff's argument that certain preambles (or portions thereof) are non-limiting. Also of note, Defendants' sur-reply presents no substantive argument as to why the preambles at issue are limiting. *See* Dkt. No. 212.

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."). Also, "the purpose or intended use of the invention . . . is of no significance to claim construction . . . ." *See Pitney Bowes*, 182 F.3d at 1305. This principle has sometimes been characterized as "the presumption against reading a statement of purpose in the preamble as a claim limitation." *Marrin v. Griffin*, 599 F.3d 1290, 1294-95 (Fed. Cir. 2010).

The preamble here at issue appears in Claim 1 of the '521 Patent, which recites:

> 1. A pitch analysis device for producing a set of pitch codebook parameters, comprising:
>
> a pitch codebook search device configured to generate a pitch code vector based on a digitized input audio data, wherein said digitized input audio data represents an input audio signal that has been sampled and digitized;
>
> a) at least two signal paths associated to respective sets of pitch codebook parameters representative of said digitized input audio data, wherein:
>
> i) each signal path comprises a pitch prediction error calculating device for calculating a pitch prediction error of said pitch codevector from said pitch codebook search device; and
>
> ii) at least one of said at least two signal paths comprises a filter for filtering the pitch codevector before supplying said pitch codevector to the pitch prediction error calculating device of said at least one signal path; and
>
> b) a selector for comparing the pitch prediction errors calculated in said at least two signal paths, for choosing the signal path having the lowest calculated pitch prediction error and for selecting the set of pitch codebook parameters associated to the chosen signal path.

The preamble does not provide antecedent basis for any limitations set forth in the body of the claim, and Defendants have not demonstrated that the preamble is "necessary to give life, meaning, and vitality to the claim" or that the body of the claim does not "define[] a structurally complete invention." *Catalina Mktg.*, 289 F.3d at 808 (citations and internal quotation marks omitted). Instead, the preamble is used merely to "state a purpose or intended use for the invention." *Id.*

The Court therefore hereby finds that the present disputed term appears in a preamble that is **not limiting**.

FF. "pitch prediction error calculating device for calculating a pitch prediction error of said pitch codevector from said pitch codebook search device"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured such that $e^{(j)} = \|\|x-b^{(j)}y^{(j)}\|\|^2$, where j = 0, 1, 2, . . . , K, and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component for calculating a pitch prediction error of said pitch codevector from said pitch codebook search device Alternatively: "a processor configured such that $e^{(j)} = \|\|x-b^{(j)}y^{(j)}\|\|^2$, where j = 1, 2, . . . , K, and equivalents thereof"

Dkt. No. 61, Ex. A at 32-33; *id.*, Ex. B at 13; Dkt. No. 73, App'x B at 6; Dkt. No. 89, Ex. A at p. 9 of 11; Dkt. No. 121 at 15; Dkt. No. 122, App'x at p. 9 of 11. The parties submit that this term appears in Claims 1, 2, 5, 6, 7, 8, 10, and 28 of the '521 Patent. Dkt. No. 61, Ex. A at 32-33; *id.*, Ex. B at 13; Dkt. No. 73, App'x B at 6.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

As to the alternative proposed constructions, Defendants argue: "[T]he parties' competing constructions differ in that the formula in Defendants' construction shows the value of 'j' going from 1 to K, whereas [Plaintiff's] formula shows that 'j' value going from 0 to K. This appears to be a mistake in [Plaintiff's] proposed construction, as the specification clearly indicates that the value 'j' goes from 1 to K in the disclosure identified by [Plaintiff]." Dkt. No. 121 at 15 (citing '521 Patent at 12:30-39).

Plaintiff replies that "[a]s shown in Fig. 3 of the '521 Patent, when there is an unfiltered path, the index 'j' for that path is 0." Dkt. No. 122 at 10. Plaintiff emphasizes that dependent claim 2 specifies that 'one of said at least two signal paths comprises no filter." *Id.* Plaintiff concludes that the index "j" should start at zero. *Id.*

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "calculating a pitch prediction error of said pitch codevector from said pitch codebook search device."

As to corresponding structure, the parties' proposals are substantially supported by disclosure in the specification that is sufficiently linked to the claimed function. *See* '521 Patent at 12:30-39. This disclosure refers to "j = 1, 2, . . . , K," and Plaintiff has not adequately shown how Figure 3 illustrates that j can be zero. Plaintiff's above-noted reliance on dependent Claim 2 is similarly unavailing.

The Court therefore hereby finds that the present disputed term is a means-plus-function term, the function is **"calculating a pitch prediction error of said pitch codevector from said pitch codebook search device,"** and the corresponding structure is **"a processor configured such that $e^{(j)} = ||x-b^{(j)}y^{(j)}||^2$, where j = 1, 2, . . . , K, and equivalents thereof."**

GG. "pitch codebook search device responsive to the perceptually weighted signal and linear prediction synthesis filter coefficients for producing the pitch codevector and an innovative search target vector"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured such that $v_T(n) = u(n-T)$ for n=0 . . . n=N-1, when T>N, and $v_T(n)$ is the available samples from the past excitation when T<N, and configured such that $x' = x-by_T$, and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component responsive to the perceptually weighted signal and linear prediction synthesis filter coefficients for producing the pitch codevector and an innovative search target vector Alternatively: "a processor configured to: $C = \frac{x^t y_T}{\sqrt{y_T^t y_T}}$ ('512 [*sic*, '521], 11:1-10.) "conduct a pitch codebook (pitch codebook) search minimizing the above defined search criterion C" to find the optimum b and T ('512 [*sic*, '521], 12:5-6.) And then "generates optimum pitch codevector V_T . . . [where] v_T corresponds to the interpolated past excitation signal," $v_T(n) = u(n-T)$ ('512 [*sic*, '521], 12:8-12.)

Dkt. No. 61, Ex. A at 37-38; *id.*, Ex. B at 15; Dkt. No. 73, App'x B at 7; Dkt. No. 89, Ex. A at pp. 9-10 of 11; Dkt. No. 121 at 7-8; Dkt. No. 122, App'x at p. 10 of 11. The parties submit that

this term appears in Claims 10 and 28 of the '521 Patent. Dkt. No. 61, Ex. A at 37-38; *id.*, Ex. B at 15; Dkt. No. 73, App'x B at 7.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

Defendant also argues that Plaintiff's proposal "leaves out the first step of conducting a pitch codebook search to find the pitch lag T and pitch gain b, which is part of the recited claim function. These are then used in producing, respectively, the pitch codevector V_T, (*Id.*, 12:7-9[]) and the innovative search target vector x', as further required by the claimed function. (*Id.*, 12:59-13:2.)." Dkt. No. 121 at 9 (emphasis omitted).

Plaintiff replies that "Defendants seek to add algorithms for other claim elements." Dkt. No. 122 at 9.

In sur-reply, Defendants submit expert opinion that there is no algorithm. *See* Dkt. No. 212 at 3; *see also id.* at Ex. C, Sept. 6, 2016 Clements Decl.

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "producing the pitch codevector and an innovative search target vector."

As to corresponding structure, the specification discloses:

> Generally, each vector in the pitch codebook is a shift-by-one version of the previous vector (discarding one sample and adding a new sample). For pitch lags T>N, the pitch codebook is equivalent to the filter structure $(1/(1-bz^{-T})$, and a pitch codebook vector $v_T(n)$ at pitch lag T is given by
>
> $v_T(n)=u(n-T)$, $n=0, \ldots, N-1$.
>
> For pitch lags T shorter than N, a vector $v_T(n)$ is built by repeating the available samples from the past excitation until the vector is completed (this is not equivalent to the filter structure).
>
> * * *
>
> [T]he target vector x is updated by subtracting the LTP contribution:
>
> $x'=x-b_{yT}$
>
> where b is the pitch gain and y_T is the filtered pitch codebook vector (the past excitation at delay T filtered with the selected low pass filter and convolved with the impulse response h as described with reference to FIG. 3).

'521 Patent at 10:35-46 & 12:62-13:2; *see id.* at 12:2-12 ("pitch codebook search module 301") & 12:19-20 ("pitch codevector generator 302"); *see also id.* at 11:1-10.

The Court hereby finds that the present disputed term is a means-plus-function term, the function is **"producing the pitch codevector and an innovative search target vector,"** and the corresponding structure is **"a processor: configured for maximizing the search criterion**

$C = \frac{x^t y_T}{\sqrt{y_T^t y_T}}$**; configured such that $v_T(n) = u(n-T)$ for n=0 . . . n=N-1, when T>N, and $v_T(n)$ is the available samples from the past excitation when T<N; and configured such that $x' = x - by_T$; and equivalents thereof."**

HH. "pitch analysis device responsive to the pitch codevector for selecting, from said sets of pitch codebook parameters, the set of pitch codebook parameters associated to the signal path having the lowest calculated pitch prediction error"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured to select the parameters b, T, and j, corresponding to the v_T or $v_f^{(j)}$ which minimizes the mean squared pitch prediction error, and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component responsive to the pitch codevector for selecting, from said sets of pitch codebook parameters, the set of pitch codebook parameters associated to the single path having the lowe[st] calculated pitch prediction error

Dkt. No. 61, Ex. A at 38-39; *id.*, Ex. B at 15-16; Dkt. No. 73, App'x B at 7-8; Dkt. No. 89, Ex. A at pp. 10-11 of 11; Dkt. No. 121 at 8; Dkt. No. 122, App'x at pp. 10-11 of 11. The parties submit that this term appears in Claims 10 and 28 of the '521 Patent. Dkt. No. 61, Ex. A at 38-39; *id.*, Ex. B at 15-16; Dkt. No. 73, App'x B at 7-8.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that

each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

Defendant also argues: "[Plaintiff's] proposed structure does not provide any algorithm for selection, merely providing desired qualities of the parameters b, T and j – that they correspond to the vT or $v_f^{(j)}$ which minimizes the mean squared pitch prediction error. [Plaintiff] proposes no algorithm for how to select such a b, T, and J." Dkt. No. 121 at 9.

Plaintiff replies that "Defendants seek to add algorithms for other claim elements." Dkt. No. 122 at 9. Plaintiff also argues: "[T]he claim does not require 'minimizing' the value of the mean squared pitch prediction error itself, as Defendants suggest. Instead, the claim requires comparing the *calculated* mean squared pitch prediction errors for the signal paths and then selecting the parameters associated with the 'lowest *calculated*' value." *Id.* (footnote omitted).

(2) Analysis

For substantially the same reasons set forth above as to the term "spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal," the Court hereby finds that the present disputed term is a means-plus-function term and that the function is "selecting, from said sets of pitch codebook parameters, the set of pitch codebook parameters associated to the signal path having the lowest calculated pitch prediction error."

As to corresponding structure, Plaintiff's proposal is substantially supported by disclosure in the specification that is sufficiently linked to the claimed function. *See* '521 Patent at 12:18-23, 12:30-34 & 12:45-47.

The Court therefore hereby finds that the present disputed term is a means-plus-function term, the function is **"selecting, from said sets of pitch codebook parameters, the set of pitch codebook parameters associated to the signal path having the lowest calculated pitch prediction error,"** and the corresponding structure is **"a processor configured to select the parameters b, T, and j, corresponding to the v_T or $v_f^{(j)}$ which minimizes the mean squared pitch prediction error, and equivalents thereof."**

II. "innovative codebook search device responsive to a weighted synthesis filter impulse response signal, and the innovative search target vector, for producing innovative codebook parameters"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6). Alternatively, the corresponding structure is: "a processor configured to find the optimum excitation codevector c_k and gain g which minimize the mean-squared error: $E = \|x' - gHc_k\|^2$, and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component for producing innovative codebook parameters

Dkt. No. 61, Ex. A at 39; *id.*, Ex. B at 16; Dkt. No. 73, App'x B at 8; Dkt. No. 89, Ex. A at p. 11 of 11; Dkt. No. 122, App'x at p. 11 of 11. The parties submit that this term appears in Claims 10 and 28 of the '521 Patent. Dkt. No. 61, Ex. A at 39; *id.*, Ex. B at 16; Dkt. No. 73, App'x B at 8.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that

each ‘device’ must be a ‘distinct hardware component,’ *i.e.* a hardware structure that performs the specific operations required by the claims.” Dkt. No. 69 at 15.

Plaintiff replies that “nothing in the intrinsic record limits the ‘device’ terms to a ‘distinct hardware component’ or exclude[s] the use of a computer.” Dkt. No. 71 at 7.

Defendants also argue that Plaintiff’s alternative proposal “fails to identify how one would ‘find the optimum excitation codevector ck and gain g’ which minimize the formula E, again, just providing the desired qualities of the ck and gain g.” Dkt. No. 121 at 16.

Plaintiff replies that Defendants’ arguments should be rejected for the same reasons as for the term “pitch codebook search device responsive to the perceptually weighted signal and linear prediction synthesis filter coefficients for producing the pitch codevector and an innovative search target vector” that appears in Claims 10 and 28 of the ’521 Patent. Dkt. No. 122 at 10.

