IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

TQ DELTA, LLC, Plaintiff, v. ADTRAN, INC., Defendant.	Civil Action No. 14-954-RGA
ADTRAN, INC., Plaintiff and Counterclaim Defendant, v. TQ DELTA, LLC, Defendant and Counterclaim Plaintiff.	Civil Action No. 15-121-RGA

MEMORANDUM OPINION

ANDREWS, U.S. DISTRICT JUDGE:

Currently before me are seven motions submitted by TQ Delta and ADTRAN regarding Family 10. This opinion will address ADTRAN's Motion for Summary Judgment of Invalidity of Claims 5 and 14 of U.S. Patent No. 8,625,660 (D.I. 721) and TQ Delta's Motion for Summary Judgment of No Invalidity of Claims 5 and 14 of U.S. Patent No. 8,625,660 (D.I. 728).[1] I have reviewed the parties' briefing and related papers. (D.I. 722, 770, 789, 730, 767, 784). After full consideration of the briefing, the motions are resolved as follows.

[1] All docket items citations refer to C.A. No. 14-954 unless otherwise noted.

I. BACKGROUND

Plaintiff TQ Delta filed this lawsuit against Defendant ADTRAN on July 17, 2014, asserting infringement of thirty-two patents. (D.I. 1). ADTRAN countersued. (C.A. 15-121, D.I. 1). I have divided the case into separate trials based on families of patents. (D.I. 369). This motion relates to the Family 10 patent and specifically to the issue of invalidity of the '660 patent.

A. The '660 Patent

The '660 patent relates to increasing the data rate and impairment immunity of multicarrier communications systems by assigning different margins to individual carriers. The '660 patent claims relate to modulating bits onto sets of carriers using different signal to noise ratio margins. The asserted claims of the '660 patent read as follows:

> 5. An apparatus comprising:
>
> A multicarrier communications transceiver operable to modulate a first plurality of bits onto a first plurality of carriers using a first Signal to Noise Ratio (SNR) margin and to modulate a second plurality of bits onto a second plurality of carriers using a second SNR margin,
>
> wherein the first plurality of carriers is different than the second plurality of carriers,
>
> wherein the first SNR margin specifies a first value for an increase in noise associated with the first plurality of carriers, wherein the second SNR margin specifies a second value for an increase in noise associated with the second plurality of carriers,
>
> and wherein the first value for the increase in noise is different than the second value for the increase in noise.

('660 patent, cl. 5).

> 14. A multicarrier communications transceiver operable to demodulate a first plurality of bits from a first plurality of carriers using a first Signal to Noise Ratio (SNR) margin and to demodulate a second plurality of bits from a second plurality of carriers using a second SNR margin,

wherein the first plurality of carriers is different than the second plurality of carriers,

wherein the first SNR margin specifies a first value for an increase in noise associated with the first plurality of carriers, wherein the second SNR margin specifies a second value for an increase in noise associated with the second plurality of carriers,

and wherein the first value for the increase in noise is different than the second value for the increase in noise.

('660 patent, cl. 14).

B. The Prior Art

The Parties do not dispute that the references at issue are prior art to the '660 patent. (D.I. 730, 770). The Parties also largely agree on the content of the prior art.

1. U.S. Patent No. 6,516,027 ("Kapoor")

Kapoor was filed on February 18, 1999 and is prior art to the '660 patent pursuant to 35 U.S.C. § 102(e) (pre-AIA). (D.I. 726, Ex. 2 (Kapoor) at Cover). Kapoor describes a "method and apparatus for allocating bits to subchannels in a discrete multitone environment." (*Id.* at Abstract, 1:7-10). Kapoor identifies a margin, SNR gap, and maximum data rate as parameters that characterize a transmission channel and explains that a "preferred approach [in DMT systems] is to load each subchannel based on the individual transmission characteristics of that subchannel." (*Id.* at 2:16-18, 21-37). Kapoor describes the margin as "the amount of additional signal-to-noise ratio in excess of the minimum required to achieve a given performance level for a particular type of modulation scheme with a particular SNR gap." (*Id.*). Kapoor describes, "[T]he need for an SNR margin factor is motivated by the presence of unforeseen additive noise impairments." (*Id.* at 7:47-52).

