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

OPTIS WIRELESS TECHNOLOGY, LLC ET AL.,

Plaintiffs,

v.

APPLE INC.,

Defendant.

Case No. 2:19-cv-00066-JRG

CLAIM CONSTRUCTION MEMORANDUM OPINION AND ORDER

Before the Court is the opening claim construction brief of Optis Wireless Technology, LLC, Optis Cellular Technology, LLC, and PanOptis Patent Management, LLC (collectively, "Plaintiffs") (Dkt. No. 82),[1] the response of Apple Inc. ("Defendant") (Dkt. No. 86), and Plaintiffs' reply (Dkt. No. 92). The Court held a hearing on the issues of claim construction and claim definiteness on February 25, 2020. Having considered the arguments and evidence presented by the parties at the hearing and in their briefing, the Court issues this Order.

[1] Citations to the parties' filings are to the filing's number in the docket (Dkt. No.) and pin cites are to the page numbers assigned through ECF.

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I. BACKGROUND

Plaintiffs allege infringement of seven U.S. Patents: No. 8,005,154 (the "'154 Patent"), No. 8,019,332 (the "'332 Patent"), No. 8,102,833 (the "'833 Patent"), No. 8,385,284 (the "'284 Patent"), No. 8,411,557 (the "'557 Patent"), No. 8,989,290 (the "'290 Patent"),[2] and No. 9,001,774 (the "'774 Patent") (collectively, the "Asserted Patents").

II. LEGAL PRINCIPLES

A. Claim Construction

"It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude.'" *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To determine the meaning of the claims, courts start by considering the intrinsic evidence. *Id.* at 1313; *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed. Cir. 2004); *Bell Atl. Network Servs., Inc. v. Covad Commc'ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *Phillips*, 415 F.3d at 1314; *C.R. Bard, Inc.*, 388 F.3d at 861. The general rule—subject to certain specific exceptions discussed *infra*—is that each claim term is construed according to its ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the patent. *Phillips*, 415 F.3d at 1312–13; *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003); *Azure Networks, LLC v. CSR PLC*, 771 F.3d 1336, 1347 (Fed. Cir. 2014) ("There is a heavy presumption that claim terms carry their accustomed meaning in the relevant community at the relevant time.") (vacated on other grounds).

[2] The parties did not submit any dispute regarding the scope of the '290 Patent. Since the hearing, the '290 Patent was dismissed from the case. (Dkt. No. 105.)

"The claim construction inquiry . . . begins and ends in all cases with the actual words of the claim." *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1248 (Fed. Cir. 1998). "[I]n all aspects of claim construction, 'the name of the game is the claim.'" *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1298 (Fed. Cir. 2014) (quoting *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998)). First, a term's context in the asserted claim can be instructive. *Phillips*, 415 F.3d at 1314. Other asserted or unasserted claims can also aid in determining the claim's meaning, because claim terms are typically used consistently throughout the patent. *Id.* Differences among the claim terms can also assist in understanding a term's meaning. *Id*. For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id*. at 1314–15.

"[C]laims 'must be read in view of the specification, of which they are a part.'" *Id*. at 1315 (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc)). "[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Phillips*, 415 F.3d at 1315 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex, Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). But, "'[a]lthough the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims.'" *Comark Commc'ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)); *see also Phillips*, 415 F.3d at 1323. "[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear

indication in the intrinsic record that the patentee intended the claims to be so limited." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

The prosecution history is another tool to supply the proper context for claim construction because, like the specification, the prosecution history provides evidence of how the U.S. Patent and Trademark Office ("PTO") and the inventor understood the patent. *Phillips*, 415 F.3d at 1317. However, "because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* at 1318; *see also Athletic Alternatives, Inc. v. Prince Mfg.*, 73 F.3d 1573, 1580 (Fed. Cir. 1996) (ambiguous prosecution history may be "unhelpful as an interpretive resource").

Although extrinsic evidence can also be useful, it is "'less significant than the intrinsic record in determining the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc.*, 388 F.3d at 862). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id*. at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert's conclusory, unsupported assertions as to a term's definition are not helpful to a court. *Id*. Extrinsic evidence is "less reliable than the patent and its prosecution history in determining how to read claim terms." *Id*. The Supreme Court has explained the role of extrinsic evidence in claim construction:

> In some cases, however, the district court will need to look beyond the patent's intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period. *See, e.g., Seymour v. Osborne*, 11 Wall. 516, 546 (1871)

> (a patent may be "so interspersed with technical terms and terms of art that the testimony of scientific witnesses is indispensable to a correct understanding of its meaning"). In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the "evidentiary underpinnings" of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal.

Teva Pharm. USA, Inc. v. Sandoz, Inc., 135 S. Ct. 831, 841 (2015).

B. Departing from the Ordinary Meaning of a Claim Term

There are "only two exceptions to [the] general rule" that claim terms are construed according to their plain and ordinary meaning: "1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of the claim term either in the specification or during prosecution."[3] *Golden Bridge Tech., Inc. v. Apple Inc.*, 758 F.3d 1362, 1365 (Fed. Cir. 2014) (quoting *Thorner v. Sony Computer Entm't Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)); *see also GE Lighting Solutions, LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) ("[T]he specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal."). The standards for finding lexicography or disavowal are "exacting." *GE Lighting Solutions*, 750 F.3d at 1309.

To act as his own lexicographer, the patentee must "clearly set forth a definition of the disputed claim term," and "clearly express an intent to define the term." *Id.* (quoting *Thorner*, 669 F.3d at 1365); *see also Renishaw*, 158 F.3d at 1249. The patentee's lexicography must appear "with reasonable clarity, deliberateness, and precision." *Renishaw*, 158 F.3d at 1249.

To disavow or disclaim the full scope of a claim term, the patentee's statements in the specification or prosecution history must amount to a "clear and unmistakable" surrender. *Cordis*

[3] Some cases have characterized other principles of claim construction as "exceptions" to the general rule, such as the statutory requirement that a means-plus-function term is construed to cover the corresponding structure disclosed in the specification. *See, e.g., CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1367 (Fed. Cir. 2002).

Corp. v. Boston Sci. Corp., 561 F.3d 1319, 1329 (Fed. Cir. 2009); *see also Thorner*, 669 F.3d at 1366 ("The patentee may demonstrate intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope."). "Where an applicant's statements are amenable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable." *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1326 (Fed. Cir. 2013).

C. Functional Claiming and 35 U.S.C. § 112, ¶ 6 (pre-AIA) / § 112(f) (AIA)

A patent claim may be expressed using functional language. *See* 35 U.S.C. § 112, ¶ 6; *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1347–49 & n.3 (Fed. Cir. 2015) (en banc in relevant portion). Section 112, Paragraph 6, provides that a structure may be claimed as a "means . . . for performing a specified function" and that an act may be claimed as a "step for performing a specified function." *Masco Corp. v. United States*, 303 F.3d 1316, 1326 (Fed. Cir. 2002).

But § 112, ¶ 6 does not apply to all functional claim language. There is a rebuttable presumption that § 112, ¶ 6 applies when the claim language includes "means" or "step for" terms, and that it does not apply in the absence of those terms. *Masco*, 303 F.3d at 1326; *Williamson*, 792 F.3d at 1348. The presumption stands or falls according to whether one of ordinary skill in the art would understand the claim with the functional language, in the context of the entire specification, to denote sufficiently definite structure or acts for performing the function. *See Media Rights Techs., Inc. v. Capital One Fin. Corp.*, 800 F.3d 1366, 1372 (Fed. Cir. 2015) (§ 112, ¶ 6 does not apply when "the claim language, read in light of the specification, recites sufficiently definite structure" (quotation marks omitted) (citing *Williamson*, 792 F.3d at 1349; *Robert Bosch, LLC v. Snap-On Inc.*, 769 F.3d 1094, 1099 (Fed. Cir. 2014))); *Williamson*, 792 F.3d at 1349 (§ 112, ¶ 6 does not apply when "the words of the claim are understood by persons of ordinary skill in the art

to have sufficiently definite meaning as the name for structure"); *Masco*, 303 F.3d at 1326 (§ 112, ¶ 6 does not apply when the claim includes an "act" corresponding to "how the function is performed"); *Personalized Media Communications, L.L.C. v. International Trade Commission*, 161 F.3d 696, 704 (Fed. Cir. 1998) (§ 112, ¶ 6 does not apply when the claim includes "sufficient structure, material, or acts within the claim itself to perform entirely the recited function … even if the claim uses the term 'means.'" (quotation marks and citation omitted)).

When it applies, § 112, ¶ 6 limits the scope of the functional term "to only the structure, materials, or acts described in the specification as corresponding to the claimed function and equivalents thereof." *Williamson*, 792 F.3d at 1347. Construing a means-plus-function limitation involves multiple steps. "The first step … is a determination of the function of the means-plus-function limitation." *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248 F.3d 1303, 1311 (Fed. Cir. 2001). "[T]he next step is to determine the corresponding structure disclosed in the specification and equivalents thereof." *Id.* A "structure disclosed in the specification is 'corresponding' structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim." *Id.* The focus of the "corresponding structure" inquiry is not merely whether a structure is capable of performing the recited function, but rather whether the corresponding structure is "clearly linked or associated with the [recited] function." *Id.* The corresponding structure "must include all structure that actually performs the recited function." *Default Proof Credit Card Sys. v. Home Depot U.S.A., Inc.*, 412 F.3d 1291, 1298 (Fed. Cir. 2005). However, § 112 does not permit "incorporation of structure from the written description beyond that necessary to perform the claimed function." *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999).

For § 112, ¶ 6 limitations implemented by a programmed general purpose computer or microprocessor, the corresponding structure described in the patent specification must include an algorithm for performing the function. *WMS Gaming Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1349 (Fed. Cir. 1999). The corresponding structure is not a general purpose computer but rather the special purpose computer programmed to perform the disclosed algorithm. *Aristocrat Techs. Austl. Pty Ltd. v. Int'l Game Tech.*, 521 F.3d 1328, 1333 (Fed. Cir. 2008).

D. Definiteness Under 35 U.S.C. § 112, ¶ 2 (pre-AIA) / § 112(b) (AIA)

Patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112, ¶ 2. A claim, when viewed in light of the intrinsic evidence, must "inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014). If it does not, the claim fails § 112, ¶ 2 and is therefore invalid as indefinite. *Id.* at 901. Whether a claim is indefinite is determined from the perspective of one of ordinary skill in the art as of the time the application for the patent was filed. *Id.* at 911. As it is a challenge to the validity of a patent, the failure of any claim in suit to comply with § 112 must be shown by clear and convincing evidence. *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1365 (Fed. Cir. 2017). "[I]ndefiniteness is a question of law and in effect part of claim construction." *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 517 (Fed. Cir. 2012).

When a term of degree is used in a claim, "the court must determine whether the patent provides some standard for measuring that degree." *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1378 (Fed. Cir. 2015) (quotation marks omitted). Likewise, when a subjective term is used in a claim, "the court must determine whether the patent's specification supplies some standard for measuring the scope of the [term]." *Datamize, LLC v. Plumtree Software, Inc.*, 417

F.3d 1342, 1351 (Fed. Cir. 2005). The standard "must provide objective boundaries for those of skill in the art." *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014).

In the context of a claim governed by 35 U.S.C. § 112, ¶ 6, the claim is invalid as indefinite if the claim fails to disclose adequate corresponding structure to perform the claimed function. *Williamson*, 792 F.3d at 1351–52. The disclosure is inadequate when one of ordinary skill in the art "would be unable to recognize the structure in the specification and associate it with the corresponding function in the claim." *Id*. at 1352.

III. AGREED CONSTRUCTIONS

The parties have agreed to the following constructions set forth in their P.R. 4-3 Joint Claim Construction and Prehearing Chart.[4] (Dkt. No. 76.)

Term	Agreed Construction
"serially multiplexing first control signals and data signals, wherein the first control signals are placed at a front part of the multiplexed signals and the data signals are placed at a rear part of the multiplexed signals" • '833 Patent Claims 1, 8	first control signals and data signals are mapped with a sequence in which one is directly after the other, wherein the first control signals are placed at a front part of the multiplexed signals and the data signals are placed at a rear part of the multiplexed signals
"mapping the multiplexed signals to" • '833 Patent Claim 1, 8	after placing the first control signals and the data signals [in step (a)], mapping the multiplexed signals to
"mapping ACK/NACK control signals to" • '833 Patent Claim 1, 8	after mapping the multiplexed signals [in step (b)], mapping ACK/NACK control signals to
"transport format" • '284 Patent Claim 1, 14[5]	transport format, transport block size, payload size, or modulation and coding scheme
"based on a received uplink signal" • '774 Patent Claim 6	no construction necessary

[4] The parties did not provide these agreements in their P.R. 4-5(d) Joint Claim Construction Chart (Dkt. No. 95.)