In sur-reply, Defendants submit expert opinion that there is no algorithm. *See* Dkt. No. 212 at 3; *see also id.* at Ex. C, Sept. 6, 2016 Clements Decl.

(2) Analysis

For substantially the same reasons set forth above as to the term “spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal,” the Court hereby finds that the present disputed term is a means-plus-function term and that the function is “producing innovative codebook parameters.”

As to corresponding structure, Plaintiff’s proposal is supported by disclosures in the specification that are sufficiently linked to the claimed function. *See* ’521 Patent at 13:3-10. The opinion of Defendants’ expert to the contrary is unpersuasive. *See* Dkt. No. 121-1, Aug. 22, 2016 Clements Decl. at ¶ 26.

The Court therefore hereby finds that the present disputed term is a means-plus-function term and that the function is **"producing innovative codebook parameters,"** and the corresponding structure is **"a processor configured to find the optimum excitation codevector c_k and gain g which minimize the mean-squared error: $E = \|x' - gHc_k\|^2$, and equivalents thereof."**

JJ. "device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of synthesizing a wideband speech signal" and "periodicity enhancing device"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6). To the extent the Court finds that § 112(6) applies, however, the corresponding structure is "a processor configured (a) [in the same manner as for Term No. 1], and (b) such that $F(z)=1-\sigma z^{-1}$ or $F(z)=-\alpha z+1-\alpha z^{-1}$, where σ or α are periodicity factors derived from the level of periodicity of the excitation signal u, and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of synthesizing a wideband speech signal

Dkt. No. 61, Ex. A at 2; *id.*, Ex. B at 16; Dkt. No. 73, App'x B at 8-9; Dkt. No. 89, Ex. A at p. 3 of 11; Dkt. No. 122 at p. 3 of 11. The parties submit that these terms appear in Claims 1, 2, 3, 6, and 21 of the '805 Patent. Dkt. No. 73, App'x B at 8-9.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that these terms use a well-known "nonce" word and are "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that

each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

Defendants also argue that Plaintiff's alternative proposed structure "does not produce an excitation signal, not to mention one with an enhanced periodicity," and "provides no algorithm for supplying a signal synthesis filter in view of synthesizing a wideband speech signal." Dkt. No. 121 at 16-17.

Plaintiff replies that "the body of the claim itself provides a structurally-complete invention and the preamble term merely states the purpose of the invention. As a result, the preambles are non-limiting." Dkt. No. 122 at 1.

(2) Analysis

The preamble here at issue appears in Claim 1 of the '805 Patent, which recites:

> 1. A device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of synthesizing a wideband speech signal, said periodicity enhancing device comprising:
>
> a) a factor generator for calculating a periodicity factor related to the wideband speech signal; and
>
> b) an innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal.

On balance, Defendants have not demonstrated that the preamble is "necessary to give life, meaning, and vitality to the claim" or that the body of the claim does not "define[] a structurally complete invention." *Catalina Mktg.*, 289 F.3d at 808 (citations and internal quotation marks omitted). Instead, the preamble is used merely to "state a purpose or intended use for the invention." *Id.*; *see TomTom Inc. v. Adolph*, 790 F.3d 1315, 1323 (Fed. Cir. 2015)

("That [a] phrase in the preamble . . . provides a necessary structure for [the] claim . . . does not necessarily convert the entire preamble into a limitation, particularly one that only states the intended use of the invention."); *see also Marrin*, 599 F.3d at 1294-95 ("the mere fact that a structural term in the preamble is part of the claim does not mean that the preamble's statement of purpose or other description is also part of the claim"). Although the preamble provides antecedent basis for "the wideband speech signal" recited in the body of the claim, the preamble does not provide any additional detail regarding that term. *See Proveris Scientific Corp. v. Innovasystems, Inc.*, 739 F.3d 1367, 1373 (Fed. Cir. 2014) ("The phrase 'the image data' clearly derives antecedent basis from the 'image data' that is *defined in greater detail in the preamble* as being 'representative of at least one sequential set of images of a spray plume.'") (emphasis added).

The Court therefore hereby finds that the present disputed term appears in a preamble that is **not limiting**.[6]

[6] In sur-reply, Defendants argue that Plaintiff's arguments as to this disputed term "contradict its own representations regarding the scope of the claims." Civil Action Nos. 2:15-CV-349, Dkt. No. 212 at 2. Because the preamble in which this disputed term appears is not limiting, Defendants' arguments are unavailing.

KK. "perceptual weighting device for producing a perceptually weighted signal in response to a wideband speech signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6). To the extent the Court finds that § 112(6) applies, the corresponding structure is "a processor configured: (a) such that $P(z)=1-\mu z^{-1}$, where μ is a preemphasis factor with a value located between 0 and 1; (b) such that autocorrelations are computed from a Hamming-windowed signal and Levinson-Durbin recursion is used to compute the LP filter coefficients; and (c) such that $W(z)=A(z/\gamma_1)/(1-\gamma_2 z^{-1})$, where $0<\gamma_2<\gamma_1\leq 1$, and equivalents thereof"	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component for producing a perceptually weighted signal in response to a wideband speech signal

Dkt. No. 61, Ex. A at 8; *id.*, Ex. B at 17; Dkt. No. 73, App'x B at 9-10; Dkt. No. 89, Ex. A at pp. 4-5 of 11; Dkt. No. 122, App'x at pp. 4-5 of 11. The parties submit that this term appears in Claims 4 and 5 of the '524 Patent. Dkt. No. 61, Ex. A at 8; *id.*, Ex. B at 17; Dkt. No. 73, App'x B at 9.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

Defendants also argue that Plaintiff's alternative proposal "provides an unbound claim scope that effectively could deliver a non-exhaustive range of value for W(z). The structure provided is thus not enabled by the specification and at best, would require undue experimentation." Dkt. No. 121 at 18.

Plaintiff replies that "the body of the claim itself provides a structurally-complete invention and the preamble term merely states the purpose of the invention. As a result, the preamble[] [is] non-limiting." Dkt. No. 122 at 1.

(2) Analysis

The preamble here at issue appears in Claim 1 of the '524 Patent:

> 1. A perceptual weighting device for producing a perceptually weighted signal in response to a wideband speech signal in order to reduce a difference between the wideband speech signal and a subsequently synthesized wideband speech signal, said perceptual weighting device comprising:
>
> a) a signal preemphasis filter responsive to the wideband speech signal for enhancing a high frequency content of the wideband speech signal to thereby produce a preemphasised signal;
>
> b) a synthesis filter calculator responsive to said preemphasised signal for producing synthesis filter coefficients; and
>
> c) a perceptual weighting filter, responsive to said preemphasised signal and said synthesis filter coefficients, for filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce said perceptually weighted signal, said perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal.

On balance, Defendants have not demonstrated that the entire preamble is "necessary to give life, meaning, and vitality to the claim" or that the body of the claim does not "define[] a structurally complete invention." *Catalina Mktg.*, 289 F.3d at 808 (citations and internal quotation marks omitted).

Instead, the portion of the preamble at issue is used merely to "state a purpose or intended use for the invention." *Id.*; *see TomTom*, 790 F.3d at 1323 ("That [a] phrase in the preamble . . . provides a necessary structure for [the] claim . . . does not necessarily convert the entire preamble into a limitation, particularly one that only states the intended use of the invention."); *see also Marrin*, 599 F.3d at 1294-95 ("the mere fact that a structural term in the preamble is part of the claim does not mean that the preamble's statement of purpose or other description is also part of the claim").

The Court therefore hereby finds that the preamble is **not limiting as to the term "perceptual weighting device for producing a perceptually weighted signal in response to a wideband speech signal."**

LL. "device for producing a gain-smoothed codevector during decoding of an encoded wideband signal from a set of wideband signal encoding parameters" and "gain-smoothed codevector producing device"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6). To the extent the Court finds that § 112(6) applies, the corresponding structure is a processor configured to perform the previously identified algorithms for Term Nos. 2, 5, 9, 10 and 12.	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct hardware component for producing a gain-smoothed codevector during decoding of an encoded wideband signal from a set of wideband signal encoding parameters

Dkt. No. 61, Ex. A at 18-19; *id.*, Ex. B at 18; Dkt. No. 73, App'x B at 10; Dkt. No. 89, Ex. A at p. 5 of 11; Dkt. No. 122, App'x at p. 5 of 11. The parties submit that these terms appear in Claims 20, 21, 23, 25, 26, 28, 30, 31, 33, 34, 102, and 103 of the '123 Patent. Dkt. No. 61, Ex. A at 18-19; *id.*, Ex. B at 18; Dkt. No. 73, App'x B at 10.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'device' is commonly used and would have been well known to a person of ordinary skill in the art." Dkt. No. 70 at 11.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court "should require that each 'device' must be a 'distinct hardware component,' *i.e.* a hardware structure that performs the specific operations required by the claims." Dkt. No. 69 at 15.

Plaintiff replies that "nothing in the intrinsic record limits the 'device' terms to a 'distinct hardware component' or exclude[s] the use of a computer." Dkt. No. 71 at 7.

Defendants also argue that the "amplifier 232" relied upon by Plaintiff is a "black box" that does not amount to any corresponding structure. Dkt. No. 121 at 19.

Plaintiff replies that "the body of the claim itself provides a structurally-complete invention and the preamble term merely states the purpose of the invention. As a result, the preambles are non-limiting." Dkt. No. 122 at 1.

(2) Analysis

The Court assumes for the sake of argument that the disputed preamble term is a limitation of the claims in which it appears, at least as to "a set of wideband signal encoding parameters," which provides antecedent basis for "said set" in the claims at issue.

Nonetheless, the Court hereby expressly rejects Defendants' argument that the preamble term "device for producing a gain-smoothed codevector during decoding of an encoded wideband signal from a set of wideband signal encoding parameters" is a means-plus-function term governed by 35 U.S.C. § 112, ¶ 6. *See Manual of Patent Examining Procedure* § 2181 (9th

ed., rev. Nov. 2015) ("If applicant uses a structural or generic placeholder with the word 'for' or other linking word in the preamble, the examiner should not construe such phrase as reciting a means-plus-function limitation.").

No further construction is necessary. *See U.S. Surgical*, 103 F.3d at 1568; *see also O2 Micro*, 521 F.3d at 1362; *Finjan*, 626 F.3d at 1207; *ActiveVideo*, 694 F.3d at 1326; *Summit 6*, 802 F.3d at 1291.

The Court therefore hereby construes **"device for producing a gain-smoothed codevector during decoding of an encoded wideband signal from a set of wideband signal encoding parameters"** and **"gain-smoothed codevector producing device"** to have their **plain meaning**.

MM. "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal[7]

[7] Defendants previously proposed: "Alternatively, a specialized circuit for using a periodicity factor to filter an innovative codevector to reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal." Dkt. No. 61, Ex. B at 2-3.

Dkt. No. 61, Ex. A at 3-4; Dkt. No. 73, App'x B at 10-11. The parties submit that this term appears in Claims 1, 2, 3, 6, 21, 22, 23, and 26 of the '805 Patent. Dkt. No. 61, Ex. A at 3-4; *id.*, Ex. B at 2-3; Dkt. No. 73, App'x B at 10-11.

(1) The Parties' Positions

Plaintiff argues that "the patents do not limit a 'filter' to 'a distinct specialized circuit' and instead clearly disclose computing filters in computer implementations." Dkt. No. 70 at 12.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

Plaintiff replies that "the filters are algorithms that are performed by a computer," rather than necessarily any "discrete hardware circuitry." Dkt. No. 71 at 7.

At the June 29, 2016 hearing, Defendants argued that because of Plaintiff's position that software alone would be sufficient, the "filter" terms and similar terms should be explicitly limited to being distinct specialized hardware. Defendants urged that although a filter could operate in conjunction with software, these terms require hardware because these terms relate to modifying physical signals.

(2) Analysis

The disputed term appears in Claim 1 of the '805 Patent, and Claim 21 refers to Claim 1 for antecedent basis. Claims 1 and 21 of the '805 Patent recite (emphasis added):

> 1. A device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of synthesizing a wideband speech signal, said periodicity enhancing device comprising:

a) a factor generator for calculating a periodicity factor related to the wideband speech signal; and

b) an *innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal*.

* * *

21. A decoder for producing a synthesized wideband speech signal, comprising:

a) a signal fragmenting device for receiving an encoded wideband speech signal and extracting from said encoded wideband speech signal at least pitch codebook parameters, innovative codebook parameters, and synthesis filter coefficients;

b) an [*sic*] pitch codebook responsive to said pitch codebook parameters for producing a pitch codevector;

c) an innovative codebook responsive to said innovative codebook parameters for producing an innovative codevector;

d) *a periodicity enhancing device as recited in claim 1* comprising said factor generator for calculating a periodicity factor related to the wideband speech signal, and *said innovation filter for filtering the innovative codevector*;

e) a combiner circuit for combining said pitch codevector and said innovative codevector filtered by said innovation filter to thereby produce said periodicity enhanced excitation signal; and

f) a signal synthesis filter for filtering said periodicity enhanced excitation signal in relation to said synthesis filter coefficients to thereby produce said synthesized wideband speech signal.