Kapoor identifies a number of "well known" bit loading algorithms and distinguishes that these prior art algorithms "do not support a bit allocation method which allows different subchannels to operate at different bit error rates or margins." (*Id.* at 4:8-10). Kapoor teaches an improvement, wherein, using the disclosed method, "Different subchannels therefore, can each have bit allocation values calculated based on different margins, different $P_e/2$ error rates, and different coding gains." (*Id.* at 8:39-42). Kapoor provides a framework "which also supports the use of different $P_e/2$ rates and SNR margins for different subchannels in a communication line." (*Id.* at 11:51-55).

2. U.S. Patent No. 6,084,917 ("Kao")

Kao was filed on December 16, 1997 and is prior art to the '660 patent pursuant to 35 U.S.C. § 102(e) (pre-AIA). (D.I. 726, Ex. 3 (Kao) at Cover). Kao discloses a "circuit for optimizing and adapting the bit and energy configurations of data sub-channels in a multi-channel data transmission signal." (*Id.* at 1:33-35). Kao describes the known connection between channel characteristics, margin, and bit error rate. (*Id.* at 3:47-51). Kao also describes well-known bit loading algorithms. (*Id.* at 4:8-5:33). Kao explains, "In applications where the required bit error rate may vary according to the type of information being transported by the specified sub-channels, the power margin can be individually adjusted to reflect this fact and the same initialization and fine-tuning routines can be applied." (*Id.* at 8:34-48).

II. LEGAL STANDARD

A. Summary Judgment

"The court shall grant summary judgment if the movant shows that there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(a). The moving party has the initial burden of proving the absence of a genuinely

disputed material fact relative to the claims in question. *Celotex Corp. v. Catrett*, 477 U.S. 317, 330 (1986). Material facts are those "that could affect the outcome" of the proceeding, and "a dispute about a material fact is 'genuine' if the evidence is sufficient to permit a reasonable jury to return a verdict for the nonmoving party." *Lamont v. New Jersey*, 637 F.3d 177, 181 (3d Cir. 2011) (quoting *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986)). When determining whether a genuine issue of material fact exists, the court must view the evidence in the light most favorable to the non-moving party and draw all reasonable inferences in that party's favor. *Scott v. Harris*, 550 U.S. 372, 380 (2007); *Wishkin v. Potter*, 476 F.3d 180, 184 (3d Cir. 2007).

B. Anticipation

"To show that a patent claim is invalid as anticipated, the accused infringer must show by clear and convincing evidence that a single prior art reference discloses each and every element of a claimed invention." *Silicon Graphics, Inc. v. ATI Tech., Inc.*, 607 F.3d 784, 796 (Fed. Cir. 2010). "[E]very element of the claimed invention [must be described], either expressly or inherently, such that a person of ordinary skill in the art could practice the invention without undue experimentation." *Callaway Golf Co. v. Acushnet Co.*, 576 F.3d 1331, 1346 (Fed. Cir. 2009). As with infringement, the court construes the claims and compares them against the prior art. *See Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1332 (Fed. Cir. 2010). "While anticipation is a question of fact, it may be decided on summary judgment if the record reveals no genuine dispute of material fact." *Encyclopaedia Britannica, Inc. v. Alpine Elecs. of Am., Inc.*, 609 F.3d 1345, 1349 (Fed. Cir. 2010).

C. Obviousness

The presumption that all patents are valid is the starting point for any obviousness determination. 35 U.S.C. § 282. A patent claim is invalid as obvious under 35 U.S.C. § 103 if

the novel aspect of the claimed invention "would have been obvious . . . to a person having ordinary skill in the art. . . ." *Id.* § 103(a); *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406-07 (2007). Obviousness is a question of law that depends on the following factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the relevant art; and (4) any objective indicia of nonobviousness. *See KSR*, 550 U.S. at 406; *see also Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1347 (Fed. Cir. 2012).

