UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

CIVIL MINUTES - GENERAL

Case No.	CV 16-3714-GW (AGRx)	Date	January 18, 2019
Title	*The California Institute of Technology v. Broadcom Limited, et al.*		

Present: The Honorable	GEORGE H. WU, UNITED STATES DISTRICT JUDGE	
Javier Gonzalez	None Present	
Deputy Clerk	Court Reporter / Recorder	Tape No.

Attorneys Present for Plaintiffs:	Attorneys Present for Defendants:
None Present	None Present

PROCEEDINGS: **IN CHAMBERS - FINAL RULING ON DEFENDANTS' MOTION FOR SUMMARY JUDGMENT OF INVALIDITY UNDER 35 U.S.C. § 101 OF ASSERTED CLAIMS OF U.S. PATENT NO.7,916,781**

Attached hereto is the Court's Final Ruling on Defendants' Motion for Summary Judgment Under 35 U.S.C. § 101 of Asserted Claims of U.S. Patent No.7,916,781 – After Consideration of Parties' Supplemental Briefing and Evidence, Including Evidence Presented at November 15, 2018 Hearing and Argument Presented at December 6, 2018 Hearing. Defendant's Renewed § 101 Motion is DENIED.

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The California Institute of Technology v. Broadcom Limited et al.; Case No. 2:16-cv-03714-GW-(AGRx)
Final Ruling on Defendants' Motion for Summary Judgment of Invalidity Under 35 U.S.C. § 101 of Asserted Claims of U.S. Patent No.7,916,781 − after Consideration of Parties' Supplemental Briefing and Evidence, Including Evidence Presented at November 15, 2018 Hearing and Argument Presented at December 6, 2018 Hearing

I. Introduction

Plaintiff The California Institute of Technology currently alleges patent infringement against Defendants Broadcom Limited, Broadcom Corporation, Avago Technologies Limited, and Apple Inc.[1] *See* First Amended Complaint ("FAC"), Docket No. 36; *see also* Docket No. 1. Plaintiff asserts that Defendants infringe fifteen claims from three of its patents: (1) U.S. Patent No. 7,116,710 ("the '710 Patent"); (2) U.S. Patent No. 7,421,032 ("the '032 Patent"); and (3) U.S. Patent No. 7,916,781 ("the '781 Patent") (collectively, the "Asserted Patents").[2] *See* Docket No. 409 (Plaintiff's Amended Notice of Withdrawal of Certain Asserted Claims of Asserted Patents).

Defendants have moved for summary judgment of invalidity under 35 U.S.C. § 101 with respect to the asserted claims of the '781 Patent. *See generally* Docket No. 544; *see also* Docket No. 596 (Plaintiff's Opposition), Docket No. 604 (Defendants' Reply), Docket No. 604-1 (Defendants' Response to Caltech's Statement of Genuine Disputes). A hearing was held in August 2018 on the motion[3] and the parties were ordered to submit supplemental briefing addressing the Court's questions related to the proper scope of the relevant claims. The parties filed opening supplemental briefs and evidence on October 4, 2018. *See* Docket No. 733 (Plaintiff's Sealed Opening Supplemental Brief); Docket No. 714 (Defendants' Opening Supplemental Brief). The parties filed responsive supplemental briefs on October 18, 2018. Docket No. 742 (Plaintiff's Responsive Supplemental Brief); Docket No. 741 (Defendants'

[1] Cypress Semiconductor Corporation was also previously named as a defendant in this case, but the parties filed a Joint Stipulation for Dismissal of all claims between them on September 7, 2018. Docket No. 665.

[2] The fifteen remaining claims in this case are: Claims 20, 22, and 23 of the '710 Patent; Claims 3, 11, 13, 17, and 18 of the '032 Patent; and Claims 5, 6, 9, 10, 13, 19, and 22 of the '781 Patent. Docket No. 409. Of those claims, eleven were selected as representative claims for purposes of adjudication in this lawsuit: Claims 20, 22, and 23 of the '710 Patent; Claims 3, 11, 17, and 18 of the '032 Patent; and Claims 6, 9, 13, and 22 of the '781 Patent. *See id.*; *see also* Docket No. 487, 488. On October 1, 2018, Plaintiff filed a Notice of Withdrawal of Claim 6 of the '781 Patent. Docket No. 705. However, Plaintiff's notice is vague as to whether it solely seeks to withdraw Claim 6 of the '781 Patent as one of the eleven claims selected for purposes of adjudication or whether it seeks to withdraw Claim 6 from the lawsuit entirely.

[3] At the August 30, 2018 hearing, the Court provided the parties with a tentative ruling wherein it indicated that it would deny the motion because of "concerns" it expressed therein. *See* Docket No. 660.

Responsive Supplemental Brief). Another hearing was held on the motion[4] in November 2018, where the parties submitted argument as well as expert testimony. Additional supplemental briefs were filed at the Court's direction. Docket Nos. 809; 812. Plaintiff also filed a Notice of Supplemental Authority identifying the Federal Circuit's recent decision in *Ancora Techs., Inc. v. HTC Am., Inc.*, No. 2018-1404, 2018 WL 6005021 (Fed. Cir. Nov. 16, 2018). Docket No. 811; *see also* Docket No. 819 (Defendants' Response to Plaintiff's Notice of Supplemental Authority).

On December 6, 2018, after a hearing on other pending motions, the parties were also asked to respond to some further thoughts raised by the Court regarding the Motion. Docket No. 828 at ECF1, ECF22-25; *see also* Docket No. 828 (Hearing Transcript for December 6, 2018 ("Dec. Hearing Tr.")).

For the reasons stated in this Order, Defendants' Motion is **DENIED**.

II. Procedural History

This case was filed on May 26, 2016. *See* Docket No. 1. In February 2017, Defendants filed a summary judgment motion where they similarly argued that the asserted claims of the '781 Patent were invalid under 35 U.S.C. § 101. Docket No. 108. A hearing was held on April 20, 2017, and the Court circulated a tentative ruling denying the motion. Docket No. 171, 176. At the hearing, the Court concluded that it would be appropriate to proceed to a technology tutorial and claim construction hearing regarding all of the asserted patents before issuing a final ruling on the § 101 motion. Docket No. 176 at 53:19-54:13. Claim construction proceedings were completed in July 2017. Docket No. 213. In the final claim construction order, the Court considered *inter alia* the parties' disputes regarding three terms from the '781 Patent: "codeword," "at least two of the information bits appear in three subsets," and "information bits." *Id.* at 25-31. The Court determined that no construction was necessary for any of these terms. *Id.* Later that month, the parties submitted a joint report that proposed a schedule setting new dates. Docket No. 217. The report did not otherwise reference the § 101 motion or re-raise the dispute. In June 2018, the Court sought the parties' positions regarding whether they continued to dispute the validity of the asserted claims of the '781 Patent under § 101. Docket No. 525; *see also* Docket No. 531. Defendants subsequently filed their current § 101 Motion. Docket No. 544.

[4] At the November 15, 2018 hearing, the Court provided the parties with another tentative ruling wherein it indicated that it would deny the motion on the merits and find the challenged claims patent eligible. Docket No. 784.

III. Technical Background

The technology disclosed in the Asserted Patents has been summarized many times before, both by the courts and the Patent Trial and Appeal Board. Although the Court provides a summary of the relevant technical background related to the '781 Patent in this Order, additional information may be found, for example, in this Court's April 2017 tentative order denying Defendants' previous § 101 Motion[5] (Docket No. 171), as well as in Judge Pfaelzer's Order denying a § 101 motion brought against the Asserted Patents by defendants in an earlier case. *California Inst. of Tech. v. Hughes Commc'ns Inc.*, 59 F. Supp. 3d 974, 977-78 (C.D. Cal. 2014) (hereinafter, "*Hughes*")[6]; *see also Hughes Network Sys., LLC v. Cal. Institute of Tech.*, IPR2015-00059, 2016 WL 3598282, at *1 (Patent Tr. & App. Bd. Apr. 21, 2016)

The Asserted Patents trace their priority to U.S. Provisional Application Serial No. 60/205,095, filed May 18, 2000, and U.S. Application Serial No. 09/922,852, filed August 18, 2000 (now U.S. Patent No. 7,089,477). *See* '710 Patent at 1:8-10; '032 Patent at 1:8-13; '781 Patent at 1:8-15. They share a common specification.

As the Court explained in its previous tentative order on this issue, the Institute of Electrical and Electronics Engineers ("IEEE") developed Wi-Fi, the industry standard for wireless communications over local area networks. *See* Docket No. 36 (FAC) ¶ 30. Wi-Fi usage is widespread in modern electronic products such as smartphones and laptops. *Id*. The IEEE Wi-Fi standards are set forth in IEEE 802.11. *See id.* ¶ 31. Some of the key improvements to the Wi-Fi standard – specifically: (1) the 802.11n version, which includes a high throughput mode that is implemented using a specific type of Low-Density Parity Check ("LDPC"), and (2) the 802.11ac version, which includes a very high throughput mode – include irregular repeat and accumulate

[5] Although the Court references the tentative order for purposes of providing further technical background information related to the '781 Patent, the ultimate determinations in that tentative order have not been adopted as the final ruling of the Court and are not adopted as the final ruling of the Court by means of this reference.

[6] Although the Court references the *Hughes* Order for purposes of providing further technical background information related to the '781 Patent and based on some of its other analysis of § 101 issues, the ultimate determinations in the *Hughes* Order (specifically, that the claims are abstract at *Alice* Step 1, yet patent-eligible based on analysis at *Alice* Step 2) have not been adopted as the final ruling of the Court and are not adopted as the final ruling of the Court by means of these references. The *Hughes* Order was issued before certain other Federal Circuit decisions that refined the Step 1/2 analysis and clarified that claims directed to technological improvements are not abstract at *Alice* Step 1. *See, e.g.*, *McRO, Inc. v. Bandai Namco Games Am. Inc*., 837 F.3d 1299, 1314 (Fed. Cir. 2016) ("We therefore look to whether the claims in these patents focus on a specific means or method that improves the relevant technology or are instead directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery.").

operations, and therefore implemented Plaintiff's patented technology.[7] *See id.* ¶¶ 32-33.