The Background of the Invention states that "[i]n CELP, a linear prediction (LP) filter is computed and transmitted every frame," and "perceptual weighting is performed using a so-called perceptual weighting filter, which is usually derived from the LP filter." '521 Patent at 1:50-51 & 2:10-12; *see id.* at 6:19-21 ("LP parameters representing the LP synthesis filter are usually computed once every frame.").

The specifications further disclose:

A novel solution . . . is, in accordance with the present invention, to introduce the preemphasis filter 103 at the input, compute the LP filter A(z) based on the preemphasized speech s(n), and use a modified filter W(z) by fixing its denominator.

Id. at 9:6-10.

> The enhanced signal c_f is therefore computed by filtering the scaled innovative codevector gc_k through the innovation filter 205 (F(z)).

'805 Patent at 15:48-50.

> The filtered scaled noise sequence w_f is then band-pass filtered to the required frequency range to be restored using the band-pass filter 216. In the preferred embodiment, the band-pass filter 216 restricts the noise sequence to the frequency range 5.6–7.2 kHz.

'802 Patent at 19:38-40; *see id.* at 15:51-55 ("Innovation filter 205 has the effect of lowering the energy of the innovative codevector c_k at low frequencies when the excitation signal u is more periodic, which enhances the periodicity of the excitation signal u at lower frequencies more than higher frequencies.")

As to extrinsic evidence, Defendants have submitted a definition of "filter" from a non-technical dictionary as well as a definition of "filter" from a technical dictionary. Those definitions, respectively, are: "Any of various devices used to reject signals, vibrations, or radiations of certain frequencies while passing others"; and "A device which transmits a selected range of energy. An electric filter transmits a selected range of frequencies, while stopping (attenuating) all others." Dkt. No. 69, Ex. 6, *The American Heritage Dictionary* 320 (2001); *id.*, Ex. 7, *Newton's Telecom Dictionary* 337 (15th ed. 1999).

On balance, the intrinsic and extrinsic evidence demonstrate that the term "filter" connotes structure. *See Greenberg*, 91 F.3d at 1583 ("Many devices take their names from the functions they perform. The examples are innumerable, such as 'filter,' 'brake,' 'clamp,' 'screwdriver,' or 'lock.'"). The Court therefore rejects Defendants' argument that the disputed term is a means-plus-function term.

As to the proper construction, the intrinsic evidence contains no definition or clear statement that a "filter" must be implemented with specialized circuitry. Instead, relevant

disclosures appear to be in the context of a processor, as quoted above. *See Phillips*, 415 F.3d at 1319 ("extrinsic evidence . . . is unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence"). Further, even the above-noted extrinsic dictionary definitions do not refer to specialized circuitry.

Finally, although Defendants have urged that the recited "filter" must be hardware because it operates upon physical signals, this argument is unavailing. Even assuming for the sake of argument that what is filtered must be a physical signal rather than a digital representation thereof, software is necessarily implemented with hardware to at least some degree. Defendants have not demonstrated why this hardware must be "a specialized circuit" rather than a general-purpose processor or computer.

Thus, Defendants' proposal of requiring "a distinct specialized hardware circuit" lacks adequate support in either the intrinsic evidence or the extrinsic evidence.

The Court therefore hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit. Further, because the remainder of Defendants' proposed construction merely repeats the claim language itself, no further construction is necessary. *See U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) ("Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy."); *see also O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008) ("[D]istrict courts are not (and should not be) required to construe every limitation present in a patent's asserted claims."); *Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1207 (Fed. Cir. 2010) ("Unlike *O2 Micro*, where the court failed to resolve the parties' quarrel, the district court rejected

Defendants' construction."); *ActiveVideo Networks, Inc. v. Verizon Commcn's, Inc.*, 694 F.3d 1312, 1326 (Fed. Cir. 2012); *Summit 6, LLC v. Samsung Elecs. Co., Ltd*., 802 F.3d 1283, 1291 (Fed. Cir. 2015).

The Court accordingly hereby construes **"innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal"** to have its **plain meaning**.

NN. "combiner circuit for combining said pitch codevector and said innovative codevector filtered by said innovation filter to thereby produce said periodicity enhanced excitation signal" and "combiner circuit for combining said pitch codevector and [said] innovative codevector to thereby produce an excitation signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for combining said pitch codevector and said innovative codevector filtered by said innovation filter to thereby produce said periodicity enhanced excitation signal / a distinct specialized hardware circuit for combining said pitch codevector and said innovative codevector to thereby produce an excitation signal[8]

Dkt. No. 61, Ex. A at 6-7; Dkt. No. 73, App'x B at 11-12. The parties submit that these terms appear in Claims 21, 22, 23, and 26 of the '805 Patent and Claims 1, 2, 3, 8, and 49 of the '802 Patent. Dkt. No. 61, Ex. A at 6-7; *id.*, Ex. B at 4; Dkt. No. 73, App'x B at 11-12.

[8] Defendants previously proposed: "Alternatively, a specialized circuit for generating a [periodicity enhanced] excitation signal by combining pitch and innovative codevectors." Dkt. No. 61, Ex. B at 4.

(1) The Parties' Positions

Plaintiff argues that these disputed terms "simply refer to adding/subtracting/computing or otherwise manipulating digital data in the digital domain and should not be limited to only 'a distinct specialized hardware circuit' for this task." Dkt. No. 70 at 13.

Defendants respond that these terms use a well-known "nonce" word and are "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that these terms "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16. Defendants urge that "[t]he claim language makes clear that the specific circuits identified here for construction are specialized circuits for carrying out specific functions." *Id.* at 18.

(2) Analysis

Defendants submit technical dictionary definitions of "circuit" as meaning: "The physical connection (or path) of channels, conductors and equipment between two given points through which an electric current may be established . . . . A circuit can also be a network of circuit elements, such as resistors, inductors, capacitors, semiconductors, etc., that performs a specific function" (Dkt. No. 69, Ex. 7, *Newton's Telecom Dictionary* 174 (15th ed. 1999)); and "Path through which electrical signals flow" and "The interconnection of a number of devices in one or more closed paths to perform a desired electrical or electronic function" (*id.*, Ex. 8, *Modern Dictionary of Electronics* 116 (7th ed. 1999)).

Nonetheless, for substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low

frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. In particular, Defendants have failed to show that "circuit" does not connote structure. *See Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1320 (Fed. Cir. 2004) ("when the structure-connoting term 'circuit' is coupled with a description of the circuit's operation, sufficient structural meaning generally will be conveyed to persons of ordinary skill in the art, and § 112 ¶ 6 presumptively will not apply"); *see also Williamson*, 792 F.3d at 1349 ("[h]enceforth, we will apply the presumption as we have done prior to *Lighting World*[, *Inc. v. Birchwood Lighting, Inc.*, 382 F.3d 1354, 1358 (Fed. Cir. 2004)]") (citing 382 F.3d 1354). Indeed, the term "circuit" appears in Defendants' own alternative proposed construction. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court therefore hereby construes **"combiner circuit for combining said pitch codevector and said innovative codevector filtered by said innovation filter to thereby produce said periodicity enhanced excitation signal"** and **"combiner circuit for combining said pitch codevector and [said] innovative codevector to thereby produce an excitation signal"** to have their **plain meaning**.

OO. "signal synthesis filter for filtering said [periodicity enhanced] excitation signal in relation to said synthesis filter coefficients to thereby produce said synthesized wideband speech signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for filtering said [periodicity enhanced] excitation signal in relation to said synthesis filter coefficients to thereby produce said synthesized wideband speech signal[9]

Dkt. No. 61, Ex. A at 8; Dkt. No. 73, App'x B at 12. The parties submit that this term appears in Claims 21, 22, 23, and 26 of the '805 Patent. Dkt. No. 61, Ex. A at 8; *id.*, Ex. B at 5; Dkt. No. 73, App'x B at 12-13.

(1) The Parties' Positions

Plaintiff argues that "the patents do not limit a 'filter' to 'a distinct specialized circuit' and instead clearly disclose computing filters in computer implementations." Dkt. No. 70 at 12.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

(2) Analysis

Claim 21 of the '805 Patent recites (emphasis added):

[9] Defendants previously proposed: "Alternatively, a specialized circuit for using synthesis filter coefficients to filter a [periodicity enhanced] excitation signal to generate a synthesized wideband speech signal." Dkt. No. 61, Ex. B at 5.

21. A decoder for producing a synthesized wideband speech signal, comprising:

a) a signal fragmenting device for receiving an encoded wideband speech signal and extracting from said encoded wideband speech signal at least pitch codebook parameters, innovative codebook parameters, and synthesis filter coefficients;

b) an [*sic*] pitch codebook responsive to said pitch codebook parameters for producing a pitch codevector;

c) an innovative codebook responsive to said innovative codebook parameters for producing an innovative codevector;

d) a periodicity enhancing device as recited in claim 1 comprising said factor generator for calculating a periodicity factor related to the wideband speech signal, and said innovation filter for filtering the innovative codevector;

e) a combiner circuit for combining said pitch codevector and said innovative codevector filtered by said innovation filter to thereby produce said periodicity enhanced excitation signal; and

f) *a signal synthesis filter for filtering said periodicity enhanced excitation signal in relation to said synthesis filter coefficients to thereby produce said synthesized wideband speech signal*.

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court accordingly hereby construes **"signal synthesis filter for filtering said periodicity enhanced excitation signal in relation to said synthesis filter coefficients to thereby produce said synthesized wideband speech signal"** to have its **plain meaning**.

PP. "signal preemphasis filter responsive to the wideband speech signal for enhancing a high frequency content of the wideband speech signal to thereby produce a preemphasised signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit responsive to the wideband speech signal for enhancing a high frequency content of the wideband speech signal to thereby produce a preemphasised signal[10]

Dkt. No. 61, Ex. A at 10-11; Dkt. No. 73, App'x B at 14. The parties submit that this term appears in Claims 4, 5, 18, and 19 of the '524 Patent. Dkt. No. 61, Ex. A at 10-11; *id.*, Ex. B at 6; Dkt. No. 73, App'x B at 14.

(1) The Parties' Positions

Plaintiff argues that "the patents do not limit a 'filter' to 'a distinct specialized circuit' and instead clearly disclose computing filters in computer implementations." Dkt. No. 70 at 12.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

(2) Analysis

Claim 1 of the '524 Patent recites (emphasis added):

[10] Defendants previously proposed: "Alternatively, a specialized circuit that converts a wideband speech signal into a preemphasized signal with enhanced high frequency content." Dkt. No. 61, Ex. B at 6.

> 1. A perceptual weighting device for producing a perceptually weighted signal in response to a wideband speech signal in order to reduce a difference between the wideband speech signal and a subsequently synthesized wideband speech signal, said perceptual weighting device comprising:
>
> a) a *signal preemphasis filter responsive to the wideband speech signal for enhancing a high frequency content of the wideband speech signal to thereby produce a preemphasised signal*;
>
> b) a synthesis filter calculator responsive to said preemphasised signal for producing synthesis filter coefficients; and
>
> c) a perceptual weighting filter, responsive to said preemphasised signal and said synthesis filter coefficients, for filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce said perceptually weighted signal, said perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal.

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court accordingly hereby construes **"signal preemphasis filter responsive to the wideband speech signal for enhancing a high frequency content of the wideband speech signal to thereby produce a preemphasised signal"** to have its **plain meaning**.

QQ. "signal injection circuit for injecting said spectrally-shaped noise sequence in said over-sampled synthesized signal version"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for injecting said spectrally-shaped noise sequence in said over-sampled synthesized signal version[11]

Dkt. No. 61, Ex. A at 16; Dkt. No. 73, App'x B at 14-15. The parties submit that this term appears in Claims 1, 2, 3, 8, and 49. Dkt. No. 61, Ex. A at 16; *id.*, Ex. B at 8; Dkt. No. 73, App'x B at 14.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. In particular, Defendants have failed to show that "circuit" does not connote structure. *See Linear Tech.*, 379 F.3d

[11] Defendants previously proposed: "Alternatively, a specialized circuit for combining a spectrally-shaped noise sequence with an over-sampled synthesized signal version." Dkt. No. 61, Ex. B at 8.

at 1320; *see also Williamson*, 792 F.3d at 1349. Indeed, the term "circuit" appears in Defendants' own alternative proposed construction. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court therefore hereby construes **"signal injection circuit for injecting said spectrally-shaped noise sequence in said over-sampled synthesized signal version"** to have its **plain meaning**.

RR. "a band-pass filter responsive to said filtered scaled white noise sequence for producing a band-pass filtered scaled white noise sequence"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction is necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit responsive to said filtered scaled white noise sequence for producing a band-pass filtered scaled white noise sequence[12]

Dkt. No. 61, Ex. A at 18; Dkt. No. 73, App'x B at 15. The parties submit that this term appears in Claims 3 and 8 of the '802 Patent. Dkt. No. 61, Ex. A at 18; *id.*, Ex. B at 9; Dkt. No. 73, App'x B at 15.