To prove obviousness, a party must show that a person skilled in the art would have been motivated to combine the prior art teachings to create the claimed apparatus with a reasonable expectation of success. *See Allergan, Inc. v. Sandoz Inc.*, 726 F.3d 1286, 1291 (Fed. Cir. 2013). The improvement over prior art must be "more than the predictable use of prior art elements according to their established functions." *KSR*, 550 U.S. at 417.

A court is required to consider secondary considerations, or objective indicia of nonobviousness, before reaching an obviousness determination, as a "check against hindsight bias." *See In re Cyclobenzaprine Hydrochloride Extended–Release Capsule Patent Litig.*, 676 F.3d 1063, 1078-79 (Fed. Cir. 2012). "Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966). Where "the content of the prior art, the scope of the patent claim, and the level of ordinary skill in the art are not in material dispute, and the obviousness of the claim is apparent in light of these factors, summary judgment is appropriate." *KSR*, 550 U.S. at 427.

III. DISCUSSION

The parties have both moved for summary judgment on ADTRAN's claims of anticipation and obviousness. The '660 patent describes and claims an apparatus using a first Signal to Noise ("SNR") margin for a first set of carriers and a second SNR margin for a second set of carriers. (D.I. 779-1, Ex. 3 at 5:30-34).

A. Anticipation

The parties do not dispute that the '660 patent describes a transceiver "operable to modulate a first plurality of bits onto a first plurality of carriers using a first Signal to Noise Ratio (SNR) margin and to modulate a second plurality of bits onto a second plurality of carriers using a [different] second SNR margin." (D.I. 722 at 3; D.I. 770 at 7). ADTRAN asserts that each of Kapoor and Kao discloses and anticipates all elements of claims 5 and 14. (D.I. 770 at 7). According to TQ Delta, prior art systems, like that of Kapoor, assign a common SNR margin to all of the carriers, even if the system uses different SNR gaps and bit error rates when allocating bits to different groups of carriers, and therefore do not disclose the claimed limitations. (*Id.* at 5).

1. Anticipation by Kapoor

The parties do not dispute that Kapoor teaches grouping carriers into a first set and a second set for the purpose of bit allocation. (D.I. 770 at 7; D.I. 789 at 3). Kapoor teaches:

> Different subchannels therefore, can each have bit allocation value calculated based on different margins, different Pe/2 error rates, and different coding gains, subject to the quantity of tables stored in the communication device 10.
>
> ...
>
> Within this inventive system and method, a framework is provided which also supports the use of different Pe/2 rates and SNR margins for different subchannels in a communication line, and a process for allocating bits and gain scaling less than the entirety of subchannels.

(D.I. 726, Ex. 2 (Kapoor) at 8:39-42, 11:51-55).

ADTRAN contends that the limitations in claims 5 and 14 are disclosed by the Kapoor prior art because a POSITA would interpret the plain language of Kapoor as providing a framework in which different SNR margins are used for different pluralities of carriers. (D.I. 722 at 7). TQ Delta argues that a reading of Kapoor does not necessarily teach a first SNR margin and a second SNR margin used for bit allocation on a respective first and second plurality of carriers. (D.I. 770 at 6). Therefore, the issue is whether Kapoor, from the perspective of a POSITA, describes using two different margins in the same manner, or whether Kapoor and the '660 patent teach two entirely different scenarios for error rates and margins.

Taking the evidence in the light most favorable to ADTRAN, a reasonable jury could determine that the claims are anticipated in view of Kapoor because Kapoor could be read to disclose the use of different SNR margins on different channels. ADTRAN maintains a reasonable inference that a POSITA would understand that one group of carriers with a common margin would constitute a first plurality of carriers and another group of carriers with a different common margin would constitute a second plurality of carriers. (D.I. 722 at 7). According to ADTRAN, the plain language of Kapoor further teaches the use of different SNR margins for different pluralities of carriers, and a POSITA would not read the two "parallel teachings" to have "disparate meanings." (*Id.* at 7-8).

