

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QUALCOMM INCORPORATED and
ZYXEL COMMUNICATIONS CORPORATION,¹
Petitioner,

v.

UNM RAINFOREST INNOVATIONS,
Patent Owner.

IPR2021-00582
Patent 8,565,326 B2

Before KRISTEN L. DROESCH, BARBARA A. PARVIS, and
CHARLES J. BOUDREAU, *Administrative Patent Judges*.

DROESCH, *Administrative Patent Judge*.

JUDGMENT

Final Written Decision

Determining All Challenged Claims Unpatentable

Granting in Part and Denying in Part Patent Owner's Motion to Amend

Dismissing Patent Owner's Motion to Exclude

35 U.S.C. § 318(a)

¹ ZyXEL Communications Corporation was joined as a petitioner in this proceeding based on a petition and motion for joinder filed in IPR2021-00741, which was granted.

I. INTRODUCTION

We have authority to hear this *inter partes* review under 35 U.S.C. § 6, and this Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, Petitioner has established by a preponderance of the evidence that claims 1–5 (“challenged claims”) of U.S. Patent No. 8,565,326 B2 (Ex. 1001, “’326 Patent”) are unpatentable. In addition, Patent Owner’s Motion to Amend is granted in part as to proposed substitute claims 6, 7, 9, and 10 and denied in part as to proposed substitute claim 8.

A. Procedural History

Qualcomm Incorporated (“Qualcomm”) filed a Petition requesting an *inter partes* review of claims 1–5 of the ’326 Patent. Paper 1 (“Pet.”). UNM Rainforest Innovations (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). Pursuant to our authorization, Qualcomm filed a Reply to the Preliminary Response (Paper 8) to address discretionary denial under 35 U.S.C. § 314(a), to which Patent Owner filed a Sur-reply (Paper 10).

Pursuant to 35 U.S.C. § 314, we instituted trial on August 17, 2021. Paper 11 (“Institution Decision” or “Dec.”).

ZyXEL Communications Corporation (“ZyXEL”) filed a petition for *inter partes* review and a Motion for Joinder in IPR2021-00741, requesting that ZyXEL be joined as a petitioner in IPR2021-00582. *ZyXEL Commc’ns Corp. v. UNM Rainforest Innovations*, IPR2021-00741, Papers 1, 3. After considering the parties’ papers, we instituted trial in IPR2021-000741, granted ZyXEL’s Motion for Joinder, and added ZyXEL as a petitioner to IPR2021-00582. *ZyXEL Commc’ns Corp. v. UNM Rainforest Innovations*,

IPR2021-00582
Patent 8,565,326 B2

IPR2021-00741, Paper 17. A copy of that decision was entered in this record. Paper 15.

After institution of trial, Patent Owner filed a Response (Paper 35, “PO Resp.”), to which Qualcomm and ZyXEL (collectively “Petitioner”) filed a Reply (Paper 36, “Pet. Reply”), to which Patent Owner filed a Sur-reply (Paper 39, “PO Sur-reply”).

Patent Owner also filed a Motion to Amend (Paper 26, “Mot. Amend”), to which Petitioner filed an Opposition (Paper 37, “Pet. Opp. MTA”). Pursuant to Patent Owner’s request (*see* Mot. Amend 1), we issued Preliminary Guidance (Paper 38, “PG”) on Patent Owner’s Motion to Amend. Patent Owner filed a Reply (Paper 59, “PO Reply MTA”) to Petitioner’s Opposition, to which Petitioner filed a Sur-reply (Paper 60, “Pet. Sur-reply MTA”).

Petitioner relies on a first Declaration of Sumit Roy Ph.D., (Ex. 1002) to support its Petition. Patent Owner relies on a Declaration of Branimir Vojcic D.Sc., (Ex. 2001) to support its Response. Patent Owner relies on a second Declaration of Dr. Vojcic (Ex. 2017) to support its Motion to Amend. Petitioner relies on a second Declaration of Dr. Roy (Ex. 1040) to support its Opposition to the Motion to Amend.

Dr. Roy and Dr. Vojcic were cross-examined during trial, and transcripts of Dr. Roy’s deposition (Ex. 2014) and Dr. Vojcic’s deposition (Ex. 1041) are included in the record.

Patent Owner filed a Motion to Exclude Evidence (Paper 51, “Mot. Excl.”), to which Petitioner filed an Opposition (Paper 53), and Patent Owner filed a Reply to Petitioner’s Opposition (Paper 57).

Oral argument was held on May 12, 2022. A transcript of the oral argument is included in the record. Paper 61.