(1) The Parties' Positions

Plaintiff argues that "the patents do not limit a 'filter' to 'a distinct specialized circuit' and instead clearly disclose computing filters in computer implementations." Dkt. No. 70 at 12.

[12] Defendants previously proposed: "Alternatively, a specialized circuit for receiving and using a filtered scaled white noise sequence to generate a band-pass filtered scale white noise sequence." Dkt. No. 61, Ex. B at 9.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

(2) Analysis

The disputed term appears in Claim 3 of the '802 Patent, which depends from Claim 2, which in turn depends from Claim 1. Claim 3 recites (emphasis added):

> 3. A decoder for producing a synthesized wideband signal as defined in claim 2, wherein said spectral shaping unit comprises:
>
> a) a gain adjustment module, responsive to said white noise sequence and a set of gain adjusting parameters, for producing a scaled white noise sequence;
>
> b) a spectral shaper for filtering said scaled white noise sequence in relation to a bandwidth expanded version of the linear prediction filter coefficients to produce a filtered scaled white noise sequence characterized by a frequency bandwidth generally higher than a frequency bandwidth of said over-sampled synthesized signal version; and
>
> c) *a band-pass filter responsive to said filtered scaled white noise sequence for producing a band-pass filtered scaled white noise sequence* to be subsequently injected in said over-sampled synthesized signal version as said spectrally-shaped white noise sequence.

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court accordingly hereby construes **"a band-pass filter responsive to said filtered scaled white noise sequence for producing a band-pass filtered scaled white noise sequence"** to have its **plain meaning**.

SS. "filter for filtering the pitch codevector before supplying said pitch codevector to the pitch prediction error calculating device"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for filtering the pitch codevector before supplying said pitch codevector to the pitch prediction error calculating device[13]

Dkt. No. 61, Ex. A at 33; Dkt. No. 73, App'x B at 15-16. The parties submit that this term appears in Claims 1, 2, 5, 6, 7, 8, 10, and 28 of the '521 Patent. Dkt. No. 61, Ex. A at 33; *id.*, Ex. B at 13; Dkt. No. 73, App'x B at 15-16.

(1) The Parties' Positions

Plaintiff argues that "the patents do not limit a 'filter' to 'a distinct specialized circuit' and instead clearly disclose computing filters in computer implementations." Dkt. No. 70 at 12.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). In particular, Defendants argue that this term "simply repeats the nonce word as the function performed and fails to disclose any specific structure." Dkt. No. 69 at 14. Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct

[13] Defendants previously proposed: "Alternatively, a specialized circuit for filtering a pitch codevector and supplying the filtered pitch codevector to the pitch prediction error calculating device." Dkt. No. 61, Ex. B at 13-14.

specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

(2) Analysis

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court accordingly hereby construes **"filter for filtering the pitch codevector before supplying said pitch codevector to the pitch prediction error calculating device"** to have its **plain meaning**.

TT. "combiner circuit for combining the amplified convolved pitch codevector with the pitch search target vector to thereby produce the pitch prediction error"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for combining the amplified convolved pitch codevector with the pitch search target vector to thereby produce the pitch prediction error[14]

[14] Defendants previously proposed: "Alternatively, a specialized circuit for generating a pitch prediction error by combining an amplified convolved pitch codevector with a pitch search target vector." Dkt. No. 61, Ex. B at 14.

Dkt. No. 61, Ex. A at 34-35; Dkt. No. 73, App'x B at 16. The parties submit that this term appears in Claims 5, 6, and 7 of the '521 Patent. Dkt. No. 61, Ex. A at 34-35; *id.*, Ex. B at 14; Dkt. No. 73, App'x B at 16.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. In particular, Defendants have failed to show that "circuit" does not connote structure. *See Linear Tech.*, 379 F.3d at 1320; *see also Williamson*, 792 F.3d at 1349. Indeed, the term "circuit" appears in Defendants' own alternative proposed construction. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court therefore hereby construes **"combiner circuit for combining the amplified convolved pitch codevector with the pitch search target vector to thereby produce the pitch prediction error"** to have its **plain meaning**.

UU. "factor generator for calculating a periodicity factor related to the wideband speech signal"

Plaintiff's Proposed Construction	Defendants' Proposed Construction
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for calculating a periodicity factor related to the wideband speech signal[15]

Dkt. No. 61, Ex. A at 3; Dkt. No. 73, App'x B at 17. The parties submit that this term appears in Claims 1 and 21 of the '805 Patent. Dkt. No. 61, Ex. A at 3; *id.*, Ex. B at 16-17; Dkt. No. 73, App'x B at 17.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

[15] Defendants previously proposed: "Alternatively, a specialized circuit for calculating a value that represents the amount of pitch contribution of the excitation signal for the wideband speech signal." Dkt. No. 61, Ex. B at 16-17.

The Court therefore hereby construes **"factor generator for calculating a periodicity factor related to the wideband speech signal"** to have its **plain meaning**.

VV. "voicing factor calculator . . . delivering a first factor representative of voicing in the wideband signal in response to said at least one second wideband signal encoding parameter"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for delivering a first factor representative of voicing in the wideband signal in response to said at least one second wideband signal encoding parameter[16]

Dkt. No. 61, Ex. A at 19-20; Dkt. No. 73, App'x B at 17-18. The parties submit that this term appears in Claim 20 of the '123 Patent. Dkt. No. 61, Ex. A at 19-20; *id.*, Ex. B at 19; Dkt. No. 73, App'x B at 17.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency

[16] Defendants previously proposed: "Alternatively, a specialized circuit for receiving and using at least one second wideband signal encoding parameter to calculate and output a value that represents the voicing of the encoded wideband signal." Dkt. No. 61, Ex. B at 19.

portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court therefore hereby construes **"voicing factor calculator . . . delivering a first factor representative of voicing in the wideband signal in response to said at least one second wideband signal encoding parameter"** to have its **plain meaning**.

WW. "stability factor calculator . . . delivering a second factor representative of stability of said wideband signal in response to said at least one third wideband signal encoding parameter"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for delivering a second factor representative of stability of said wideband signal in response to said at least one third wideband signal encoding parameter[17]

Dkt. No. 61, Ex. A at 20; Dkt. No. 73, App'x B at 18. The parties submit that this term appears in Claim 20 of the '123 Patent. Dkt. No. 61, Ex. A at 20; *id.*, Ex. B at 19-20; Dkt. No. 73, App'x B at 18.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this

[17] Defendants previously proposed: "Alternatively, a specialized circuit for receiving and using at least one third wideband signal encoding parameter to calculate and output a value that represents the stability of the encoded wideband signal." Dkt. No. 61, Ex. B at 19-20.

term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court therefore hereby construes **"stability factor calculator . . . delivering a second factor representative of stability of said wideband signal in response to said at least one third wideband signal encoding parameter"** to have its **plain meaning**.

XX. "smoothing gain calculator . . . delivering a smoothing gain based on said first and second factors"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary. The term is not subject to 35 U.S.C. § 112(6).	Indefinite This term is subject to 35 U.S.C. § 112(6). Alternatively, a distinct specialized hardware circuit for delivering a smoothing gain based on said first and second factors[18]

Dkt. No. 61, Ex. A at 21; Dkt. No. 73, App'x B at 18-19. The parties submit that this term appears in Claim 20 of the '123 Patent. Dkt. No. 61, Ex. A at 21; *id.*, Ex. B at 20; Dkt. No. 73, App'x B at 18-19.

[18] Defendants previously proposed: "Alternatively, a specialized circuit for using the first and second factors to calculate and output a smoothing gain." Dkt. No. 61, Ex. B at 20.

Defendants argue that this term uses a well-known "nonce" word and is "in a format consistent with traditional means-plus-function limitations." Dkt. No. 69 at 13 (quoting *Williamson*, 792 F.3d at 1350). Alternatively, Defendants argue, the Court should find that this term "must be a 'distinct specialized hardware circuit,'—*i.e.* a hardware structure that perform[s] the specific operation, as required by the claims." Dkt. No. 69 at 16.

For substantially the same reasons set forth as to the term "innovation filter for filtering the innovative codevector in relation to said periodicity factor to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal," addressed above, the Court hereby rejects Defendants' argument that the present disputed term is a means-plus-function term. The Court likewise hereby expressly rejects Defendants' proposal of a distinct specialized hardware circuit, and no further construction is necessary.

The Court therefore hereby construes **"smoothing gain calculator . . . delivering a smoothing gain based on said first and second factors"** to have its **plain meaning**.

V. DISPUTED TERMS NOT ALLEGED TO BE MEANS-PLUS-FUNCTION

AAA. "[synthesized] [weighted] wideband [speech] signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction is necessary.	"a [synthesized] [weighted] signal containing [speech] information at least in the frequency range of 50-7000Hz"

Dkt. No. 61, Ex. A at 1; *id.*, Ex. B at 1; Dkt. No. 73, App'x B at 32-33. The parties submit that this term appears in various claims of the '805 Patent, the '524 Patent, the '802 Patent, and the

’123 Patent. *See* Dkt. No. 61, Ex. A at 1; *see also id.*, Ex. B at 1; Dkt. No. 73, App’x B at 32-33.[19]

(1) The Parties’ Positions

Plaintiff argues that “[t]he term ‘wideband signal’ has been well-known and commonly-used by those of ordinary skill in the art for years and need not be construed.” Dkt. No. 70 at 15. For example, Plaintiff submits that “manufacturers and engineers—including [Defendants’] engineers—routinely implement the AMR *wideband* standard without requiring any specific definition.” *Id.* at 16. As to Defendants’ proposed construction, Plaintiff argues:

> [Defendants’] construction is improper for at least three reasons: (1) a wideband signal is not strictly limited to the range of 50–7000 Hz and the patents disclose wideband signal ranges both higher and lower than 7000 Hz; (2) defendants seek to apply the same 50–7000 Hz range to *all* variations of the wideband claim term—including “synthesized wideband signal” and “weighted wideband signal”—without regard to the context of the claims or the disclosed embodiments; and (3) the use of the term “information” renders the construction ambiguous.

Id.

Defendants respond that their proposed construction “adopt[s] the patentee’s definition in the specification.” Dkt. No. 69 at 20. Defendants explain that “the only question is whether a signal can be considered ‘wideband’ if it has a frequency range that falls outside 50-7000 Hz. The patents make clear that it cannot.” *Id.* (footnote omitted). Defendants argue that “[Plaintiff] seeks to divorce the term ‘wideband signal’ from the specification such that there would be no discernible way to distinguish a wideband signal from any other type of speech signal.” *Id.* at 21.

[19] Specifically, the parties submit that this term appears in Claims 1, 2, 3, 6, 21, 23, and 26 of the ’805 Patent, Claims 4, 5, 18, and 19 of the ’524 Patent, Claims 1, 2, 3, 8, and 49 of the ’802 Patent, and Claims 21, 23, 25, 26, 28, 30, 31, 33, 34, 102, and 103 of the ’123 Patent. Dkt. No. 73, App’x B at 32-33.

Plaintiff replies that Defendants' proposal "reads out preferred embodiments," and Plaintiff argues that "the industry readily distinguishes between a 'wideband' signal and older 'narrowband' signals as is evident, for example, from publications by Motorola and LG." Dkt. No. 71 at 10 (citing *id.*, Ex. C at 2:17-23, Ex. D at ¶ 44, Ex. E at ¶¶ 3-6 & Ex. F at ¶ 3). Plaintiff urges that "[t]his common understanding of wideband signals would include, for example, the 6.4 kHz wideband signals described in the asserted patents that were previously down-sampled." Dkt. No. 71 at 10.

At the June 29, 2016 hearing, the parties submitted this disputed term on the briefing without oral argument.

(2) Analysis

The Background of the Invention contrasts "wideband" speech signals with narrow bandwidth speech signals that had been used in the past, such as in the range of 200-3400 Hz:

> The demand for efficient digital *wideband* speech/audio encoding techniques with a good subjective quality/bit rate trade-off is increasing for numerous applications such as audio/video teleconferencing, multimedia, and wireless applications, as well as Internet and packet network applications. Until recently, telephone bandwidths filtered in the range 200–3400 Hz were mainly used in speech coding applications. However, there is an increasing demand for *wideband* speech applications in order to increase the intelligibility and naturalness of the speech signals. A bandwidth in the range *50–7000 Hz* was found sufficient for delivering a face-to-face speech quality.

'805 Patent at 1:12-23 (emphasis added); *see id.* at 2:12-14 ("In *wideband* speech/audio applications, the sound signal is band-limited to *50-7000 Hz* and sampled at 16000 samples/sec.") (emphasis added).