[5] Only the highest-level claim in each dependency chain is listed.

Having reviewed the intrinsic and extrinsic evidence of record, the Court hereby adopts the parties' agreed constructions.

IV. CONSTRUCTION OF DISPUTED TERMS

A. U.S. Patent No. 8,005,154

The '154 Patent is entitled Method and Apparatus for Transmitting and Receiving Shared Control Channel Message in a Wireless Communication System Using Orthogonal Frequency Division Multiple Access. The application leading to the '154 Patent was filed on December 26, 2007 and the patent states a priority claim to a foreign application filed on December 22, 2006.

In general, the patent is directed to technology for "configuring and transmitting/receiving a message of a Forward Shared Control Channel (F-SCCH) to support various antenna technologies for forward data transmission in a wireless communication system using OFDMA." '154 Patent at 7:58–62. A "shared control channel … includes control information necessary for demodulation of the transmission data" that is transmitted together with the shared control channel. *Id.* at 5:9–13. In an embodiment of the invention, the shared control channel includes a TD-FLAM field to "identify Transmit Diversity (TD) technologies agreed upon between a base station and a terminal to determine which precoding is used for data transmission in an OFDMA wireless communication system." *Id.* 6:29–33; *see also, id.* at 8:8–67.

With reference to Figure 6, reproduced and annotated by the Court below, the patent describes an exemplary "process in which to demodulate data transmitted over the forward link, a terminal receives a shared control channel, analyzes its message, and demodulates a data channel depending on the analysis result." *Id*. at 11:7–10. "In step 602, the terminal receives a shared control channel from the base station, and demodulates it to acquire a message. In step 603 [(green)], the terminal determines whether the base station uses the common pilot or uses the dedicated pilot at the corresponding time." *Id*. at 11:15–20. In step 604 (green), the terminal determines whether

precoding feedback (BFCH) is enabled. *Id*. at 11:20–23. The patent elsewhere explains that "[t]he rule for determining which feedback channel the base station will enable and which feedback channel the base station will disable is commonly agreed upon between the base station and the terminal by Layer-3 signaling." *Id*. at 9:30–33. Based on pilot and feedback type, the message type is then determined (605, 608, and 611, yellow). *Id*. at 11:20–27, 11:38–41, 11:52–54. The data

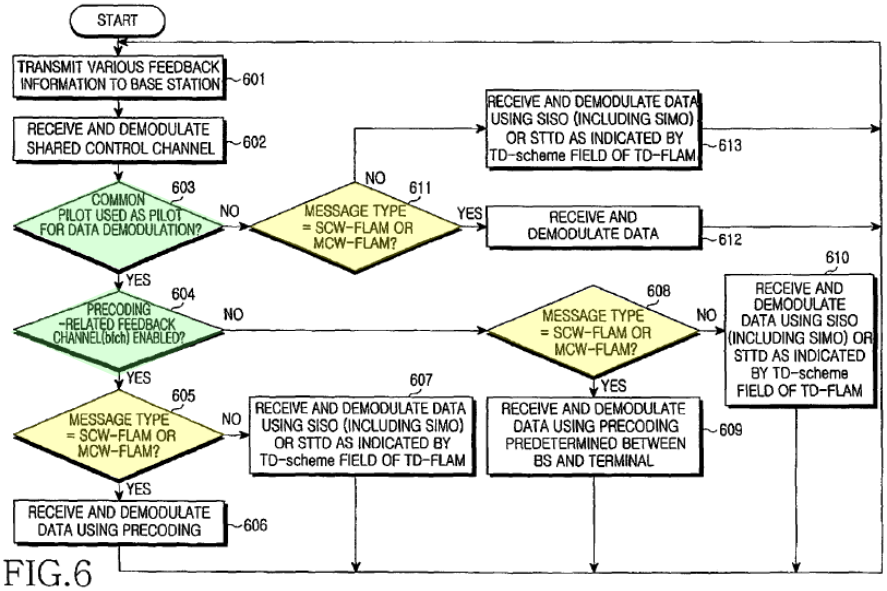

FIG.6

channel is received and demodulated based on the message type and TD-FLAM control information (606, 607, 609, 610, 612, 613).

The patent also describes an exemplary receiver with reference to Figure 8, reproduced and annotated by the Court below: "the receiver includes a demodulation and channel decoding unit 802, a control information extractor 803, a controller 804, a reception processor 805, a reception combiner 806, and a demodulation, channel decoding & interference cancellation unit 807." *Id*. at 12:35–39. Operation of the receiver is described as follows:

> A control channel reception unit composed of the demodulation and channel decoding unit 802 and the ***control information extractor 803*** extracts control information ***through a demodulation and channel decoding process on the signal received over a specific control channel***. The ***extracted control information is input to the controller 804***. The controller 804 controls a data channel reception

unit composed of the reception processor 805, the reception combiner 806 and the demodulation, channel decoding & interference cancellation unit 807 using the method described in FIG. 6.

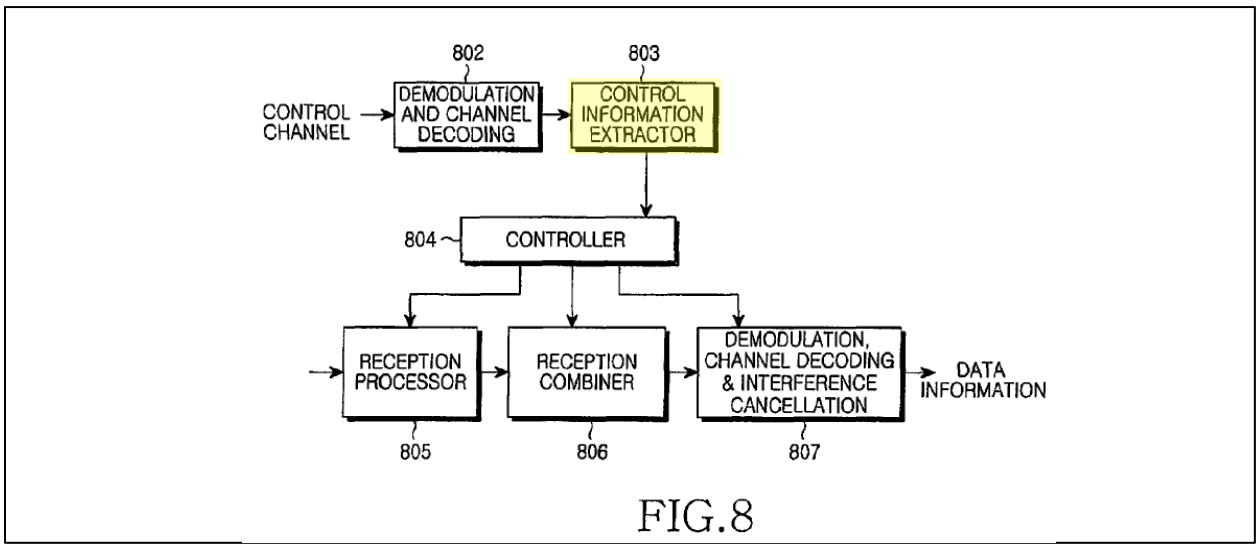

FIG.8

Id. at 12:40–49 (emphasis added).

The abstract of the ’154 Patent provides:

> A method and apparatus for transmitting/receiving a shared control channel message in an Orthogonal Frequency Division Multiple Access (OFDMA) wireless communication system are provided. The message transmission apparatus receives feedback information from a terminal; determines whether to transmit data by applying preceding; and transmits, in the shared control channel message, control information whose message type is differently set according to the application of the preceding. The message reception apparatus receives the shared control channel message from a base station; determines a message type of the shared control channel message; and if the message type is a Transmit Diversity (TD)-Forward Link Assignment Message (FLAM), demodulates data by at least one of Single Input Single Output (SISO) and Spatial Time Transmit Diversity (STTD) as indicated by the TD-FLAM.

Claim 37, an exemplary asserted claim from the ’154 Patent, is reproduced below with the term in dispute emphasized:

> **37**. An apparatus for receiving downlink shared channel in an Orthogonal Frequency Division Multiple Access (OFDMA) wireless communication system, the apparatus comprising:
>
> a reception unit for receiving downlink control channel comprising transmission scheme information for downlink shared channel data and downlink shared channel data from a base station;

a ***control information extractor for configuring transmission information for the downlink control channel via higher layer signaling***;
a demodulator for demodulating the downlink shared channel data; and
a controller for controlling the reception unit to receive the downlink control channel with a format corresponding to the transmission information and the demodulator to demodulate the downlink shared channel data according to the transmission scheme information included in the format,
wherein the transmission scheme information indicates that a Transmit Diversity or Open-Loop Spatial Multiplexing is used for transmitting the downlink shared channel data.

A-1. "control information extractor for configuring transmission information for the downlink control channel via higher layer signaling"

Disputed Term[6]	Plaintiffs' Proposed Construction	Defendant's Proposed Construction
"control information extractor for configuring transmission information for the downlink control channel via higher layer signaling" • '154 Patent Claim 37	no construction necessary: not 35 U.S.C. § 112, ¶ 6, not indefinite alternatively (if § 112, ¶ 6), • **function**: configuring transmission information for the downlink control channel via higher layer signaling • **structure**: hardware programmed, or hardware with software programmed, to extract transmission information for the downlink control channel; for example, as shown and described in Figures 5, 6, and 8 and at 9:1-33, 11:12-65 and 12:33-58, and equivalents thereof	35 U.S.C. § 112, ¶ 6, indefinite • **function**: configuring transmission information for the downlink control channel via higher layer signaling • **structure**: indefinite

The Parties' Positions

Plaintiffs submit: The "control information extractor" term is not governed by 35 U.S.C. § 112, ¶ 6 for two reasons. First, the term "control information extractor" is a term of art for specific structure. Second, the claim provides the structure of this term by providing the

[6] For all disputed-term charts in this order, the claims in which the term is found are listed with the term but: (1) only the highest-level claim in each dependency chain is listed, and (2) only asserted claims identified in the parties' P.R. 4-5(d) Joint Claim Construction Chart (Dkt. No. 95) are listed.

"objectives and operations" of the extractor. Thus, the presumption against applying § 112, ¶ 6 is not overcome. Even if § 112, ¶ 6 applies to this term, the '154 Patent satisfies that statute's disclosure requirements (citing '154 Patent Figs.5, 8; 9:30–33, 9:63–10 :15, 11:30–36, 12:35–45, 12:64–67). (Dkt. No. 82 at 9–13.)

In addition to the claims themselves, Plaintiffs cite the following intrinsic and extrinsic evidence to support their position: **Intrinsic evidence**: '154 Patent Figs.5, 8; 9:30–33, 9:63–10:15, 11:30–36, 12:35–45, 12:64–67. **Extrinsic evidence**: Mahon Decl.[7] ¶¶ 93–113 (Plaintiffs' Ex. 7, Dkt. No. 82-7); Akbar Rahbar, *Quality of Service in Optical Packet Switched Networks* 310–11 (2015) (Plaintiffs' Ex. 8, Dkt. No. 82-8 at 20–21); *Microsoft Computer Dictionary* at 203 (5th ed. 2002), "extract" (Plaintiffs' Ex. 9, Dkt. No. 82-9 at 4).

Defendant responds: The "control information extractor" term is governed by § 112, ¶ 6 and is indefinite because: (1) the extractor is defined by its function rather than being a name for definite structure, (2) the claim itself does not provide sufficient structure for performing the recited function, and (3) the '154 Patent does not disclose structure for performing the recited function, which requires "configuring … via higher layer signaling" at the mobile station rather than extracting control information. First, the *Rahbar* publication that Plaintiffs' present as evidence that "control information extractor" is a term of art denoting definite structure does not establish such. Rather, *Rahbar* is addressed to different art (optical-fiber networks instead of wireless communications), postdates the '154 Patent's filing date by eight years, uses the term "control information extractor unit" to denote a functional black box rather than any structure, and describes a different function than is provided in the claim. Second, the claim-recited function alone does not denote any definite structure. Finally, the "control information extractor" described

[7] Dr. Mark Mahon's Declaration in Support of Plaintiffs' Claim Construction Positions.

in the patent is merely a functional black box, not structure, and it is not clearly linked with the claimed function. In fact, there is no structure described in the patent that is linked with "configuring transmission information for the downlink control channel via higher layer signaling" at the mobile station. (Dkt. No. 86 at 7–14.)