More particularly, the specification purports to disclose solutions for reliable yet efficient data signal transmission over a digital communication channel, specifically by disclosing improved ways to protect data from loss due to transmission errors. *See generally* '781 Patent at 1:29-2:16. The Asserted Patents describe ensuring reliability by repeating/manipulating "information bits," *i.e.* binary digits "0" and "1," to generate error correction codes that are then transmitted along with the original information bits. *See, e.g.*, *id.* at 2:41-46. Repeating every information bit would significantly insulate transmitted data from errors, but it would also significantly increase the size of data, slowing data transmission speeds. *Id.* at 1:29-43; *see also Hughes*, 59 F. Supp. 3d at 978 ("Although greater repetition of every bit would allow for better error correction, it would also force the transmitter to send more bits, decreasing the coding rate and increasing data transfer time."). The Asserted Patents attempt to strike a balance by describing methods of generating "irregular repeat and accumulate" ("IRA") error correction codes. *See generally id.*; *see also id.* at 2:41-46; 3:34-37; *id.*, Abstract. Rather than duplicate every information bit, according to the Asserted Patents, the information bits may first be split into smaller data blocks where information bits are repeated in a particular, irregular way. *Id.* at 1:63-2:3. The information bits may then be further manipulated (such as by scrambling) before they are used to create other bits, including "parity bits" and "codewords." *Id.* "Parity bits" are bits created by summing or otherwise evaluating the original information bits (and potentially other parity bits) in a certain way to create a bit that reflects the value of the selection of original information bits. *Id.* at 4:4-15. "Parity bits" may be combined together to create a "codeword." *Id.* at 4:24-45. "Codewords" can alternatively include a combination of both parity bits and additional information bits. These codewords/parity bits are eventually used to double check whether errors have occurred in the original information bit sequence during data encoding/transmission/decoding (and potentially correct those errors).

Judge Pfaelzer has described these concepts in a similar way, explaining that after the original information bits are irregularly repeated, in one example, they:

> may then be randomly permuted and combined to form intermediate bits, which are accumulated to form parity bits. Parity bits reflect the values of a

[7] As set out in the '781 Patent, "[t]he Government has a paid-up license in this invention and the right in limited circumstances to require the patent owner to license others on reasonable terms as provided for by the terms of Grant No. CCR-9804793 awarded by the National Science Foundation." '781 Patent at 1:19-25.

> selection of original information bits. These parity bits are transmitted along with the original information bits. The receiver ensures that the received original information bits were not corrupted during transmission. It can do this by modulo-2 ("mod-2") adding the original information bits and parity bits. The receiver knows whether this sum is supposed to be odd or even. If the sum is supposed to be odd but is instead even, the receiver will know that an error occurred and can perhaps correct the error using other information it has received.

Hughes, 59 F. Supp. 3d at 978. According to the asserted patents, IRA codes aim to both minimize errors and maintain a transmission rate close to the theoretical limit of the amount of data that a channel can carry. *See, e.g.*, '781 Patent at 2:54-64.

As explained in the Court's April 2017 tentative order, the specification section of the '781 Patent specifically describes two embodiments for an IRA coding system:

> The specification discloses an embodiment of the IRA coding system that includes an outer coder 202, an interleaver 204, and an inner coder 206. *See* '781 Patent at Fig. 2.[2]
>
> [2] [Footnote in original] The specification also appears to indicate that the outer coder may encompass the interleaver, the component that scrambles bits. *Compare id.* at 2:3-5 ("The coding system includes an outer coder, which repeats and *scrambles* bits in the data block. The data block is apportioned into two or more sub-blocks, and bits in different sub-blocks are repeated a different number of times according to a selected degree profile. The outer coder may include a repeater with a variable rate and an *interleaver*.") (emphases added); *with id.* at 2:40-41 ("The coder 200 may include an outer coder 202, an interleaver 204, and inner coder 206."), 2:56-58 ("In an embodiment, the outer coder 202 is a repeater that repeats the k bits in a block a number of times q to produce a block with n bits, where n:qk.").

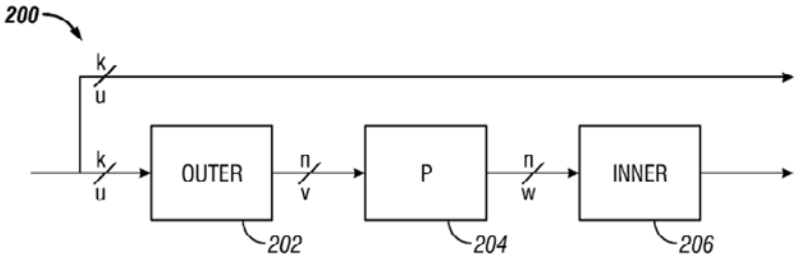

FIG. 2

> In that embodiment, reproduced above, the outer coder 202 receives an un-encoded data block containing a fixed number of original information bits, which it then repeats, acting as a repeater. *See id.* at 1:65-67, 2:50-51. The outer coder has an irregular output, which means that different bits in the data block may be repeated a different number of times. *See id.* at 2:58-60; *see also id.* at 2:60-64 ("For example, a fraction of the bits in the block may be repeated two times, a fraction of bits may be repeated three times, and the

remainder of bits may be repeated four times. These fractions define a degree sequence, or degree profile, of the code."). The interleaver 204 then scrambles (or rearranges) the bits. *See id.* at 3:29-33. Finally, the inner coder 206 recursively performs exclusive-OR or modulo-two logical operations on the bits it receives from the interleaver, generating the "accumulate code." *Id.* at 3:3-24; *see also* at 2:7-10 ("The repeated and scrambled bits are input to an inner coder that has a rate substantially close to one. The inner coder may include one or more accumulators that perform recursive modulo two addition operations on the input bit stream."). It is the "serial concatenation" of the interleaved irregular repeat code and the accumulate code that produces the IRA code, which is transmitted over the communication channel along with the original information bits. *See id.* at 3:34-36; *see also id.* at 2:11-13 ("The encoded data output from the inner coder may be transmitted on a channel and decoded in linear time at a destination using iterative decoding techniques.").

The specification also discloses an alternate embodiment, reproduced below, where the outer coder may be a low-density generator matrix ("LDGM") coder. *See id.* at Fig. 4. The IRA code in that case is produced by a serial concatenation of the LDGM code and the accumulator code, and the interleaver may be excluded as unnecessary. *See id.* at 3:65-4:1-3.

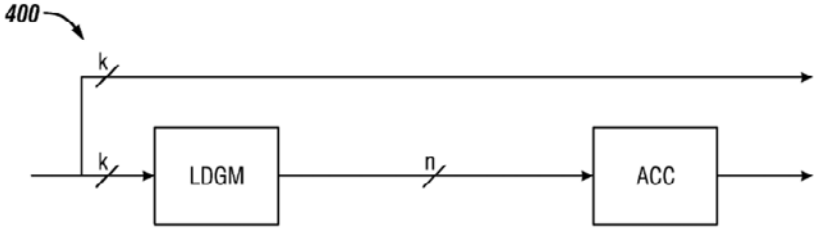

FIG. 4

See Docket No. 171 at 3-4.

IV. Legal Standards

A. Summary Judgment

Under Federal Rule of Civil Procedure ("Rule") 56, a party may move for summary judgment, identifying each claim or defense – or the part of each claim or defense – on which summary judgment is sought, and the court shall grant it when the pleadings, the discovery and disclosure materials on file, and any affidavits show that "there is no genuine issue as to any material fact and that the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a); *see also Miranda v. City of Cornelius*, 429 F.3d 858, 860 n.1 (9th Cir. 2005). As to materiality, "[o]nly disputes over facts that might affect the outcome of the suit under the governing law will properly preclude the entry of summary judgment." *Anderson v. Liberty Lobby, Inc.*, 477 U.S.

242, 248 (1986). A dispute as to a material fact is "genuine" if there is sufficient evidence for a reasonable jury to return a verdict for the nonmoving party. *Id*.

To satisfy its burden at summary judgment, a moving party with the burden of persuasion must establish "beyond controversy every essential element of its [claim or defense]." *S. Cal. Gas Co. v. City of Santa Ana*, 336 F.3d 885, 888 (9th Cir. 2003); O'Connell & Stevenson, *Rutter Group Prac. Guide: Fed. Civ. Proc. Before Trial* ("*Federal Practice Guide*") § 14:126 (2016). By contrast, a moving party without the burden of persuasion "must either produce evidence negating an essential element of the nonmoving party's claim or defense or show that the nonmoving party does not have enough evidence of an essential element to carry its ultimate burden of persuasion at trial." *Nissan Fire & Marine Ins. Co., Ltd. v. Fritz Cos.*, Inc., 210 F.3d 1099, 1102 (9th Cir. 2000); *see also Devereaux v. Abbey,* 263 F.3d 1070, 1076 (9th Cir. 2001) (en banc) ("When the nonmoving party has the burden of proof at trial, the moving party need only point out 'that there is an absence of evidence to support the nonmoving party's case.'") (quoting *Celotex Corp. v. Catrett,* 477 U.S. 317, 325 (1986), and citing *Fairbank v. Wunderman Cato Johnson,* 212 F.3d 528, 532 (9th Cir. 2000) (holding that the *Celotex* "showing" can be made by "pointing out through argument . . . the absence of evidence to support plaintiff's claim")).

> If the party moving for summary judgment meets its initial burden of identifying for the court the portions of the materials on file that it believes demonstrate the absence of any genuine issue of material fact, the nonmoving party may not rely on the mere allegations in the pleadings in order to preclude summary judgment[, but instead] must set forth, by affidavit or as otherwise provided in Rule 56, specific facts showing that there is a genuine issue for trial.

T.W. Elec. Serv., Inc., v. Pac. Elec. Contractors Ass'n, 809 F.2d 626, 630 (9th Cir. 1987) (internal citations and quotation marks omitted) (citing, among other cases, *Celotex*, 477 U.S. at 323). "A non-movant's bald assertions or a mere scintilla of evidence in his favor are both insufficient to withstand summary judgment." *See FTC v. Stefanchik*, 559 F.3d 924, 929 (9th Cir. 2009). In addition, the evidence presented by the parties must be admissible. *See* Fed. R. Civ. P. 56(e). Conclusory, speculative testimony in affidavits and moving papers is insufficient to raise genuine issues of fact and defeat summary judgment. *See Thornhill Publ'g Co., Inc. v. GTE Corp.*, 594 F.2d 730, 738 (9th Cir. 1979). Relatedly, "[a]ny objections to declarations or other evidence must be made at or (preferably) before the hearing, and should be ruled upon by the court before ruling on the motion itself." *Federal Practice Guide* § 14:333 (citing *Hollingsworth Solderless Terminal*

Co. v. Turley, 622 F.2d 1324, 1335 n.9 (9th Cir. 1980); *Sigler v. American Honda Motor Co.*, 532 F3d 469, 480 (6th Cir. 2008)). In judging evidence at the summary judgment stage, however, courts do not make credibility determinations or weigh conflicting evidence at the summary judgment stage, and must view all evidence and draw all inferences in the light most favorable to the non-moving party. *See T.W. Elec.*, 809 F.2d at 630-31 (citing *Matsushita Elec. Indus. Co., Ltd. v. Zenith Radio Corp.*, 475 U.S. 574 (1986)); *Anderson*, 477 U.S. at 255 ("The evidence of the non-movant is to be believed and all justifiable inferences are to be drawn in [the non-movant's] favor.").

"If the court does not grant all the relief requested by the motion, it may enter an order stating any material fact – including an item of damages or other relief – that is not genuinely in dispute and treating the fact as established in the case." Fed. R. Civ. P. 56(g); *see also Federal Practice Guide* § 14:352 ("A partial summary judgment may be granted on motion of either party for adjudication of particular claims or defenses.") (citing *id.* § 14:33).