Also of note, some of the patents-in-suit use parentheticals to describe "wideband" or a "wideband signal" as extending to 7000Hz. *See* '524 Patent at 1:15 ("wideband signal (0–7000

Hz)"), '123 Patent at 3:21-22 ("wideband (50–7000 Hz) signals") & '521 Patent at 2:49-50 ("wideband (7000 Hz) sound signals").

The specification also discloses, however, an example in which the upper limit of a wideband signal appears to extend beyond 7000 Hz, namely to at least 7200 Hz:

> The filtered scaled noise sequence w_f is then band-pass filtered to the required frequency range to be restored using the band-pass filter 216. In the preferred embodiment, the band-pass filter 216 restricts the noise sequence to the *frequency range 5.6-7.2 kHz*. The resulting band-pass filtered noise sequence z is added in adder 221 to the oversampled synthesized speech signal s to obtain the final reconstructed sound signal s_{out} on the output 223.

'805 Patent at 17:64-18:4 (emphasis added); *see* '802 Patent at Cl. 8 ("wherein said band-pass filter comprises a frequency bandwidth located between 5.6 kHz and 7.2 kHz").

As to whether a "wideband" signal necessarily extends to 7000 Hz, the Background of the Invention of the '802 Patent discloses that down-sampling may "reduce[] . . . signal bandwidth below 7000 Hz":

> As an example, in order to improve the coding efficiency and reduce the algorithmic complexity of the wideband encoding algorithm, the input wideband signal is down-sampled from 16 kHz to around 12.8 kHz. *This reduces the number of samples in a frame, the processing time and the signal bandwidth below 7000 Hz* to thereby enable reduction in bit rate down to 12 kbit/s while keeping very high quality decoded sound signal. The complexity is also reduced due to the lower number of samples per speech frame. At the decoder, the high frequency contents of the signal needs to be reintroduced to remove the low pass filtering effect from the decoded synthesized signal and retrieve the natural sounding quality of wideband signals. For that purpose, an efficient technique for recovering the high frequency content of the wideband signal is needed to thereby produce a full-spectrum wideband synthesized signal, while maintaining a quality close to the original signal.

'802 Patent at 2:46-62 (emphasis added); *see* '524 Patent at 7:45-52 ("Down-sampling increases the coding efficiency, since a smaller frequency bandwidth is encoded.").

As to extrinsic evidence, Plaintiff has submitted technical articles reinforcing that, in the context of audio signals, the word "wideband" is used in contrast with "narrowband," which

refers to traditional bandwidths. *See* Dkt. No. 70, Ex. G, P. Mermelstein, *G.722, A New CCITT Coding Standard for Digital Transmission of Wideband Audio Signals*, IEEE Comm. Mag., Vol. 26, No. 1, p. 8 (Jan. 1988) (referring to "300-3,400-Hz audio signals" as "narrowband audio," and referring to "the customary 300-3400-Hz-wide telephone signal"); *see also id.* at Fig. 1 (comparing "Frequency Characteristics of Wideband and Narrowband Audio Channels" and illustrating "Wideband" as spanning 50Hz–7000Hz); *id.*, Ex. H, Jason A. Fuemmeler et. al, *Techniques for the Regeneration of Wideband Speech from Narrowband Speech*, EURASIP Journal on Applied Signal Processing 2001:0, p. 2 (Sept. 2001) (referring to speech signal with an upper cutoff at 3.3 kHz as a "narrowband" speech signal); *id.*, Ex. I, C.H. Ritz et. al., *Lossless Wideband Speech Coding*, 10th Australian Int'l. Conference on Speech Sci. & Tech. 249 (Dec. 2004) (discussing "wideband speech coding" in context of speech "bandlimited to the range 50 Hz to 7 kHz").

Likewise, Plaintiff has cited other United States Patents and patent applications. Although unrelated patents generally are of limited probative value, it is nonetheless noteworthy that the usage of "wideband" in those patents is consistent with the other evidence discussed above. *See id.*, Exs. J-L (U.S. Patents No. 5,444,816, 5,581,652, and 6,615,169); *see also* Dkt. No. 71, Ex. C, PCT Int'l Publication No. WO 01/48931 at p. 2, ll. 17-23 ("In the context of wideband audio, one can consider that the transmitted audio bandwidth may be 5 kHz or more and probably about 7 kHz, the lower cut-off frequency is likely to be around 50-70 Hz. In contrast, narrowband signals have a limited bandwidth of up to about 3.5 kHz with a lower cut-off frequency of about 250 Hz . . . ."); *id.*, Ex. D, U.S. Patent Application Publication No. 2013/0317812 at ¶ 44 ("Voice signals can be classified into a narrowband signal with a bandwidth of about 4 kHz widely used in a public switched telephone network (PSTN), a

wideband signal with a bandwidth of about 7 kHz widely used in high quality speech more natural than a narrowband voice signal or AM radio, and a super-wideband signal with a bandwidth of 14 kHz widely used in the field in which sound quality is emphasized such as digital broadcast, depending on the bandwidth."); *id.*, Ex. E, EP 2 763 137 at ¶¶ 3-6; Ex. F, EP 2 590 164 at ¶ 3.

On balance, the intrinsic and extrinsic evidence demonstrate that "wideband" is well-understood in the relevant art as referring to bandwidth that is wider than traditional telephone signal bandwidth and that spans approximately 50Hz–7000Hz. *Acumed LLC v. Stryker Corp.*, 483 F.3d 800, 806 (Fed. Cir. 2007) ("The resolution of some line-drawing problems . . . is properly left to the trier of fact.") (citing *PPG Indus. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1355 (Fed. Cir. 1998) ("after the court has defined the claim with whatever specificity and precision is warranted by the language of the claim and the evidence bearing on the proper construction, the task of determining whether the construed claim reads on the accused product is for the finder of fact")); *see EON Corp. IP Holdings LLC v. Silver Springs Networks, Inc.*, 815 F.3d 1314, 1318-19 (Fed. Cir. 2016) (citing *PPG*). "[S]ome construction of the disputed claim language will assist the jury to understand the claims." *See TQP Dev., LLC v. Merrill Lynch & Co., Inc.*, No. 2:08-CV-471, 2012 WL 1940849, at *2 (E.D. Tex. May 29, 2012) (Bryson, J.).

As to the proper construction, however, the entire relevant bandwidth might not be filled at all times. *See, e.g.*, '805 Patent at 11:40-41 ("The harmonic structure exists only up to a certain frequency, depending on the speech segment."). Thus, to whatever extent Defendants are proposing that "information" in the signal must be present at all frequencies within the bandwidth, the Court rejects any such limitation.

The Court therefore hereby construes **"[synthesized] [weighted] wideband [speech] signal"** to mean **"a [synthesized] [weighted] [speech] signal that spans a wider bandwidth than traditional telephone signals and that has a frequency range of approximately 50–7000Hz."**

BBB. "signal path" and "signal paths"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction is necessary.	"a route for the transmission of electrical data between two or more points"

Dkt. No. 61, Ex. A at 32; *id.*, Ex. B at 13; Dkt. No. 73, App'x B at 33. The parties submit that these terms appear in Claims 1, 2, 5, 6, 7, 8, and 10 of the '521 Patent. Dkt. No. 61, Ex. A at 32; *id.*, Ex. B at 13; Dkt. No. 73, App'x B at 33.

(1) The Parties' Positions

Plaintiff argues that "[t]he term 'signal path' is widely used and understood by those of ordinary skill in the art and the Court need not construe it," and "[a]dditionally, the term is given added meaning by the surrounding claim language." Dkt. No. 70 at 20. Plaintiff also argues that Defendants' construction "uses language that appears *nowhere* in the specification or prosecution history," and "it is unclear what constitutes 'electrical data,' a 'route' and/or 'two or more points.'" *Id.*

Defendants respond: "The term 'signal path' itself suggests something physical or electrical—a 'path' for a 'signal' to traverse," and "[t]he surrounding claim language removes any doubt" because "device" is a distinct hardware component. Dkt. No. 69 at 19 (footnote omitted). Defendants also argue that Plaintiff improperly seeks to construe these disputed terms in light of the accused device and, moreover, "the AMR-WB technical specification cited by

[Plaintiff] is not contemporaneous with the patents and cannot be used to contradict the intrinsic evidence." *Id.* at 20.

Plaintiff replies that "[t]he term 'signal path' appears verbatim in the AMR-WB standard's technical specification, emphasizing that a POSA would readily understand its meaning." Dkt. No. 71 at 8. Plaintiff also argues that "the reference code that accompanies the AMR-WB standard and was developed by the inventors in conjunction with their filing of the asserted patents implements these 'signal paths' in the form of a series of algorithms performed on the digital data—not a series of hardware circuits." Dkt. No. 71 at 8 (citing *id.*, Ex. B ("excerpt from 'cod_main.c' file")). Further, Plaintiff submits, "the patents disclose implementing filters, amplifiers and subtractors in the form of mathematical algorithms performed on a computer." Dkt. No. 71 at 8-9.

At the June 29, 2016 hearing, the parties submitted this disputed term on the briefing without oral argument.

(2) Analysis

Claim 1 of the '521 Patent recites (emphasis added):

> 1. A pitch analysis device for producing a set of pitch codebook parameters, comprising:
>
> a pitch codebook search device configured to generate a pitch code vector based on a digitized input audio data, wherein said digitized input audio data represents an input audio signal that has been sampled and digitized;
>
> a) at least two *signal paths* associated to respective sets of pitch codebook parameters representative of said digitized input audio data, wherein:
>
> i) each *signal path* comprises a pitch prediction error calculating device for calculating a pitch prediction error of said pitch codevector from said pitch codebook search device; and
>
> ii) at least one of said at least two *signal paths* comprises a filter for filtering the pitch codevector before supplying said pitch codevector to the pitch prediction error calculating device of said at least one *signal path*; and

> b) a selector for comparing the pitch prediction errors calculated in said at least two *signal paths*, for choosing the *signal path* having the lowest calculated pitch prediction error and for selecting the set of pitch codebook parameters associated to the chosen *signal path*.

Nothing in the claim language demands the "electrical data" limitation that Defendants have proposed, and Defendants have not identified any relevant definition or disclaimer in the specification. To whatever extent Defendants are relying upon their above-discussed proposals of specialized hardware circuits, Defendants' arguments are unavailing.

As to extrinsic evidence, Defendants have cited technical dictionary definitions of "signal" as meaning: "An electrical wave used to convey information." Dkt. No. 69, Ex. 7, *Newton's Telecom Dictionary* 746 (15th ed. 1999); *id.*, Ex. 8, *Modern Dictionary of Electronics* 691 (7th ed. 1999).

Plaintiff responds that the AMR-WB technical specification uses the term "signal path," and this extrinsic evidence does not suggest any "electrical data" limitation:

> In order to enhance the pitch prediction performance in wideband signals, a frequency-dependant [*sic*] pitch predictor is used. This is important in wideband signals since the periodicity doesn't necessarily extend over the whole spectrum. In this algorithm, there are two *signal paths* associated to respective sets of pitch codebook parameters, wherein each *signal path* comprises a pitch prediction error calculating device for calculating a pitch prediction error of a pitch codevector from a pitch codebook search device. One of these two paths comprises a low-pass filter for filtering the pitch codevector and the pitch prediction error is calculated for these two *signal paths*. The *signal path* having the lowest calculated pitch prediction error is selected, along with the associated pitch gain.

Dkt. No. 70, Ex. M, 3GPP TS 26.190 V10.0.0 (2011-03) at 25 (emphasis added).

Although "[a] claim is construed in the light of the claim language, the other claims, the prior art, the prosecution history, and the specification, not in light of the accused device,"[20] and

[20] *SRI Int'l v. Matsushita Elec. Corp. of Am.*, 775 F.2d 1107, 1118 (Fed. Cir. 1985) (en banc):

> A claim is construed in the light of the claim language, the other claims, the prior art, the prosecution history, and the specification, not in light of the accused

although this technical specification is not contemporaneous with the filing of the '521 Patent application, it is nonetheless noteworthy that this technical specification contains no suggestion that the term "signal path" requires specialized hardware circuits. *See Phillips*, 415 F.3d at 1319 ("extrinsic evidence can help educate the court regarding the field of the invention and can help the court determine what a person of ordinary skill in the art would understand claim terms to mean").[21] Plaintiff's expert likewise persuasively opines that "it was well known to those of ordinary skill in the art that such a 'signal path' may be implemented as either a physical path for a signal promulgated in a circuit or as a logical path implemented using computer code." Dkt. No. 70, May 4, 2016 Ogunfunmi Decl. at ¶ 30.

Thus, based on the foregoing intrinsic and extrinsic evidence, the Court hereby expressly rejects Defendants' proposed construction. No further construction is necessary. *See U.S. Surgical*, 103 F.3d at 1568; *see also O2 Micro*, 521 F.3d at 1362; *Finjan*, 626 F.3d at 1207; *ActiveVideo*, 694 F.3d at 1326; *Summit 6*, 802 F.3d at 1291.

The Court accordingly hereby construes **"signal path"** and **"signal paths"** to have their **plain meaning**.