In addition to the claims themselves, Defendant cites the following intrinsic and extrinsic evidence to support its position: **Intrinsic evidence**: '154 Patent Fig.8, 9:30–33, 12:1–52, 12:54–55. **Extrinsic evidence**: Beuhrer Decl.[8] ¶¶ 40–41, 45–48, 50–57, 60 (Defendant's Ex. 2, Dkt. No. 86-3); *Rahbar* at 310 (Dkt. No. 82-8 at 20).

Plaintiffs reply: While the '154 Patent may describe the "configuring" function in the context of a base station, the description sufficiently informs the claimed configuring for the mobile station. For example, Figure 6 depicts a flow for configuring the mobile station based on control information received by the mobile station. (Dkt. No. 92 at 6–8.)

Plaintiffs cite further intrinsic and extrinsic evidence to support their position: **Intrinsic evidence**: '154 Patent Fig.6. **Extrinsic evidence**: Mahon Decl. ¶ 47.

Analysis

There are two issues in dispute. First, whether the "control information extractor" term should be governed by 35 U.S.C. § 112, ¶ 6. Second, if the term is governed by § 112, ¶ 6, whether the '154 Patent satisfies the disclosure requirements of the statute. The Court determines that this term is not governed by § 112, ¶ 6 and therefore does not address the second issue.

Defendant has not overcome the presumption against applying § 112, ¶ 6. The Court begins with the presumption that § 112, ¶ 6 does not apply because the term does not include the "means"

[8] Declaration of Dr. R. Michael Buehrer in Support of Defendant Apple Inc.'s Claim Construction Brief

language traditionally used to signal application of the statute. *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1347–49 & n.3 (Fed. Cir. 2015) (en banc in relevant portion). This "presumption can be overcome and § 112, para. 6 will apply if the challenger demonstrates that the claim term fails to recite sufficiently definite structure or else recites function without reciting sufficient structure for performing that function." *Id.* at 1349 (quotation marks omitted). "[T]he mere fact that the disputed limitations incorporate functional language does not automatically convert the words into means for performing such functions." *Zeroclick, LLC v. Apple Inc.*, 891 F.3d 1003, 1008 (Fed. Cir. 2018). "The question whether [a term] invokes section 112, paragraph 6, depends on whether persons skilled in the art would understand the claim language to refer to structure, assessed in light of the presumption that flows from the drafter's choice not to employ the word 'means.'" *Samsung Elecs. Am., Inc. v. Prisua Eng'g Corp.*, 948 F.3d 1342, 1354 (Fed. Cir. 2020). Here, Defendant has not overcome the presumption against § 112, ¶ 6.

"Control information extractor" connotes structure; namely, software/hardware in a communication device that includes functionality for configuring transmission information for the downlink control channel. Claim 1 provides sufficient indications of the structural nature of the control information extractor by providing the objectives and operations of the extractor within the invention. For example, the claim recites that the extractor configures the transmission information for the downlink control channel and that the controller controls the reception unit to receive the downlink control channel with a format corresponding to the transmission information. The Court understands that the extractor is providing the transmission information to the controller for the purpose of controlling the reception unit to receive data in the format provided by the transmission information. This suggests that § 112, ¶ 6 should not apply. *See, e.g., Linear Tech. Corp. v. Impala Linear Corp.*, 379 F.3d 1311, 1319–21 (Fed. Cir. 2004) ("circuit [for performing a function]"

found to be sufficiently definite structure because the claim recited the "objectives and operations" of the circuit); *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1295, 1301 (Fed. Cir. 2014) ("heuristic [for performing a function]" found to be sufficiently definite structure in part because the claim described the operation and objectives of the heuristic); *Zeroclick, LLC v. Apple Inc.*, 891 F.3d 1003, 1008 (Fed. Cir. 2018) ("program that can [perform function]" found to be sufficiently definite structure in part because the claims provided operational context for the program); *Prisua Eng'g Corp.*, 948 F.3d at 1347–48, 1353–54 ("digital processing unit … performing [functions]" found to be sufficiently definite structure in part because the claims provided operational context for the unit). Further, the patent describes the extractor as structural: it is a component of a receiver that is connected to the controller and provides extracted control information to the controller. Finally, and while Defendant's expert has expressed a contrary view, Plaintiffs' expert has opined that "control information extractor" denoted structure at the relevant time period. (Mahon Decl. ¶¶ 93–99, Dkt. No. 82-7 at 43–46.) Given this context, Defendant has failed to overcome the presumption against application of § 112, ¶ 6.

Accordingly, the Court determines that Defendant has failed to establish that "control information extractor for configuring transmission information for the downlink control channel via higher layer signaling" should be governed by § 112, ¶ 6 or that Claim 37 is indefinite for including the term.

B. U.S. Patent No. 8,019,332

The '332 Patent is entitled Method for Transmitting and Receiving Control Information Through PDCCH. The application leading to the '332 Patent was filed on December 8, 2010 and the patent states an earliest priority claim to a provisional application filed on February 19, 2008.

In general, the patent is directed to technology "for efficiently transmitting and receiving control information through a Physical Downlink Control Channel (PDCCH)." '332 Patent at

1:22–26. The patent generally describes an approach to limiting the Control Channel Elements (CCEs) available to User Equipment (UE) for the PDCCH in order to reduce search processing by the UE. Different UEs may be allocated different CCEs based on different starting positions for the PDCCH. *See, e.g., id*. at 2:18–22, 5:26–47, 5:58–67.

The abstract of the ’332 Patent provides:

> A method for efficiently transmitting and receiving control information through a Physical Downlink Control Channel (PDCCH) is provided. When a User Equipment (UE) receives control information through a PDCCH, the received control information is set to be decoded in units of search spaces, each having a specific start position in the specific subframe. Here, a modulo operation according to a predetermined first constant value (D) is performed on an input value to calculate a first result value, and a modulo operation according to a predetermined first variable value (C) corresponding to the number of candidate start positions that can be used as the specific start position is performed on the calculated first result value to calculate a second result value and an index position corresponding to the second result value is used as the specific start position. Transmitting control information in this manner enables a plurality of UEs to efficiently receive PDCCHs without collisions.

Claim 6, an exemplary asserted claim from the ’332 Patent, is reproduced below with the terms in dispute emphasized:

> **6**. A user equipment (UE) for decoding control information, the UE comprising:
> a receiver for receiving a Physical Downlink Control Channel (PDCCH) from a base station at subframe k; and
> a decoder for decoding a set of PDCCH candidates within a search space of the PDCCH at the subframe k, wherein each of the set of PDCCH candidates comprises `L` control channel elements (CCEs),
> wherein the `L` CCEs corresponding to a specific PDCCH candidate among the set of PDCCH candidates of the search space at the subframe k are contiguously located from a position ***given by using a variable of Y_k for the subframe k and a modulo `C` operation***, wherein `C` is determined as `floor(N/L)`, wherein `N` represents a total number of CCEs in the subframe k, and
> ***wherein Y_k is defined by:***
> $$Y_k=(A*Y_{k-1}) \bmod D,$$
> wherein A, and D are predetermined constant values.

B-1. "given by using a variable of Y_k for the subframe k and a modulo 'C' operation"

Disputed Term	Plaintiffs' Proposed Construction	Defendant's Proposed Construction
"given by using a variable of Y_k for the subframe k and a modulo 'C' operation" • '332 Patent Claims 1, 6	no construction necessary	given by one of: • $L\cdot[(A\cdot Y_k+B) \bmod D] \bmod C$ or • $L\cdot(Y_k \bmod C)$

The Parties' Positions

Plaintiffs submit: The '332 Patent discloses multiple embodiments that are consistent with this claim term and limiting the term to Defendant's proposed equations would improperly exclude several of those embodiments. Further, dependent claims 4, 5, 9, and 10 each recite specific mathematical expressions for the term, indicating that the term itself should not be limited to any specific mathematical expression. Finally, it is not proper to limit this term to specific described embodiments based solely on an enablement argument—enablement is a distinct issue. (Dkt. No. 82 at 14–17.)

In addition to the claims themselves, Plaintiffs cite the following **extrinsic evidence** to support their position: Madisetti Decl.[9] ¶¶ 36–39 (Plaintiffs' Ex. 10, Dkt. No. 82-10); Lanning '332 Decl.[10] ¶ 125 (Plaintiffs' Ex. 11, Dkt. No. 82-11).

Defendant responds: The disputed term is set forth in the claims to denote how the start position for a candidate Physical Downlink Control Channel (PDCCH) is calculated. "[T]o satisfy the written description requirement, the claimed calculation must be one or more of [the formulas disclosed in the '332 Patent]." In the context of the claims, the start position is necessarily given as a CCE index rather than a CCE-aggregation index. As there are only two formulas provided in

[9] Declaration of Dr. Vijay Madisetti.
[10] Declaration of Mark Lanning Pursuant to Patent Local Rule 4-3(B): U.S. Patent No. 8,019,332.

the ’332 Patent for providing a start location as a CCE index using Y_k and a modulo ‘C’ operation, the term should be limited to those two equations, denoted Expression 4 and Expression 6 in the patent. The dependent claims are consistent with this construction, as they further narrow the scope to only one of the formulas. (Dkt. No. 86 at 20–24.)

In addition to the claims themselves, Defendant cites the following intrinsic and extrinsic evidence to support its position: **Intrinsic evidence**: ’332 Patent at 7:22, 9:15–33, 9:56–61, 10: 3–8. **Extrinsic evidence**: Lanning ’332 Decl.[11] ¶¶ 51, 128–56 (Defendant’s Ex. 3, Dkt. No. 86-4); Madisetti Decl. ¶¶ 34–36, 39.

Plaintiffs reply: It would be improper to limit the claims to two of the exemplary embodiments, as Defendant proposes. Further, while dependent Claims 4 and 9 may be limited to a start position based on a CCE index, independent Claims 1 and 6 are not so limited. (Dkt. No. 92 at 8–9.)

Analysis

The issue in dispute distills to whether the claims should be limited to two exemplary embodiments of a formula for calculating a CCE start-position for a candidate PDCCH. They should not.

The Court declines to limit the claims to the disclosed embodiments identified by Defendant. To begin, the claims rather than the embodiments define the invention. *Phillips*, 415 F.3d at 1312, 1323 (“although the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments”). Defendant’s argument that limiting the claims to the embodiments is necessary to satisfy the written description and enablement requirements is not persuasive. (Dkt. No. 86 at 20–21; Lanning ’332 Decl. ¶ 133,

[11] This is the same declaration submitted by Plaintiffs as Dkt. No. 82-11.

Dkt. No. 86-4 at 45–46.) Determining whether written-description and enablement requirements are met is distinct from determining claim scope. *See Phillips*, 415 F.3d at 1327 ("we have certainly not endorsed a regime in which validity analysis is a regular component of claim construction"). Further, the patent need not disclose every embodiment that falls within the scope of the claims. *Toshiba Corp. v. Imation Corp.*, 681 F.3d 1358, 1369 (Fed. Cir. 2012) ("a patentee need not describe in the specification every conceivable and possible future embodiment of his invention" (quotation marks omitted)); *Rexnard Corp. v. Laitram Corp.*, 274 F.3d 1336, 1344 (Fed. Cir. 2001) (a patent "applicant is not required to describe in the specification every conceivable and possible future embodiment of his invention").

The Court is also not persuaded that the independent claims are necessarily limited to CCE-based units of measure. The '332 Patent teaches that the CCE search space may be defined by CCE aggregations or by CCE units. *See, e.g.*, '332 Patent at 9:5–27. In either case, the number of CCEs that are used to transmit one PDCCH, "L_{CCE}" or "L" in the patent, may be a factor in the defining the search space. For example, "mathematical expression 3" is directed to defining the start position of a CCE search space in terms of an aggregation index: "$Z_k = [(A \cdot y_k + B) \bmod D] \bmod C$." *Id*. at 8:7 – 9:13. The term "C" is elsewhere defined: "$C = \text{floor}(N_{CEE}/L_{CEE})$." *Id*. at col.7 ll.9–27. This start position may be redefined to denote "a corresponding position based on an index assigned to each CCE rather than an index assigned to each CCE aggregation" simply by multiplying the start position of "mathematical expression 3" by L_{CEE} to yield "$Z_k = L_{CCE} \cdot [(A \cdot y_k + B) \bmod D] \bmod C$." *Id*. at 9:17–45 ("mathematical expression 4"). In other words, L contiguous CCEs (a CCE aggregation) are located by an aggregation index according to "mathematical expression 3" and equivalently by a CCE index according to "mathematical

expression 4," which includes a "L" multiplier. Dependent Claims 4, 5, 9, 10, 19, and 20 expressly recite determining a start position using this "L" multiplier. The independent claims do not.