B. Patent Eligibility under 35 U.S.C. § 101

An invention or a discovery is patentable if it is a "new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof." 35 U.S.C. § 101. "In choosing such expansive terms . . . Congress plainly contemplated that the patent laws would be given wide scope." *Diamond v. Chakrabarty*, 447 U.S. 303, 308 (1980). Still, the Supreme Court has identified exceptions to this wide scope to "distinguish between patents that claim the building blocks of human ingenuity and those that integrate the building blocks into something more." *Alice Corp. Pty. v. CLS Bank Int'l*, 573 U.S. 208, 217 (2014) (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.,* 566 U.S. 66, 89 (2012)) (internal quotations omitted). These exceptions to patent protection are "laws of nature, natural phenomena, and abstract ideas." *Diamond v. Diehr*, 450 U.S. 175, 185 (1981). While the boundaries of the judicial exceptions remain subject to further development, the Supreme Court has clearly delineated the policy underlying those exceptions: avoiding patents that "too broadly preempt the use of a natural law [or abstract idea]." *Mayo*, 566 U.S. at 72. Thus, patent law should "not inhibit further discovery by improperly tying up the future use of laws of nature [or abstract ideas]." *Id*. at 85.

In *Mayo*, the Supreme Court "set forth a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts." *Alice*, 573 U.S. at 217. The first step is to ask "whether the claims

at issue are directed to one of those patent-ineligible concepts." *Id.* at 218. If not, the claims fall within the scope of § 101 and are patent-eligible. If the claims are directed to one of the exceptions, the second step is to search for an "inventive concept" that is "sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the natural law [or abstract idea] itself." *Mayo*, 566 U.S. at 72-73. In doing so, a court must "consider the elements of each claim both individually and 'as an ordered combination' to determine whether the additional elements provide for an "inventive concept" that 'transform[s] the nature of the claim' into a patent-eligible application." *Alice*, 573 U.S. at 217 (quoting *Mayo*, 566 U.S. at 78-79). If, in considering the claim elements individually and as an ordered combination, they merely recite well-understood, routine, and conventional steps, they will not constitute an inventive concept for patent eligibility purposes. *Aatrix Software, Inc. v. Green Shades Software, Inc.*, 882 F.3d 1121, 1128 (Fed. Cir. 2018).

"Like indefiniteness, enablement, or obviousness, whether a claim recites patent eligible subject matter is a question of law which may contain underlying facts." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1368-69 (Fed. Cir. 2018). The Federal Circuit has held, for example, that fact questions may arise in the context of step two of the patent eligibility inquiry. *Aatrix*, 882 F.3d at 1128 ("[w]hether the claim elements or the claimed combination are well-understood, routine, conventional is a question of fact."). To the extent patent eligibility questions do turn on a factual issue, an accused infringer must prove invalidity by clear and convincing evidence. *Microsoft Corp. v. i4i Ltd. P'ship*, 564 U.S. 91, 112 (2011).

V. Analysis

A. Parties' Disputes Regarding the Scope of the Relevant Claims

Before resolving Defendants' § 101 arguments, the parties' various disputes regarding the scope of the claims are addressed. *See Bancorp Serv., L.L.C. v. Sun Life Assur. Co. of Canada*, 687 F.3d 1266, 1273-74 (Fed Cir. 2012) ("the determination of patent eligibility requires a full understanding of the basic character of the claimed subject matter."). Determining the scope of the claims is an interpretive issue "exclusively within the province of the court." *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996). It is "a question of law in the way that we treat document construction as a question of law," with subsidiary fact-finding reviewed for clear error pursuant to Fed. R. Civ. P. 52(a)(6). *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 135 S.Ct. 831, 837-40 (2015) ("*Teva I*"). Courts may rely on extrinsic evidence, including expert testimony, to

resolve factual disputes. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1318 (Fed. Cir. 2005) ("[E]xtrinsic evidence in the form of expert testimony can be useful to a court for a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field."). But while "[e]xperts may explain terms of art and the state of the art at any given time, . . . they cannot be used to prove the legal construction of a writing." *Teva Pharms. USA, Inc v. Sandoz, Inc.*, 789 F.3d 1335, 1339 (Fed. Cir. 2015) (*Teva II*") (citing *Teva I*, 135 S.Ct. at 841).

Not all of the claim scope arguments discussed in the following subsections ultimately have bearing on the *outcome* of the § 101 analysis. However, they have been raised by the parties as potentially relevant and thus will be considered as provided herein.

i. Meaning of the "wherein the information bits appear in a variable number of subsets" Clause and Related Clauses in the Claims for Adjudication

The three claims of the '781 Patent identified for adjudication in this case each include a "variable number of subsets" requirement. The parties both dispute the meaning of this requirement and its impact on § 101 patentability. Specifically, Plaintiff suggests that this limitation supports the conclusion that the claims are limited to the field of IRA correction/detection codes and thus patent eligibility. Defendants argue that this limitation is not specific to IRA code and does not save the claims under § 101. Claim 22 of the '781 Patent, which depends from Claim 21 and thus incorporates all the limitations of Claim 21, together with Claim 21 recites:

> 21. A method comprising:
> ***receiving a collection of information bits***;
> mod-2 or exclusive-OR adding a ***first subset of information bits in the collection*** to yield a first parity bit;
> mod-2 or exclusive-OR adding a ***second subset of information bits in the collection and*** the first parity bit to yield a second parity bit; and
> outputting a codeword that includes the first parity bit and the second parity bit.
>
> 22. The method of claim 21, wherein:
> the method further comprises mod-2 or exclusive-OR adding ***additional subsets of information bits in the collection and*** parity bits to yield additional parity bits; and
> ***the information bits in the collection appear in a variable number of***

subsets.

Claim 13 of the ’781 Patent recites:

> 13. A method of encoding a signal, comprising:
> receiving a block of data in the signal to be encoded, ***the block of data including information bits***; and
> performing an encoding operation using the information bits as an input, the encoding operation including ***an accumulation of*** mod-2 or exclusive-OR ***sums of bits in subsets of the information bits***, the encoding operation generating at least a portion of a codeword,
> ***wherein the information bits appear in a variable number of subsets***.

Claim 9 of the ’781 Patent depends from numerous claims of the ’781 Patent. They collectively recite:

> 1. A method of encoding a signal, comprising:
> receiving a block of data in the signal to be encoded, ***the block of data including information bits***;
> performing a first encoding operation on at least some of the information bits, the first encoding operation being a linear transform operation that generates L transformed bits; and
> performing a second encoding operation using the L transformed bits as an input, the second encoding operation including an accumulation operation in which the L transformed bits generated by the first encoding operation are accumulated, said second encoding operation producing at least a portion of a codeword, wherein L is two or more.
>
> 2. The method of claim 1, further comprising:
> outputting the codeword, wherein the codeword comprises parity bits.
>
> 5. The method of claim 2, wherein performing the first encoding operation comprises transforming the at least some of the information bits via a low density generator matrix transformation.
>
> 6. The method of claim 5, ***wherein generating each of the L transformed bits comprises mod-2 or exclusive-OR summing of bits in a subset of the information bits***.
>
> 9. The method of claim 6, ***wherein the information bits appear in a variable number of subsets***.

Notably, Plaintiff agrees with Defendants’ characterization of the “variable number of subsets” limitation as meaning “some information bits are used in more mod-2 or exclusive-OR operations (*i.e.*, more ‘subsets’) than others.” Docket No. 714 at 8; *see* Docket No. 742 at 10

("what Defendants describe ***is*** irregular repetition"). Plaintiff's concern rises out of the example Defendants gave at the August 2018 hearing and in their supplemental briefs where Defendants purport to apply this understanding in practice. Specifically, Defendants refer back to an example the Court had used in its April 2017 tentative order when it was discussing the requirements of Claim 21 (which does not include the "variable number of subsets" limitation). *See* Docket No. 171 at 15-16. In the April 2017 tentative order, the Court had provided an example of a mod-2 summation of information bits:

> Applying the steps or limitations claimed in method claim 21 to the information sequence "0, 1, 1, 0, 1" – that is, where the input block [x_1, x_2, x_3, x_4, x_5] is [0, 1, 1, 0, 1] – in light of the relationship disclosed above yields the following output block (or codeword of parity bits):
>
> $y_1 = x_1 = 0$
> $y_2 = x_1 \oplus x_2 = 0 \oplus 1 = 1$
> $y_3 = x_1 \oplus x_2 \oplus x_3 = 1$ (output of the previous step) $\oplus$ 1 = 0
> $y_4 = x_1 \oplus x_2 \oplus x_3 \oplus x_4 = 0 \oplus 0 = 0$
> $y_5 = x_1 \oplus x_2 \oplus x_3 \oplus x_4 \oplus x_5 = 0 \oplus 1 = 1$
>
> The codeword of parity bits [y_1, y_2, y_3, y_4, y_5] generated, therefore, is [0, 1, 0, 0, 1]. It is "[t]he serial concatenation of the interleaved irregular repeat code" generated by the outer coder and this "accumulate code" of [0, 1, 0, 0, 1] "that produces an irregular repeat and accumulate (IRA) code," the thrust of the claimed invention. *See id.* at 3:34-36[.]

Docket No. 171 at 16. Defendants effectively argue that this mod-2 summing step of Claim 21 itself shows information bits appearing in a variable number of subsets:

'781 Claim 22	Illustration Of "A Variable Number Of Subsets"
[6] the information bits in the collection appear in a variable number of subsets.	$Y_1 = x_1$ $Y_2 = x_1 + x_2 = Y_1 + x_2$ $Y_3 = x_1 + x_2 + x_3 = Y_2 + x_3$ $Y_4 = x_1 + x_2 + x_3 + x_4 = Y_3 + x_4$ $Y_5 = x_1 + x_2 + x_3 + x_4 + x_5 = Y_4 + x_5$ (*Id.*)

Docket No. 714 at 10. According to Defendants, because x_2 appears in four summations and x_3 appears in 3 summations, these information bits appear in a variable number of subsets. The plain language of Claim 21, however, explains that the relevant "subsets" in the "variable number of subsets" limitation relate to subsets of the original collection of data, not to information bits that

have already been used to create a parity bit. Claim 21 states, "mod-2 or exclusive-OR adding a ***second subset of information bits in the collection <u>and</u> the first parity bit*** to yield a second parity bit." As Plaintiff explains, "Defendants' example . . . incorrectly defines each 'subset' to include ***both*** the additional information bits added to the previous parity bit, ***and*** all the information bits that were previously used to generate the prior parity bits . . . [instead,] exactly one new information bit is used to generate each successive parity bit, and that information bit is different every time." Docket No. 742 at 11. Using Defendants' example, Plaintiff identifies the actual subsets of information bits, consistent with the claim language, in green boxes:

[6] the information bits in the collection appear in a variable number of subsets.	$Y_1 = x_1$ $Y_2 = x_1 + x_2 = Y_1 + x_2$ $Y_3 = x_1 + x_2 + x_3 = Y_2 + x_3$ $Y_4 = x_1 + x_2 + x_3 + x_4 = Y_3 + x_4$ $Y_5 = x_1 + x_2 + x_3 + x_4 + x_5 = Y_4 + x_5$ (*Id.*)

Id. From this perspective, Plaintiff shows that Defendants' example does not meet the "variable number of subsets" requirement of Claim 22 – each new subset added to the previous parity bit includes only one new information bit used exactly once.[8] *See also* Shoemake Declaration in Support of Plaintiff's Opposition to Defendants' Renewed Summary Judgment Motion ("Shoemake Decl."), Docket No. 596-9, ¶ 102.

