IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TQ DELTA, LLC,

        Plaintiff,

   v.

2WIRE, INC.,

        Defendant.

Civil Action No. 1:13-cv-01835-RGA

TQ DELTA, LLC,

        Plaintiff,

   v.

ZYXEL COMMUNICATIONS, INC
and
ZYXEL COMMUNICATIONS
CORPORATION,

        Defendants.

Civil Action No. 1:13-cv-02013-RGA

TQ DELTA, LLC,

        Plaintiff,

   v.

ADTRAN, INC.,

        Defendants.

Civil Action No. 1:14-cv-00954-RGA

ADTRAN, INC.,

       Plaintiff,

      v.

TQ DELTA, LLC,

       Defendant.

Civil Action No. 1:15-cv-00121-RGA

MEMORANDUM OPINION

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ANDREWS, U.S. DISTRICT JUDGE:

Presently before the Court is the issue of claim construction of multiple terms in U.S. Patent Nos. 7,451,379 ("the '379 patent"), 8,516,337 ("the '337 patent"), 7,979,778 ("the '778 patent"), and 7,925,958 ("the '958 patent"). The Court has considered the parties' joint claim construction brief. (Civ. Act. No. 13-01835-RGA, D.I. 374; Civ. Act. No. 13-02013-RGA, D.I. 363; Civ. Act. No. 14-00954-RGA, D.I. 218; Civ. Act. No. 15-00121-RGA, D.I. 220).[1] The Court heard oral argument on January 10, 2018. (D.I. 463 ("Tr.")).

I. BACKGROUND

The patents-in-suit represent "Family 5" of the patents that Plaintiff has asserted against Defendants. (*See* D.I. 374 at 11). They all share a common specification. (*Id.*). The patents relate to anomaly detection in communications systems. (*E.g.*, '379 patent, 1:14–17).

II. LEGAL STANDARD

"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). "'[T]here is no magic formula or catechism for conducting claim construction.' Instead, the court is free to attach the appropriate weight to appropriate sources 'in light of the statutes and policies that inform patent law.'" *SoftView LLC v. Apple Inc.*, 2013 WL 4758195, at *1 (D. Del. Sept. 4, 2013) (quoting *Phillips*, 415 F.3d at 1324) (alteration in original). When construing patent claims, a court considers the literal language of the claim, the patent specification, and the prosecution history. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979–80 (Fed. Cir. 1995) (en banc), *aff'd*, 517 U.S. 370 (1996). Of these sources, "the specification is always highly relevant to the claim construction analysis. Usually, it is

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[1] Unless otherwise noted, all references to the docket refer to Civil Action No. 13-1835-RGA.

dispositive; it is the single best guide to the meaning of a disputed term." *Phillips*, 415 F.3d at 1315.

"[T]he words of a claim are generally given their ordinary and customary meaning. . . . [Which is] the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application." *Id.* at 1312–13. "[T]he ordinary meaning of a claim term is its meaning to [an] ordinary artisan after reading the entire patent." *Id.* at 1321. "In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Id.* at 1314.

When a court relies solely upon the intrinsic evidence—the patent claims, the specification, and the prosecution history—the court's construction is a determination of law. *See Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015). The court may also make factual findings based upon consideration of extrinsic evidence, which "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Phillips*, 415 F.3d at 1317–19. Extrinsic evidence may assist the court in understanding the underlying technology, the meaning of terms to one skilled in the art, and how the invention works. *Id.* Extrinsic evidence, however, is less reliable and less useful in claim construction than the patent and its prosecution history. *Id.*

"A claim construction is persuasive, not because it follows a certain rule, but because it defines terms in the context of the whole patent." *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998). It follows that "a claim interpretation that would

exclude the inventor's device is rarely the correct interpretation." *Osram GMBH v. Int'l Trade*

Comm'n, 505 F.3d 1351, 1358 (Fed. Cir. 2007).

III. PATENTS-IN-SUIT

Plaintiff asserts claims 11 and 16 of the '379 patent. Claim 16 depends from claim 15.

Those claims read as follows:

> 11. *A Cyclic Redundancy Checksum (CRC) anomaly counter normalization module designed to normalize a CRC anomaly counter based on a value for a CRC computation period (PERp)*, comprising
>
>> a *CRC bit computation module* designed to determine a local CRC octet based on a received bit stream;
>>
>> a *CRC bit comparison module* designed to compare the local CRC octet to a received CRC octet; and
>>
>> a *CRC error reporting module* designed to identify a CRC anomaly when the local CRC octet is not identical to the received CRC octet.

('379 patent, claim 11) (disputed terms italicized).

> 15. The apparatus of claim 11 wherein the normalizing of the CRC anomaly counter comprises incrementing the CRC anomaly counter by a value of M, wherein the value M is equal to PERp/K, and K is a positive integer.

(*Id.* at claim 15).

> 16. The apparatus of claim 15, wherein K is equal to 20 or 15.

(*Id.* at claim 16).

Plaintiff also asserts claims 14 and 19 from the '958 patent. Claim 19 depends

from claim 18. Those claims read as follows:

> 14. A Cyclic Redundancy Checksum (CRC) anomaly counter normalization system comprising:
>
>> a *CRC bits computation module* in a first *transceiver* capable of computing a CRC octet based on a transmit ted bit stream;
>>
>> the first *transceiver* capable of transmitting the CRC octet to a

second *transceiver*; a *CRC bits computation module* in the second *transceiver* capable of computing a local CRC octet based on a received bit stream;

a *CRC bits comparison module* capable of comparing the local CRC octet to a received CRC octet;

a *CRC error module* capable of identifying a CRC anomaly when the local CRC octet is not identical to the received CRC octet; and

a *normalization module* capable of *normalizing a CRC anomaly counter* based on a value for a CRC computation period (*PERp*).