Taking the evidence in the light most favorable to TQ Delta, a reasonable jury could determine that the claims are not anticipated in view of Kapoor. TQ Delta's expert Dr. Brody reads "different … SNR margins for different subchannels" to mean that Kapoor discloses the use of one common SNR margin across all subchannels in one initialization, and a different common SNR margin across all subchannels in a second initialization. (D.I. 760-1, Ex. 24

(Brody Rpt.) at ¶ 58; Brody Vol. I. Tr. 109:3-6). I think that a jury could reasonably read this sentence to describe using two different scenarios for error rates and margins.

TQ Delta also argues that because there are no embodiments of Kapoor that use a first SNR margin for a first group of subchannels while using a different second SNR margin for a second group of subchannels, a POSITA would have interpreted the statement about "different margins" to refer to the fact that a single margin of either four or six dB could be selected as disclosed in Kapoor at 7:51-52. (D.I. 770 at 11). TQ Delta further points to the prosecution history to support its contention: the original claim submission in the '660 patent was rejected in view of Kapoor, and the patent examiner considered this prior art reference during the prosecution of the later-submitted claims 5 and 14. (*Id.* at 5, 12; *see* D.I. 760-1, Ex. 32 (File History) at TQD-ADT 016476). I think that a jury could reasonably find that, in view of the embodiments of Kapoor and the prosecution history, a POSITA could have interpreted Kapoor as teaching only a single margin applied to sets of carriers.

A reasonable jury could decide in either party's favor on a POSITA's characterization of the plain language of Kapoor and the logical inferences that derive therefrom. Therefore, there is a genuine dispute as to whether a POSITA would have interpreted the relevant portions of Kapoor to teach "a first plurality, a second plurality, an SNR margin which is used for bit allocation on that first plurality and second plurality, and that the SNR margins in the first and second plurality are different." (D.I. 770 at 11). Summary judgment is not appropriate for either side on the Kapoor reference.

2. Anticipation by Kao

Kao discloses a multicarrier communications transceiver wherein a plurality of bits is modulated onto, and demodulated from, a plurality of carriers. (D.I. 722 at 14). Specifically, Kao teaches:

> "In applications where the required bit error rate may vary according to the type of information being transported by the specified sub-channels, the power margin can be individually adjusted to reflect this fact and the same initialization and fine tuning routines can be applied."

(D.I. 726, Ex. 3 (Kao) at 8:34-38).

In order to grant summary judgment on ADTRAN's motion for invalidity, ADTRAN must overcome a high bar: there must be no genuine dispute of material fact that every claim limitation is present in the prior art. ADTRAN argues that Kao uses the term "power margin" to refer to what the asserted claims call "SNR margin." (D.I. 722 at 14). According to ADTRAN, a POSITA would understand that these terms are interchangeable because Kao uses the term "power margin" to describe a certain variable contained in a "well known" equation that appears in other prior art references, and those references use the phrase "SNR margin" to describe the analogous variable. (*Id.*, citing D.I. 760-1, Ex. 23 (Zimmerman Rpt.) at ¶¶ 95-99; Kao at 3:47-63). On the basis of this characterization, ADTRAN asserts that in teaching that "some specified sub-channels may transport one type of information that may require a specific bit error rate while other specified sub-channels transport information at a different bit error rate," and, "the SNR margin can be individually adjusted for each of the specified sub-channels," Kao anticipates the asserted claims. (D.I. 722 at 15).

TQ Delta argues there is no evidence, other than the assertion of ADTRAN's expert, that the term "power margin" in Kao is interchangeable with "SNR margin." (D.I. 770 at 13). But there is evidence that prior art references use the term "power margin" to connote "SNR margin," making it more likely that a POSITA would find the terms interchangeable in this case.