Accordingly, the Court rejects Defendant's proposal to limit the claims to two specific exemplary embodiments and determines that "given by using a variable of Y_k for the subframe k and a modulo 'C' operation" has its plain and ordinary meaning without the need for further construction.

B-2. "wherein Y_k is defined by: $Y_k=(A*Y_{k-1})\text{mod } D$"

Disputed Term	Plaintiffs' Proposed Construction	Defendant's Proposed Construction
"wherein Y_k is defined by: $Y_k=(A*Y_{k-1})\text{mod } D$" • '332 Patent Claims 1, 6	no construction necessary	indefinite

The Parties' Positions

Plaintiffs submit: The '332 Patent provides guidance regarding the "types of initial values that can be used" in the sequence defined by $Y_k=(A*Y_{k-1})\text{mod } D$ and the claims need not specify an initial value to be definite. For example, the patent explains that the initial value may be provided by: "$Y_{-1}=n_{RNTI}\neq 0$ [where] n_{RNTI} corresponds to a UE ID" (quoting '332 Patent at 9:62–63). Further, the claims are open ended, thus they may encompass a variety of unrecited initial values. Finally, the claims themselves do not need to be enabling, that is a function of the patent's technical disclosure. (Dkt. No. 82 at 17–22.)

In addition to the claims themselves, Plaintiffs cite the following intrinsic and extrinsic evidence to support their position: **Intrinsic evidence**: '332 Patent Figs.8, 9, 11–14, 8:5–29, 9:56, 9:61–63, 10:21–22, 10:36–38; U.S. Patent No. 8,213,377; U.S. Patent No. 8,717,904.[12] **Extrinsic**

[12] U.S. Patents No. 8,717,904 and No. 8,213,377 are related to the '332 Patent through shared priority claims to U.S. Patent App. No. 12/252,270 (U.S. Patent No. 7,873,004).

evidence: Madisetti Decl. ¶¶ 23–32 (Plaintiffs' Ex. 10, Dkt. No. 82-10); Lanning '332 Decl. ¶ 29 (Defendant's Ex. 3, Dkt. No. 86-4).

Defendant responds: The equation $Y_k=(A*Y_{k-1})\text{mod } D$ is recursive in that a given value, Y_k, depends on a previous value, Y_{k-1}; thus, without specifying the starting point—i.e., the first Y_k—the meaning of Y_k is not reasonably certain. (Dkt. No. 86 at 14–20.)

In addition to the claims themselves, Defendant cites the following intrinsic and extrinsic evidence to support its position: **Intrinsic evidence**: '332 Patent at 8:7–29, 9:62–63, 10:22–25, 10:32–43; U.S. Patent No. 7,973,004[13] (Defendant's Ex. 6, Dkt. No. 86-7); U.S. Patent No. 7,973,004 File Wrapper April 2, 2010 Preliminary Amendment (submitting translation of December 23, 2009 Notice of Submission of Opinion of the Korean Intellectual Property Office with Request for Participation in the Patent Prosecution Highway (PPH) Program) (Defendant's Ex. 5, Dkt. No. 86-6 at 39–58); U.S. Patent No. 8,717,904 File Wrapper (Defendant's Ex. 9, Dkt. No. 86-10); U.S. Patent No. 8,213,377 File Wrapper (Defendant's Ex. 10, Dkt. No. 86-11). **Extrinsic evidence**: Lanning '332 Decl. ¶¶ 31–39, 72–103, 110–21 (Defendant's Ex. 3, Dkt. No. 86-4); Madisetti Decl. ¶¶ 9–11, 27.

Plaintiffs reply: Like the variables A and D in the equation, which Defendant does not dispute can take on many different values without rendering the claims indefinite, Y_{-1} can take on many different values without rendering the claims indefinite. (Dkt. No. 92 at 9–11.)

Plaintiffs cite further **extrinsic evidence** to support their position: Lanning '332 Decl. ¶¶ 117–18.

[13] The '332 Patent purports to be a continuation of the application that issued as U.S. Patent No. 7,873,004. '332 Patent, at [63] Related U.S. Application Data.

Analysis

The issue in dispute distills to whether claims directed to decoding within a search space "at subframe k" using a start position calculated using the variable Y_k, which has a value that depends on the variable's value for a previous subframe, k-1, are indefinite for failing to specify the ultimate beginning value of that variable (e.g., Y_{-1}). They are not.

What Defendant presents as an issue of indefiniteness the Court interprets as an issue of breadth. The '332 Patent is clear that the recursive function has an initial value. *See, e.g.*, '332 Patent at 8:14–29 (noting "$y_0 = x$" and "an initial value 'x' must be input"), 9:63–62 ("$Y_{-1} = n_{RNTI} \neq 0$"), 10:39–43 ("all of the following information items or combinations thereof can be used to create initial values [list]"). That the initial value may be any of a wide variety of values goes to breadth rather than indefiniteness. The Federal Circuit addressed a similar issue in *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360 (Fed. Cir. 2017). There, the Federal Circuit criticized—and reversed—a district court that: "credit[ed] [the expert's] assertion that 'a practically limitless number of materials' could catalyze SCR of NOx, and … treat[ed] that scope as 'indicating that the claims, as written, fail to sufficiently identify the material compositions.'" *Id*. at 1367. The Federal Circuit held that "the inference of indefiniteness simply from the scope finding is legally incorrect: 'breadth is not indefiniteness.'" *Id*. (quoting *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1341 (Fed. Cir. 2005)). Ultimately, *BASF* held that "the claims and specification let the public know that any known SCR and AMOx catalysts can be used as long as they play their claimed role in the claimed architecture." *Id*. Here, the Y_k is akin to the catalysts in *BASF*—the claims and the specification of the '332 Patent let the public know that any initial value may be used, so long as Y_k plays its claimed role in the claimed process or device.

Accordingly, the Court determines that Defendant has not established that any claim is indefinite for including "wherein Y_k is defined by: $Y_k=(A*Y_{k-1})\text{mod } D$" and determines that this term has its plain and ordinary meaning without the need for further construction.

C. U.S. Patent No. 8,385,284

The '284 Patent is entitled Control Channel Signaling Using a Common Signaling Field for Transport Format and Redundancy Version. The application leading to the '284 Patent was filed on December 18, 2008 and the patent states an earliest priority claim to a foreign application filed on December 20, 2007.

In general, the patent is directed to technology for efficient use of control channels by reducing the amount of data (bits) needed to signal transport format and redundancy version for the associated user data. The patent discloses using a single field, the "control information field" to signal both transport format and redundancy. *See, e.g.*, '284 Patent at 6:57–7:14. In one embodiment of this field, the field is subdivided into two subsets: "a first subset of the values is reserved for indicating a transport format of the protocol data unit and a second subset of values are reserved for indicating a redundancy version for transmitting the user data." *Id*. at 7:36–46. The patent further provides that the first subset of values

> are used to indicate a transport format associated to a given fixed or preconfigured redundancy version (In this case one could speak of an explicit signaling of the transport format and a simultaneous implicit signaling of the redundancy version). All or part of the remaining values is used to indicate additional redundancy versions that may be for example used for retransmissions of the protocol data unit.

Id. at 15:29–41. The transport format may be indicated by, e.g., "the transport block size of the data (payload size, information bits size), the Modulation and Coding Scheme (MCS) level, the Spectral Efficiency, the code rate, etc." *Id*. at 3:29–4:3. Further, the patent instructs:

> in all embodiments of this invention the term "transport format" means either one of "transport format", "transport block size", "payload size" or "modulation and coding scheme". Similarly, in all embodiments of this invention the term

> "redundancy version" can be replaced by "redundancy version and/or constellation version".

Id. at 15:10–15.

The abstract of the '284 Patent provides:

> The invention relates to a method for providing control signalling associated to a protocol data unit conveying user data in a mobile communication system and to the control channel signal itself. Furthermore, the invention also provides a mobile station and a base station and their respective operation in view of the newly defined control channel signals defined herein. In order to reduce the control channel overhead, the invention suggests defining a common field for the transport format and redundancy version in the control channel information format. According to one approach, the common field is used to jointly encode transport format and redundancy version therein. According to another aspect, one shared field is provided on the control channel signal that indicates either a transport format or a redundancy version depending of whether the control channel signal relates to an initial transmission or a retransmission. In another embodiment, further enhancements to a HARQ protocol are suggested for addressing certain error cases.

Claim 1, an exemplary asserted claim from the '284 Patent, is reproduced below with the terms in dispute emphasized:

> **1.** A mobile terminal for use in a mobile communication system, the mobile terminal comprising:
>
> a receiver unit for receiving a sub-frame of physical radio resources comprising a control channel signal destined to the mobile terminal,
>
> ***a processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data***, and
>
> a transmitter unit for transmitting the protocol data unit on at least one physical radio resource using the transport format and the redundancy version of the protocol data unit indicated in the received control channel signal,
>
> wherein the control channel signal received within said sub-frame comprises a control information field, in which the transport format and the redundancy version of the protocol data unit are jointly encoded,
>
> ***wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field***, wherein a first subset of the values ***is reserved for indicating*** the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, ***is reserved for indicating*** the redundancy version for transmitting the user data, and

wherein the first subset of the values contains more values than the second subset of the values.

C-1. "reserved for indicating"

Disputed Term	Plaintiffs' Proposed Construction	Defendant's Proposed Construction
"reserved for indicating" • '284 Patent Claims 1, 14	no construction necessary alternatively, • kept, but not exclusively, for the purpose of identifying explicitly or implicitly	explicitly signals

The Parties' Positions

Plaintiffs submit: The dispute here is similar to that addressed in Claim Construction Memorandum Opinion and Order, *Optis Wireless Tech., LLC v. Huawei Device Co. Ltd. et al.*,[14] 2:17-cv-123-JRG-RSP, Dkt. No. 114 (E.D. Tex. Jan. 18, 2018). There, the Court held that "reserved for indicating" held its plain and ordinary meaning and rejected that the term was limited to "is set aside just for," allowing that a subset of values may satisfy the limitation even if the subset indicates something in addition to the transport format or redundancy version that it is "reserved for indicating."[15] Here, the issue is whether a subset of values may implicitly indicate the transport format or redundancy version through correlation with an index rather than directly with a transport format or redundancy version. The '284 Patent explicitly teaches implicit indication and it would thus be improper to require explicit indication (citing, inter alia, '284 Patent 7:58–67, 8:36–39). (Dkt. No. 82 at 22–26.)

[14] The "*Huawei* Litigation."

[15] This term appears in the broader phrase "a first subset of values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data." '284 Patent at 28:65–29:2, 30:15–20.

In addition to the claims themselves, Plaintiffs cite the following intrinsic and extrinsic evidence to support their position: **Intrinsic evidence**: '284 Patent at 7:47–67, 8:36–39, 14:4–6, 15:29–41, 15:53, 16:4–12, 16:23, 16:27, 16:46–51, 17:46–58, Tables 3–8 (17:1–20:49). **Extrinsic evidence**: Mahon Decl. ¶¶ 64–65 (Plaintiffs' Ex. 7, Dkt. No. 82-7); Buehrer Decl.[16] ¶¶ 67–77 (Plaintiffs' Ex. 14, Dkt. No. 82-14); Womack Decl.[17] ¶ 97 (Plaintiffs' Ex. 15, Dkt. No. 82-15); Womack Trial Tr.[18] 77:12 – 79:12 (Plaintiffs' Ex. 16, Dkt. No. 82-16 at 78–80).