('958 patent, claim 14) (disputed terms italicized).

18. The system of claim 14, wherein the *normalizing of the CRC anomaly counter* comprises incrementing the CRC anomaly counter by a value of M wherein the value M is equal to PERp/K, where K is a positive integer.

(*Id.* at claim 18).

19. The system of claim 18, wherein K is equal to 20 or 15.

(*Id.* at claim 19).

Plaintiff further asserts claims 1 and 3 from the '778 patent. Claim 3 depends from claim 2. Those claims read as follows:

1. A method of reporting severely errored seconds (SES) in a consistent manner across a plurality of connections in a service provider network comprising:

computing a local CRC octet based on a received bit stream;

comparing, by a processor, the local CRC octet to a received CRC octet;

identifying a CRC anomaly when the local CRC octet is not identical to the received CRC octet; and

normalizing a CRC anomaly counter based on a value for a CRC computation period (*PERp*), wherein *a Severely Errored Second is declared if there are more than N CRC anomalies in a second.*

('778 patent, claim 1) (disputed terms italicized).

> 2. The method of claim 1, wherein the *normalizing of the CRC anomaly counter* comprises incrementing the CRC anomaly counter by a value of M, wherein the value M is equal to PERp/K, and K is a positive integer.

(*Id.* at claim 2) (disputed term italicized).

> 3. The method of claim 2, wherein K is equal to 20 or 15.

(*Id.* at claim 3).

Finally, Plaintiff asserts claims 10 and 16 of the '337 patent. Claim 16 depends from claim 15. Those claims read:

> 10. An apparatus comprising:
>
>> a *transceiver* operable to *normalize a CRC anomaly counter* based on a value for a CRC computation period (*PERp*) and to *declare a Severely Errored Second when there are more than N CRC anomalies in a period of time*.

('337 patent, claim 10) (disputed terms italicized).

> 15. The apparatus of claim 10, wherein the *transceiver* is operable to increment the CRC anomaly counter by a value of M wherein the value M is equal to PERp/K, where K is a positive integer.

(*Id.* at claim 15) (disputed term italicized).

> 16. The apparatus of claim 15, wherein K is equal to 20 or 15.

(*Id.* at claim 16).

IV. CONSTRUCTION OF DISPUTED TERMS

1. The Preamble of Claims 11 and 16 of the '379 Patent

a. *Plaintiff's proposed construction*: limiting

b. *Defendants' proposed construction*: not limiting

c. *Court's construction*: limiting as to claim 16

The parties dispute whether the preamble of claims 11 and 16 of the '379 patent is limiting. (D.I. 374 at 27). The preamble reads: "A Cyclic Redundancy Checksum (CRC) anomaly counter normalization module designed to normalize a CRC anomaly counter based on a value for a CRC computation period (PERp) . . . ." ('379 patent, 11:8–11).

A preamble should be construed as a claim limitation "if it recites essential structure or steps, or if it is necessary to give life, meaning, and vitality to the claim." *Catalina Mktg. Int'l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002). "Preamble language that merely states the purpose or intended use of an invention is generally not treated as limiting the scope of the claim." *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 952 (Fed. Cir. 2006). However, "[w]hen limitations in the body of the claim rely upon and derive antecedent basis from the preamble, then the preamble may act as a necessary component of the claimed invention." *Eaton Corp. v. Rockwell Int'l Corp.*, 323 F.3d 1332, 1339 (Fed. Cir. 2003). Further, a preamble may limit the invention when it "recit[es] additional structure or steps underscored as important by the specification," or it "is essential to understand limitations or terms in the claim body." *Catalina Mktg.*, 289 F.3d at 808.

Plaintiff argues the preamble is limiting because it "provides antecedent basis for three terms found in dependent claim 16." (D.I. 374 at 27). Plaintiff asserts further that the "(CRC) anomaly counter normalization module" in the preamble "constitutes the recitation of essential structure that is further defined by dependent claim 16." (*Id.* at 28).

Defendants counter that "Cyclic Redundancy Checksum (CRC) anomaly counter normalization module" in the preamble "is merely a descriptive name for the claimed invention that is fully recited in the elements of claims 11 and 16." (*Id.* at 29). Further, they argue,

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"[N]one of the claim language regarding 'modules' that appears in the body of the claims refers back to or relies in any way on the preamble." (*Id.* (citing '379 patent, 11:12–18)).[2]

At the *Markman* hearing, I requested, and the parties subsequently submitted, supplemental letters regarding whether courts have found preambles to be limiting where they provide antecedent basis for terms found only in dependent claims. (*See* D.I. 464, 469). Citing *PersonalWeb Technologies LLC v. International Business Machines Corp.*, 2017 WL 2180980 (N.D. Cal. May 18, 2017), among others, Plaintiff argues that district courts have found such preambles limiting. (*See* D.I. 464). Defendants respond by arguing essentially that the cases cited by Plaintiff are inapposite. (*See* D.I. 469).[3]

Having considered the parties' joint brief and supplemental letters, I conclude the preamble is limiting only as to dependent claim 16. As a general matter, the patent consistently describes the invention as relating to the concept of normalizing a CRC anomaly counter based on a value for a CRC computation period. (*See, e.g.*, '379 patent, 3:4–10). Indeed, the patent discusses the "importan[ce] . . . in today's communications environment" of "accurately and efficiently calculat[ing] and report[ing] communications errors." (*Id.* at abstract). It states, "Through a normalization technique applied to a CRC computation period (e.g., the PERp value), accurate error identification and reporting for each individual connection can be

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[2] Defendants additionally assert that because nothing in the specification recites what comprises a "normalization module," finding the preamble limiting would render claims 11 and 16 invalid. (D.I. 374 at 30). Whether certain claims would be rendered invalid, however, has no bearing on whether the preamble itself is limiting.