> device. Contrary to what MEI's counsel wrote the district court, claims are not construed "to cover" or "not to cover" the accused device. That procedure would make infringement a matter of judicial whim. It is only after the claims have been construed without reference to the accused device that the claims, as so construed, are applied to the accused device to determine infringement.

[21] Plaintiff also submits the finding of a German court, as to related European patent EP 1 125 276, that "the wording of the claim does not restrict the feature of the 'signal path' to a physical signal path in such a way that it has to be an electronic hardware component and thus a software implementation (in accordance with the standard) is not sufficient." *Id.*, Ex. F at 19 (p. 28 of 46 of pt. 4 of 4 of Ex. F). Plaintiff has not demonstrated, however, that this foreign finding is of any probative value in the present case. *Cf. Pfizer, Inc. v. Ranbaxy Labs. Ltd.*, 457 F.3d 1284, 1290 (Fed. Cir. 2006) (finding that "the statements made during prosecution of foreign counterparts to the [patent-in-suit] are irrelevant to claim construction because they were made in response to patentability requirements unique to Danish and European law").

CCC. "low frequency portion"

Plaintiff's Proposed Construction	Defendants' Proposed Construction
No construction is necessary.	Indefinite

Dkt. No. 61, Ex. A at 2; *id.*, Ex. B at 2; Dkt. No. 73, App'x B at 33. The parties submit that this term appears in Claims 1, 2, 3, 6, 21, 23, and 26 of the '805 Patent. Dkt. No. 61, Ex. A at 2; *id.*, Ex. B at 2; Dkt. No. 73, App'x B at 33.

(1) The Parties' Positions

Plaintiff argues that this disputed term is part of a "thereby" clause that is analogous to a "whereby" clause and is therefore non-limiting. Dkt. No. 70 at 21. Plaintiff explains that "the reduction in the energy and enhancement in periodicity of the low frequency portion of the codevector and excitation signal, respectively, merely state the result of applying the innovation filter and do not limit the claims in which they appear." *Id.* at 21-22. Alternatively, Plaintiff argues that even if this disputed term is a limitation, then the Court should reject Defendants' indefiniteness argument because "[t]he 'low frequency portion' term relates to the output of the innovation filter. Accordingly, application of the innovation filters recited in the '805 Patent's specification would define the scope of the 'low frequency portion' with reasonable certainty." *Id.* at 22.

Defendants respond that "[i]n light of the failure of the intrinsic record to provide context for the term 'low frequency portion,' a POSA [(person of ordinary skill in the art)] would not understand, with reasonable certainty, the bounds of the claims." Dkt. No. 69 at 22. Defendants urge that the disputed term is not mere surplusage, as Plaintiff has argued, because the larger phrase "in relation to said periodicity factor to thereby reduce energy of a low frequency portion" "would be incomprehensible and grammatically incomplete without 'low frequency portion.'"

Id. at 23 (emphasis omitted). Finally, Defendants argue: "Under [Plaintiff's] view, claim 1 would allow for the use of any type of filter regardless of whether it brought about the claimed result. This would untether the claim scope from the claim language and the patent specification." *Id.*

Plaintiff replies that this term is among "non-limiting 'whereby clauses' that state merely the intended result of applying the claim language. However, to the extent the terms limit the claims, the specification provides 'reasonable certainty' as to their meaning by disclosing the form of the transfer functions that produce those results." Dkt. No. 71 at 9.

(2) Analysis

Claim 1 of the '805 Patent recites (emphasis added):

> 1. A device for enhancing periodicity of an excitation signal produced in relation to a pitch codevector and an innovative codevector for supplying a signal synthesis filter in view of synthesizing a wideband speech signal, said periodicity enhancing device comprising:
>
> a) a factor generator for calculating a periodicity factor related to the wideband speech signal; and
>
> b) an innovation filter for filtering the innovative codevector in relation to said periodicity factor *to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal.*

The specification discloses:

> A new alternative approach, which is part of the present invention, is disclosed whereby periodicity enhancement is achieved by filtering the innovative codevector c_k from the innovative (fixed) codebook through an innovation filter 205 (F(z)) whose frequency response *emphasizes the higher frequencies more than lower frequencies*.
>
> * * *
>
> Innovation filter 205 has the effect of lowering the energy of the innovative codevector c_k at low frequencies when the excitation signal u is more periodic, which *enhances the periodicity of the excitation signal u at lower frequencies more than higher frequencies.*

’805 Patent at 14:6-30 (emphasis added).

On one hand, in some circumstances, “surplusage may exist in some claims.” *Decisioning.com, Inc. v. Federated Dep’t Stores, Inc.*, 527 F.3d 1300, 1312 n.6 (Fed. Cir. 2008); *accord ERBE Elektromedizin GmbH v. Canady Tech. LLC*, 629 F.3d 1278, 1286 (Fed. Cir. 2010). In particular, “[a] ‘whereby’ clause that merely states the result of the limitations in the claim adds nothing to the patentability or substance of the claim.” *Tex. Instruments Inc. v. U.S. Int’l Trade Comm’n*, 988 F.2d 1165, 1172 (Fed. Cir. 1993); *accord Lockheed Martin Corp. v. Space Sys./Loral, Inc.*, 324 F.3d 1308, 1319 (Fed. Cir. 2003); *In re Omeprazole Patent Litig.*, 536 F.3d 1361, 1370 (Fed. Cir. 2008) (similar as to claim phrase “such that the stability of the preparation is enhanced”).

On the other hand, “[a]llowing a patentee to argue that physical structures and characteristics specifically described in a claim are merely superfluous would render the scope of the patent ambiguous, leaving examiners and the public to guess about which claim language the drafter deems necessary to his claimed invention and which language is merely superfluous, nonlimiting elaboration. For that reason, claims are interpreted with an eye toward giving effect to all terms in the claim.” *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006).

Here, although the claim sets forth a limitation of “an innovation filter for filtering the innovative codevector *in relation to said periodicity factor*,” the subsequent “thereby” clause—“to thereby reduce energy of a low frequency portion of the innovative codevector and enhance periodicity of a low frequency portion of the excitation signal”—provides additional limitations on the manner of filtering. *See, e.g., K-2 Corp. v. Salomon S.A.*, 191 F.3d 1356, 1363 (Fed. Cir. 1999) (“The functional language is, of course, an additional limitation in the claim.”).

This finding is reinforced by the specification, which discloses that the output of the filter depends upon applying the periodicity factors in particular ways. *See* '805 Patent at 14:30-38.

The Court therefore rejects Plaintiff's argument that the term "low frequency portion" appears in a non-limiting portion of the claim. The remaining dispute, then, is whether the term renders the scope of the claims not reasonably certain.

On balance, the use of the word "low" is appropriate because the relative bandwidths and the precise manner of filtering are implementation-specific details. *See Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576 (Fed. Cir. 1986) (regarding a chair leg portion "so dimensioned as to be insertable through the space between the doorframe of an automobile and one of the seats thereof," finding that "[t]he patent law does not require that all possible lengths corresponding to the spaces in hundreds of different automobiles be listed in the patent, let alone that they be listed in the claims").

This does not give rise to indefiniteness because "the definiteness requirement must take into account the inherent limitations of language," and "[s]ome modicum of uncertainty . . . is the price of ensuring the appropriate incentives for innovation." *Nautilus*, 134 S. Ct. at 2128 (citation and internal quotation marks omitted); *see id.* at 2128 n.5 (citing *Eibel Process Co. v. Minn. & Ontario Paper Co.*, 261 U.S. 45, 58, 65-66 (1923) (Taft, J.), as "upholding as definite a patent for an improvement to a paper-making machine, which provided that a wire be placed at a 'high' or 'substantial elevation,' where 'readers . . . skilled in the art of paper making and versed in the use of the . . . machine' would have 'no difficulty . . . in determining . . . the substantial [elevation] needed' for the machine to operate as specified") (ellipses and square bracketed text the Court's); *see also id.* at 2129 ("The definiteness requirement . . . mandates clarity, while recognizing that absolute precision is unattainable."); *Interval Licensing LLC v. AOL, Inc.*, 766

F.3d 1364, 1370 (Fed. Cir. 2014) ("We do not understand the Supreme Court to have implied in *Nautilus* . . . that terms of degree are inherently indefinite.").

The Court therefore hereby expressly rejects Defendants' indefiniteness argument. No further construction is necessary. *See U.S. Surgical*, 103 F.3d at 1568; *see also O2 Micro*, 521 F.3d at 1362; *Finjan*, 626 F.3d at 1207; *ActiveVideo*, 694 F.3d at 1326; *Summit 6*, 802 F.3d at 1291.

The Court accordingly hereby construes **"low frequency portion"** to have its **plain meaning**.

DDD. "[enhanced] / [enhancing a] high frequency content"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction is necessary	Indefinite

Dkt. No. 61, Ex. A at 9; *id.*, Ex. B at 5; Dkt. No. 73, App'x B at 33. The parties submit that these terms appear in Claims 4, 5, 18, and 19 of the '524 Patent. Dkt. No. 61, Ex. A at 9; *id.*, Ex. B at 5; Dkt. No. 73, App'x B at 33.

(1) The Parties' Positions

Plaintiff argues that "the term 'high frequency content' does not impose any structural limitations on the preemphasis filter, and instead recites its intended use. As a result, the term is not a limitation." Dkt. No. 70 at 23. Alternatively, Plaintiff argues that "[t]he 'high frequency content' term refers to the output of the preemphasis filter, and the application of the preemphasis filter disclosed in the '524 Patent would define the scope of the 'high frequency portion' with reasonable certainty." *Id.* at 23.

Defendants respond that "[l]ike 'low frequency portion,' 'high frequency content' is a

relative term of which a POSA would not know with reasonable certainty the boundaries." Dkt. No. 69 at 24. Defendants also urge that "'enhancing a high frequency content' appears in the body of the claim and clearly limits the type of 'signal preemphasis filter' claimed," and "[w]ithout this limitation, that claim element would merely encompass 'a signal preemphasis filter responsive to the wideband speech signal' which is far broader than what was actually claimed." *Id.* at 25.

Plaintiff replies that this term is among "non-limiting 'whereby clauses' that state merely the intended result of applying the claim language. However, to the extent the terms limit the claims, the specification provides 'reasonable certainty' as to their meaning by disclosing the form of the transfer functions that produce those results." Dkt. No. 71 at 9.

(2) Analysis

The claims here at issue depend from Claim 1 of the '524 Patent, which recites (emphasis added):

> 1. A perceptual weighting device for producing a perceptually weighted signal in response to a wideband speech signal in order to reduce a difference between the wideband speech signal and a subsequently synthesized wideband speech signal, said perceptual weighting device comprising:
>
> a) a signal preemphasis filter responsive to the wideband speech signal for *enhancing a high frequency content* of the wideband speech signal to thereby produce a preemphasised signal;
>
> b) a synthesis filter calculator responsive to said preemphasised signal for producing synthesis filter coefficients; and
>
> c) a perceptual weighting filter, responsive to said preemphasised signal and said synthesis filter coefficients, for filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce said perceptually weighted signal, said perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal.

For substantially the same reasons set forth above as to the term "low frequency portion," the Court rejects Plaintiff's argument that "high frequency content" is not a limitation. Of

particular note here, the disputed term is a limitation because it appears in conjunction with producing "a preemphasized signal," and that preemphasized signal provides antecedent basis for "said preemphasized signal" recited later in the claim.

The Court also hereby expressly rejects Defendants' indefiniteness argument for substantially the same reasons set forth above as to the term "low frequency portion." No further construction is necessary. *See U.S. Surgical*, 103 F.3d at 1568; *see also O2 Micro*, 521 F.3d at 1362; *Finjan*, 626 F.3d at 1207; *ActiveVideo*, 694 F.3d at 1326; *Summit 6*, 802 F.3d at 1291.

The Court accordingly hereby construes **"[enhanced] / [enhancing a] high frequency content"** to have its **plain meaning**.

EEE. "said full-spectrum synthesized wideband signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction is necessary.[22]	Indefinite

Dkt. No. 61, Ex. A at 14; *id.*, Ex. B at 7; Dkt. No. 73, App'x B at 33. Plaintiff submits that this term appears in Claims 1, 2, 3, 8, and 49 of the '802 Patent. Dkt. No. 61, Ex. A at 14; *id.*, Ex. B at 7; Dkt. No. 73, App'x B at 33.

(1) The Parties' Positions

Plaintiff argues that "[t]his term does not limit the claims in which it appears because it is a 'whereby' clause that merely states the result of the limitations and adds nothing to the substance of the claim." Dkt. No. 70 at 24. In particular, Plaintiff argues that "the term refers to what is produced by the signal injection circuit – i.e. the resulting output of the signal injection circuit." *Id.* Alternatively, Plaintiff urges:

[22] Plaintiff has also proposed: "[Plaintiff] requests that the Court address the antecedent basis issue by correcting the typo in this term from 'said' to 'a.'" Dkt. No. 70 at 23.