Defendant responds: The '284 Patent claims are directed to "joint encoding" and the patent teaches that for joint encoding a value that is reserved for indicating a parameter explicitly indicates what that parameter is, regardless of whether the value also implicitly indicates some other parameter or is used to explicitly indicate more than one parameter. "Nowhere does the patent disclose a value implicitly signaling a parameter that it is 'reserved for indicating.'" In fact, Plaintiffs argued in the *Huawei* Litigation that because the "reserved for indicating" limitation required "explicit signaling," the claims did not encompass prior art (citing Plaintiffs' JMOL briefing and its expert's testimony). Finally, allowing a subset of values reserved for indicating a parameter to implicitly indicate the parameter would exclude all the exemplary embodiments. Every disclosed indicating subset of values in the embodiments would implicitly or explicitly indicate the redundancy version and therefore would qualify as a subset "reserved for indicating" the redundancy version under Plaintiffs' proposed construction. The claims, however, require that that subset reserved for indicating the transport format must be different than (contain more values

[16] Declaration of Dr. R. Michael Buehrer in Support of Defendant Apple Inc.'s Claim Construction Brief.
[17] Rebuttal Expert Report of Dr. James E. Womack, Regarding Validity of U.S. Patent Nos. 8,208,569 and 8,385,284, *Optis Wireless Tech., LLC et al. v. Huawei Device USA, Inc. et al.*, 2:17-cv-123 (E.D. Tex.).
[18] Trial Tr., *Optis Wireless Tech., LLC et al. v. Huawei Device USA, Inc. et al.*, 2:17-cv-123 (E.D. Tex. Aug. 21, 2018).

than) the subset reserved for indicating the redundancy version, a limitation that none of the embodiments would satisfy under Plaintiffs' proposed construction. (Dkt. No. 86 at 24–28.)

In addition to the claims themselves, Defendant cites the following intrinsic and extrinsic evidence to support its position: **Intrinsic evidence**: '284 Patent at 7:47–65, 8:11–21, 8:33–39, 15:21–41, 15:52–60, 27:12–15, 27:31–34; '284 Patent File Wrapper Sept. 20, 2012 Amendment at 2, 5, 12 (Defendant's Ex. 13, Dkt. No. 86-14 at 4, 7, 14). **Extrinsic evidence**: Buehrer Decl.[19] ¶¶ 65–75 (Defendant's Ex. 2, Dkt. No. 86-3); Womack Decl.[20] ¶¶ 95–96, 105 (Defendant's Ex. 14, Dkt. No. 86-15); Womack Trial Tr.[21] 78:6 – 79:9, 141:10–17 (Defendant's Ex. 15, Dkt. No. 86-16 at 4–6); Plaintiffs' JMOL Response[22] at 13–15 & n.6 (Defendant's Ex. 16, Dkt. No. 86-17 at 3–5); U.S. Patent Application Publication No. 2013/0028212 (Defendant's Ex. 17, Dkt. No. 86-18); U.S. Patent Application Publication No. 2016/0323084 (Defendant's Ex. 18, Dkt. No. 86-19).

Plaintiffs reply: Even if the '284 Patent does not describe an embodiment of a value "reserved for indicating" a parameter that implicitly indicates the parameter, the plain meaning of "reserved for indicating" encompasses both implicit and explicit indicating. In fact, the patent supports implicit indicating with, e.g., "TF range" and "RV range," which may be "reserved for indicating." These ranges differ in that the TF range has a greater number of values than does the RV range, as specified in the claims. Finally, the issue in the *Huawei* Litigation was not whether "reserved for indicating" required explicit signaling, but rather whether Huawei correctly characterized the prior

[19] This is the same declaration submitted by Plaintiffs as Dkt. No. 82-14.
[20] This is a subset of the declaration excerpts submitted by Plaintiffs as Dkt. No. 82-15.
[21] This is subset of the transcript submitted by Plaintiffs as Dkt. No. 82-16.
[22] Plaintiffs' Response to Huawei's Renewed Motion for Judgment as a Matter of Law, *Optis Wireless Tech., LLC v. Huawei Device Co. Ltd. et al.*, 2:17-cv-123-JRG-RSP, Dkt. No. 393 (E.D. Tex. May 3, 2019).

art as expressly signaling transport format or redundancy version and whether Claim 1 "permits explicit signaling for both transport format and redundancy version." (Dkt. No. 92 at 11–13.)

Plaintiffs cite further intrinsic and extrinsic evidence to support their position: **Intrinsic evidence**: '284 Patent at 14:4–8, 17:54–59. **Extrinsic evidence**: Womack Decl. ¶¶ 95–96, 103, 105; Womack Trial Tr. 141:10–17; Mahon Decl. ¶¶ 72–75; Plaintiffs' JMOL Response at 13–15 & n.6.

Analysis

The issue in dispute distills to whether a subset of values that is "reserved for indicating" a parameter necessarily indicates the parameter by explicitly signaling the parameter. It does not.

The '284 Patent teaches both implicit and explicit signaling of parameters by reserved values. For example, the patent explains that "in general, the transport format defines the modulation and coding scheme (MCS) and/or the transport block size." '284 Patent at 13:49–50. Transport block size (TBS) and MCS are related such that the "control signaling may only need to indicate either the transport block size or the modulation and coding scheme." *Id*. at 13:64–66. Further, "transport block size is typically not explicitly signaled, but is rather signaled as a TBS index. The interpretation of the TBS index to determine the actual transport block size may for example depend on the resource allocation size." *Id*. at 14:4–8. In other words, the transport format may be implicitly indicated by explicitly signaling a TBS or a TBS index and then using a known relationship to determine the transport format.

The patent also teaches indicating a transport format (e.g., as described in the previous paragraph) and then using a known relationship between the transport format and redundancy version to determine the redundancy version. For example, a given value of a transport-format indicator may indicate a transport format "associated to a given fixed or preconfigured redundancy

version." The patent describes this as "explicit" signaling of transport format and "implicit" signaling of redundancy version. '284 Patent at 15:29–41. The patent describes a scheme in which values reserved for indicating the transport format indicate various transport format/redundancy version pairings and thus "implicitly" indicate a redundancy version, even allowing that "the same transport format may be associated to different redundancy versions." *Id*. at 17:26–64 ("Table 4" and accompanying description). This is contrasted with a value reserved for indicating a redundancy version that does not also express information about the transport format. *Id*. When using the later, "it may be assumed that the transport format is constant or known," but the transport format is not affirmatively stated by the value. *Id*.

In general, the explicit/implicit dichotomy does not clarify claim scope. For example, the patent suggests that using a value to indicate a parameter (e.g., TBS or MCS) from which one can determine transport format is "explicit" signaling of the transport format but at the same time suggests that the ability to determine redundancy version from the value is "implicit" signaling of redundancy version. In either case, the indicating value supports a determination through association rather than directly expressing the transport format or redundancy version. Indeed, Tables 3 through 8 each indicate the signaled value is used to determine (e.g., look up) a transport format and a redundancy version through association. For example, in Table 3, a signaled value of "1000" (binary) is associated with TBS=200 and RV=0. In Table 4, a signaled value of "1000" (binary) is associated with TBS=200 and RV=2. *Id*. at 17:1–44. The value "1000" is reserved for indicating a transport format but actually indicates both a transport format and a redundancy version. In contrast, a signaled value of "1110" (binary) is associated with RV=2 (Table 3) or RV=1 (Table 4) but is not associated with a transport format, even though the patent explains that "it may be assumed that the transport format is constant or known." *Id*. at 17:1–64. The value

"1110" is reserved for indicating a redundancy version and affirmatively states a redundancy version but does not affirmatively state a transport format.

Ultimately, implicit or explicit signaling is not a clarifying characteristic of values "reserved for indicating" a parameter. Rather, a common characteristic of the "reserved for indicating" values is that they affirmatively carry information about the parameter they are reserved for indicating, even though the affirmatively-carried information is associated with the parameter rather than stating the parameter directly. Thus, the plain meaning of "reserved for indicating" does not hinge on "explicit" or "implicit" signaling of the parameter, as the Court understands the parties to use those terms. Ultimately, whether a particular value, such as an index, satisfies the "reserved for indicating" limitation is an issue of fact for the jury.

Accordingly, the Court rejects both the "implicit" and "explicit" language suggested by the parties and determines that "reserved for indicating" has its plain and ordinary meaning without the need for further construction.

C-2. "processing unit for … wherein the processing unit is further configured for …"

Disputed Term	Plaintiffs' Proposed Construction	Defendant's Proposed Construction
"processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and … wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data" • '284 Patent Claim 1	no construction necessary: not 35 U.S.C. § 112, ¶ 6, not indefinite alternatively (if § 112, ¶ 6), • **function 1**: determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data • **structure 1**: hardware programmed, or hardware with software programmed, according to an algorithm in which a determination of the transport format and the redundancy version is made such as described at 10:21-34 by determining the data within a joint field of a transmission such as shown and described in Figure 5, 12:55-58, 22:45-59 and that data is correlated to the transport format and redundancy version via tables such as Tables 3-8, and equivalents thereof • **function 2**: determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field • **structure 2**: hardware programmed, or hardware with software programmed, according to algorithms in which a determination of the control information field is made by interpreting the control information field content, such as described in 6:65-8:54, 10:21-34, 12:55-58, 15:29-60, 16:46-21:3, 22:45-59, 27:61-28:12, Tables 3-8, Figs. 5, 8, 9, and equivalents thereof.	35 U.S.C. § 112, ¶ 6, indefinite • **function**: determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and determin[ing] of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field, wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data • **structure**: indefinite

The Parties' Positions

Plaintiffs submit: For the reasons Plaintiffs provided to the Court in the *Huawei* Litigation, this term should not be governed by 35 U.S.C. § 112, ¶ 6. Even if governed by § 112, ¶ 6, the '284 Patent satisfies the structural disclosure requirements of the statute. For example, the patent describes jointly encoding transport format and redundancy version in a 4-bit field in a control-channel signal. Examples of this encoding are provided in Tables 3 through 8 in the patent. The patent explains that this encoding methodology applies to transport block size (TBS) and modulation and coding scheme (MCS), since TBS and MCS are interrelated. Finally, the patent also explains that this encoding methodology applies to redundancy version (RV) and constellation version (CV), in that RV and CV are described as interchangeable. (Dkt. No. 82 at 26–30.)

In addition to the claims themselves, Plaintiffs cite the following intrinsic and extrinsic evidence to support their position: **Intrinsic evidence**: '284 Patent Fig.5, 6:44–49, 6:65–8:54, 10:21–24, 12:55–58, 13:30–15:15, 15:29–60, 16:4–13, 16:46–21:3, 22:45–59, 27:61–28:12, Tables 3–8 (17:1–20:49). **Extrinsic evidence**: Mahon Decl. ¶¶ 38–39, 58–62, 79–81, 83–89, (Plaintiffs' Ex. 7, Dkt. No. 82-7); Buehrer Decl. ¶¶ 82–83, 87 (Plaintiffs' Ex. 14, Dkt. No. 82-14).

Defendant responds: The '284 Patent does not meet the disclosure requirements of § 112, ¶ 6 because it fails to provide structure for performing the fully recited functions. First, the look-up tables do not provide the requisite algorithms. Second, there is no disclosure of any algorithm for determining the MCS or CV. Since MCS falls within the scope of "transport format" as used in the patent, and CV falls within the scope of "redundancy version" as used in the patent, § 112, ¶ 6 requires that structure for "determining based on the received control channel signal a transport format of and a redundancy version …" be capable of determining MCS and CV. Since the patent

fails to disclose such structure, it does not satisfy the statute and Claim 1 is indefinite. (Dkt. No. 86 at 28–32.)

In addition to the claims themselves, Defendant cites the following intrinsic and extrinsic evidence to support its position: **Intrinsic evidence**: '284 Patent at 3:29–4:8, 4:17–20, 14:1–4, 14:27–52, 15:10–15, 16:32–46, 17:53–65, 18:13–16, 26:46–27:20, Tables 3–8 (17:1–20:49). **Extrinsic evidence**: Buehrer Decl. ¶¶ 78–102 (Defendant's Ex. 2, Dkt. No. 86-3).

Plaintiffs reply: The patent provides for mapping bit values to transport format and redundancy version combinations and further provides examples of this mapping with TBS and RV, exemplary transport format and redundancy version, respectively. The law does not require examples of every possible transport format and redundancy version and thus examples of mapping bit values to MCS and CV is not required by § 112, ¶ 6. Further, the structural disclosure requirement of the statute relates to the means for performing the recited function (the determining) rather than the object of the recited function (the transport format and redundancy version). (Dkt. No. 92 at 13–15.)

Plaintiffs cite further **intrinsic evidence** to support their position: '284 Patent at 15:1–22:67.

Analysis

The issues in dispute are whether 35 U.S.C. § 112, ¶ 6 applies and whether the '284 Patent discloses adequate structure if § 112, ¶ 6 does apply. Section 112, ¶ 6 applies and, as set forth below and in the *Huawei* claim-construction order, the '284 Patent satisfies the disclosure requirements of the statute.