[3] Further, at the *Markman* hearing and again in its supplemental letter, Defendants cited *CreAgri, Inc. v. Pinnaclife Inc.*, 2013 WL 1663611 (N.D. Cal. Apr. 16, 2013), for the proposition that "a preamble phrase appearing in an independent claim should [not] be construed as limiting simply because that phrase appears in both the preamble and the body of a dependent claim." (D.I. 469 at 1 (quoting *CreAgri*, 2013 WL 1663611, at *7–8)). I note that *CreAgri* was decided before both the Federal Circuit's decision in *Pacing Techs., LLC v. Garmin Int'l, Inc.*, 778 F.3d 1021 (Fed. Cir. 2015) and the Northern District of California's decision in *PersonalWeb*. In any event, I do not find the preamble limiting as to dependent claim 16 solely because it provides antecedent basis for terms in that claim.

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achieved." (*Id.*). Thus, the normalizing step performed by the "normalization module" in the preamble is "underscored as important by the specification." *See Catalina Mktg.*, 289 F.3d at 808.

Furthermore, while the preamble does not provide antecedent basis for any terms in the body of claim 11, it provides antecedent basis for three terms in dependent claim 16, which, in my opinion, supports the conclusion that the preamble is limiting as to that claim. Specifically, the preamble recites "a CRC anomaly counter," which provides antecedent basis for "the CRC anomaly counter" in dependent claim 16. The preamble also recites "[a] Cyclic Redundancy Checksum (CRC) anomaly counter normalization module designed to normalize," which provides antecedent basis for claim 16's recitation of "the normalizing." Finally, the preamble recites "a CRC computation period (PERp)," which provides antecedent basis for the term "PERp" in claim 16.

The Federal Circuit has held that a preamble is limiting where its terms "provide antecedent basis for and are necessary to understand positive limitations in the body of the claims." *Pacing Techs., LLC v. Garmin Int'l, Inc.*, 778 F.3d 1021, 1024 (Fed. Cir. 2015).

In *Pacing Techs.*, the Federal Circuit found that the preamble of an independent claim was limiting where a term in the preamble provided antecedent basis for a term in the body of the claim and another term in the preamble provided antecedent basis for a term in a dependent claim. *Id.* In *PersonalWeb*, the district court for the Northern District of California, relying in part on the Federal Circuit's analysis in *Pacing Techs.*, found a preamble limiting where the preamble provided antecedent basis for a limitation in a dependent claim. *See* 2017 WL 2180980, at *13–14. The court noted, "Although it is true that in *Pacing Techs.* the preamble provided antecedent basis for both limitations in the same claim and in a dependent claim, the

Federal Circuit's reference to the dependent claim suggests that antecedent basis for a dependent claim is still relevant." *Id.* at *13. The court stated that it did not read *Pacing Techs.*, however, as creating a "bright-line rule" that "antecedent basis for a dependent claim is always sufficient to render a preamble limiting." *Id.* n.15.

Similarly, I do not read *Pacing Techs.* as creating a bright-line rule that a preamble is limiting whenever it provides antecedent basis for a term in a dependent claim. Like the court in *PersonalWeb*, however, I think the fact that the preamble provides antecedent basis for three terms in dependent claim 16 is relevant and supports my conclusion that the preamble is limiting as to that claim. I note that, at the *Markman* hearing, neither party objected to the idea that a preamble could be construed as limiting a dependent claim, but not limiting the independent claim in which it appears.

Thus, for the reasons stated above, I conclude the preamble of claims 11 and 16 is limiting only as to dependent claim 16.

2. "transceiver"

    a. *Plaintiff's proposed construction*: "communications device capable of transmitting and receiving data wherein the transmitter portion and receiver portion share at least some common circuitry"

    b. *Defendants' proposed construction*: "communications device capable of transmitting and receiving data"

    c. *Court's construction*: "communications device capable of transmitting and receiving data wherein the transmitter portion and receiver portion share at least some common circuitry"

For the reasons stated in the Court's *Markman* opinion for the Family 1 patents, "transceiver" is construed to mean, "communications device capable of transmitting and receiving data wherein the transmitter portion and receiver portion share at least some common circuitry". (D.I. 477 at 7).

3. "PERp"

    a. *Plaintiff's proposed construction*: "repetition period of the CRC computations"

    b. *Defendants' proposed construction*: "period of time over which the CRC is computed"

    c. *Court's construction*: "period of time of the CRC computation"

At oral argument, I construed this term to mean "period of time of the CRC computation." (Tr. at 47:18–19). The parties agreed with my construction. (*See id.* at 46:21–47:3).