Defendants' disputed example focuses on Claim 22. Claims 9 and 13 appear to similarly identify "information bits" as relating back to the original block of data. Both of these claims

[8] Notably, in their opening memorandum in support of their July 2018 § 101 motion, Defendants provided a slightly altered example to support § 101 arguments. *See* Docket No. 544-1 at 10-11. In that slightly altered example, they made the following modification to support their position:

[6] the information bits in the collection appear in a variable number of subsets.	$Y_1 = x_1$ $Y_2 = x_1 + x_2 = Y_1 + x_2$ $Y_3 = x_1 + x_2 + x_3 = Y_2 + x_3$ $Y_4 = x_1 + x_2 + x_3 + x_4 = Y_3 + x_4$ $Y_5 = x_1 + x_2 + x_3 + x_4 + \sout{x_5}\ x_4 = Y_4 + \sout{x_5}\ x_4$ (*Id.*)

Id. at 10; *see also* Declaration of Brendan Frey in Support of Defendants' § 101 Motion ("Frey Decl."), Docket No. 544-3 at 14. In other words, at the time of their original motion briefing, Defendants suggested through their example that they agreed with Plaintiff's position regarding the "variable number of subsets" limitation and its meaning. *See also* Shoemake Decl., Docket No. 596-9, ¶ 102.

separately refer to, for instance, "generating at least a portion of a codeword" through encoding operations that involve "accumulation" of "mod-2 or exclusive-OR summing of bits in subsets of the information bits." In their responsive supplemental brief, Defendants provide another example of how they believe the "variable number of subsets" requirement in Claim 13 is met. Defendants state, "if the input bits are i_1, i_2, i_3, then we can group bits into two subsets: (1) subset 1: i_1, i_2 and (2) subset 2: i_2, i_3. These bits appear in variable numbers of subsets: i_2 appears in two subsets whereas i_1 and i_3 each only appear in one subset." Docket No. 741 at 15. Defendants' example appears to be consistent with Plaintiff's interpretation of the "variable number of subsets" claim phrase: under Plaintiff's logic, it would seem that this example focuses on categorizing information bits, not previous parity bits, and there is "irregular" repetition of information bits because i_2 appears in more subsets than i_1 and i_3.

In the November 2018 tentative order, the Court questioned why, even keeping these examples in mind, they showed that the "variable number of subsets" limitation necessarily required ***irregular*** repetition of subsets. At the November 2018 hearing, Plaintiff directed attention to the parties' First Amended Joint Claim Construction Statement, filed in March 2017, where the parties had agreed to a construction for the terms "irregular"/"irregularity" (appearing in other claims of the Asserted Patents not at issue here) as "a different number of times." Docket No. 125 at 1. With this understanding of the meaning of the term "irregular," the Court agrees with Plaintiff that the phrase "variable number of subsets" creates a requirement in the relevant claims for irregular repetition of information bits.[9]

ii. Parties Apparently Agree the Claims Do Not Require Scrambled Information Bits as an Input; Patent Does Not Require Scrambling to Create IRA Code

In their briefing, Defendants argue that the relevant claims do not require scrambled information bits as an input. In its Responsive Supplemental Brief, Plaintiff states, "even if the

[9] As Plaintiff observes, language in decisions from the Patent Office suggests that the Patent Trial and Appeal Board ("PTAB") also understood these claims as requiring irregular repetition. In one of the *inter partes* review decisions, the PTAB stated, "Claim 13 and its dependent claims are directed to encoding methods that produce irregular repeat accumulate codes" and alternatively observed that Claim 1 "does not require irregularity." Docket No. 742-10 at 7 (Preliminary Decision (declining to institute review of Claim 13), April 27, 2015, IPR2015-00059). Defendants dismiss this statement as "dicta" (*see* Docket No. 741 at 12), but do not dispute that in another decision, the PTAB found Claims 13-15, 18, and 22 of the '781 Patent were not invalid because it would not have been obvious to combine the teaching of the benefits of "irregular" code in one reference with the method of another reference that did not disclose irregular repetition of information bits. *See also* Docket No. 550-1 (Final Written Decision, June 29, 2018, IPR2017-00297).

IRA encoders disclosed in the specification of the '781 patent include a scrambling operation, that has no bearing on the patent eligibility of claims 9, 13, and 22. It is black letter law that a patentee may draft claims broader than the particular embodiments disclosed in a patent's specification." Docket No. 742 at 12. In other words, while Plaintiff argues (and the Court agrees) that the input data for the claimed method steps includes variably repeated bits, Plaintiff apparently agrees with Defendants that the relevant claims do not require scrambled information bits as an input. Defendants argue in their supplemental briefs that the lack of a scrambling requirement supports the conclusion that the claims are not patent eligible under § 101 because it shows that the claims are not limited to error correction/detection encoding in general and IRA codes in particular.

Defendants' arguments in their supplemental briefs suggest that "code" is not IRA code unless it includes both irregularly repeated ***and*** scrambled information bits as an input. Defendants' expert states, without further explanation, that "[b]ecause the claimed method does not require irregular repetition and scrambling of bits before an accumulation operation, a person of ordinary skill in the art would not understand the output of the method to be an IRA code or a precursor to an IRA code." Declaration of Dr. Brendan Frey in Further Support of Defendants' Motion for Summary Judgment ("Supp. Frey Decl."), Docket No. 738, ¶ 186. As Plaintiff observes, however, Figure 4 of the '781 Patent relates to an embodiment that uses a "low-density generator matrix (LDGM) coder" that "performs an irregular repeat" of the bits of the input data block. '781 Patent, 3:63-64; *see also* Docket No. 714 at 3 (Defendants' supplemental brief, acknowledging the Figure 4 embodiment). In this embodiment, "[t]he interleaver **204** in FIG. 2 may be excluded due to the randomness already present in the structure of the LDGM code." '781 Patent at 4:1-3; *see id.* at 3:30-31 (explaining that scrambling may be performed by the interleaver). In other words, the '781 Patent describes embodiments for methods of creating IRA code that do not, on their face, require scrambling. *See also* Docket No. 714 at 3-4 (Defendants' supplemental brief, referring to Figure 4 but failing to explain how they believe Figure 4 either: (1) requires scrambling data or (2) fails to teach an alternative method of creating IRA code compared to Figure 2). Neither the parties nor their experts further addressed the dispute as to whether IRA code requires scrambling at the November 2018 hearing, and based on the specification's disclosure, the argument that scrambling is required is not persuasive.

iii. Plaintiff Does Not Dispute that Claimed Methods Require Encoding, Not Necessarily Transmission, of Data

In its Supplemental Brief, Plaintiff does not appear to dispute that the claims are related to

data encoding, not necessarily to data transmission. *See* Docket No. 733. Defendants have previously argued that the fact that the claims do not require transmission supports the conclusion that the claims are patent-ineligible on the basis that the claimed methods could be applied in contexts other than error correction/detection encoding.

The conclusion that the claims do not require data transmission is consistent with the claim language, which does not refer to data transmission. It is also consistent with the Court's Markman Order, where the Court rejected Defendants' argument that the term "codeword" in certain claims of the '781 Patent required bits transmitted on a channel. Docket No. 213 at 25 ("The problem with Defendants' proposed construction is that it mandates that the bits be transmitted on a channel subsequent to the encoding operation, a construction belied by the express disclosure in the claim language and specification, which imposes no such constraint.").[10]

iv. Other Claim Language Considered Collectively and in Context of Specification Supports that Claims Are Limited to Field of Error Correction/Detection Encoding

Defendants downplay language in the claims referring to "information bits," "codewords," "parity bits," "signal," "encoding," and "low density generator matrix transformation" to support their argument that the scope of the claims extend beyond error correction encoding. According to Defendants, these terms are not used solely in the context of error correction encoding, and thus the scope of the claims is not necessarily limited to error correction encoding. Defendants, however, target these terms in a piecemeal fashion. In other words, Defendants fail to argue that the use of these terms in the collective combinations found in the claims could relate to anything other than error correction codes and error detection codes.[11] For instance, Defendants' expert states that the term "irregularity" (a term not used in these claims) is used in contexts outside error correction/detection codes when, for instance, "young children learn about . . . irregular polygons." Supp. Frey Decl., Docket No. 738, ¶ 89. Such a characterization is particularly unhelpful where it is clear that irregular polygons are not also described to young children in terms of "information bits" and "parity bits." The same is true as far as the examples Frey raises in his rebuttal declaration

[10] Plaintiff's expert, Mitzenmacher, in acknowledging that the relevant claims do not require data transmission, has also presented the opinion that IRA codewords have other useful real-world applications besides those related to data transmission. Declaration of Dr. Michael Mitzenmacher in support of Plaintiff's First Supplemental § 101 Brief ("Mitzenmacher First Supp. Decl."), Docket No. 710-37, ¶ 56.

[11] The parties' dispute regarding error correction encoding versus error detection encoding is addressed in a later section, *supra*.

as to these technical terms. Rebuttal Declaration of Dr. Brendan Frey in Further Support of Defendants' Motion for Summary Judgment ("Rebuttal Frey Decl."), Docket No. 741-1, ¶¶ 67-83. Frey refers to references that supposedly use the terms in the relevant claims in fields other than error correction encoding. However, Frey picks and chooses terminology between the references and patent claims to make his point. Frey does not identify an article that, for instance, uses the phrases "signal," "encoding," "information bits," and "codeword" as in Claim 13 in a context outside of error correction/detection encoding.

At the November 2018 hearing, Defendants emphasized an article submitted in connection with the Rebuttal Frey Declaration as an example of a reference outside of the field of error correction encoding that uses the same nomenclature that appears in the claims in the '781 Patent. "An Optimal Class of Symmetric Key Generation Systems," Rolf Blom (1985), Docket No. 741-5 ("Blom article"). The Blom article relates to the field of data encryption. The Blom article describes using linear transformation operations to create a "codeword" for use with encrypted data. In one instance, the article uses the term "encoded." *See id.* at 2 ("If $d=GF(q)^k$ denotes a vector of k information symbols, they will be ***encoded*** into c=dG."). Defendants/Frey also suggest that the Blom article's use of the term "information symbols" is equivalent to the phrase "information bits" in the claims. *See* Rebuttal Frey Decl., Docket No. 741-1, ¶ 80. The fact that the Blom article uses the term "information symbols" rather than "information bits," however, is exactly the point: although there may be some overlapping terminology among different fields, even the Blom article still fails to use the same collection of phrases used in the claims of the '781 Patent.[12] *See also* Shoemake Decl., Docket No. 596-9, ¶ 156 ("I do not believe the claimed methods have any practical application outside the context of communications systems.").