(Zimmerman Rpt. at ¶¶ 96-98). Kao's system appears to operate in one of two modes, in both of which a single SNR margin is assigned to all of the carriers. (D.I. 770 at 14). TQ Delta argues, even assuming that the terms "power margin" and "SNR margin" are synonymous, Kao teaches assigning a single SNR margin to all the carriers of Kao's system. (D.I. 730 at 15). In support of this contention, TQ Delta's expert Dr. Brody points out that all of the embodiments of the initialization and fine-tuning routines described in Kao teach a single SNR margin assigned to all the carriers. (D.I. 770 at 17; D.I. 760-1, Ex. 29 at 164:5-7, 164:24-164:7).

Taking the evidence in the light most favorable to ADTRAN, a reasonable jury could find that Kao teaches a first and second plurality of carriers modulated using a first and second SNR margin. It is reasonable that a POSITA could understand that one group of carriers with a common margin would constitute a first plurality of carriers and another group of carriers with a different common margin would constitute a second plurality of carriers. The term "individually" in the relevant portion of Kao could reasonably be construed to refer back to the "specified sub-channels" whose SNR margins are adjusted to reflect different types of information being carried.

Taking the evidence in the light most favorable to TQ Delta, a reasonable jury could find Kao does not teach a first and second plurality of carriers modulated using a first and second SNR margin. The cited portion of Kao, above, could reasonably imply only that there are multiple potential groups of carriers. The term "individually" in Kao could reasonably refer to a plurality of channels, and thereby does not establish with "sufficient precision and detail" that Kao discloses using two different power margins for two different pluralities of carriers. *See Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1284 (Fed. Cir. 2017). While a specific embodiment of the claim limitation is not needed to find that a POSITA could arrive at a

particular conclusion, the context of the clause in Kao, and the evidence submitted in connection therewith, do not suggest that Kao necessarily discloses that each plurality of carriers described is assigned a different SNR margin.

Thus, I find a genuine dispute of material fact as to whether Kao anticipates the '660 patent and granting summary judgment based on Kao is not appropriate.

B. Obviousness

ADTRAN argues that claims 5 and 14 of the '660 patent are obvious over either Kapoor or Kao in combination with the admitted prior art and the knowledge of one of ordinary skill in the art. (D.I. 722 at 1). ADTRAN asserts, "[O]ne of ordinary skill in the art would have been motivated to assign a different first and second SNR margin to a first and second plurality of carriers in Kao because it results in a more efficient system." (*Id.* at 19). ADTRAN also argues that a POSITA would have had a strong expectation of success in doing so. (*Id.*).

Taking the evidence in the light most favorable to ADTRAN, a reasonable jury could determine that the claims are invalid as obvious. ADTRAN asserts that the use of different SNR margins on different carriers was known in the art prior to April 2000. (*Id.* at 4). U.S. Patent No. 6,205,410 to Cai describes the technical shortcomings of using a common margin on all carriers and states that the use of "varying margins allow the DMT channels to be used with maximum of efficiency, while ensuring a low bit error rate." (D.I. 726, Ex. 4 (Cai) at 1:51-62, 3:11-13). Kapoor recognizes the desirability of a bit allocation method that allows different subchannels to operate at different margins. (Kapoor at 4:8-10). Thus, a POSITA could have been motivated to design a technology that teaches the use of different margins on different pluralities of carriers.

Taking the evidence in the light most favorable to TQ Delta, a reasonable jury could determine that the claims are not invalid as obvious. ADTRAN's expert, Dr. Zimmerman,

conceded that it was not known to use two margins for a first and second plurality of carriers. (D.I. 770 at 18). Neither Kapoor nor Kao specifically teach a first SNR margin and a different second SNR margin assigned to a respective first and second plurality of carriers. Nor does Cai specifically provide the motivation to assign a different first and second SNR margin to a respective first and second plurality of carriers in order to achieve a more efficient system.

Thus, I find a genuine dispute of material fact as to whether claims 5 and 14 are obvious over Kapoor and Kao. Summary judgment is denied.

IV. CONCLUSION

For the foregoing reasons, ADTRAN's motion for summary judgment of invalidity is denied and TQ Delta's motion for summary judgment of no invalidity is denied.

An accompanying order will be entered.