4. "to normalize / normalizing a CRC anomaly counter"

    a. *Plaintiff's proposed construction*: "to adjust / adjusting a CRC anomaly counter quantity so that the quantity lies in a prescribed range"

    b. *Defendants' proposed construction*: "to increment / incrementing the CRC anomaly counter"

    c. *Court's construction*: "to scale / scaling a CRC anomaly counter quantity so that it can be compared with another CRC anomaly counter quantity"

As an initial matter, I decline to adopt either Plaintiff's or Defendants' proposal. In my opinion, Defendants' proposal suggests that "to normalize" means to add. In other words, I do not think it properly reflects the ordinary meaning of the term. Neither Plaintiff nor Defendants argue disclaimer or lexicography. Accordingly, the plain meaning of the term controls. *See Toshiba Corp. v. Imation Corp.*, 681 F.3d 1358, 1369 (Fed. Cir. 2012) ("Absent disclaimer or lexicography, the plain meaning of the claim controls."). Further, that the patentee used the term "increment" elsewhere in the claims suggests that "normalize" should not be construed to mean "increment." I think Plaintiff's proposal, on the other hand, while based on a technical definition of the word "normalize," is overly broad and would not otherwise help the jury in understanding what it means "to normalize" in the context of the Family 5 patents.

In any event, at the *Markman* hearing, the parties seemed to agree that "to normalize" generally means "to scale" (*see* Tr. at 16:18–19, 68:24–69:2), though Plaintiff explained that the patents disclose two methods for normalizing—one involving a "scaling factor" and one involving "grouping" (*see id.* at 18:15–19:14). The parties further seemed to agree that normalizing involves adjusting two things so that they can be compared. (*See id.* at 48:11–24, 58:24–59:7).

In light of the parties' agreement in that regard, I will construe these terms to mean, "to scale / scaling a CRC anomaly counter quantity so that it can be compared with another CRC anomaly counter quantity." I do not understand that construction to limit "to normalize / normalizing" to multiplication by a scaling factor. In other words, I do not understand it to exclude the "grouping" method of normalization described in the patents.

5. "a Severely Errored Second is declared if there are more than N CRC anomalies in a second"

    a. *Plaintiff's proposed construction*: "a bit stream received over a second is declared to be severely errored if the normalized amount of CRC anomalies in that second is greater than a specified number N"

    b. *Defendants' proposed construction*: indefinite

    c. *Court's construction*: "a bit stream received over a second is declared to be severely errored if the amount of CRC anomalies in that second is greater than a specified number N"

At oral argument, Defendants maintained that Terms 5 through 8 are indefinite unless "N" is construed as 18. (*See id.* at 84:15–19).

"[A] patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134

S. Ct. 2120, 2124 (2014). Indefiniteness must be proven by clear and convincing evidence. *One-E-Way, Inc. v. Int'l Trade Comm'n*, 859 F.3d 1059, 1063 (Fed. Cir. 2017).

Defendants argue "this term is indefinite because the term 'N CRC anomalies' does not provide any limit on the scope of the claim – 'N' encompasses any value without limit." (D.I. 374 at 73). Defendants contend that while a person of ordinary skill would understand that a value of 18 is valid, because that value is disclosed in the specification, nowhere else does the written description provide any guidance for selecting other values of N. (*Id.* at 74). According to Defendants, "the term 'N' is analogous to a term of degree or to an ambiguously derived value in an equation." (*Id.* at 73 (citations omitted)).

Plaintiff responds by arguing that "because the specification provides sufficient guidance for a person skilled in the art to derive the value of N in the context of the claims, the claim term is not indefinite." (*Id.* at 76). Plaintiff points out that "the patent encompasses other communications systems besides ADSL systems." (*Id.* at 78 (citation omitted)).

I am not persuaded by Defendants' indefiniteness argument. As an initial matter, the Federal Circuit has "rejected the proposition that claims involving terms of degree are inherently indefinite." *Sonix Tech. Co. v. Publ'ns Int'l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017). Rather, what is important is that "[c]laim language employing terms of degree . . . provide[s] enough certainty to one of skill in the art when read in the context of the invention." *Id.* (alteration in original).

Here, that the patent discloses 18 as a value for "N" in ADSL systems does not, in my opinion, require that "N" be construed as 18. Nor do I think that not limiting "N" to 18 renders the claims indefinite. Rather, I am persuaded that, when read in the context of the specification and the claims, a person of ordinary skill would understand how to derive a value for "N." As

Plaintiff points out, the patent discloses communications systems in addition to ADSL, including ADSL 2 and VDSL 2. (*E.g.*, '379 patent, 1:40–49). As I understand it, while "N" is defined as 18 in ADSL systems, it is not necessarily limited to 18 in other communications systems in the prior art. (*See* D.I. 375 at A423 (Chrissan Decl.) ¶ 15). I am convinced that a person of ordinary skill familiar with these various communications systems would understand how to derive values for "N" other than 18. In any event, I do not think Defendants have shown by clear and convincing evidence that this term is indefinite.

Defendants additionally fault Plaintiff's proposed construction for requiring a "normalized amount of CRC anomalies," while the claim recites only "CRC anomalies." (D.I. 374 at 75 (emphasis omitted)). They argue that the specification makes clear that those are two different numbers, and thus Plaintiff's "proposal effectively rewrites the term 'CRC anomalies' . . . as the term 'normalized CRC anomalies.'" (*Id.*).

On this point, I agree with Defendants. That the patent distinguishes between the terms suggests that "CRC anomalies" should not be construed here to mean "normalized CRC anomalies." (*See* '379 patent, 4:54–61).

This term is construed to mean, "a bit stream received over a second is declared to be severely errored if the amount of CRC anomalies in that second is greater than a specified number N."