The Court addressed this term in the *Huawei* litigation even though it did not directly consider the "wherein the processing unit is further configured for …" clause. Claim Construction Memorandum Opinion and Order, *Optis Wireless Tech., LLC v. Huawei Device Co. Ltd. et al.*,

2:17-cv-123-JRG-RSP, Dkt. No. 114 at 59–67 (E.D. Tex. Jan. 18, 2018). The "wherein" clause does not alter the Court's *Huawei* analysis since the structure there identified by the Court satisfies the wherein clause. For example, Tables 3 through 8 all indicate a "number of bits representing a range of values that can be represented in the control information field" and further indicate a first subset of values reserved for indicating the transport format (the "TF range") and a second subset of values reserved for indicating the redundancy version (the "RV range") where there are more values in the TF range than in the RV range. '284 Patent at 17:1–20:50. The Court is not persuaded by either party's argument or evidence that the *Huawei* ruling was incorrect. Thus, the Court reiterates the *Huawei* ruling and reasoning and adopts the *Huawei* construction, with a clarification that the identified structure is not merely exemplary (other than through application of statutory equivalents).

Specifically, the Court is not persuaded: (1) that "processing unit" is not governed by § 112, ¶ 6 and (2) that "processing unit" is indefinite because it does not explicitly disclose structure tied to every species of "transport format" (including MCS) and to every species of "redundancy version" (including CV). With respect to whether "processing unit" is governed by § 112, ¶ 6, Plaintiff offers nothing more than a reference to its arguments and evidence presented in the *Huawei* litigation. With respect to the whether the patent satisfies the § 112, ¶ 6 disclosure requirements, it clearly describes structure for performing the recited functions (as set forth in the *Huawei* ruling). The Court does not understand § 112, ¶ 6 to require a description of the structure applied to every possible piece of information that may be input to or output from the structure. For example, the lookup tables provide an algorithm (structure) for determining transport format based on a control signal using the association between the control-signal value and format. *See, e.g.*, *Typhoon Touch Techs., Inc. v. Dell, Inc.*, 659 F.3d 1376, 1385 (Fed. Cir. 2011) ("the patent

need only disclose sufficient structure for a person of skill in the field to provide an operative software program for the specified function"). The patent need not describe every possible embodiment of such an association between a signal value and a transport format to satisfy § 112, ¶ 6. *See Toshiba Corp. v. Imation Corp.*, 681 F.3d 1358, 1369 (Fed. Cir. 2012) ("a patentee need not describe in the specification every conceivable and possible future embodiment of his invention" (quotation marks omitted)); *IMS Tech., Inc. v. Haas Automation, Inc.*, 206 F.3d 1422, 1432–34 (Fed. Cir. 2000) ("means to sequentially display data block inquiries" limited to the display structure but not to the exemplary data block inquiries). Ultimately, whether the structure disclosed for performing the claim-recited function (as set forth below) encompasses a prior-art or accused structure that determines MCS or RV is an issue of fact for the jury.

Accordingly, the Court construes "processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and … wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data" under 35 U.S.C. § 112, ¶ 6 as follows:

- **function**: "determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and determining the control information field, which consists of a number of bits representing a range of values that can be represented in the control

information field, wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data"

- **structure**: "hardware programmed, or hardware with software programmed, according to an algorithm in which a determination of the transport format and the redundancy version is made as described at 10:21–34 by determining the data within a joint field of a transmission as shown and described in Figure 5, 12:55-58, 22:45–59 and that data is correlated to the transport format and redundancy version via Tables 3–8, and equivalents thereof"

D. U.S. Patent No. 8,411,557

The '557 Patent is entitled Mobile Station Apparatus and Random Access Method. The application leading to the '557 Patent was filed on December 21, 2011 and the patent states an earliest priority claim to a foreign application filed on March 20, 2006.

In general, the patent is directed to technology for allowing a mobile communication device to report control information to the base station using the Random Access Channel ("RACH"). '557 Patent at 1:11–15, 1:54–2:22. The RACH is used, for example, for a mobile to request access to communication resources from the base station. *Id*. at 1:17–18. The RACH signal sent to the base station is a "signature" that distinguishes the sending mobile from other mobiles also sending RACH signals. *Id*. at 1:19–22. This signature may be one a series of code sequences that have low cross-correlation and high auto-correlation (e.g., Constant Amplitude Zero Auto-Correlation ("CAZAC") sequences). *Id*. at 1:23–32.

There are advantages to be gained if the mobile may use the RACH signal to report control information to the base station. *Id*. at 1:33–39. Such control information includes information such

as "mobile station ID, the reason for RACH transmission, bandwidth allocation request information (QoS information, the amount of data, and so on), and downlink received quality information." *Id*. The invention of the '557 Patent is meant to allow the mobile to efficiently report such control information in the RACH by establishing certain associations between code sequences and the control information that is to be reported to the base station. *Id*. at 1:54–2:22.

With reference to Figures 3 and 4, reproduced below and annotated by the Court, the patent describes an exemplary association between control information and CAZAC-sequence signatures. *Id*. at 4:54–5:24. In the example, the various potential values of the downlink "received quality" control information are separately associated with multiple CAZAC sequences. *Id*. In the example of Figure 4, the sequences associated with a particular received quality are derived from a common base CAZAC sequence (sequence number k) through application of shift values (shift m). *Id*. The mobile selects as its RACH signature one of the sequences associated with the control information it wishes to report. *Id*. at 5:25–44. Thus, the base station can identify the mobile and the control information from a single RACH signal sent from the mobile. *Id*. To alleviate the interference of multiple mobiles sending the same signature (collisions), the mobile preferably randomly selects the signature sequence from the series of appropriate sequences. *Id*. at 5:45–61.

’557 Patent

Figure 3

RECEIVED QUALITY	CONTROL INFORMATION
SINR<−5dB	000
−5dB≦SINR< 0dB	001
0dB≦SINR< 5dB	010
5dB≦SINR<10dB	011
10dB≦SINR<15dB	100
15dB≦SINR<20dB	101
20dB≦SINR<25dB	110
25dB≦SINR	111

Figure 4

CONTROL INFORMATION	CAZAC SEQUENCE NUMBER: k	SHIFT: m	SIGNATURE NUMBER
000	#1	0	#1
		1	#2
		⋮	⋮
		7	#8
001	#2	0	#9
		1	#10
		⋮	⋮
		7	#16
010	#3	0	#17
		1	#18
		⋮	⋮
		7	#24
011	#4	0	#25
		1	#26
		⋮	⋮
		7	#32
100	#5	0	#33
		1	#34
		⋮	⋮
		7	#40
101	#6	0	#41
		1	#42
		⋮	⋮
		7	#48
110	#7	0	#49
		1	#50
		⋮	⋮
		7	#56
111	#8	0	#57
		1	#58
		⋮	⋮
		7	#64

TABLE

With reference to Figure 11, reproduced herein and annotated by the Court, the patent also describes a dynamically generated association between the control information and code sequences. *Id*. at 8:27–9:3. To account for variances in the number of mobiles reporting the same control information, the mobile may use information about the rates of occurrence of the particular pieces of control information to alter the association between the control information and the sequences. *Id*. This allows for more sequences to be associated with high-occurrence control information (those that are reported from many mobiles) and for fewer to be associated with low-occurrence control information. *Id*. This reduces the rate of collisions (multiple mobiles sending the same signature sequence). *Id*. at 7:50–67. The information regarding the rate of occurrence of the various pieces of control information is provided by the base station via a “control signal.” *Id*. at 8:42–51.

’557 Patent

Figure 11

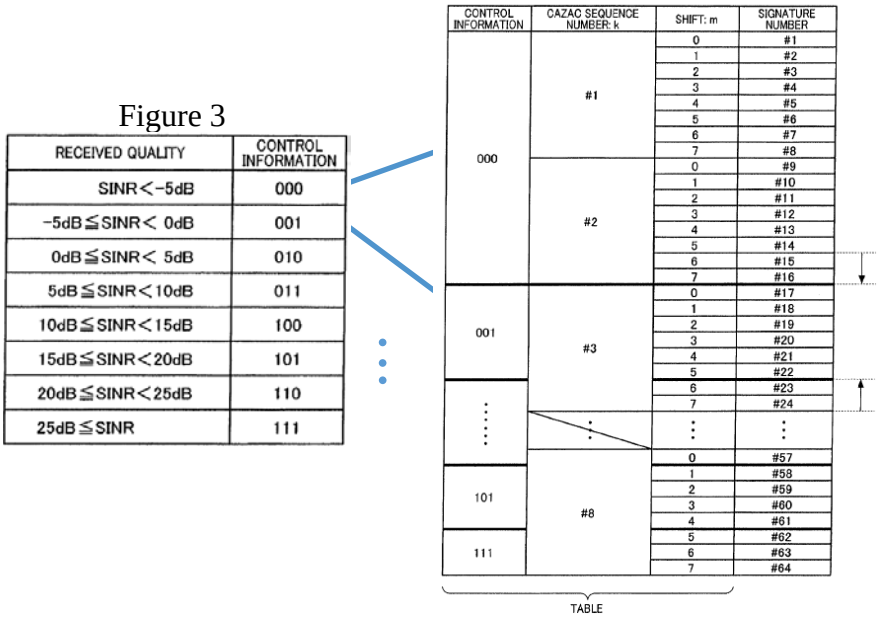

Figure 3

RECEIVED QUALITY	CONTROL INFORMATION
SINR＜−5dB	000
−5dB≦SINR＜ 0dB	001
0dB≦SINR＜ 5dB	010
5dB≦SINR＜10dB	011
10dB≦SINR＜15dB	100
15dB≦SINR＜20dB	101
20dB≦SINR＜25dB	110
25dB≦SINR	111

The abstract of the ’557 Patent provides:

> A mobile station apparatus includes a receiving unit configured to receive control information; a selecting unit configured to randomly select a sequence from a plurality of sequences contained in one group of a plurality of groups, into which a predetermined number of sequences generated from a plurality of base sequences are grouped and which are respectively associated with different amounts of data or reception qualities; and a transmitting unit for transmitting the selected sequence. The predetermined number of sequences are grouped by partitioning the predetermined number of sequences, in which sequences generated from the same base sequence and having different cyclic shifts are arranged in an increasing order of the cyclic shifts. A position at which the predetermined number of sequences are partitioned is determined based on the control information, and a number of sequences contained in each of the plurality of groups varies in accordance with the control information.

Claim 1, an exemplary asserted claim from the ’557 Patent, is reproduced below with the term in dispute emphasized:

> **1.** A mobile station apparatus comprising:
> a receiving unit configured to receive control information;
> a ***selecting unit configured to randomly select a sequence from a plurality of sequences contained in one group of a plurality of groups, into which a predetermined number of sequences that are generated from a plurality of base sequences are grouped and which are respectively associated with different amounts of data or reception qualities, wherein the predetermined***

number of sequences are grouped by partitioning the predetermined number of sequences, in which sequences generated from the same base sequence and having different cyclic shifts are arranged in an increasing order of the cyclic shifts; and

a transmitting unit configured to transmit the selected sequence,

wherein a position at which the predetermined number of sequences are partitioned is determined based on the control information, and a number of sequences contained in each of the plurality of groups varies in accordance with the control information.