At the hearing, Defendants raised a second point with the Blom article. Nomenclature aside, Defendants argued that if the relevant claims are found patent eligible under § 101, they could be relied on to prevent others from "us[ing] the math of the claims to do what Blom is talking about for encryption." Hearing Transcript for November 15, 2018 ("Nov. Hearing Tr."), 68:9-11.

[12] Defendants submit multiple references regarding only the term "parity bit" and its appearance in contexts outside of error correction/detection encoding. Rebuttal Frey Decl., Docket No. 741-1, ¶¶ 74-78. This appears to be in response to Plaintiff's unequivocal statement in one of its earlier briefs that "[t]he term 'parity bits' is not used in any other field." Docket No. 710 at 2 (emphasis omitted). Although Defendants apparently have proven Plaintiff wrong on this point, for the reasons stated in this Order, this is still insufficient to inevitably lead to Defendants' preferred conclusion regarding the scope of the claims.

As an initial matter, if this were true, the Court questions why Defendants did not rely on Blom as a prior art reference under 35 U.S.C. § 102 and/or § 103 to seek invalidation of the '781 Patent claims.[13] The Court also observes that after the significant written record that has developed in this case with Plaintiff consistently urging that the claims are limited to the field of error correction encoding, Plaintiff would likely face an uphill battle with attempts to assert these patents against technology existing outside of the field of error correction encoding. These issues aside, Defendants have not provided evidence that the steps required by the claims, including the "variable number of subsets" limitation would be practiced outside of the field of error correction encoding. Although Defendants state that "the math of the claims" could be used in other contexts, that statement does not reflect all of the limitations of the claims and thus is not the relevant inquiry.

The specification also supports the conclusion suggested by the wording of the claims that the claims are directed to error correction encoding. As explained in the background section of this Order, the specification discloses various embodiments for creating IRA code. Indeed, in documents both in and out of this lawsuit, the '781 Patent has been characterized as relating to error correction codes, and specifically to IRA codes. For instance, as Plaintiff notes, in Defendants' opening claim construction brief, they stated, "[t]he four asserted patents . . . are directed to a specific type of error correcting code for use in wireless communications." Docket No. 127 at 3. Moreover, in the PTAB's IPR determinations, it similarly considered and characterized the relevant claims as relating to IRA codes. *See supra* n.9. Particularly in combination with the "variable number of subsets" limitations in each of the relevant claims and the other nomenclature used in the relevant claims, the specification supports that the relevant scope for the claims is to some form of error correction/detection encoding.

Defendants emphasize that the Court declined to incorporate certain limitations proposed by Plaintiff into certain claim terms during claim construction. The Court, for instance, declined Plaintiff's proposal that a codeword be understood as "data elements generated by electronic circuitry, computer hardware, and/or computer software," Docket No. 213 (Markman Order) at

[13] Mitzenmacher has presented opinions that "encryption and error correction coding have essentially opposite goals and functions," Mitzenmacher First Supp. Decl., Docket No. 710-37, ¶ 48, perhaps explaining why Defendants have not relied on Blom as § 102 or § 103 prior art in this case. Plaintiff otherwise notes that "all of the prior art Defendants raised in this case and in their IPRs is from the field of error correction encoding." Docket No. 710 at 18.

26-27, finding that there was no reference to such a requirement in the specification.[14] It reached a similar conclusion for the term "information bits." However, these conclusions in the Markman Order are different from the conclusion that the overall scope of the claims appear to relate to a method for error correction encoding in the field of digital wireless communications based on the combination of terms used within the relevant claims and their roles in the claimed methods. *See id.* at 7 (observing that many of the parties' claim construction arguments did not relate to particular claim terms, but to the overall scope of the claims). The latter is the issue here.

v. Whether Claim Steps Can Be Used to Create Code That Can Only Detect, Not Correct, Errors

In another aspect of the parties' argument, they dispute the relevance of Plaintiff's concession in its supplemental briefing that the field of error correction encoding necessarily includes the field of error detection encoding. According to Defendants, Plaintiff has not only changed its position about the relationship between error correction and detection encoding, but also effectively conceded that the limitations of the claims could result in an output codeword that is only able to perform error detection. Plaintiff's briefs, although adamant that "[a]ny code with the ability to correct errors necessarily has the ability to detect errors," (Docket No. 742 at 7) are not so adamant about whether the claimed methods could be used in creating codewords that could only perform error detection. That is, error correction and detection are not coextensive. While the evidence suggests that all codes with the ability to correct errors necessarily have the ability to detect errors, Plaintiff's expert admits that not all codes with the ability to detect errors have the ability to correct errors.

Plaintiff's expert states:

> while IRA codes can detect errors, they do so in conjunction with error correction. I am not aware of any system that uses IRA codes to detect but not correct errors. Indeed, it would not make any sense to use IRA codes for just one purposes (foregoing their error correction capabilities) when there are less complex options if detecting errors alone is the goal.

See Declaration of Dr. Matthew B. Shoemake Regarding § 101 Eligibility ("Supp. Shoemake Decl."), Docket No. 733-1, ¶ 301. In earlier sections, Shoemake explains how the concept of the "parity bit" introduces redundancy that enables error correction. *See, e.g.*, *id.* at ¶ 198. This

[14] The meaning of the term "codeword" and its relevance in the context of the parties' § 101 dispute will be further addressed *infra* in light of discussion at the November 2018 hearing.

statement is not exactly supported by Shoemake's earlier declaration, which suggested that parity bits could be used in codes that only performed error correction. *See* Shoemake Decl., Docket No. 596-9, ¶ 42 ("it is possible to form codewords by adding on a single parity bit [*i.e.*, by performing an encoding operation]. This may be done by adding all the information bits together and determining if the sum is odd or even . . . This type of code is known as an error *detection* code but is not an error *correction* code because it cannot correct errors at the receiver."). It is possible, however, that Shoemake's later statements regarding "parity bit" were made because of Shoemake's understanding that the "variable number of subsets" limitation of the relevant claims would inherently lead to claimed parity bits with some level of redundancy (because at least some of the information bits must be repeated different numbers of times in the data block subsets forming the parity bits). Even then, evidence at the November 2018 hearing demonstrated that the real question regarding whether the claims could cover simple error detection encoding is inherently tied to whether there is a required length for the codeword (or portion of codeword) output as a result of the claimed steps. The examples submitted by the parties show that the relevant claims cover codes that can only detect (but not correct) errors even though in most instances, a code that practices the claims will be able to both correct and detect errors. *See* Further Declaration of Dr. Matthew B. Shoemake Regarding § 101 Eligibility ("Shoemake Second Supp. Decl."), Docket No. 809-2, ¶ 37 ("I also am not aware of an existing system using the IRA encoding of the '781 patent claims for any application other than error correction coding with at least hundreds of information bits being encod[ed] into codewords that likewise have at least hundreds of bits.").

vi. Whether the "Codeword" (or "Portion of a Codeword") Output by the Claims Must Be a Certain Length

At the November 2018 hearing, Defendants' expert showed that his example using three information bits to satisfy Claim 13 would lead to parity bits (*i.e.*, a codeword) that could only perform some level of error detection, not error correction. Nov. Hearing Tr. 138:23-139:5. Indeed, Defendants' expert conceded that in certain circumstances, the three-information-bit example would not be able to even perform full error detection. *Id.* Plaintiff's expert (Dr. Shoemake), meanwhile, referred to the three-information-bit example as "fundamentally flawed" and "not . . . reversible." *Id.* at 138:10-12. In its supplemental brief submitted after the hearing, Plaintiff stated,

> [d]uring the hearing, Caltech also informed the Court that it would address

> the question of whether the claims can lead to an IRA codeword that can only perform error detection. Such an IRA codeword could be generated in limited circumstances through the unique and inventive methods covered by the asserted claims, and is useful as confirmed by both parties' experts.

Docket No. 809 at 3 (citing Supp. Frey Decl., Docket No. 738, ¶¶ 95, 97-104; Shoemake Second Supp. Decl., Docket No. 809-2, ¶¶ 24-39; Further Declaration of Dr. Michael Mitzenmacher Regarding § 101 Eligibility ("Mitzenmacher Second Supp. Decl."), Docket No. 809-1, ¶¶ 39-40). In other words, Plaintiff effectively concedes that beyond some claims' requirements for at least two parity bits, there is no minimum required length for the codewords output by the claims.[15] The parties do not appear to dispute that only very limited circumstances will result in codewords or portions of codewords covered by the claims that can before error detection, but not error correction.

Defendants suggest that not only has Plaintiff shifted its position regarding the relationship between error correction and detection and the relevant scope of the claims, but the fact that the claims are broad enough to cover instances where a codeword can only be used to for error detection shows that the claims are patent ineligible. *See* Docket No. 741 at 11-12; *see also* Rebuttal Frey Decl., Docket No. 741-1, ¶¶ 44-52. Plaintiff, for its part, argues in its supplemental briefs that error correction and detection are simply part of the same technological field, making it largely irrelevant whether the claims also cover some error detection codes in addition to error detection/correction codes. Docket No. 733 at 18; *see also* Supp. Shoemake Decl., Docket No. 733-1, ¶¶ 302-311; *but see* Shoemake Decl., Docket No. 596-9, ¶ 42 ("Unfortunately, since this is a very weak code, the receiver is able to determine that an error occurred, but cannot deduce the

[15] Despite this, in his Second Supplemental Declaration, Shoemake observes:

> I am not aware of any system that uses IRA encoding to facilitate error detection alone. In situations where error detection alone is needed, there are other encoding options available to practitioners that fall outside the bounds of the IRA encoding claims of the '781 patent . . . . I am also not aware of an existing system using the IRA encoding of the '781 patent claims for any application other than error correction coding with at least hundreds of information bits being encod[ed] into codewords that likewise have at least hundreds of bits. In these situations, the full value of the asserted '781 patent is clear . . . . [A]lthough shorter codewords could be implemented by following the steps of the claims and those codewords would have utility in detect[ing] and correcting errors, a significant technological contribution made by Caltech's invention is the generation of codewords that enable near Shannon limit levels of performance.

Shoemake Second Supp. Decl., ¶¶ 37-38.

nature of the error. This type of code is known as error *detection* code but is not an error *correction* code, because it cannot correct errors at the receiver.").