> However, to the extent the Court concludes that the term is a limitation, [Plaintiff] requests that the Court address [Defendants'] antecedent-basis complaint by correcting the language from "*said* full-spectrum synthesized wideband signal" to "*a* full-spectrum synthesized wideband signal."

Id. Plaintiff submits that "the typographical error is self-evident on the face of the patent, the correction is not subject to reasonable debate based on consideration of the claim language and the specification, and the prosecution history does not suggest a different interpretation of the claims." *Id.* at 25.

Defendants respond that "[t]his term lacks antecedent basis and is thus indefinite as a matter of law." Dkt. No. 69 at 30. Moreover, Defendants argue that "the term is indefinite because the specification fails to inform one of ordinary skill in the art with reasonable certainty the scope of a '*full-spectrum* synthesized wideband signal.'" *Id.* (emphasis Defendants'). Defendants explain: "[T]he specification of the '802 Patent defines a wideband signal as a signal containing information at least in the frequency range of 50-7000Hz. The specification fails to provide any guidance with reasonable certainty what additional scope a 'full spectrum' wideband signal would include." *Id.*

Plaintiff replies that this term is among "non-limiting 'whereby clauses' that state merely the intended result of applying the claim language. However, to the extent the terms limit the claims, the specification provides 'reasonable certainty' as to their meaning by disclosing the form of the transfer functions that produce those results." Dkt. No. 71 at 9.

At the June 29, 2016 hearing, the parties submitted this disputed term on the briefing without oral argument.

(2) Analysis

Claim 1 of the '802 Patent, for example, recites (emphasis added):

1. A decoder for producing a synthesized wideband signal, comprising:

a) a signal fragmenting device for receiving an encoded version of a wideband signal previously down-sampled during encoding and extracting from said encoded wideband signal version at least pitch codebook parameters, innovative codebook parameters, and linear prediction filter coefficients;

b) a pitch codebook responsive to said pitch codebook parameters for producing a pitch codevector;

c) an innovative codebook responsive to said innovative codebook parameters for producing an innovative codevector;

d) a combiner circuit for combining said pitch codevector and said innovative codevector to thereby produce an excitation signal;

e) a signal synthesis device including a linear prediction filter for filtering said excitation signal in relation to said linear prediction filter coefficients to thereby produce a synthesized wideband signal, and an oversampler responsive to said synthesized wideband signal for producing an over-sampled signal version of the synthesized wideband signal; and

f) a high-frequency content recovering device comprising:

i) a random noise generator for producing a noise sequence having a given spectrum;

ii) a spectral shaping unit for shaping the spectrum of the noise sequence in relation to linear prediction filter coefficients related to said down-sampled wideband signal; and

iii) a signal injection circuit for injecting said spectrally-shaped noise sequence in said over-sampled synthesized signal version *to thereby produce said full-spectrum synthesized wideband signal*.

Although the disputed term relates to the "injecting" by the recited signal injection circuit, on balance the disputed term merely describes a result of other claim language and therefore is not a limitation. *See Tex. Instruments*, 988 F.2d at 1172 ("A 'whereby' clause that merely states the result of the limitations in the claim adds nothing to the patentability or substance of the claim."); *see also Lockheed*, 324 F.3d at 1319; *In re Omeprazole Patent Litig.*, 536 F.3d at 1370 (similar as to claim phrase "such that the stability of the preparation is enhanced").

Because this disputed term is not a limitation, the Court hereby expressly rejects Defendants' indefiniteness arguments that are based upon this disputed term.

FFF. "a frequency bandwidth generally higher than a frequency bandwidth of [the / said] over-sampled synthesized signal version"

Plaintiff's Proposed Construction	Defendants' Proposed Construction
No construction is necessary.	Indefinite

Dkt. No. 61, Ex. A at 18; *id.*, Ex. B at 9; Dkt. No. 73, App'x B at 33-34. The parties submit that this term appears in Claims 3, 8, and 49 of the '802 Patent. Dkt. No. 61, Ex. A at 18; *id.*, Ex. B at 9; Dkt. No. 73, App'x B at 33.

(1) The Parties' Positions

Plaintiff argues that this disputed term "refers to what is *produced* by the spectral shaper disclosed in the '802 Patent, and the term is not a limitation." Dkt. No. 70 at 25. Alternatively, Plaintiff argues that even if this term is a limitation, then "[g]iven the disclosure of a specific transfer function for producing the filtered scaled white noise, a person of ordinary skill in the art would know what it means for the filtered scaled white noise sequence to be characterized by a frequency bandwidth generally higher than a frequency bandwidth of the over-sampled synthesized signal." *Id.* at 26.

Defendants respond that "[t]he intrinsic record provides no guidance to interpret the term," and "[t]hus, the patent fails to teach a POSA the meaning of 'generally higher' in the context of the asserted claims and impermissibly leaves the claim's interpretation to 'the unrestrained, subjective opinion of a particular individual.'" Dkt. No. 69 at 26 (quoting *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1350 (Fed. Cir. 2005)). Defendants also argue that the disputed term is a limitation of the claims because "the language imposes a substantive limitation on the 'spectral shaper'—that is, the spectral shaper must produce the specified 'filtered scaled white noise sequence' . . . ." Dkt. No. 74 at 26.

Plaintiff replies that this term is among "non-limiting 'whereby clauses' that state merely the intended result of applying the claim language. However, to the extent the terms limit the claims, the specification provides 'reasonable certainty' as to their meaning by disclosing the form of the transfer functions that produce those results." Dkt. No. 71 at 9.

(2) Analysis

Claim 49 of the '802 Patent, for example, recites (emphasis added):

> 49. A decoder for producing a synthesized wideband signal as defined in claim 1, wherein said spectral shaping unit comprises a spectral shaper for filtering the noise sequence in relation to a bandwidth expanded version of the linear prediction filter coefficients *to produce a filtered noise sequence characterized by a frequency bandwidth generally higher than a frequency bandwidth of the over-sampled synthesized signal version*.

As a threshold matter, Plaintiff has failed to adequately demonstrate that the disputed term is not a limitation. On one hand, "surplusage may exist in some claims," *Decisioning.com*, 527 F.3d at 1312 n.6, and in some circumstances "[a] 'whereby' clause that merely states the result of the limitations in the claim adds nothing to the patentability or substance of the claim," *Tex. Instruments*, 988 F.2d at 1172. Here, however, the disputed term is a substantive limitation upon the recited spectral shaper. The Court therefore rejects Plaintiff's argument that the disputed term is not a limitation.

As to whether the phrase "generally higher" renders the claim indefinite, the specification of the '802 Patent discloses:

> The oversampled synthesis S signal does not contain the higher frequency components which were lost by the downsampling process (module 101 of FIG. 1) at the encoder 100. This gives a low-pass perception to the synthesized speech signal. To restore the full band of the original signal, a high frequency generation procedure is disclosed. This procedure is performed in modules 210 to 216, and adder 221, and requires input from voicing factor generator 204 (FIG. 2).
>
> In this new approach, the high frequency contents are generated by filling the upper part of the spectrum with a white noise properly scaled in the excitation

> domain, then converted to the speech domain, preferably by shaping it with the same LP synthesis filter used for synthesizing the down-sampled signal S.

'802 Patent at 17:57-18:3.

> Once the noise is properly scaled (w_g), it is brought into the speech domain using the spectral shaper 215. In the preferred embodiment, this is achieved by filtering the noise w_g through a bandwidth expanded version of the same LP synthesis filter used in the down-sampled domain (1/Â(z/0.8)). The corresponding bandwidth expanded LP filter coefficients are calculated in spectral shaper 215.

Id. at 19:29-35.

On balance, the use of "generally higher" is appropriate because the above-quoted passages demonstrate that the relative bandwidths and the precise manner of addition of noise-based information are implementation-specific details. *See Orthokinetics*, 806 F.2d at 1576 (regarding a chair leg portion "so dimensioned as to be insertable through the space between the doorframe of an automobile and one of the seats thereof," finding that "[t]he patent law does not require that all possible lengths corresponding to the spaces in hundreds of different automobiles be listed in the patent, let alone that they be listed in the claims").

This does not give rise to indefiniteness because "the definiteness requirement must take into account the inherent limitations of language," and "[s]ome modicum of uncertainty . . . is the price of ensuring the appropriate incentives for innovation." *Nautilus*, 134 S. Ct. at 2128 (citation and internal quotation marks omitted); *see id.* at 2128 n.5; *see also id.* at 2129 ("The definiteness requirement . . . mandates clarity, while recognizing that absolute precision is unattainable."); *Interval Licensing*, 766 F.3d at 1370 ("We do not understand the Supreme Court to have implied in *Nautilus* . . . that terms of degree are inherently indefinite.").

The Court therefore hereby expressly rejects Defendants' indefiniteness argument. No further construction is necessary. *See U.S. Surgical*, 103 F.3d at 1568; *see also O2 Micro*, 521

F.3d at 1362; *Finjan*, 626 F.3d at 1207; *ActiveVideo*, 694 F.3d at 1326; *Summit 6*, 802 F.3d at 1291.

The Court accordingly hereby construes **"a frequency bandwidth generally higher than a frequency bandwidth of [the / said] over-sampled synthesized signal version"** to have its **plain meaning**.

GGG. "weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction is necessary.	Indefinite

Dkt. No. 61, Ex. A at 10; *id.*, Ex. B at 5-6; Dkt. No. 73, App'x B at 34. The parties submit that this term appears in Claims 4, 5, 18, and 19 of the '524 Patent. Dkt. No. 61, Ex. A at 10; *id.*, Ex. B at 5-6; Dkt. No. 73, App'x B at 34.

(1) The Parties' Positions

Plaintiff argues that the disputed term appears in a non-limiting "whereby" clause that "refers to the result of applying the perceptual weighting filter disclosed in the '524 Patent." Dkt. No. 70 at 27. Alternatively, Plaintiff argues that even if this disputed term is a limitation, then "[g]iven the intrinsic evidence, the term 'substantially decoupled' informs those skilled in the art with reasonable certainty about the scope of the invention." *Id.* "Additionally," Plaintiff argues, "the transfer function for this modified filter W(z) is set forth in the specification and recited in dependent claim 4." *Id.* at 28. Plaintiff further cites prosecution history in which, "applying the perspective of a person of ordinary skill in the art, not only did the examiner understand the scope of the 'substantially decoupled' term, he reiterated it in his reasons for allowance." *Id.* at 29. Finally, Plaintiff argues that "[t]he technical specifications for AMR-WB," which is a standard that Plaintiff submits has been adopted by Defendants and other

cellular phone manufacturers, "uses the very same phrase when describing the perceptual weigh[t]ing filter." *Id.*

Defendants respond that "the whereby clause is limiting largely for the same reasons as the term 'low frequency portion' above. . . ." Dkt. No. 69 at 29. Defendants also argue that "the '524 patent fails to provide an objective standard for knowing how much variation is sufficient to show that weighting of a wideband speech signal is 'substantially decoupled' from a spectral tilt of that signal." *Id.* at 28.

Plaintiff replies that this term is among "non-limiting 'whereby clauses' that state merely the intended result of applying the claim language. However, to the extent the terms limit the claims, the specification provides 'reasonable certainty' as to their meaning by disclosing the form of the transfer functions that produce those results." Dkt. No. 71 at 9. In particular, Plaintiff argues that "the patent itself ties th[e] term to the use of a 'fixed denominator' in a perceptual weighting filter," and "the use of a fixed denominator in a perceptual weighting filter provides an *objective* standard for a POSA." *Id.* at 9-10.

(2) Analysis

The claims at issue depend from Claim 1 of the '524 Patent, which recites (emphasis added):

> 1. A perceptual weighting device for producing a perceptually weighted signal in response to a wideband speech signal in order to reduce a difference between the wideband speech signal and a subsequently synthesized wideband speech signal, said perceptual weighting device comprising:
>
> a) a signal preemphasis filter responsive to the wideband speech signal for enhancing a high frequency content of the wideband speech signal to thereby produce a preemphasised signal;
>
> b) a synthesis filter calculator responsive to said preemphasised signal for producing synthesis filter coefficients; and
>
> c) a perceptual weighting filter, responsive to said preemphasised signal and said synthesis filter coefficients, for filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce said perceptually

> weighted signal, said perceptual weighting filter having a transfer function with fixed denominator *whereby weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal*.

As a threshold matter, "[a] 'whereby' clause that merely states the result of the limitations in the claim adds nothing to the patentability or substance of the claim." *Tex. Instruments*, 988 F.2d at 1172. Plaintiff urges that the intrinsic and extrinsic evidence support Plaintiff's argument that the recited "decoupl[ing]" is a *result* of using a "transfer function with fixed denominator," as recited by other claim language. *See* '524 Patent at 9:20-45 (reproduced below); *see also* Dkt. No. 70, Ex. M, 3GPP TS 26.190 V10.0.0 (2011-03) at 21 (quoted below).