B. Real Parties in Interest

Qualcomm states that Qualcomm Incorporated is the real party in interest and further identifies its customers Dell Technologies Inc., Dell Inc., and EMC Corporation as additional real parties in interest. *See* Pet. 2.

ZyXEL states that ZyXEL Communications Corporation is a real party in interest. *ZyXEL Commc 'ns Corp. v. UNM Rainforest Innovations*, IPR2021-00741, Paper 1, 1–2. ZyXEL also identifies ZyXEL Communications Inc. as a U.S. subsidiary of ZyXEL Communications Corporation, but indicates that ZyXEL Communications Corporation does not believe that ZyXEL Communications Inc. qualifies as a real party in interest. *Id.* at 2.

Patent Owner states that the University of New Mexico Board of Regents is an additional real party in interest. *See* Paper 4, 2.

C. Related Matters

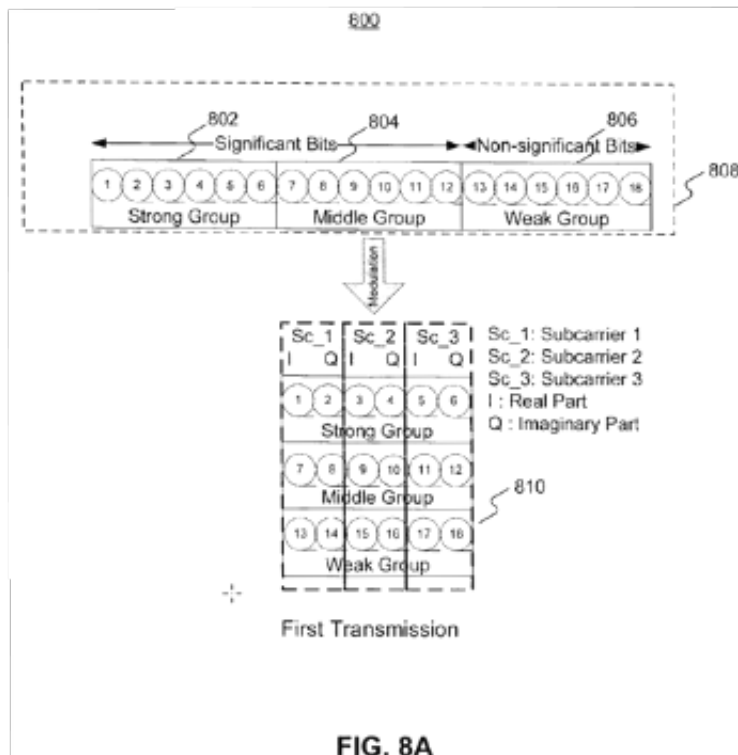
The parties indicate the following matters may affect or be affected by a decision in this proceeding: *UNM Rainforest Innovations v. Industrial Technology Research Institute*, No. D-202-CV-2021-02803 (N.M. 2d. Judicial District Court May 4, 2021); *UNM Rainforest Innovations v. ASUSTek Computer, Inc.*, No. 6:20-cv-00142-ADA (W.D. Tex.); *UNM Rainforest Innovations v. Dell Technologies, Inc.*, No. 6:20-cv-00468-ADA (W.D. Tex.); *UNM Rainforest Innovations v. D-Link Corp.*, No. 6:20-cv-00143-ADA (W.D. Tex.); *UNM Rainforest Innovations v. TP-Link Technologies Co.*, No. 6:19-cv-00428-ADA (W.D. Tex.); and *UNM*

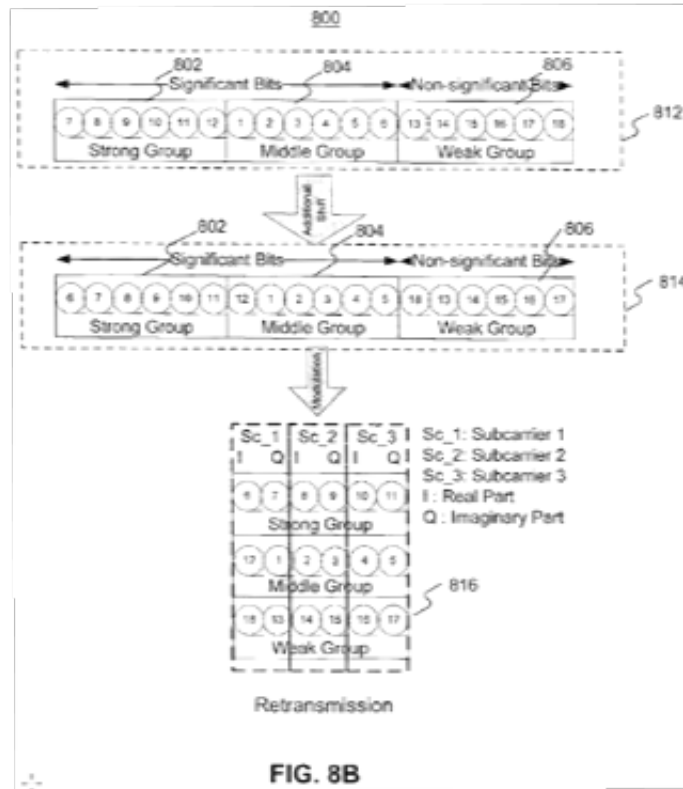
Rainforest Innovations v. ZyXEL Communications Corp., No. 6:20-cv-00522-ADA (W.D. Tex.). *See* Pet. 2–3; Paper 4, 2; Paper 7, 1.