There appears to be no real dispute that error correction codes and error detection codes are different. That is all Shoemake said in his original declaration, and it is all Frey says in his rebuttal declaration. *See* Rebuttal Frey Decl., Docket No. 741-1, ¶ 45 ("As I explained in my October 4 Declaration, error detection codes and error correction codes are different"); Shoemake Decl., Docket No. 596-9, ¶ 42. But the relevant question is whether error correction and error detection are part of the same technological *field*. Supp. Shoemake Decl., Docket No. 733-1, ¶ 303 ("Those of ordinary skill in the art would be well aware that, because of this close relationship, error correction and detection go hand-in-glove, and should not be seen as separate fields."); *see also id.* ¶¶ 302-311. Although Defendants assert that error correction/detection are "different technologies" (Docket No. 741 at 12), Defendants do not explicitly state that error correction/detection are part of different technological fields. Neither does Frey. The evidence thus supports the conclusion that error correction and detection are interconnected technological fields and thus, although the evidence shows that the claims may cover some codes that can only perform error detection, this fact does not necessarily separate them from the error correction/detection field.[16]

B. Application in § 101 Analysis

As explained in the sections above, the evidence supports the conclusion that the relevant claims are rooted in the field of error correction/detection encoding. More specifically, the claims' "variable number of subsets" limitation supports the conclusion that the claims require irregular repetition of information bits. In other words, the claims are directed to "IRA codes," although IRA codes that do not necessarily require scrambled information bits as input.

Software claims have long been greeted with some consternation by the courts in the context of § 101:

> Computer software-related inventions—due to their intangible nature—can be particularly difficult to assess under the abstract idea exception. *See* [*Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016)] (noting that the *Alice*-recognized distinction between "computer-functionality improvements" and "uses of existing computers as tools in aid of processes

[16] Although Frey otherwise suggests that if the claims extend to error detection, they must also extend to other unrelated technological fields (*see, e.g.*, Rebuttal Frey Decl., Docket No. 741-1, ¶ 48), he does not adequately support these assertions (relying on scattered, piecemeal nomenclature from various references, as previously discussed and rejected) and they are unpersuasive.

> focused on "abstract ideas" " "has common-sense force even if it may present line-drawing challenges because of the programmable nature of ordinary existing computers"). The exception nevertheless applies to new and old technologies alike. Importantly, we have found a number of software-based claims to be patent-eligible, observing that "[s]oftware can make non-abstract improvements to computer technology just as hardware improvements can, and sometimes the improvements can be accomplished through either route." *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016); *id.* at 1339 (claims directed to a self-referential table "designed to improve the way a computer stores and retrieves data in memory"); *see also Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1348-49 (Fed. Cir. 2016) (claims directed to improved content filter); *McRO, Inc. v. Bandai Namco Games Am. Inc.,* 837 F.3d 1299, 1313–14 (Fed. Cir. 2016) (claims directed to a technical improvement in animation techniques); *Core Wireless Licensing S.A.R.L. v. LG Elecs., Inc*., 880 F.3d 1356, 1362 (Fed. Cir. 2018) (holding that claims which were directed to "particular manner of summarizing and presenting information in electronic devices" were patent-eligible).

Interval Licensing LLC v. AOL, Inc., 896 F.3d 1335, 1343-44 (Fed. Cir. 2018); *Finjan, Inc. v. Blue Coat Sys., Inc.*, 879 F.3d 1299, 1304 (Fed. Cir. 2018); *Ancora Techs., Inc. v. HTC Am., Inc*., 908 F.3d 1343, 1347 (Fed. Cir. 2018); *see also Hughes*, 59 F. Supp. 3d at 990-91 ("computer software and codes remain patentable. The Supreme Court approved a patent on computer technology in *Diehr* and suggested that software and code remain patentable in *Alice*. The America Invents Act further demonstrates the continuing eligibility of software. Moreover, *Alice* did not significantly increase the scrutiny that courts must apply to software patents. It held only that an ineligible abstract idea does not become patentable simply because the claim recites a generic computer. Courts must not extend the reach of *Alice* too far, lest they read in § 101 limitations that do not exist.").

Claims concerning data compression and encoding, which by their very nature focus on the manipulation of arguably intangible data, present even more challenges. But courts have not categorically relegated such claims to abstractness, either. *See Sycamore IP Holdings LLC v. AT & T Corp.*, 294 F. Supp. 3d 620, 652 (E.D. Tex. 2018) (Bryson, J.) (collecting district court cases and stating, "a compression protocol is not fundamentally different from other computer-driven programs that improve the accuracy, speed, and security of communications such as error correction programs, encryption protocols, and methods for synchronizing data, all of which have been held to survive section 101 challenges without serious doubts as to their patentability."); *TQP Development, LLC v. Intuit Inc.*, No. 2:12-cv-180-WCV, 2014 WL 651935, at *5 (E.D. Tex. Feb.

19, 2014) (Bryson, J.) ("Typically, transforming data from one form to another does not qualify as the kind of transformation that the Supreme Court in *Bilski* regarded as an important indicator of patent eligibility. In the case of an invention in the field of encryption, however, the entire object of the invention is to transform data from one form into another that will be recognizable by the intended recipient but secure against decryption by unintended recipients." (citation omitted)).

The Court finds that the relevant claims in this case set out a method of performing error correction/detection encoding, including with the requirement that information bits in a data set appear in a "variable number of subsets," that is patent-eligible. The claims are "directed to" a method for encoding data that, according the specification and testimony of Plaintiff's experts, improves on previous data encoding methods by allowing for more efficient data transmission. These technological improvements are sufficient for the relevant claims to pass muster under § 101.

Defendants compare the claims at issue in this case to claims found patent-ineligible in many Federal Circuit cases, but have repeatedly emphasized four cases in particular where the Federal Circuit found claims invalid under § 101: *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344 (Fed. Cir. 2014); *Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1148 (Fed. Cir. 2016), *cert. denied sub nom. Sypnosys, Inc. v. Mentor Graphics Corp.*, 138 S. Ct. 71 (2017); *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1324 (Fed. Cir. 2017), *cert. denied*, 138 S. Ct. 672 (2018); and *Interval Licensing*, 896 F.3d 1335. Each case is distinguishable.

Digitech included some claims that did not even require data manipulation on their face, let alone describe how data manipulation could be achieved. One of the *Digitech* claims, for instance, referred to a "device profile" comprising "first data" and "second data" that together defined "device dependent transformation of spatial and color information." *Digitech*, 758 F.3d at 1349. Another claim referred to a "method of generating a device profile" by generating a first data, generating a second data, and combining the two. Some of the sweeping language in *Digitech* is oft-quoted by Defendants: "Data in its ethereal, non-physical form is simply information that does not fall under any of the categories of eligible subject matter under section 101." *Id.* at 1350; *see also id.* at 1351 ("Without additional limitations, a process that employs mathematical algorithms to manipulate existing information to generate additional information is not patent eligible."). Judge Pfaelzer has observed problems with applying *Digitech's* language too broadly:

> *Digitech* seems to set forth a bright-line rule: if a claim consists of

> mathematical algorithms that transform data, the claim is not patentable. But that cannot be what *Digitech* means. . . . this interpretation results in the incorrect conclusion that software is not patentable. The essence of software is manipulating existing data and generating additional data through algorithms. This simplistic take on *Digitech* would eviscerate all software patents, a result that contradicts Congress's actions and the Supreme Court's guidance that software may be patentable if it improves the functioning of a computer.

Hughes, 59 F. Supp. 3d at 987 (internal citations omitted). A closer review of *Digitech* reveals that one of the core problems with the claims at issue was their result-oriented nature and large breadth. *Digitech*, 758 F.3d at 1349-50 ("The claims encompass all embodiments of the information contained in the device profile, regardless of the process through which this information is obtained or the physical medium in which it is stored."). The same concerns are not present in this case, which includes claims to a specific method of encoding, including the actual steps that must be performed to achieve the desired result. The specific limitations of the claims in the '781 Patent are thus distinguishable from the result-oriented claims of *Digitech*.

Synopsys also included distinguishable claims related to "translat[ing] from a functional description of a level sensitive latch into a hardware component description of that same latch." *Synopsis*, 839 F.3d at 1142. In its analysis, the Federal Circuit found it relevant that all of the steps claimed for translating the descriptions of the level sensitive latch could be performed mentally, and the patent inventors admitted as much. *Id.* at 1148. The Federal Circuit distinguished *TQP*, a district court decision authored by Federal Circuit Judge Bryson (sitting by designation) that involved a § 101 challenge to claims for transmitting encrypted data by generating sequences of pseudo-random key values. *TQP*, 2014 WL 651935, at *1. According to the Federal Circuit in *Synopsis*, the court in *TQP*

> explained that . . . the plaintiff's "invention involves a several-step manipulation of data that, *except in its most simplistic form, could not conceivably be performed in the human mind or with pencil and paper*." [*TQP*, 2014 WL 651935,] at *4 (emphasis added). This case is different. Representative claim 1 is directed to generating a representation of a single specific hardware component and can be—and was—performed mentally or with pencil and paper.

Synopsys, 839 F.3d at 1148 (emphasis in original). *Synopsys* further considered the fact that the *Synopsys* patent claims at issue did not call for any form of computer implementation: "Because the Asserted Claims make no mention of employing a computer or any other physical device, they

are so broad as to read on an individually performing the claimed steps mentally or with pencil and paper." *Id.* at 1149. The relevant claims in this case are closer aligned with *TQP* than with *Synopsys*. Although the parties here have demonstrated that the most simplistic of examples could conceptually be performed using pen and paper (setting aside the inherent nature of "information bits"), Defendants have not shown that a representation of a *typical* IRA code—generally relying on hundreds of information bits at a minimum as input—could be generated mentally or with pencil and paper, and particularly in a way that would meet the claimed goals of allowing simpler transmission of data at or near the Shannon limit.[17] *See also* Shoemake Decl., Docket No. 596-9, ¶ 104 (explaining that IRA codes allow operation near the Shannon Limit). *TQP* also considered the fact that the claims at issue did not specifically recite particular machines, "such as a computer, particular types of transmitters and receivers, or a particular type of pseudo-random number generating machine." *TQP*, 2014 WL 651935, at *5. The court in *TQP* stated,

> it is apparent from the patent that computing devices and electronic transmitters, receivers, and pseudo-random number generating machines would be required for all but the most fanciful uses of the invention. To invalidate claim 1 on the ground that it does not expressly require the use of a computer or other specific mechanisms would be to adopt an overly formalistic approach to subject-matter eligibility.

Id. *TQP* and *Synopsys* (as well as *Digitech*) together thus suggest that the "pen and paper test" and the "association with hardware" test go hand in hand: if a patent claim is sufficiently complex that it could only be performed mentally in the most simplistic of circumstances, that fact that physical hardware components are not explicitly claimed does not doom the claims. Such circumstances are present here. In particular, the "variable number of subsets" limitation plays a key role in the pen and paper determination. This is also aside from the nomenclature of the claims which, as discussed, have not been shown to appear in contexts outside of error correction/detection encoding.

Judge Pfaelzer had reason to consider and reject a similar issue in considering the patent eligibility of a related patent at *Alice* step two:

> One of Hughes' arguments deserves special attention. Hughes argues that calculating parity bit values involve "mental steps [that] can be performed by

[17] "Shannon Limit," or "channel capacity," refers to the theoretical concept that "it is possible through error correction coding to communicate [*i.e.*, send data over a transmission channel] with practically no chance of error . . . as long as [the coding techniques] do not exceed the capacity of the [communications] channel." Shoemake Decl., Docket No. 596-9, ¶¶ 35-37.