6. **"declare a Severely Errored Second when there are more than N CRC anomalies in a period of time"**

   a. *Plaintiff's proposed construction*: "a bit stream received over a period of time is declared to be severely errored if the normalized amount of CRC anomalies over that period of time is greater than a specified number N"

   b. *Defendants' proposed construction*: indefinite

c. *Court's construction*: "a bit stream received over a period of time is declared to be severely errored if the amount of CRC anomalies over that period of time is greater than a specified number N"

The sole difference between this and the previous term is that this term does not limit the time period used to determine a severely errored second. Rather, it requires only a "period of time."

As noted above, Defendants maintained at oral argument that Terms 5 through 8 are indefinite unless "N" is construed as 18. (*See* Tr. at 84:15–19). In the briefing, however, they additionally argue that this term is indefinite because, like the term, "N," "a period of time" "has no bound." (D.I. 374 at 85).

For the same reasons as those stated above with respect to the previous term, I am not persuaded that Defendants have demonstrated by clear and convincing evidence that this term is indefinite. *See One-E-Way, Inc.*, 859 F.3d at 1063. When read in the context of the patent, which discusses communications systems in which the value of "N" and a "period of time" may be different than "18" or "one second," respectively, I am persuaded that a person of ordinary skill in the art would understand how to derive a value for each of those terms.

I will construe this term to mean, "a bit stream received over a period of time is declared to be severely errored if the amount of CRC anomalies over that period of time is greater than a specified number N."

7. **"Severely Errored Second"**

a. *Plaintiff's proposed construction*: This term should not be construed out of context. See above for proposed construction in context.

b. *Defendants' proposed construction*: "18 or more CRC anomalies in a 1-second interval"

c. *Court's construction*: see constructions for Terms 5 and 6

For the same reasons as stated above, I am not persuaded by Defendants' argument that this term is indefinite unless it is construed to require "18 or more CRC anomalies in a 1-second interval." Accordingly, I decline to adopt Defendants' proposed construction. Because I have construed this term in the context of the two previous terms, I will not provide a separate construction for "Severely Errored Second" here.

8. **"N CRC anomalies"**

    a. *Plaintiff's proposed construction*: This term should not be construed out of context. See above for proposed construction.

    b. *Defendants' proposed construction*: indefinite

    c. *Court's construction*: see constructions for Terms 5 and 6

For the same reasons as stated above with respect to Terms 5 and 6, I am not persuaded by Defendants' indefiniteness argument. Plaintiff does not offer a proposed construction for this term. Having rejected Defendants' arguments, I otherwise see no reason to construe this term.

9. **"CRC bit[s] computation module"**

    a. *Plaintiff's proposed construction*: "A CRC bits computation module is a class of hardware and/or software structures that perform the limited function of computing the CRC (cyclic redundancy checksum) bits (i.e., CRC octet) from a bit stream"

    b. *Defendants' proposed construction*: Governed by 112, ¶ 6. No structure described, indefinite under *Williamson*.

    Function ('379): determine a local CRC octet based on a received bit stream.

    Function ('958): determine a local CRC octet based on a transmitted or received bit stream.

    Structure: indefinite

    c. *Court's construction*: not governed by 35 U.S.C. § 112, ¶ 6

"A CRC bit[s] computation module is a class of hardware and/or software structures that perform the limited function of computing the CRC (cyclic redundancy checksum) bits (i.e., CRC octet) from a bit stream"

The parties generally seem to agree that the function of the "CRC bit[s] computation module" is to compute or determine a CRC octet from a bit stream. They dispute whether this term is governed by 35 U.S.C. § 112, ¶ 6.

"CRC bit[s] computation module" is presumptively not subject to construction under § 112, ¶ 6 because it does not recite the word "means." *See Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015). "[T]he presumption can be overcome and § 112, [¶] 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 (alteration in original) (quoting *Watts v. XL Sys., Inc.*, 232 F.3d 877, 880 (Fed. Cir. 2000)). "What is important is . . . that the term, as the name for structure, has a reasonably well understood meaning in the art." *Greenberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580, 1583 (Fed. Cir. 1996).

Plaintiff argues that one of ordinary skill in the art would recognize that "CRC bit[s] computation module" "refer[s] to a class of hardware and/or software structures that implement the particular CRC computations on the data bits in a bit stream to generate the CRC bits or 'CRC octet.'" (D.I. 374 at 102 (citation omitted)). According to Plaintiff, the specification of the Family 5 patents supports this conclusion. (*Id.* at 103). It points to various references in the patent to the "CRC bit[s] computation module" and to a specific algorithm referenced in the patent for carrying out the function of the module. (*See id.* at 103–06). Plaintiff argues also that the term "module" is "generally understood in the communications field to convey sufficiently definite structure." (*Id.* at 106).

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Defendants counter that the word "module" in this term does not refer to any definite structure. (*Id.* at 107). "Nor does the prefix 'CRC bit computation' impart structure into the term," Defendants argue. (*Id.*). Defendants fault Plaintiff for relying on Figure 1 in the patent, which, according to Defendants, is merely a "black box" recitation of structure. (*Id.*). Finally, Defendants contend that this term is indefinite because the specification fails to recite any corresponding structure to the claimed function. (*Id.* at 108).

In my opinion, Defendants have failed to overcome the presumption that this term is not subject to § 112, ¶ 6.