D. The '326 Patent (Ex. 1001)

The '326 Patent relates to bit allocation and interleaving for communication systems. *See* Ex. 1001, 1:13–14.

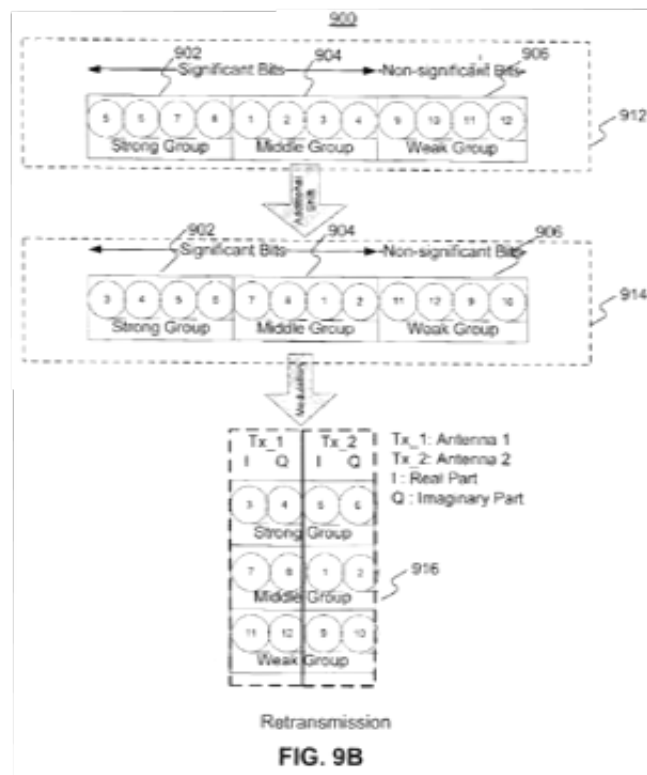
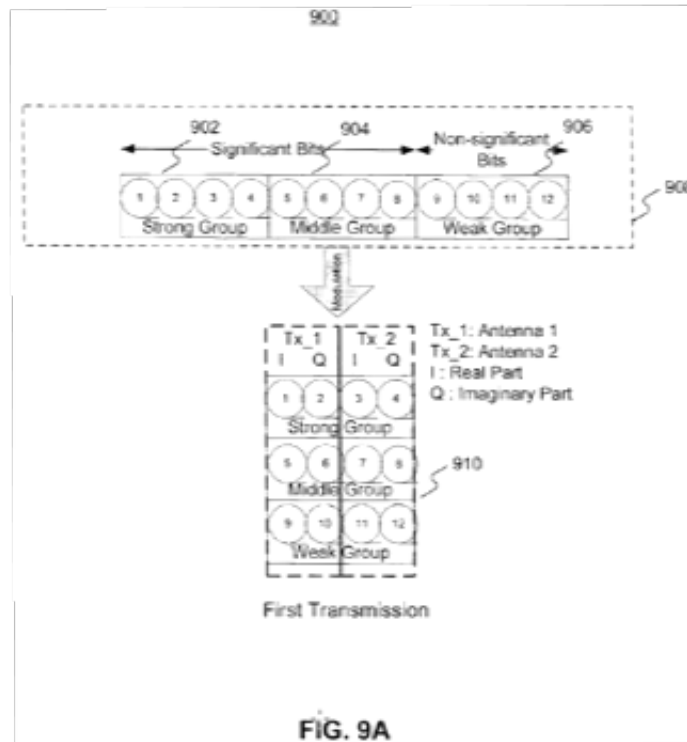
Figures 8A and 8B of the '326 Patent are reproduced below:





Figures 8A and 8B depict a bit allocation and interleaving method 800 for a single-input and single-output communication system. *See* Ex. 1001, 4:5–8, 11:13–15. Bits 1 through 12 are significant bits and allocated to strong group 802 and middle group 804, respectively, and bits 13 through 18 are non-significant bits allocated to weak group 806 to form group allocation 808 for the first transmission. *See id.* at 11:15–30. During retransmission, a circular shift may be performed on the significant bits resulting in group allocation 812, where the bits allocated to strong group 802 during the first transmission are allocated to middle group 804 and the bits allocated to middle group 804 during the first transmission are allocated to strong group 802. *See id.* at 11:38–47. An additional circular shift of one bit is performed on the significant bits and non-significant bits resulting in group allocation 814. *See id.* at 11:48–57.

Figures 9A and 9B of the '326 Patent are reproduced below:



Figures 9A and 9B depict a bit allocation and interleaving method 900 for a multi-input and multi-output communication system. *See* Ex. 1001, 4:9–12, 12:14–16. Bits 1 through 8 are significant bits and allocated to strong group 902 and middle group 904, respectively, and bits 9 through 12 are non-significant bits allocated to weak group 906 to form group allocation 908 for the first transmission. *See id.* at 12:20–31. During retransmission, a circular shift may be performed on the significant bits, resulting in group allocation 912, where the bits allocated to strong group 902 during the first transmission are allocated to middle group 904 and the bits allocated to middle group 904 during the first transmission are allocated to strong group 902. *See id.* at 12:38–47. An additional circular shift of two bits is performed on the significant bits and non-significant bits, resulting in group allocation 914. *See id.* at 12:48–59. The length of the bit shift for the additional circular shift may be $2*k$, where $k = 1, 2 \dots$ or N_t-1 , where N_t is the total number of transmitting antennas. *See id.* at 12:51–55.

E. Illustrative Claims

Claims 1, 2, 4, and 5 are independent, and claim 3 depends from claim 2. Claims 1 and 2 are illustrative and reproduced below:

1. A method for transmitting data represented by a plurality of coded bits, the method comprising:
 - performing a circular shift, with a variable length related to a modulation order and a number of transmissions, on ones of the plurality of coded bits; and
 - transmitting the circularly shifted ones of the plurality of coded bits.

2. A method for transmitting data represented by a plurality of coded bits, the method comprising:
allocating ones of the plurality of coded bits, the allocating resulting in a circular shift, with a variable length related to a modulation order and a number of transmissions, of the ones of the plurality of coded bits; and
transmitting the allocated ones of the plurality of coded bits.

Ex. 1001, 14:17–31.

F. Patentability Challenges and Asserted Prior Art

Petitioner asserts the following challenges to the patentability of claims 1–5:

Claim(s) Challenged	35 U.S.C. § ²	Reference(s)/Basis
1, 2, 4, 5	102	Yoon ³
1, 2, 4, 5	103	Yoon
4, 5	103	Yoon, Wengerter ⁴
3	103	Yoon, Naka ⁵

II. ANALYSIS

A. Claim Construction

The Board applies the same claim construction standard as applied in federal courts in a civil action under 35 U.S.C. § 282(b), which is generally referred to as the *Phillips* standard. *See* 37 C.F.R. § 42.100(b); *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). Under the *Phillips* standard, “[t]he words of a claim are generally given their ordinary and customary meaning as understood by a person of ordinary skill in the art

² Petitioner challenges patentability under pre-AIA 35 U.S.C. §§ 102 and 103. Pet. 30, 58, 62.

³ Ex. 1010, US 2006/0072292 A1, issued Apr. 17, 2003 (“Yoon”).

⁴ Ex. 1013, WO 2006/119794 A1, published Nov. 16, 2006 (“Wengerter”).

⁵ Ex. 1015, EP 1819079 B1, published August 15, 2007 (“Naka”).

when read in the context of the specification and prosecution history.”
Thorner v. Sony Computer Entm't Am. LLC, 669 F.3d 1362, 1365 (Fed. Cir. 2012) (citing *Phillips*, 415 F.3d at 1313).

“ones of the plurality of coded bits”

Patent Owner contends that “ones of the plurality of coded bits,” recited in each of the challenged claims, should be construed as “ones of the plurality of coded bits, spanning multiple modulation symbols.” *See* PO Resp. 15–23. In support of its construction, Patent Owner asserts that the ’326 Patent makes clear beyond a doubt that the claimed circular shift is performed on ‘ones of the plurality of coded bits’ *prior to the result of that operation being processed further, i.e.,* by the bit interleaver, and finally the bit mapper which assigns bits to modulation symbols. Notably, the further processing may include *additional circular shifts or other bit operations*.