> a person with pencil and paper." Therefore, Hughes, argues the claim is not patentable . . . . The Court finds this mode of analysis unhelpful for computer inventions. Many inventions could be theorized with pencil and paper, but pencil and paper can rarely produce the actual effect of the invention. Likewise, with regard to software, a human could spend months or years writing on paper the 1s and 0s comprising a computer program and applying the same algorithms as the program. At the end of the effort, he would be left with a lot of paper that obviously would not produce the same result as the software.[19]
>
> > [Footnote 19: Courts should not view software as abstract simply because it exists in an intangible form. It is as fruitless to say that a human could use pencil and paper to perform the same calculations as a computer, as it is to say that a human could use pencil and paper to write down the chemical structure of a DNA strand. In either case, any effort on the part of a human will only be a symbolic representation. The effort will not produce the same effect as executing a computer program or isolating a DNA strand.]
>
> The problems of pencil-and-paper analysis are heightened in the context of software, which necessarily uses algorithms to achieve its goals. Pencil-and-paper analysis can mislead courts into ignoring a key fact: although a computer performs the same math as a human, a human cannot always achieve the same results as a computer. Hughes' statement is theoretically correct. A human could perform the calculations that would yield the value of a parity bit. But Hughes' statement is literally wrong. It states the obvious to say that a pencil and paper cannot actually produce parity bits. Hughes' proposed analysis oversimplifies § 101 and ignores the fact that the '032 patent creates an algorithmic solution for a computing problem − the corruption of data during transmission.
>
> The pencil-and-paper test is a stand-in for another concern: that humans engaged in the same activity long before the invention of computers . . . . This concern is highly relevant, but courts should not scan patents for this concern by using a test that creates false positives. In the case at hand, it is clear that Caltech's error correction codes were not conventional activity that humans engaged in before computers, and the codes do not become conventional simply because humans can do math. Pencil-and-paper analysis is inappropriate at least for this area of technology.

Hughes, 59 F. Supp. 3d at 994-95. The Court finds her reasoning to be additionally persuasive, in addition to its interpretation of *Synopsys* and *TQP*.[18]

[18] For the same reasons and others, the parties' dispute regarding the deposition testimony of Caltech professor Dr. Babak Hassibi, who was directed by Defendants' counsel to write out on a piece of paper a three "information bit"

In *Recognicorp*, the Federal Circuit considered claims for "[a] method for creating a composite image," which included displaying facial feature images on a screen and deriving composite facial image code by "performing at least one multiplication operation on a facial code" and reproducing the composite facial image code on a display. *Recognicorp*, 855 F.3d at 1324. The Federal Circuit stated that the claimed method:

> is directed to the abstract idea of encoding and decoding image data . . . This method reflects standard encoding and decoding, an abstract concept long utilized to transmit information. Morse code, ordering food at a fast food restaurant via a numbering system, and Paul Revere's "one if by land, two if by sea" signaling system all exemplify encoding at one end and decoding at the other end.

Id. at 1326; *see also id.* at 1327 ("Adding one abstract idea (math) to another abstract idea (encoding and decoding) does not render the claim non-abstract."). The claims of *Recognicorp* did not relate to a specific method of encoding, and let alone to a particular method of encoding tied to error correction/detection. Instead, as the Federal Circuit observed, the method reflected "***standard*** encoding and decoding." *Id.* at 1326 (emphasis added). Here, the entire purpose of the asserted patents is focused on claiming encoding/decoding methods/means that are new and improved compared to standard methods/means. The claims are not comparable to Paul Revere's "one if by land, two if by sea," but to something that Paul Revere did not (and, in most cases beyond very limited examples, could not and need not) accomplish. For much the same reasons mentioned as to *Digitech* and *Synopsys*, it would be inappropriate to extend some of the sweeping language in *Recognicorp* to apply to a system directed at improved error correction encoding/decoding methods.

Like *Digitech*, the Federal Circuit panel in *Interval Licensing* strongly emphasized concerns with result-oriented claiming. The Federal Circuit considered claims to "[a] computer readable medium . . . encoded with one or more computer programs for enabling acquisition of a set of content data and display of an image or images generated from the set of content data on a display device during operation of an attention manager." *Interval Licensing*, 896 F.3d at 1339-40. The Federal Circuit had previously construed the term "attention manager" as "a system that displays images to a user either when the user is not engaged in a primary interaction or in an area

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example following the claimed methods, is irrelevant and Defendants' suggestion that it demonstrates the invalidity of the claims is unpersuasive. *See* Docket Nos. 785, 807; *see also* Docket Nos. 789, 816.

of the display screen that is not used by the user's primary activity." *Id.* at 1338. The Federal Circuit focused on the lack of information in the intrinsic record about the claimed "attention manager." *See, e.g.*, *id.* at 1342-43. After commenting about the difficulty of assessing computer software-related inventions under § 101 (*see supra* at 22-23), the Federal Circuit emphasized:

> ***Other software-based claimed inventions . . . have failed to pass section 101 muster, because they did not recite any assertedly inventive technology for improving computers as tools and/or because the elements of the asserted invention were so result-based that they amounted to patenting the patent-ineligible concept itself.*** *See Elec. Power Grp.*, 830 F.3d at 1354, 1355 (claims lacking "any requirements for *how* the desired result is achieved") (emphasis in original); *SAP Am., Inc.*, 890 F.3d at 1022 ("the focus of the claims [wa]s not any improved computer or network").

Interval Licensing, 896 F.3d at 1343-44 (emphasis added). The Federal Circuit found the focus of the claims at issue "is directed to 'providing information to a person without interfering with the persons primary activity,' i.e., the result-centric construction of the claimed 'attention manager.'" *Id.* (citing *Interval Licensing LLC v. AOL INC*, 193 F. Supp. 3d 1184, 1188 (W.D. Wash. 2016), *aff'd sub nom. Interval Licensing*, 896 F.3d 1335). The Federal Circuit further noted, "[r]ecitation, as in this case, of the collection, organization, and display of two sets of information on a generic display device is abstract absent a 'specific improvement to the ways computers [or other technologies] operate.'" *Id.* at 1345 (citing *Enfish*, 822 F.3d at 1336). For much the same reasons distinguishing *Digitech*, *Interval Licensing's* concerns about result-oriented claiming are not present here. The claims relate to a specific method of encoding, including the actual steps that must be performed to achieve the desired result.

Ultimately, the focus of the claims of the '781 Patent is on improving error correction encoding itself, not on using standard encoding/decoding as a means to accomplish an abstract result. By purporting to present a novel error correction encoding method, the claims focus on providing an improvement to the use of computers as tools through a specific set of encoding steps. *See also Finjan*, 879 F.3d at 1305 ("Here, the claims recite more than a mere result. Instead, they recite specific steps—generating a security profile that identifies suspicious code and linking it to a downloadable—that accomplish the desired result."); *Ancora*, 908 F.3d at 1348 ("Improving security—here, against a computer's unauthorized use of a program—can be a non-abstract computer-functionality improvement if done by a specific technique that departs from earlier approaches to solve a specific computer problem.").

Defendants' § 101 challenge over the last two years has focused (as it ought to) on both defining the scope of the relevant claims in this case and interpreting/applying the numerous and varied Federal Circuit cases addressing § 101 issues. By November/December 2018, Plaintiff had made two important concessions about the scope of the claims that became a focus of the parties' dispute over the contours of § 101 jurisprudence. First, Plaintiff agreed that the relevant claims in this case can be met by outputting a full codeword (Claims 9 and 22) or a portion of a codeword (Claim 13) of almost any length, including very short codewords based on even three or four input information bits. Docket No. 809 at 3 (citing Supp. Frey Decl., Docket No. 738, ¶¶ 95, 97-104; Shoemake Second Supp. Decl., Docket No. 809-2, ¶¶ 24-39; Mitzenmacher Second Supp. Decl., Docket No. 809-1, ¶¶ 39-40). Second, at the November Hearing, Plaintiff's expert (Dr. Shoemake) referred to a three-information-bit example as "fundamentally flawed" and "not . . . reversible." Nov. Hearing Tr. 138:10-12; *see also supra* at 21. Although Plaintiff later recharacterized short codewords as still "useful as confirmed by both parties' experts," Dr. Shoemake's statements at the hearing are enlightening.

Based on these characterizations about the scope of the claims, the Court asked Plaintiff to file a supplemental report that provided legal authority, if any existed, for the proposition that a claim can be found patent eligible where the overall framework could be applied in a way that improves the operation of computers, but the claim is broad enough to cover specific examples that do not actually provide any improvement to computer operations. Nov. Hearing Tr. 110:24-111:8 (requesting briefing to support the proposition that "if you have a claim that . . . can be utilized for a very, very sophisticated and inventive purpose but it also can cover something that is very simple that probably no one would actually utilize it in the simplistic context, that . . . can be found to be patentable."). Defendants were also given an opportunity to file a response. The parties' supplemental briefing was not particularly helpful.

Rather than identifying legal authority based on *Alice* and its progeny, Plaintiff's supplemental brief invokes the utility prong of § 101. Docket No. 809 at 1; *see also Brooktree Corp. v. Advanced Micro Devices, Inc.*, 977 F.2d 1555, 1571 (Fed. Cir. 1992) ("If the claimed subject matter is inoperable, the patent may indeed be invalid for failure to meet the utility requirement of § 101 and the enablement requirement of § 112 . . . . To violate § 101 the claimed device must be totally incapable of achieving a useful result." (citations omitted)). The question of patent utility or usefulness, however, is a separate inquiry compared to whether a claim is directed

to patent-ineligible subject matter such as an abstract idea. *In re Nuijten*, 500 F.3d 1346, 1365 (Fed. Cir. 2007) (Linn, J., concurring-in-part and dissenting-in part) ("[W]e have treated the utility requirement of § 101 as a distinct concept from the question of whether an invention qualifies as patentable subject matter . . . .").

Defendants, meanwhile, relied on statements from *Interval Licensing* and *Synopsys* that the Court has already discussed, *supra*. *See supra* at 25-29. Neither of these cases provide for the overarching legal proposition that when actually practiced, a claim must *always* improve the functioning of a computer.

Indeed, the Court's review of claims found patent-eligible supports the opposite conclusion: a claim is not invalid simply because in practice, it may cover one or more examples where there is not actually an improvement to the relevant technological field.

In *Diehr*, for instance, the Supreme Court considered claims directed to a process of curing rubber with the assistance of a computer. There, the Court observed, even though the claims at issue relied on a mathematical formula,

> the [patentees] here do not seek to patent a mathematical formula. Instead, they seek patent protection for a process of curing synthetic rubber. Their process admittedly employs a well-known mathematical equation, but they do not seek to pre-empt the use of that equation. Rather, they seek only to foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process. These include installing rubber in a press, closing the mold, constantly determining the temperature of the mold, constantly recalculating the appropriate cure time through the use of the formula and a digital computer, and automatically opening the press at the proper time. Obviously, one does not need a 'computer' to cure natural or synthetic rubber, but if the computer use incorporated in the process patent significantly lessens the possibility of 'overcuring' or 'undercuring,' the process as a whole does not thereby become unpatentable subject matter.