While the Federal Circuit has recognized "module" as a "nonce word that can operate as a substitute for 'means' in the context of § 112, [¶] 6," *Williamson*, 792 F.3d at 1350, I do not think it operates as a substitute for "means" here. And while I am not persuaded by Plaintiff's argument that "module" is necessarily understood in the "communications field to convey sufficiently definite structure" (D.I. 374 at 106), I am nevertheless convinced that read in light of the specification, a person of ordinary skill in the art would understand "CRC bit[s] computation module" to refer to sufficiently definite structure. *See Media Rights Techs., Inc. v. Capital One Fin. Corp.*, 800 F.3d 1366, 1372 (Fed. Cir. 2015) ("In undertaking this analysis, we ask if the claim language, read in light of the specification, recites sufficiently definite structure to avoid § 112, ¶ 6." (citation omitted)).

As an initial matter, as Plaintiff points out, the specification recognizes CRC bits computation as well-known in the prior art. The patent states:

> Cyclic Redundancy Checksum (CRC) error detection is a common method of detecting errors in a data stream transmitted over a communications channel. ITU standard G.992.3, which is incorporated herein by reference in its entirety, describes CRC operations for ADSL systems in section 7.7.1.2. As discussed in G.992.3, the transmitter computes the transmitter CRC bits based on the transmitted bit stream and sends the CRC bits to the receiver.

('379 patent, 1:19–26). At oral argument, Defendants agreed that the CRC technology captured in the first three "module" terms at issue here was routine at the time of the invention. (*See* Tr. at 121:5–13; *see also id.* at 88:24–25 (stating that "the CRC functionality, Cyclic Redundancy Checksum is prior art.")). Indeed, I think Defendants more or less agreed that in light of the fact that CRC technology was well-known in the art at the time of the invention, a person of ordinary skill would understand the disputed CRC "module" terms as being implemented through a certain class of structures. (*See id.* at 121:16–25).

Further, as Plaintiff points out in the briefing, the specification refers to the "CRC bit[s] computation module" as a component of the transceiver in the claims. The patent provides, "The transceiver 100, acting as a transmitting transceiver, includes a CRC bits computation module and a CRC bits transmission module." ('379 patent, 4:43–45). It further references a specific algorithm from an ADSL 2 standard for carrying out the function of computing CRC bits from a bit stream. (*See id.* at 1:19–26); *see Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1299 (Fed. Cir. 2014) ("Structure may also be provided by describing the claim limitation's operation. . . . The limitation's operation is more than just its function; it is how the function is achieved in the context of the invention."), *overruled on other grounds by Williamson*, 792 F.3d at 1348–49.

In light of those references in the patent to the "CRC bit[s] computation module" and its operation, and given that this CRC technology was routine in the prior art at the time of the invention, I am convinced that a person of ordinary skill in the art would understand this term as having sufficiently definite meaning as the name for structure, even if that structure covers a broad class of hardware or software that is used to perform the computation. *See Lighting World, Inc. v. Birchwood Lighting, Inc.*, 382 F.3d 1354, 1359–60 (Fed. Cir. 2004) ("In considering whether a claim term recites sufficient structure to avoid application of section 112 ¶

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6, we have not required the claim term to denote a specific structure. Instead, we have held that it is sufficient if the claim term is used in common parlance or by persons of skill in the pertinent art to designate structure, even if the term covers a broad class of structures and even if the term identifies the structures by their function."), *overruled on other grounds by Williamson*, 792 F.3d at 1348–49. In other words, I am persuaded that "CRC bit[s] computation module" has a reasonably well understood meaning in the art as the name for structure. *See Greenberg*, 91 F.3d at 1583.

Thus, I find Defendants have failed to overcome the presumption that this term is not subject to construction under § 112, ¶ 6.

This term is construed to mean, "A CRC bit[s] computation module is a class of hardware and/or software structures that perform the limited function of computing the CRC (cyclic redundancy checksum) bits (i.e., CRC octet) from a bit stream."

10. "CRC bit[s] comparison module"

a. *Plaintiff's proposed construction*: "A CRC bits comparison module is a class of hardware and and/or software structures that perform the limited function of comparing one set of CRC bits (e.g., local CRC octet) to another set of CRC bits (e.g., received CRC octet)"

b. *Defendants' proposed construction*: Governed by 112, ¶ 6. No structure described, indefinite under *Williamson*.

Function: compare the local CRC octet to a received CRC octet

Structure: indefinite

c. *Court's construction*: not governed by 35 U.S.C. § 112, ¶ 6

"A CRC bit[s] comparison module is a class of hardware and and/or software structures that perform the limited function of comparing one set of CRC bits (e.g., local CRC octet) to another set of CRC bits (e.g., received CRC octet)"

The parties generally seem to agree that the function of this "module" is to compare a local CRC octet to another CRC octet. They dispute whether this term is subject to § 112, ¶ 6. The parties' § 112, ¶ 6 arguments are essentially the same as those made for the previous term.

As noted above, Defendants agreed at oral argument that CRC technology was routine at the time of the invention. (*See* Tr. at 121:5–13).

Additionally, as with the previous term, the patent refers to the "CRC bit[s] comparison module" as a component of the transceiver. (*See* '379 patent, 4:48–50). It further describes how that module operates. (*See id.* at 5:32–39 ("Knowing the CRC bits determined by the CRC bit computation module 110, and the CRC bits computed by the CRC bit computation module 210, the CRC bits comparison module 230 performs a comparison between the two and, in conjunction with the CRC error counter and reporting module 240, computes and identifies a CRC anomaly when the local CRC bits are not identical to the received CRC bits determined in transceiver 100)).