Id. at 15–16 (citing Ex. 2001 ¶ 81); PO Sur-reply 3 (same argument, citing Ex. 2001 ¶ 81); *see* PO Resp. 16–18 (supporting arguments, reproducing Ex. 2001 ¶¶ 55–57; Ex. 1001, Figs. 8A, 8B). Patent Owner asserts that the important concept is that the claimed circular shift occurs first, and another 1-bit circular shift is performed after the claimed circular shift. *See* PO Resp. 18 (quoting Ex. 2001 ¶ 57; citing Ex. 1001, Fig. 8B). Patent Owner contends that “[t]his key concept confirms that the claimed circular shift operation is not performed on the bits of a single modulated symbol, but on a large sequence of coded bits *before* interleaving and bit mapping the shifted bit sequence to modulation symbols.” *Id.* at 18–19.

Patent Owner contends that Dr. Vojcic explains in detail that the advantages of the ’326 Patent cannot be realized by intra-symbol shifts. *See* PO Resp. 19 (quoting Ex. 2001 ¶ 62); *see also id.* at 21 (similar argument,

quoting Ex. 2001 ¶ 62), 23 (similar argument, quoting Ex. 2001 ¶ 62); PO Sur-reply 2 (similar argument), 10 (similar argument, citing Ex. 2001 ¶ 62; Pet. Reply 10). Patent Owner points out that “[a] key characteristic of this invention is the ability to take advantage of the varying channel attenuation experienced by different modulation symbols.” PO Resp. 19 (quoting Ex. 2001 ¶ 62), 20–21 (quoting Ex. 2001 ¶ 62); PO Sur-reply 2 (quoting Ex. 2001 ¶ 62), 7 (quoting Ex. 2001 ¶ 62). Patent Owner asserts that “the claimed circular shift of ‘ones of the plurality of coded bits’ occurs across multiple modulation symbols and cannot be realized within only a single symbol, which typically spans only on the order of 2, 4, or 6 bits.” *Id.* at 19; PO Sur-reply 2. According to Patent Owner, a person of ordinary skill in the art ““would understand that the length of the sequence of coded bits, K, would typically be on the order of at least several hundred bits to several thousand bits.”” PO Resp. 19 (quoting Ex. 2001 ¶ 48); PO Sur-reply 2 (quoting Ex. 2001 ¶ 48). Patent Owner asserts that the ’326 Patent is, therefore, “able to ‘provide channel coding, i.e., forward error correction coding, and diversity in that bits/symbols that experienced bad channel conditions in one transmission may experience good channel conditions in the subsequent transmission/retransmission due to reordering in consecutive transmission.’” PO Resp. 19 (quoting Ex. 2001 ¶ 48); *see* PO Sur-reply 2 (quoting Ex. 2001 ¶ 48).

In the Reply, Petitioner asserts that “Patent Owner’s proposed construction erroneously attempts to narrow the plain and ordinary meaning of a straightforward term.” Pet. Reply 2. Petitioner contends that the Board’s preliminary determination in the Institution Decision declining Patent Owner’s narrow and unnecessary proposed construction is supported

by *Thorner*. *See id.* at 3 (quoting *Thorner* at 1367). According to Petitioner, “[t]he preamble of each independent claim calls for ‘data represented by a plurality of coded bits,’ – a broad and basic term, with [a] plain and ordinary meaning and which provides the antecedent basis for the term ‘ones of the plurality of coded bits.’” *Id.* at 3–4 (citing Ex. 1001, 14:17–18, 14:24–25, 14:39–40, 14:47–48). Petitioner contends that the claims and specification do not redefine “coded bits” or “ones of the plurality of coded bits” and do not disavow any scope of the ordinary meaning of “ones of the plurality of coded bits.” *See id.* at 4.

Petitioner also asserts that the Abstract explains that the ’326 Patent is directed to rearranging coded bits for retransmission without limitation to inter-symbol rearrangement. *See* Pet. Reply 4 (citing Ex. 1001, code (57)). Petitioner contends that, in the Summary of the ’326 Patent, the first and fifth aspects of the disclosed invention are directed to allocating coded bits to a plurality of groups and rearranging them on retransmission, but without a requirement that the groups of bits must span multiple modulation symbols. *See id.* (citing Ex. 1001, 2:8–18, 2:62–3:15). According to Petitioner, “rather than limiting the application of the alleged invention to a particular implementation or disavowing particular implementations or scope, the specification is written expansively so as provide description and disclose embodiments as only exemplary and such that ‘the scope of the invention only be limited by the appended claims.’” *Id.* (quoting Ex. 1001, 14:12–13; citing Ex. 1001, 3:45–48, 4:24–30, 13:54–14:14).