D-1. "selecting unit configured to …"

Disputed Term	Plaintiffs' Proposed Construction	Defendant's Proposed Construction
"selecting unit configured to randomly select a sequence from a plurality of sequences contained in one group of a plurality of groups, into which a predetermined number of sequences that are generated from a plurality of base sequences are grouped and which are respectively associated with different amounts of data or reception qualities, wherein the predetermined number of sequences are grouped by partitioning the predetermined number of sequences, in which sequences generated from the same base sequence and having different cyclic shifts are arranged in an increasing order of the cyclic shifts" • '557 Patent Claim 1	plain and ordinary meaning, not 35 U.S.C. § 112, ¶ 6, not indefinite alternatively (if § 112, ¶ 6), • **function**: randomly select a sequence from a plurality of sequences contained in one group of a plurality of groups, into which a predetermined number of sequences that are generated from a plurality of base sequences are grouped and which are respectively associated with different amounts of data or reception qualities, wherein the predetermined number of sequences are grouped by partitioning the predetermined number of sequences, in which sequences generated from the same base sequence and having different cyclic shifts are arranged in an increasing order of the cyclic shifts • **structure**: Figs. 1 (111), 4, 5, 8, 9, 10 (111), col./line 1:65-2:7, 2:57-67, 3:18-7:49, 4:57-4:67, 5:19-6:5, 8:55-9:3, 9:6-12 and/or equivalents thereof	35 U.S.C. § 112, ¶ 6, indefinite • **function**: randomly select a sequence from a plurality of sequences contained in one group of a plurality of groups, into which a predetermined number of sequences that are generated from a plurality of base sequences are grouped and which are respectively associated with different amounts of data or reception qualities, wherein the predetermined number of sequences are grouped by partitioning the predetermined number of sequences, in which sequences generated from the same base sequence and having different cyclic shifts are arranged in an increasing order of the cyclic shifts • **structure**: indefinite

The Parties' Positions

Plaintiffs submit: The dispute here was previously addressed in Memorandum Opinion and Order, *Optis Wireless Tech., LLC v. ZTE Corporation et al.*,[23] 2:15-cv-300-JRG-RSP, Dkt. No. 116 (E.D. Tex. Apr. 20, 2016). There, the Court determined that the "selecting unit …" limitation was not governed by 35 U.S.C. § 112, ¶ 6. The Court's previous construction of this term is justified because "selecting unit" is used in the '557 Patent and the prior art to denote specific structure. Further, the claim sets forth the objectives and operations of the selecting unit in such detail as to convey its structural nature. Finally, even if § 112, ¶ 6 governs, the patent satisfies the statute in that is specifies "a specific arrangement of sequences, the grouping of the sequences, and the selection of a sequence from one of the groups" and "signature selecting section 111, which is described in multiple embodiments in the specification, both graphically, as it interacts with the other components in the system in Figs. 1 and 10, as well as verbally, down to complex mathematical equations that may be used to generate sequences." (Dkt. No. 82 at 31–35.)

In addition to the claims themselves, Plaintiffs cite the following intrinsic and extrinsic evidence to support their position: **Intrinsic evidence**: '557 Patent Figs.1, 4, 5, 9–11, 1:65–2:7, 2:57–67, 3:18–7:49, 8:55–9:3, 9:6–12, 9:26–48; U.S. Patent Application Publication 2010/0278114 (Plaintiffs' Ex. 19, Dkt. No. 82-19); U.S. Patent Application Publication 2008/0192678 (Plaintiffs' Ex. 20, Dkt. No. 82-20). **Extrinsic evidence**: Madisetti Decl. ¶¶ 43–46 (Plaintiffs' Ex. 10, Dkt. No. 82-10).

Defendant responds: The term "selecting unit" is a nonce term rather than a name for specific structure that performs the recited function and the term, therefore, is governed by 35 U.S.C. § 112, ¶ 6. As the "selecting unit" is computer implemented, the '557 Patent must disclose an algorithm

[23] The "*ZTE* Litigation."

for performing the recited function to satisfy the statue. Instead, the patent merely repeats the function when describing the "selecting unit." As such, Claim 1 of the '557 Patent is indefinite. (Dkt. No. 86 at 33–36.)

In addition to the claims themselves, Defendant cites the following intrinsic and extrinsic evidence to support its position: **Intrinsic evidence**: '557 Patent Figs.1, 10, 2:62–65, 4:57–67, 5:25–35, 5:45–61, 5:63–6:5; U.S. Patent Application Publication 2010/0278114 (Plaintiffs' Ex. 19, Dkt. No. 82-19); U.S. Patent Application Publication 2008/0192678 (Plaintiffs' Ex. 20, Dkt. No. 82-20). **Extrinsic evidence**: Lanning '557 Decl.[24] ¶¶ 41–43, 46, 47, 49–56, 59 (Defendant's Ex. 23, Dkt. No. 93-1); U.S. Patent No. 7,107,056 (Defendant's Ex. 24, Dkt. No. 86-25); U.S. Patent No. 5,732,334 (Defendant's Ex. 25, Dkt. No. 86-26); U.S. Patent No. 6,311,059 (Defendant's Ex. 26, Dkt. No. 86-27); U.S. Patent No. 6,073,024 (Defendant's Ex. 27, Dkt. No. 86-28).

Plaintiffs reply: In the context of the claims and description of the '557 Patent, "selecting unit" is sufficiently structural. (Dkt. No. 92 at 15–16.)

Plaintiffs cite further **extrinsic evidence** to support their position: Madisetti Decl. ¶¶ 41–47.

Analysis

The issues in dispute are whether 35 U.S.C. § 112, ¶ 6 applies and whether the '557 Patent discloses adequate structure if § 112, ¶ 6 applies. Because the Court finds that 35 U.S.C. § 112, ¶ 6 does not apply, it does not reach the second issue.

This is substantially the same issue before the Court in the *ZTE* Litigation. The Court is not persuaded by Defendant's argument and evidence that the *ZTE* ruling was incorrect. Specifically,

[24] Declaration of Mark Lanning Pursuant to Patent Local Rule 4-3(B): U.S. Patent Number 8,411,557

given the presumption against application of § 112, ¶ 6 and Federal Circuit instruction regarding denoting the structural nature of a claim term by reciting its operational context within the claimed invention (as described above in Section A-1), the Court reiterates the *ZTE* ruling and reasoning and rejects Defendant's arguments that the "selecting unit …" term renders any claim indefinite. *See Optis Wireless Tech., LLC v. ZTE Corporation et al.*, 2:15-cv-300-JRG-RSP, Dkt. No. 116 at 82–87 (E.D. Tex. Apr. 20, 2016).

Accordingly, the Court determines that this term is not governed by 35 U.S.C. § 112, ¶ 6 and needs no further construction.

E. U.S. Patent No. 9,001,774

The '774 Patent is entitled System and Method for Channel Estimation in a Delay Diversity Wireless Communication System. The application leading to the '774 Patent was filed on November 12, 2013 and the patent states an earliest priority claim to a provisional application filed on April 21, 2005.

In general, the patent is directed to technology "for performing channel estimation in an orthogonal frequency division multiplexing (OFDM) network or an orthogonal frequency division multiple access (OFDMA) network." '774 Patent at 1:32–37. The patent builds off a "technique for artificially introducing frequency diversity into an OFDM environment" in which "multiple copies of the same OFDM symbol are delayed by different delay values, then amplified by the same or different gain values, and then transmitted from different antennas." *See id*. at 1:41–60. The patent teaches using an uplink signal to estimate the quality of a channel between a base station and a subscriber station, and to use that estimate to determine a parameter set used to establish the delay values and gains values. *Id*. at 2:43–59. Part of the communication in such a system is using the parameter set on received information to reverse the frequency-diversity processing ("compensating" for the processing). *Id*. at 9:32–10:17. "[T]he compensation can either be done

on the time domain OFDM symbol or directly in the frequency domain. … a time delay in the time domain translates into a phase rotation in the frequency domain." *Id*. at 10:18–30.

The abstract of the '774 Patent provides:

> A method of controlling downlink transmissions to a subscriber station capable of communicating with a base station of an orthogonal frequency division multiplexing (OFDM) network. The method comprises the steps of: receiving a first pilot signal from a first base station antenna; receiving a second pilot signal from a second base station antenna; and estimating the channel between the base station and subscriber station based on the received first and second pilot signals. The method also comprises determining a set of OFDM symbol processing parameters based on the step of estimating the channel and transmitting the OFDM symbol processing parameters to the base station. The base station uses the OFDM symbol processing parameters to control the relative gains and the relative delays of OFDM symbols transmitted from the first and second antennas.

Claim 6, an exemplary asserted claim from the '774 Patent, is reproduced below with the term in dispute emphasized:

> **6**. A method, comprising:
> receiving a processing parameter for transmission of data on two antenna ports, the processing parameter including ***at least one of a time delay, a phase rotation and a gain*** determined based on a received uplink signal;
> receiving a first pilot, a second pilot, a first data symbol and a second data symbol transmitted on the two antenna ports; and
> demodulating the first data symbol and the second data symbol based on the processing parameter, the first pilot and the second pilot.

E-1. "at least one of a time delay, a phase rotation and a gain"

Disputed Term	Plaintiffs' Proposed Construction	Defendant's Proposed Construction
"at least one of a time delay, a phase rotation and a gain" • '774 Patent Claim 6	no construction necessary, this is a disjunctive list not requiring at least one of all three listed items	at least one time delay, at least one phase rotation, and at least one gain

The Parties' Positions

Plaintiffs submit: As explained in the '774 Patent, any of "time delay," "phase rotation," and "gain" may be used as recited in the claim. In fact, "phase rotation" is described as an alternative

to "time delay," and is not described as a parameter in addition to "time delay." In this context, "at least one of a time delay, a phase rotation and a gain" should be construed as a disjunctive list. (Dkt. No. 82 at 35–38.)

In addition to the claims themselves, Plaintiffs cite the following intrinsic and extrinsic evidence to support their position: **Intrinsic evidence**: '774 Patent Fig.3, 10:21–30. **Extrinsic evidence**: Mahon Decl. ¶¶ 117–26 (Plaintiffs' Ex. 7, Dkt. No. 82-7).

Defendant responds: A plain reading of "at least one of a time delay, a phase rotation and a gain" is, by reason of the "and," a conjunctive list. Thus, the claim requires at least one of each member in the list. This comports with the description of the invention, which indicates multiple parameters in every embodiment and never suggests that a single parameter may be used. (Dkt. No. 86 at 36–39.)

In addition to the claims themselves, Defendant cites the following **intrinsic evidence** to support its position: '774 Patent at 1:61–62, 4:11–13, 7:52–55, 10:22–28.

Plaintiffs reply: The embodiment depicted in Figure 3 uses a single processing parameter, gain. Ultimately, a conjunctive interpretation of the list is inconsistent with the description of the invention. (Dkt. No. 92 at 16–17.)

Plaintiffs cite further **intrinsic evidence** to support their position: '774 Patent at 7:3–5.

Analysis

The issue in dispute is whether "at least one of a time delay, a phase rotation and a gain" requires at least one of each member of the list, or only at least one of the members of the list. In the context of the '774 Patent, the term requires at least one time delay, at least one phase rotation, or at least one gain. That is, while it encompasses at least one of each, it does not require one of each.

The Court agrees with Plaintiffs that the '774 Patent teaches time delays and phase rotations as alternatives, and that this suggests a disjunctive reading of the list. Specifically, the patent provides:

> In an OFDM system, the pilot and data symbols are carried on OFDM subcarriers. Therefore, the ***compensation can either be done on the time domain OFDM symbol or directly in the frequency domain***. In order to do compensation in the frequency domain, the [e]ffect of OFDM symbol delay in the time-domain must be accounted for in the frequency domain. In general, ***a time delay in the time domain translates into a phase rotation in the frequency domain***. Therefore, the OFDM subcarriers carrying the pilot symbols may be appropriately phase rotated in the frequency domain to account for time delays.

'774 Patent at 10:20–30 (emphasis added). Requiring both a time delay and a phase rotation as Defendant proposes would require working in both the time domain and the frequency domain, in contradiction to the patent's teaching that the processing is done "either" in the time domain or frequency domain. The claims should be construed in the context of the patent's teaching that time delay and phase rotation are alternatives. "The claims are directed to the invention that is described in the specification; they do not have meaning removed from the context from which they arose." *Phillips*, 415 F.3d at 1316 (quoting *Network, LLC v. Centraal Corp.*, 242 F.3d 1347, 1352 (Fed. Cir. 2001)). "The only meaning that matters in claim construction is the meaning in the context of the patent." *Trs. of Columbia Univ. v. Symantec Corp.*, 811 F.3d 1359, 1363 (Fed. Cir. 2016). In this context, the Court understands "at least one of a time delay, a phase rotation and a gain" to be disjunctive.

Accordingly, the Court construes "at least one of a time delay, a phase rotation and a gain" as follows:

- "at least one of a time delay, a phase rotation and a gain" means "at least one time delay, at least one phase rotation, or at least one gain."

F. U.S. Patent No. 8,102,833

The ’833 Patent is entitled Method for Transmitting Uplink Signals. The application leading to the ’833 Patent was filed on September 11, 2008 and the patent states an earliest priority claim to a provisional application filed on September 13, 2007.

In general, the patent is directed to technology for transmitting uplink control signals, including specifically ACK and NACK signals. The patent teaches mapping multiplexed control and data signals to physical communication resources (e.g., symbols and subcarriers), and then overwriting some of the information in the resource region with ACK/NACK signals. *See, e.g.*, ’774 Patent at 2:15–32. As explained in the patent, in this context “‘overwritten’ means that specific information mapped in the resource region is skipped and the corresponding region is mapped. Also, ‘overwritten’ means that the length of the entire information is maintained equally even after specific information is inserted.” *Id*. at 6:9–21.