Diehr, 450 U.S. at 187. It is not difficult to imagine that, despite the aid of a digital computer, *Diehr's* claimed method of operating a rubber-molding press for precision molded compounds could still result in burned rubber. But despite this reality, the claims were not found invalid on this basis. The fact that the claimed process "***significantly lessens the possibility*** of 'overcuring' or 'undercuring'" was enough, and the focus was on "the process as a whole." *See id.* Similarly, the relevant claims in this case are directed as a whole to solving problems that arise within the

context of error correction encoding in digital communications. They require particular encoding steps, including that information bits appearing in a variable number of subsets be included in the encoding process. These steps mean that the relevant claims do not preempt the use of the recited mathematical formulas outside of this error correction encoding context, again particularly because of this "variable number of subsets" limitation. In other words, the claims recite mathematical formulas, but do not seek to patent them. *See also Thales Visionix Inc. v. U.S.*, 850 F.3d 1343, 1347-48 (Fed. Cir. 2017) ("claims are patent eligible under § 101 'when a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect.'") (citations omitted); s*ee also Core Wireless*, 880 F.3d at 1362 (discussing *Thales* "[w]e noted that even though the system used conventional sensors and a mathematical equation, the claims specified a particular configuration of the sensors and a particular method of utilizing the raw data that eliminated many of the complications inherent in conventional methods."). And although the relevant claims of the '781 Patent encompass a specific example that arguably fails to provide an improvement to computer functioning, like *Diehr*, the focus on the claims as a whole and the framework they create provides for patent eligibility.

In *Visual Memory*, the Federal Circuit considered claims to "[a] computer memory system connectable to a processor and having one or more programmable operational characteristics, said characteristics being defined through configuration by said computer based on the type of said processor." *Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1257 (Fed. Cir. 2017). The Federal Circuit, considering the claims at the motion to dismiss stage, found the claims as informed by the patent specification related to an improvement to the operation of computers. It found that the claims avoided the need to design separate memory systems for each type of processor, while also avoiding performance problems of prior art memory systems. *Id.* at 1259. Of course, these improvements assume a certain type of programming is employed in practice. The claims of *Visual Memory* themselves do not require that the programmable operational characteristic is actually programmed in a way that improves computer functioning. *See id.* at 1257 (listing language of Claim 1 of the relevant patent). Indeed, the dissent specifically noted that the patent did not describe how to implement the programmable operational characteristic. *Id.* at 1263. The majority responded by stating,

> the dissent assumes that the "innovative" effort in the '740 patent lies in the

> programming required for a computer to configure a programmable operational characteristic of a cache memory. This assumption is inconsistent with the patent specification itself. The specification makes clear that the inventors viewed their innovation as the creation of "a memory system which is efficiently operable with different types of host processors," '740 patent col. 2 ll. 65-67, and the patent discloses how to implement such a memory system. Specifically, as demonstrated above, both the specification and the claims expressly state that this improved memory system is achieved by configuring a programmable operational characteristic of a cache memory based on the type of processor connected to the memory system. . . . ***Configuring the memory system based on the type of processor connected to the memory system is the improvement in computer technology to which the claims are directed.*** *Alice* requires no more from the claims or the specification to support our conclusion that the claims are not directed to an abstract idea. This conclusion is particularly proper on a motion to dismiss under Rule 12(b)(6), where all factual inferences drawn from the specification must be weighed in favor of Visual Memory, the non-moving party.

Visual Memory, 867 F.3d at 1261-62 (emphasis added). The majority elsewhere suggested that the dissent's concerns were better suited for an enablement challenge than an eligibility challenge under § 101. *Id.* at 1261.

At the December 2018 hearing, Defendants argued that there is a core difference between claims found patent-eligible in cases such as *Enfish* and the claims at issue in the '781 Patent. Dec. Hearing Tr. 59:7-9. Defendants argued that in *Enfish*, for example, "the claims themselves recited the specific elements that were the improvement to how the self-referential database functioned." *Id.* at 59:10-13. Defendants argued that even a simple version of the *Enfish* claims as written would still lead to an improvement in computer functioning. *Id.* at 59:14-19. The *Enfish* patent involved a system claim (for "[a] data storage and retrieval system for a computer memory") and included a "means for configuring" phrase that had been construed to require a four-step algorithm. *Enfish*, 822 F.3d at 1336. As Defendants put it, "no matter how simple you made [the self-referential table], you still have those elements as a part of the claim." Dec. Hearing Tr. 60:14-16. Defendants' position appears to be that the claims in *Enfish* would always include the *capability* to build a more complex self-referential table, even if a particular example included only a very simple self-referential table. Although perhaps true for the claims in *Enfish*, the Court is not persuaded that Defendants' argument (that all implementations of patent-eligible claims lead to technological improvements) holds true for circumstances like those presented in *Visual Memory*. But more importantly, the relevant claims in this case set out a method of performing error

correction/detection encoding, including with the requirement that information bits in a data set appear in a "variable number of subsets." Like *Enfish* and *Visual Memory*, this element remains part of the claims, no matter the surrounding circumstances when the claims are practiced. Much like *Visual Memory*, that the inventors created a framework where there is always encoding that includes information bits in a variable number of subsets leads to the improvement in error correction/detection encoding technology. The innovative effort was not the actual information bits inputted, but that data can be encoded by this overall method.[19] *See also Finjan*, 879 F.3d at 1302 (method comprising receiving a executable program, generating a security profile for it, and linking the security profile to the program found patent-eligible).

What *Diehr* and *Visual Memory* show is that in the § 101 patent eligibility context, the issue is not whether a claim used in practice always leads to an improvement, but whether the overall structure and framework created by the claims leads to a situation where certain benefits/improvements flow from that structure. This is also consistent with how courts are instructed to perform the § 101 analysis at step 1. Whether claims are "directed to" an abstract idea requires an inquiry into the nature of the claims "as a whole," not dissecting specific examples of the claims in use. *Elec. Power Grp.*, 830 F.3d at 1353. Here, the claims are "directed to" a method for encoding data that, according to the patent specification and testimony of Plaintiff's experts, leads to a framework that improves on previous data encoding methods. Claims directed to such improvements in computer technology are patent eligible. *See Enfish*, 822 F.3d at 1336 ("[W]e find that the claims at issue in this appeal are not directed to an abstract idea within the meaning of *Alice*. Rather, they are directed to *a specific improvement to the way computers operate*.") (emphasis added).

Certain district court cases further inform the Court's determination. More often, district courts have considered the same issue of claims directed to improved methods or systems for encoding/encrypting/transmitting data in a technological context and found such claims patent eligible. *TQP* for instance, a case already discussed, found claims directed to a method of transmitting data in encrypted form patent-eligible. *TQP*, 2014 WL 651935, at *1; *see also supra* at 25-26. In *Evolved Wireless, LLC v. Apple Inc.*, 221 F. Supp. 3d 485, 493 (D. Del. 2016), the

[19] The Court also speculates but declines to further consider whether the effect of Defendants' position would be significantly more questions about the validity of method claims under § 101 compared to the validity of system and apparatus claims.

district court found claims reciting "[a] method of transmitting a preamble sequence in a mobile communication system" patent eligible.

In *Huawei Techs., Co, Ltd v. Samsung Elecs. Co, Ltd.*, No. 3:16-CV-02787-WHO, 2016 WL 6834614, at *6 (N.D. Cal. Nov. 21, 2016), a district court similarly found claims related to "reduc[ing] signal interference when a mobile device connects to a cellular network" patent-eligible, although they relied on various mathematical equations. Of note, the court observed that mathematical equations employed by the relevant claims had "no significance outside of decreasing interference between mobile devices." *See id.* at *8 ("The only 'abstract idea' identified by Samsung is the mathematical equation used . . . But Samsung itself admits that the equation has no significance when removed from the context of mobile devices connecting to a base station within a cell. . . . If the equation has no independent significance outside the technological environment of mobile communication systems, then the claims tying the equation to a mobile device cannot be an attempt to limit something that could be broader, and thus, there is no attempt to 'circumvent' patent law."). Similarly here, even in their simplest version, Defendants present no basis for why a person would ever choose to perform the claimed steps, including the "variable number of subsets" limitation, in contexts outside of error detection/correction encoding. Defendants' argument − that the "variable number of subsets" requirement fails to save the claims from abstraction because it is itself an abstract concept (*see, e.g.*, Docket No. 714 at 17) − is unpersuasive; both because Defendants have failed to show that such a step would have any relevance outside of the context of error correction/detection encoding and because that limitation must be considered in combination with the other language of the relevant claims, which by their steps and nomenclature, have been shown to be limited to the error correction/detection encoding field. *But see Huawei Techs.*, 2016 WL 6834614, at *8 (suggesting that a claim must be tied to a "concrete structure" to be patent eligible).

Sycamore, 294 F. Supp. 3d at 653, is particularly instructive. In *Sycamore*, Judge Bryson found claims relating to encoding information groups and control codes were patent eligible. In doing so, Judge Bryson distinguished many of the same Federal Circuit decisions finding claims patent ineligible addressed in this Order and found them distinguishable for similar reasons. *See id.* at 652-653 (addressing *Recognicorp*, *Digitech*, *Synopsys*, and others.). As *Synopsys* explained,

> While it is true that the invention in this case involves the manipulation of data, the point of the invention is not simply the transmission of data in coded form, but the conversion of the data into a form that makes the communication

> of the data more efficient. The specific function of the recited encoding scheme is to add efficiency to the process in a particular manner. As such, the recited protocol, even though expressed (as are all computer operations) as an algorithm, is a concrete technical contribution and not simply the embodiment of an abstract idea.

Id. The same reasoning applies here.

Because the claims are directed to patent-eligible subject matter at *Alice* Step 1, it is not necessary to reach *Alice* Step 2.[20]

VI. Conclusion

For the reasons stated in this ruling (and in the consistent portions of the August 30, 2018 and November 15, 2018 tentative rulings), Defendants' Renewed § 101 Motion is **DENIED**.

[20] Perhaps the problem is not really one of whether the '781 Patent claims raise an abstract idea issue under Section 101, but rather under the concepts of enablement, written description, or prior art. *C.f. McRO*, 837 F.3d at 1313-14 ("Patent law has evolved to place additional requirements on patentees seeking to claim a genus; however, these limits have not been in relation to the abstract idea exception to § 101. Rather they have principally been in terms of whether the patentee has satisfied the tradeoff of broad disclosure for broad claim scope implicit in 35 U.S.C. § 112."). Plaintiff's arguments in particular related to "scrambling" and its belief that the claims are broader than the embodiments disclosed in the specification may create § 112 concerns.