Petitioner further contends that the ’326 Patent discloses a circular shift on bits within a modulation symbol, i.e., not spanning multiple modulation symbols. *See* Pet. Reply 5 (quoting Ex. 1001, 11:9–13, citing

Ex. 12:9–13). Petitioner contends that even if the '326 Patent only identified inter-symbol bit shift embodiments, that would not limit the claimed circular shift to inter-symbol shifting. *See id.* Petitioner asserts that the holding in *Kara Tech Inc. v. Stamps.com, Inc.*, 582 F.3d 1341 (Fed. Cir. 2009) supports this conclusion. *See id.* (quoting *Kara Tech*, 582 F.3d at 1347–48).

In the Sur-reply, Patent Owner contends that the line of cases including *E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1433 (Fed. Cir. 1988), *In re American Academy of Science Tech Center*, 367 F.3d 1359, 1369 (Fed. Cir. 2004), and *Thorner*, do not contradict Patent Owner's proposed construction because all of these cases acknowledge that the meaning of claim terms can be modified by the supporting disclosure in light of clear supporting evidence. *See* PO Sur-reply 3.

Patent Owner asserts that despite Petitioner's citation to the '326 Patent disclosure of the first and fifth aspects of the invention, "the implicit requirement of the invention that the 'plurality of coded bits' span multiple modulation symbols is still clearly present." PO Sur-reply 4 (citing Pet. Reply 4). According to Patent Owner, "both the first and fifth aspect[s] refer to allocating or separating the coded bits to form a plurality of groups," and "[e]ven this rudimentary first step would not be possible on a single modulation symbol because a single symbol may encode only two bits." *Id.* (citing Ex. 1001, 2:10–11, 2:63–66; Ex. 2001 ¶ 48). Patent Owner contends that "the implicit but necessary requirement that the plurality of coded bits span multiple modulation symbols is clearly obvious to a [person of ordinary skill in the art] in all aspects of the invention." *Id.* (citing Ex. 2001 ¶ 62).

Patent Owner also disputes Petitioner's contention that the '326 Patent Specification discloses a circular shift on bits within a modulation symbol, because, according to Patent Owner, "this disclosure does not relate to the claimed invention." PO Sur-reply 4. Patent Owner contends that Dr. Vojcic cited to the same passage, and explained that it supports Patent Owner's position by disclosing that circular shifts can be performed for different purposes. *See id.* at 4–5 (reproducing Ex. 2001 ¶ 81).

Patent Owner also disputes Petitioner's argument regarding *Kara Tech*, asserting that it is based on the premise that the invention of the '326 patent *could be* realized using intra-symbol shift. *See* PO Sur-reply 6. Patent Owner asserts that Petitioner's premise is false on the basis that there is no disclosure in the '326 patent supporting that the invention can ever be implemented on an intra-symbol basis, and neither Petitioner nor its expert identifies such support in the patent. *See id.* Patent Owner contends that, unlike *Kara Tech*, the '326 Patent discloses multiple variations of implementing a circular shift, only some of which are explicitly identified as intra-symbol. *See id.* According to Patent Owner, "the '326 patent contains 23 references to the intra-symbol interleaver which 'may perform the additional circular shift,'" which Patent Owner asserts is not the claimed circular shift. *Id.* (citing Ex. 1001, 11:10–12, 12:10–12). Patent Owner also contends that the '326 Patent explicitly distinguishes this from the inter-symbol interleavers. *See id.* (quoting Ex. 1001, 6:28–32).

We decline to adopt Patent Owner's construction adding "spanning multiple modulation symbols" to the claim limitation "ones of the plurality of coded bits" because it is improper to read an extraneous limitation into the claim from the specification. *See E.I. du Pont de Nemours*, 849 F.2d