The abstract of the ’833 Patent provides:

> A method for transmitting uplink signals, which include ACK/NACK signals, control signals other than the ACK/NACK signals, and data signals, is disclosed. The method comprises serially multiplexing the control signals and the data signals; sequentially mapping the multiplexed signals within a specific resource region in accordance with a time-first mapping method, the specific resource region including a plurality of symbols and a plurality of virtual subcarriers; and arranging the ACK/NACK signals at both symbols near symbols to which a reference signal of the plurality of symbols is transmitted. Thus, the uplink signals can be transmitted to improve receiving reliability of signals having high priority.

Claim 1, an exemplary asserted claim from the ’833 Patent, is reproduced below with the term in dispute emphasized:

> **1**. A method for transmitting uplink signals comprising control signals and data signals in a wireless communication system, the method comprising:
>
> (a) serially multiplexing first control signals and data signals in a mobile station, wherein the first control signals are placed at a front part of the multiplexed signals and the data signals are placed at a rear part of the multiplexed signals;

(b) mapping the multiplexed signals to a 2-dimensional resource matrix comprising a plurality of columns and a plurality of rows, wherein the columns and the rows of the 2-dimensional resource matrix correspond to single carrier frequency divisional multiple access (SC-FDMA) symbols and subcarriers for each SC-FDMA symbol, respectively, wherein a number of columns of the 2-dimensional resource matrix corresponds to a number of SC-FDMA symbols within one subframe except specific SC-FDMA symbols used for a reference signal, and wherein the multiplexed signals are mapped from the first column of the first row to the last column of the first row, the first column of the second row to the last column of the second row, and so on, until all the multiplexed signals are mapped to the 2-dimensional resource matrix

(c) mapping ACK/NACK control signals to specific columns of the 2-dimensional resource matrix, wherein the specific columns correspond to SC-FDMA symbols right adjacent to the specific SC-FDMA symbols, wherein ***the ACK/NACK control signals overwrite some of the multiplexed signals mapped to the 2-dimensional resource matrix at step (b) from the last row of the specific columns***; and

(d) transmitting the signals mapped to the 2-dimensional resource matrix at steps (b) and (c) by column by column to a base station.

F-1. "the ACK/NACK control signals overwrite some of the multiplexed signals mapped to the 2-dimensional resource matrix [at step (b)] from the last row of the specific columns"

Disputed Term	Plaintiffs' Proposed Construction	Defendant's Proposed Construction
"the ACK/NACK control signals overwrite some of the multiplexed signals mapped to the 2-dimensional resource matrix at step (b) from the last row of the specific columns" • '833 Patent Claims 1	(1) some of the multiplexed signals, from the last row of the specific columns of the 2-dimensional resource matrix, are skipped and the corresponding ACK/NACK signals are mapped, and (2) the length of the entire information is maintained equally even after the ACK/NACK control signals are inserted	(1) some of the multiplexed signals, beginning from the last row of the specific columns of the 2-dimensional resource matrix, are skipped and the corresponding ACK/NACK signals are mapped, and (2) the length of the entire information is maintained equally even after the ACK/NACK control signals are inserted
"the ACK/NACK control signals overwrite some of the multiplexed signals mapped to the 2-dimensional resource matrix from the last row of the specific columns" • '833 Patent Claim 8		

Because the parties' arguments and proposed constructions with respect to these terms are related, the Court addresses the terms together.

The Parties' Positions

Plaintiffs submit: The dispute here was previously addressed in the Claim Construction Memorandum Opinion and Order, *Optis Cellular Tech., LLC v. Kyocera Corp. et al.*,[25] 2:16-cv-59-JRG-RSP (Lead Case), Dkt. No. 108 (E.D. Tex. Feb. 19, 2017). There, the Court rejected the "beginning" language proposed by Defendant here and held that the terms do not mandate a starting position. The Court's construction in the *Kyocera* Litigation was agreed to by the parties in the *Huawei* Litigation.[26] This construction is correct because nothing in the intrinsic record rises to lexicography or disclaimer requiring a specific starting point for the claimed overwriting. Rather, the claims simply require that the ACK/NACK control signals overwrite data "from the last row," regardless of where the overwriting begins. (Dkt. No. 82 at 38–40.)

In addition to the claims themselves, Plaintiffs cite the following intrinsic and extrinsic evidence to support their position: **Intrinsic evidence**: '833 Patent Fig.6. **Extrinsic evidence**: Madisetti Decl. ¶¶ 48–52 (Plaintiffs' Ex. 10, Dkt. No. 82-10).

Defendant responds: As Plaintiffs argued and their expert opined in the *Kyocera* Litigation, the overwriting "begins in the last row of the matrix." This is the correct interpretation of the claim language as it recites overwriting "from" the last row rather than "in" the last row. This is how the patent applicant explained the claim language during prosecution, when it was added to distinguish the claims from prior art. Specifically, the applicant explained that one "can reduce the probability

[25] The "*Kyocera* Litigation."
[26] *Optis Wireless Tech., LLC v. Huawei Device Co. Ltd. et al.*, 2:17-cv-123-JRG-RSP (E.D. Tex.).

that the first control signals are overwritten" by overwriting "from the last row." This is also how the Plaintiffs explained the prosecution history in the *Kyocera* Litigation. (Dkt. No. 86 at 40–43.)

In addition to the claims themselves, Defendant cites the following intrinsic and extrinsic evidence to support its position: **Intrinsic evidence**: '833 Patent File Wrapper September 6, 2011 Amendment at 2–3, 6, 10 (Defendant's Ex. 35, Dkt. No. 86-36 at 3–4, 7, 11). **Extrinsic evidence**: Wells Decl.[27] ¶¶ 46–47, 52–55 (Defendant's Ex. 33, Dkt. No. 86-34); Akl. Decl.[28] ¶ 45 (Defendant's Ex. 34, Dkt. No. 86-35); Madisetti Decl. ¶¶ 48–52.

Plaintiffs reply: The same evidence and argument presented here were considered and rejected by the Court in the *Kyocera* Litigation. While Plaintiffs originally proposed the argument and evidence in the *Kyocera* Litigation, they recognize the *Kyocera* construction is correct and agreed to it in the *Huawei* Litigation. Ultimately, the overwriting in the last row does not necessarily come before overwriting in other rows. (Dkt. No. 92 at 17–18.)

Analysis

The issue in dispute is whether "ACK/NACK control signals overwrite [data] . . . from the last row" necessarily means the data in the last row is overwritten before data in any other row is overwritten. It does not.

This issue was addressed by the Court in the *Kyocera* Litigation. The Court is not persuaded by Defendant's argument and evidence that the *Kyocera* ruling was incorrect. Thus, the Court reiterates the *Kyocera* ruling and reasoning and rejects Defendant's arguments that the overwriting necessarily begins in the last row of the matrix. *See Optis Cellular Tech., LLC v. Kyocera Corp. et al.*, 2:16-cv-59-JRG-RSP (Lead Case), Dkt. No. 108 at 31–36 (E.D. Tex. Feb. 19, 2017).

[27] Declaration of Jonathan Wells, Ph.D., Pursuant to Patent Local Rule 4-3(B).
[28] Declaration of Dr. Robert Akl, D.Sc. Regarding Claim Construction, *Optis Cellular Tech., LLC et al. v. Blackberry Corp. et al.*, 2:16-cv-59-JRG-RSP (Lead Case) (E.D. Tex.)

Accordingly, the Court construes these terms as follows:

- "the ACK/NACK control signals overwrite some of the multiplexed signals mapped to the 2-dimensional resource matrix at step (b) from the last row of the specific columns" means "(1) some of the multiplexed signals, from the last row of the specific columns of the 2-dimensional resource matrix, are skipped and the corresponding ACK/NACK signals are mapped, and (2) the length of the entire information is maintained equally even after the ACK/NACK control signals are inserted"; and
- "the ACK/NACK control signals overwrite some of the multiplexed signals mapped to the 2-dimensional resource matrix from the last row of the specific columns" means "(1) some of the multiplexed signals, from the last row of the specific columns of the 2-dimensional resource matrix, are skipped and the corresponding ACK/NACK signals are mapped, and (2) the length of the entire information is maintained equally even after the ACK/NACK control signals are inserted"

V. CONCLUSION

The Court adopts the constructions set forth above, as summarized in the following table. The parties are **ORDERED** that they may not refer, directly or indirectly, to each other's claim-construction positions in the presence of the jury. Likewise, the parties are **ORDERED** to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the Court, in the presence of the jury. Any reference to claim-construction proceedings is limited to informing the jury of the definitions adopted by the Court.

Section	Term	Construction
A-1	"control information extractor for configuring transmission information for the downlink control channel via higher layer signaling" • '154 Patent Claim 37	not § 112, ¶ 6; plain and ordinary meaning
B-1	"given by using a variable of Y_k for the subframe k and a modulo 'C' operation" • '332 Patent Claims 1, 6	plain and ordinary meaning
B-2	"wherein Y_k is defined by: $Y_k=(A*Y_{k-1})\text{mod } D$" • '332 Patent Claims 1, 6	plain and ordinary meaning
C-1	"reserved for indicating" • '284 Patent Claims 1, 14	plain and ordinary meaning

Section	Term	Construction
C-2	"processing unit for determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and … wherein the processing unit is further configured for the determination of the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field" • '284 Patent Claim 1	• **function**: determining based on the received control channel signal a transport format of and a redundancy version for an initial transmission or a retransmission of a protocol data unit conveying user data, and determining the control information field, which consists of a number of bits representing a range of values that can be represented in the control information field, wherein a first subset of the values is reserved for indicating the transport format of the protocol data unit and a second subset of the values, different from the first subset of the values, is reserved for indicating the redundancy version for transmitting the user data • **structure**: hardware programmed, or hardware with software programmed, according to an algorithm in which a determination of the transport format and the redundancy version is made as described at 10:21-34 by determining the data within a joint field of a transmission as shown and described in Figure 5, 12:55-58, 22:45-59 and that data is correlated to the transport format and redundancy version via Tables 3-8, and equivalents thereof

Section	Term	Construction
D-1	"selecting unit configured to randomly select a sequence from a plurality of sequences contained in one group of a plurality of groups, into which a predetermined number of sequences that are generated from a plurality of base sequences are grouped and which are respectively associated with different amounts of data or reception qualities, wherein the predetermined number of sequences are grouped by partitioning the predetermined number of sequences, in which sequences generated from the same base sequence and having different cyclic shifts are arranged in an increasing order of the cyclic shifts" • '557 Patent Claim 1	not § 112, ¶ 6; plain and ordinary meaning
E-1	"at least one of a time delay, a phase rotation and a gain" • '774 Patent Claim 6	"at least one time delay, at least one phase rotation, or at least one gain"
F-1	"the ACK/NACK control signals overwrite some of the multiplexed signals mapped to the 2-dimensional resource matrix at step (b) from the last row of the specific columns" • '833 Patent Claims 1 "the ACK/NACK control signals overwrite some of the multiplexed signals mapped to the 2-dimensional resource matrix from the last row of the specific columns" • '833 Patent Claim 8	"(1) some of the multiplexed signals, from the last row of the specific columns of the 2-dimensional resource matrix, are skipped and the corresponding ACK/NACK signals are mapped, and (2) the length of the entire information is maintained equally even after the ACK/NACK control signals are inserted"

Section	Term	Construction
AGREED	"serially multiplexing first control signals and data signals, wherein the first control signals are placed at a front part of the multiplexed signals and the data signals are placed at a rear part of the multiplexed signals" • '833 Patent Claims 1, 8	"first control signals and data signals are mapped with a sequence in which one is directly after the other, wherein the first control signals are placed at a front part of the multiplexed signals and the data signals are placed at a rear part of the multiplexed signals"
	"mapping the multiplexed signals to" • '833 Patent Claim 1, 8	"after placing the first control signals and the data signals [in step (a)], mapping the multiplexed signals to"
	"mapping ACK/NACK control signals to" • '833 Patent Claim 1, 8	"after mapping the multiplexed signals [in step (b)], mapping ACK/NACK control signals to"
	"transport format" • '284 Patent Claim 1, 14	"transport format, transport block size, payload size, or modulation and coding scheme"
	"based on a received uplink signal" • '774 Patent Claim 6	no construction necessary

So ORDERED and SIGNED this 7th day of April, 2020.

RODNEY GILSTRAP
UNITED STATES DISTRICT JUDGE