Thus, for similar reasons as those stated above, I conclude this term is not governed by § 112, ¶ 6. Rather, I am persuaded that "CRC bit[s] comparison module" has a reasonably well understood meaning in the art as the name for structure. *See Greenberg*, 91 F.3d at 1583.

This term is construed to mean, "A CRC bit[s] comparison module is a class of hardware and and/or software structures that perform the limited function of comparing one set of CRC bits (e.g., local CRC octet) to another set of CRC bits (e.g., received CRC octet)."

11. "CRC error [reporting] module"

    a. *Plaintiff's proposed construction*: "A CRC error [reporting] module is a class of hardware and/or software structures that perform the limited function of identifying a CRC anomaly when one set of CRC bits (e.g., local CRC octet) is not identical to another set of CRC bits (e.g., received CRC octet)"

b. *Defendants' proposed construction*: Governed by 112, ¶ 6. No structure described, indefinite under *Williamson*.

Function: identify a CRC anomaly when the local CRC octet is not identical to the received CRC octet

Structure: indefinite

c. *Court's construction*: not governed by 35 U.S.C. § 112, ¶ 6

"A CRC error [reporting] module is a class of hardware and/or software structures that perform the limited function of identifying a CRC anomaly when one set of CRC bits (e.g., local CRC octet) is not identical to another set of CRC bits (e.g., received CRC octet)"

The parties seem to agree that the function of this "module" is to identify a CRC anomaly when the local CRC octet is not identical to the received CRC octet. They again dispute whether this term should be governed by § 112, ¶ 6. On that point, their arguments with respect to this term are essentially the same as those with respect to the previous "module" terms.

Like the previous two "module" terms, this term is described in the patent as a component of the transceiver (*see* '379 patent, 4:49–53), and the specification describes the operation of the "CRC error [reporting] module" (*e.g.*, *id.* at 1:32–34, 5:32–40). Further, as noted earlier, Defendants agreed at the *Markman* hearing that this CRC technology was routine at the time of the invention. (*See* Tr. at 121:5–13).

Accordingly, I conclude this term is not governed by § 112, ¶ 6. I will construe this term to mean, "A CRC error [reporting] module is a class of hardware and/or software structures that perform the limited function of identifying a CRC anomaly when one set of CRC bits (e.g., local CRC octet) is not identical to another set of CRC bits (e.g., received CRC octet)."

12. **"normalization module"**

a. *Plaintiff's proposed construction*: "A normalization module is a class of hardware and/or software structures that perform the limited function of

normalizing a quantity (i.e., adjusting a quantity so that the quantity lies in a prescribed range) as specified in the claims."

b. *Defendants' proposed construction*: '379 claims 11, 16 (in the alternative, if preamble found limiting)

Governed by 112, ¶ 6. No structure described, indefinite under *Williamson*.

Function: normalize a CRC anomaly counter based on a value for a CRC computation period (PERp)

Structure: indefinite

c. *Court's construction*: governed by 35 U.S.C. § 112, ¶ 6

Function: normalize a CRC anomaly counter based on a value for a CRC computation period (PERp)

Structure: indefinite

The parties agree that if the preamble of the asserted claims of the '379 patent is limiting, the term "normalization module" must be construed. I have already held that the preamble is limiting as to claim 16.

The parties dispute whether this term is governed by § 112, ¶ 6. On that question, Plaintiff makes many of the same arguments as it does for the previous three terms. (*See* D.I. 374 at 138–39). The core of its argument is that the term "normalization module" is not subject to construction under § 112, ¶ 6 because a person of ordinary skill in the art would "readily recognize" the term "to refer to a class of hardware and/or software structures that implement the limited function of normalizing a quantity." (*Id.* at 138). It argues also that the word "'module' is generally understood in the communications field to convey sufficiently definite structure." (*Id.* at 139). As support, Plaintiff relies primarily upon the declaration of its expert, Dr. Chrissan.

Defendants respond that this term should be construed pursuant to § 112, ¶ 6 because the word "module" in the term does not refer to any definite structure. (*Id.*). On that point,

Defendants make many of the same arguments as they do for the previous three "module" terms. (*See id.* at 139–40). According to Defendants, this term is indefinite under *Williamson* because the patent fails to identify any corresponding structure. (*Id.* at 140).

As with the previous "module" terms, this term is presumptively not subject to construction under § 112, ¶ 6 because it does not recite the word "means." *See Williamson*, 792 F.3d at 1348. Here, however, I think Defendants have overcome that presumption.

As an initial matter, I find Dr. Chrissan's declaration, upon which Plaintiff heavily relies, entitled to little weight. According to Plaintiff, Dr. Chrissan "explains in great detail[] why" this term refers to structure. (D.I. 374 at 142 (citations omitted)). But Dr. Chrissan states only in conclusory fashion that this term "would be readily understood by a person of ordinary skill in the art to mean a class of hardware and/or software structures that perform the function of normalizing a quantity." (D.I. 375 at A377 ¶ 74). He claims his position on that point is "further supported by the specification and extrinsic evidence," but in so doing, Dr. Chrissan refers back only to his discussion of the term "to normalize / normalizing a CRC anomaly counter." (*See id.* at A377–78 ¶ 75). That the general term "to normalize" is an old concept that has an ordinary meaning to one skilled in the art does not, in my opinion, mean that "normalization module" is well understood in the art as the name for structure. Dr. Chrissan also refers back to previous sections of his declaration in arguing that "the term 'module' in general is well understood in the communications field to mean a class of hardware and/or software structures." (*Id.* at A378 ¶ 76). Again, I am not persuaded. Dr. Chrissan offers no support for his contention in that regard. Further, in my *Markman* opinion for the Family 1 patents, I rejected Plaintiff's argument that cases like *Blast Motion, Inc. v. Zepp Labs, Inc.*, 2017 WL 476428 (S.D. Cal. Feb. 6, 2017),

broadly established, post-*Williamson*, that the term "module" in the "telecommunications field, denotes sufficient structure such that § 112, ¶ 6 is not invoked." (*See* D.I. 477 at 23–24).