at 1433. An extraneous limitation is “a limitation read into a claim from the specification wholly apart from any need to interpret what the patentee meant by particular words or phrases in the claim.” *Id.* Patent Owner acknowledges that “the ’326 Patent discloses multiple variations of implementing a circular shift,” including inter-symbol circular shifts and intra-symbol circular shifts. *See* PO Sur-reply 6. Thus, we are not persuaded “spanning multiple modulation symbols” is necessary based on Patent Owner’s arguments and Dr. Vojcic’s testimony that the claimed circular shift is limited to the inter-symbol circular shift and excludes an intra-symbol shift. Patent Owner’s arguments rest on Dr. Vojcic’s unsupported testimony regarding “key aspects,” certain advantages of reordering significant and non-significant bits between consecutive transmissions, and “[a] key characteristic.” *See, e.g.*, Ex. 2001 ¶¶ 48, 62. Dr. Vojcic cites column 7, lines 31 through 52 and reproduces Figures 4A and 4B of the ’326 Patent to support his testimony. *See* Ex. 2001 ¶¶ 48, 62. These cited disclosures of the ’326 Patent are silent regarding forward error correction decoding, coding diversity, and channel attenuation, and further are silent regarding any relationship to inter-symbol circular shifts alone compared to intra-symbol circular shifts or a combination of intra-symbol circular shifts and inter-symbol circular shifts. Accordingly, Patent Owner does not present a sufficient underlying factual basis to support Dr. Vojcic’s testimony that: (1) a person of ordinary skill in the art “would [] understand that reordering of significant and non-significant bits between consecutive transmissions would provide channel coding, *i.e.*, forward error correction coding, diversity in that bits/symbols that experienced bad channel conditions in one transmission due to reordering in consecutive

transmission, may experience good channel conditions in the subsequent transmission/retransmission,” (Ex. 2001 ¶ 48); and (2) “[a] key characteristic of this invention is the ability to take advantage of varying channel attenuation by different modulation symbols,” (Ex. 2001 ¶ 62). We give little weight to Dr. Vojcic’s aforementioned testimony. *See* 37 C.F.R. § 42.65(a) (“Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”). We also do not credit Patent Owner’s unsupported attorney arguments that: (1) advantages of the ’326 Patent cannot be realized by intra-symbol shifts (*see* PO Resp. 19 (citing Ex. 2001 ¶ 62), 21 (citing Ex. 2001 ¶ 62), 23 (citing Ex. 2001 ¶ 62); PO Sur-reply 2 (citing Ex. 2001 ¶ 62)); (2) the claimed circular shift of one of the plurality of coded bits cannot be realized within only a single symbol (*see* PO Resp. 19, 21; PO Sur-reply 2); (3) “the implicit but necessary requirement that the plurality of coded bits span multiple modulation symbols is clearly obvious to a [person of ordinary skill in the art] in all aspects of the invention” (PO Sur-reply 4 (citing Ex. 2001 ¶ 62)); and (4) “a person of skill in the art would understand that the invention cannot be implemented within a single symbol, *i.e.*, the plurality of coded bits necessarily spans multiple symbols” (PO Sur-reply 7 (citing Ex. 2001 ¶ 62)). Argument of counsel cannot take the place of objective evidence. *See Gemtron Corp. v. Saint-Gobain Corp.*, 572 F.3d 1371, 1380 (Fed. Cir. 2009) (unsworn attorney argument is not evidence).

Related to Patent Owner’s arguments that there is an implicit but necessary requirement that the plurality of coded bits span multiple modulation symbols, we also are not persuaded by Patent Owner’s attorney argument that allocating or separating coded bits to form a plurality of

groups would not be possible on a single modulation symbol because a single symbol may encode only two bits. Argument of counsel cannot take the place of objective evidence. *See Gemtron*, 572 F.3d at 1371. Moreover, Patent Owner's argument is not supported by the '326 Patent, which discloses 64-QAM and 16-QAM schemes that include 6 bits per symbol, and 4 bits per symbol, respectively. *See* Ex. 1001, 5:9–24; Ex. 2001 ¶¶ 50, 52. Patent Owner does not direct us to a disclosure in the '326 Patent of a scheme that utilizes 2 bits per symbol. *See* PO Sur-reply 4.

Similarly, we are not persuaded by Patent Owner's attorney argument that "the '326 Patent consistently describes its invention in terms that 'ones of the plurality of coded bits' must refer to multiple modulation symbols," and "the '326 Patent, in every instance, limits the description of its invention as pertaining to 'ones of the plurality of coded bits' spanning multiple modulation symbols," and concomitant arguments that the holdings of *Ariad*, *Gentry Gallery*, and *ICU Medical* support Patent Owner's proposed construction. *See* PO Resp. 20–23 (quoting *Ariad Pharm., Inc. v. Eli Lilly Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (*en banc*); *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 1478, 1480 (Fed. Cir. 1998); *ICU Medical, Inc. v. Alaris Medical Systems, Inc.*, 558 F.3d 1368, 1378 (Fed. Cir. 2009)); PO Sur-reply 6–7 (quoting *Gentry Gallery*, 134 F.3d at 1479; *ICU Medical*, 558 F.3d at 1378). Moreover, Patent Owner's arguments relying on the holdings of *Ariad*, *Gentry Gallery*, and *ICU Medical* to support its proposed narrower construction are misplaced because those cases are directed to issues of claim scope and sufficiency of the written description requirement under 35 U.S.C. § 112 ¶ 1 and not directed to issues of claim construction.