On balance, however, the "whereby" clause sets forth a further limitation upon the recited "transfer function with fixed denominator." *See Bicon*, 441 F.3d at 950 ("Allowing a patentee to argue that physical structures and characteristics specifically described in a claim are merely superfluous would render the scope of the patent ambiguous, leaving examiners and the public to guess about which claim language the drafter deems necessary to his claimed invention and which language is merely superfluous, nonlimiting elaboration. For that reason, claims are interpreted with an eye toward giving effect to all terms in the claim.").

Nonetheless, even though the disputed "whereby" clause is a limitation, the '524 Patent discloses:

> The above traditional perceptual weighting filter 105 works well with telephone band signals. However, it was found that this traditional perceptual weighting filter 105 is not suitable for efficient perceptual weighting of wideband signals. It was also found that the traditional perceptual weighting filter 105 has inherent limitations in modelling the formant structure and the required spectral tilt concurrently. *The spectral tilt is more pronounced in wideband signals due to the wide dynamic range between low and high frequencies. The prior art has suggested to add a tilt filter into W(z) in order to control the tilt and formant weighting of the wideband input signal separately.*

> A novel solution to this problem is, in accordance with the present invention, to introduce the preemphasis filter 103 at the input, compute the LP filter A(z) based on the preemphasized speech s(n), and use a modified filter W(z) by fixing its denominator.
>
> LP analysis is performed in module 104 on the preemphasized signal s(n) to obtain the LP filter A(z). Also, *a new perceptual weighting filter 105 with fixed denominator is used*. An example of transfer function for the perceptual weighting filter 104 is given by the following relation:
>
> $$W(z) = A(z/\gamma_1)/(1-\gamma_2 z^{-1})$$ where $0<\gamma_2<\gamma_1\leq 1$
>
> A higher order can be used at the denominator. *This structure substantially decouples the formant weighting from the tilt.*

'524 Patent at 9:20-45 (emphasis added).

Plaintiff and its expert persuasively argue that, in light of this disclosure, "a person of ordinary skill in the art would understand from the context of the patent and the disclosure of its 'novel solution' what the phrase 'substantially decouple[d]' means in the above term." Dkt. No. 70 at 28; *see* Dkt. No. 70, May 4, 2016 Ogunfunmi Decl. at ¶¶ 70-91. At the June 29, 2016 hearing, Defendants argued that because this disclosed example appears in dependent claims, this example does not inform the meaning of the disputed term in the broader independent claim. This argument is unavailing. Defendants have presented no authority for the proposition that a disclosed example cannot provide context for a disputed term merely because that example is set forth in a dependent claim.

Plaintiff also submits that the Examiner indicated understanding of the phrase "substantially decoupled" at the time of allowance. An examiner's apparent ability to understand a disputed term may be of some probative value. *See Am. Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359 (Fed. Cir. 1984) (patent examiners are "assumed . . . to be familiar from their work with the level of skill in the art"), *abrogated on other grounds, Therasense, Inc. v. Becton, Dickinson & Co.*, 649 F.3d 1276 (Fed. Cir. 2011); *see also*

PowerOasis, Inc. v. T-Mobile USA, Inc., 522 F.3d 1299, 1304 (Fed. Cir. 2008) (citing *American Hoist*); *Salazar v. Procter & Gamble Co.*, 414 F.3d 1342, 1347 (Fed. Cir. 2005) ("Statements about a claim term made by an Examiner during prosecution of an application may be evidence of how one of skill in the art understood the term at the time the application was filed."); *R+L Carriers, Inc. v. Qualcomm, Inc.*, 801 F.3d 1346, 1351 (Fed. Cir. 2015) (discussing "the examiner's focus in allowing the claims").

Although the Examiner did not comment upon the term "substantially decoupled," the Examiner used the phrase "fixed denominator":

> The combination of Kroon et al [(United States Patent No. 5,664,055)] and Oshikiri et al [(United States Patent No. 6,064,962)] fail to specifically disclose or fairly suggest a pre-emphasis filter for producing pre-emphasized speech which is used to calculate LP coefficients that are further utilized with a perceptual weighting filter, *having a fixed denominator*, to compensate for spectral tilt in a wideband speech signal.

Dkt. No. 70, Ex. P, Apr. 14, 2004 Notice of Allowability at 7 (emphasis added).

As to extrinsic evidence, Plaintiff submits that the 3GPP TS 26.190 standard for AMR-WB explains that fixing the denominator of the perceptual weighting filter "substantially decouples the formant weighting from the tilt." Dkt. No. 70, Ex. M, 3GPP TS 26.190 V10.0.0 (2011-03) at 21. Although "[a] claim is construed in the light of the claim language, the other claims, the prior art, the prosecution history, and the specification, not in light of the accused device,"[23] and although Defendants properly note that this technical specification is not contemporaneous with the filing of the '521 Patent application, it is nonetheless noteworthy that this technical specification uses the very phrase that Defendants contend is not reasonably certain to a person of ordinary skill in the art. *See Phillips*, 415 F.3d at 1319 ("extrinsic evidence can

[23] *SRI*, 775 F.2d at 1118.

help educate the court regarding the field of the invention and can help the court determine what a person of ordinary skill in the art would understand claim terms to mean").

Further, although the word "substantially" is "a word of degree" that may be "imprecise," such terms are not necessarily indefinite. *Apple, Inc. v. Samsung Elecs. Co.*, 932 F. Supp. 2d 1076, 1080 (N.D. Cal. 2013) ("substantially centered" found not indefinite); *see Anchor Wall Sys, Inc. v. Rockwood Retaining Walls, Inc.*, 340 F.3d 1298, 1310-11 (Fed. Cir. 2003) ("[W]ords of approximation, such as 'generally' and 'substantially,' are descriptive terms commonly used in patent claims to avoid a strict numerical boundary to the specified parameter.") (citations and internal quotation marks omitted); *see also Playtex Prods., Inc. v. Procter & Gamble Co.*, 400 F.3d 901, 907-09 (Fed. Cir. 2005); *Verve, LLC v. Crane Cams, Inc.*, 311 F.3d 1116, 1120 (Fed. Cir. 2002) ("Expressions such as 'substantially' are used in patent documents when warranted by the nature of the invention, in order to accommodate the minor variations that may be appropriate to secure the invention.").

On balance, the intrinsic and extrinsic evidence demonstrate that "substantially decoupled" is reasonably well-understood in the relevant art such that the claims at issue "inform[s] those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus*, 134 S. Ct. at 2129; *see id.* at 2128 ("the definiteness requirement must take into account the inherent limitations of language," and "[s]ome modicum of uncertainty . . . is the price of ensuring the appropriate incentives for innovation") (citation and internal quotation marks omitted); *see also id.* at 2128 n.5; *id.* at 2129 ("The definiteness requirement . . . mandates clarity, while recognizing that absolute precision is unattainable."); *Interval Licensing*, 766 F.3d at 1370 ("We do not understand the Supreme Court to have implied in *Nautilus* . . . that terms of degree are inherently indefinite.").

The Court therefore hereby expressly rejects Defendants' indefiniteness argument. No further construction is necessary. *See U.S. Surgical*, 103 F.3d at 1568; *see also O2 Micro*, 521 F.3d at 1362; *Finjan*, 626 F.3d at 1207; *ActiveVideo*, 694 F.3d at 1326; *Summit 6*, 802 F.3d at 1291.

The Court accordingly hereby construes **"weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal"** to have its **plain meaning**.

HHH. "reduce a difference between the wideband speech signal and a subsequently synthesized wideband speech signal"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction is necessary.	Indefinite

Dkt. No. 61, Ex. A at 8-9; *id.*, Ex. B at 5; Dkt. No. 73, App'x B at 34. Plaintiff submits that these terms appear in Claims 4, 5, 18, and 19 of the '524 Patent. Dkt. No. 61, Ex. A at 8-9; *id.*, Ex. B at 5; Dkt. No. 73, App'x B at 34.

(1) The Parties' Positions

Plaintiff argues that "the term is a whereby clause which refers to the intended result of applying the perceptual weighting device disclosed in the '524 Patent." Dkt. No. 70 at 30.

Defendants respond that this term is a limitation for substantially the same reasons as for the term "a frequency bandwidth generally higher . . .," which is addressed above. Dkt. No. 69 at 28. Defendants also argue that this term "is inconsistent with the disclosure set forth in the specification of the '524 Patent, which discusses only 'reduc[ing] a difference between a *weighted* wideband signal and a subsequently synthesized *weighted* wideband signal.'" *Id.* at 27 (citing '524 Patent at 1:16-17, 3:2-4 & 3:24-26) (emphasis Defendants'). "Additionally," Defendants argue, "'reduce a difference' is vague and a POSA would be unable to understand[]

with reasonable certainty the bounds of this claim term, which is not discussed in connection with an unweighted wideband signal." Dkt. No. 69 at 27.

Plaintiff replies that this term is among "non-limiting 'whereby clauses' that state merely the intended result of applying the claim language. However, to the extent the terms limit the claims, the specification provides 'reasonable certainty' as to their meaning by disclosing the form of the transfer functions that produce those results." Dkt. No. 71 at 9.

(2) Analysis

The claims at issue depend from Claim 1 of the '524 Patent, which recites (emphasis added):

> 1. A perceptual weighting device for producing a perceptually weighted signal in response to a wideband speech signal in order to *reduce a difference between the wideband speech signal and a subsequently synthesized wideband speech signal*, said perceptual weighting device comprising:
>
> a) a signal preemphasis filter responsive to the wideband speech signal for enhancing a high frequency content of the wideband speech signal to thereby produce a preemphasised signal;
>
> b) a synthesis filter calculator responsive to said preemphasised signal for producing synthesis filter coefficients; and
>
> c) a perceptual weighting filter, responsive to said preemphasised signal and said synthesis filter coefficients, for filtering said preemphasised signal in relation to said synthesis filter coefficients to thereby produce said perceptually weighted signal, said perceptual weighting filter having a transfer function with fixed denominator whereby weighting of said wideband speech signal in a formant region is substantially decoupled from a spectral tilt of said wideband speech signal.

Although the disputed term is recited in the preamble, the body of the claim relies upon the preamble for antecedent basis, in particular as to "a perceptually weighted signal." On balance, the disputed term affects the recited "perceptually weighted signal," and the Court rejects Plaintiff's argument that the disputed term is not a limitation. *See Bicon*, 441 F.3d at 950 ("[C]laims are interpreted with an eye toward giving effect to all terms in the claim.").

As to Defendants' indefiniteness argument, the Background of the Invention states:

> The present invention relates to a perceptual weighting device and method for producing a perceptually weighted signal in response to a wideband signal (0-7000 Hz) in order to *reduce a difference between a weighted wideband signal and a subsequently synthesized weighted wideband signal*.

'524 Patent at 1:13-17; *see id.* at 3:2-4 & 3:24-26 (similar). Defendants argue that these disclosures are "inconsistent" with the disputed terms. Although these disclosures refer to a "weighted" wideband signal, Defendants have not demonstrated that this renders the claim scope not reasonably certain.

The Court therefore hereby expressly rejects Defendants' indefiniteness arguments. No further construction is necessary.

The Court accordingly hereby construes **"reduce a difference between the wideband speech signal and a subsequently synthesized wideband speech signal"** to have its **plain meaning**.

III. "α is a periodicity factor"

Plaintiff's Proposed Construction	**Defendants' Proposed Construction**
No construction necessary	Indefinite

Dkt. No. 61, Ex. A at 2; *id.*, Ex. B at 16. The parties submit that this term appears in Claims 3 and 23 of the '805 Patent. Dkt. No. 61, Ex. A at 2; *id.*, Ex. B at 16.

Plaintiff argues:

> Independent claim 1 recites a factor generator for calculating a periodicity factor and an innovation filter for filtering the innovative codebook in relation to said periodicity factor. Dependent claims 3 and 23 then specify the transfer function of the innovation filter and in that transfer function, identify the periodicity factor as α. Accordingly, one of ordinary skill in the art would have understood the scope of the claim with reasonable certainty. *See* [Ogunfunmi] Decl. ¶¶ 108-111.

Dkt. No. 70 at 30.

Defendants' response brief does not address this term. *See* Dkt. No. 69.

Plaintiff replies that "[Defendants] ha[ve] not briefed the term 'α is a periodicity factor.' Accordingly, [Defendants] ha[ve] failed to show indefiniteness of this term by clear and convincing evidence." Dkt. No. 71 at 9 n.2.

Because Defendants have not briefed this term, the Court concludes that this term is no longer in dispute. The Court therefore does not further address this term.

VI. CONCLUSION

The Court adopts the constructions set forth in this opinion for the disputed terms of the patents-in-suit. Also, as discussed above, the Court finds that various terms of the patents-in-suit lack corresponding structure and are therefore indefinite.

The parties are ordered to not refer to each other's claim construction positions in the presence of the jury. Likewise, in the presence of the jury, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the Court. The Court's reasoning in this order binds the testimony of any witnesses, but any reference to the claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

SIGNED this 24th day of October, 2016.

ROY S. PAYNE
UNITED STATES MAGISTRATE JUDGE