In any event, as Defendants point out, though "module" is substituted for "means," and "designed to" is substituted for "for," the "normalization module" is otherwise claimed in traditional means-plus-function format. Claim 11 recites, "A Cyclic Redundancy Checksum (CRC) anomaly counter normalization module designed to normalize a CRC anomaly counter based on a value for a CRC computation period (PERp) . . . ." ('379 patent, claim 11). Since "normaliz[ing]" is a function, claim 11 describes the "normalization module" only in terms of its functional capability. Nor does the specification provide any structure for the "normalization module." Rather, other than referring to the "normalization module" as a component of the transceiver (*see id.* at Fig. 1, 4:48–53), the specification consistently discusses the "module" in terms of its normalizing function (*see, e.g., id.* at 5:44–47, 8:64–67).

Williamson recognized "module" as a common nonce word. 792 F.3d at 1350. Though some "module" claim terms may contain words that modify "module" so as to recite sufficiently definite meaning as the name for structure, that is not the case here. Unlike the previous three "module" terms, there is no basis to conclude that at the relevant time, "normalization module" had a known meaning, let alone one that connoted structure.

Thus, I conclude that "normalization" does not modify "module" with language so as to impart structure. Nor does reading the claims in light of the specification support the conclusion that "normalization module" has a sufficiently definite meaning as the name for structure. Therefore, I conclude that "normalization module" is governed by § 112, ¶ 6.

Application of § 112, ¶ 6 proceeds in two steps. *Id.* at 1351. First, the court must identify the claimed function. *Id.* The identified function must be the function "explicitly recited in the

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claim." *Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258 (Fed. Cir. 1999). Second, "the court must determine what structure, if any, disclosed in the specification corresponds to the claimed function." *Williamson*, 792 F.3d at 1351. "Structure disclosed in the specification qualifies as 'corresponding structure' if the intrinsic evidence clearly links or associates that structure to the function recited in the claim." *Id.* at 1352. "Even if the specification discloses corresponding structure, the disclosure must be of 'adequate' corresponding structure to achieve the claimed function." *Id.*

The claimed function of the "normalization module" is to normalize a CRC anomaly counter based on a value for a CRC computation period (PERp). ('379 patent, claim 11). This matches Defendants' proposed function. Plaintiff does not offer an alternative construction under § 112, ¶ 6 and thus does not propose any function. It states in the briefing, however, that the "normalization module" performs the "limited function of normalizing a quantity." (D.I. 374 at 138). In any event, I adopt Defendants' proposed function since it is "explicitly recited in the claim." *Micro Chem., Inc.*, 194 F.3d at 1258.

Defendants argue that the specification fails to disclose sufficient structure corresponding to the function of the "normalization module" under § 112, ¶ 6. They argue, "Instead, the patent specification purports to include every 'known or later developed hardware, software, firmware, or combination thereof that is capable of performing' the recited function." (D.I. 374 at 145 (quoting '379 patent, 4:19–21)). Although Plaintiff does not appear to address directly Defendants' argument regarding the second step under *Williamson*, it maintains that Defendants are "plainly wrong" that "Plaintiff does not identify any structure in the specification." (*Id.* at 142). Plaintiff cites Figure 1 in the patent and its expert's declaration. (*Id.*).

I agree with Defendants. In my opinion, the intrinsic evidence fails to clearly link or associate any corresponding structure to the "normalization module" recited in the claim. *See Williamson*, 792 F.3d at 1352. Not once does the specification identify any specific structure corresponding to the "normalization module" or its function. Rather, as noted above, other than referring to the "normalization module" as a component of the transceiver, the specification generally describes the "module" in terms of its normalizing capability, *i.e.*, its function.

Additionally, the patent states, "The term module as used herein can refer to any known or later developed hardware, software, firmware, or combination thereof that is capable of performing the functionality associated with that element." ('379 patent, 4:19–22). Rather than disclosing "adequate corresponding structure to achieve the claimed function," *Williamson*, 792 F.3d at 1352, the patent specification aims broadly to capture everything under the sun, whether now known or developed in the future. I find this insufficient to impart sufficiently definite structure corresponding to the claimed function of the "normalization module."

Nor am I persuaded that Figure 1 imparts adequate corresponding structure. Figure 1 is merely a black box recitation of structure, showing that the "normalization module" is contained within the transceiver. Further, Plaintiff's reliance on Dr. Chrissan's declaration is unavailing. *See Noah Sys., Inc. v. Intuit Inc.*, 675 F.3d 1302, 1312 (Fed. Cir. 2012) ("The testimony of one of ordinary skill in the art cannot supplant the total absence of structure from the specification.").

Accordingly, I conclude that the '379 patent specification fails to recite sufficiently definite structure for the "normalization module." I therefore find claim 16 of the '379 patent invalid as indefinite.

V.   CONCLUSION

Within five days the parties shall submit a proposed order consistent with this Memorandum Opinion suitable for submission to the jury.