For all of the foregoing reasons, we do not adopt Patent Owner’s proposed construction for “ones of the plurality of coded bits.” As demonstrated in the analysis below, we need not provide an explicit claim construction for “ones of the plurality of coded bits.”

Other claim terms

The parties identify the following claim constructions, entered by the court in *UNM Rainforest Innovations v. Apple Inc.*, No. 1:20-cv-00351 (W.D. Tex.) (Ex. 1005),⁶ as consistent with the positions advanced in the Petition:

Claim Term or Phrase	Construction
preambles	limiting
“circular shift”	“an operation that moves a sequence of bits from one end of an ordered group of bits to the other end”
“with a variable length related to a modulation order and a number of transmissions”	“with a variable length related to both modulation order and a number of transmissions”

See Pet. 26–30; PO Resp. 15.

As demonstrated in the analysis below, we need not construe any additional claim terms or phrases. See *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

⁶ Patent Owner previously asserted the ’326 Patent in *UNM Rainforest Innovations v. Apple Inc.*, No. 1:20-cv-00351 (W.D. Tex. Apr. 9, 2020), which was ultimately dismissed. See Pet. 3 n.1.

B. Level of Ordinary Skill in the Art

Petitioner asserts:

As of 2008, a person of ordinary skill in the art (“POSA”) in the field of the ’326 patent would have had a Bachelor’s degree in Electrical Engineering, Computer Engineering, or a related field, and around two years of experience in the design or development of wireless communication systems, or the equivalent.

Pet. 26 (citing Ex. 1002 ¶¶ 55–57). Patent Owner offers a slightly different description, as follows:

At the relevant time, a person of ordinary skill in the art in the technical field of the ’326 patent would have had at least a master’s degree in Computer Engineering or Electrical Engineering, or equivalent work experience, along with at least 1 year of experience related specifically to wireless communications, including error correction control and modulation.

PO Resp. 14 (citing Ex. 2001 ¶ 17).

We adopt Patent Owner’s definition of a person of ordinary skill in the art because it is consistent with the level of skill reflected by the ’326 Patent Specification and the asserted prior art, but our conclusions would be the same under Petitioner’s definition.

C. Principles of Law

“Under 35 U.S.C. § 102 a claim is anticipated ‘if each and every limitation is found either expressly or inherently in a single prior art reference.’” *King Pharm., Inc. v. Eon Labs, Inc.*, 616 F.3d 1267, 1274 (Fed. Cir. 2010) (quoting *Celeritas Techs. Ltd. v. Rockwell Int’l Corp.*, 150 F.3d 1354, 1360 (Fed. Cir. 1998)).

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) if in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); see *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

*D. Unpatentability of Claims 1, 2, 4, and 5 under
35 U.S.C. § 102 as Anticipated by Yoon*

1. Overview of Yoon (Ex. 1010)

Yoon discloses a transmitting/receiving apparatus and method for improving decoding performance at retransmission. See Ex. 1010 ¶ 3.

Figure 4 of Yoon is reproduced below.

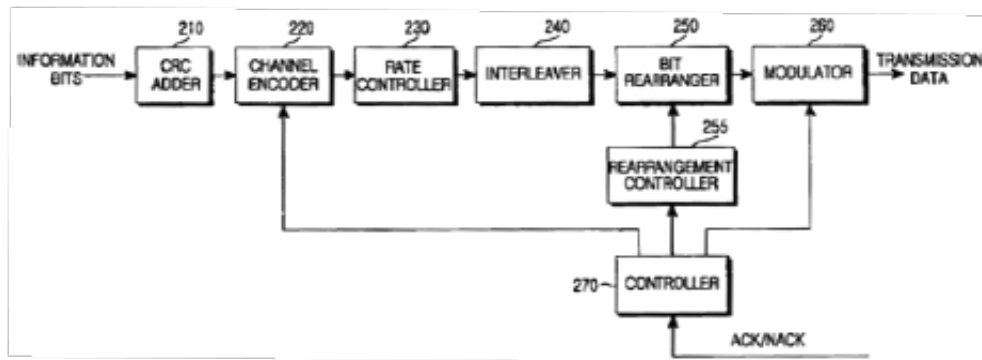


Figure 4 depicts a block diagram of a transmitter in a Code Division Multiple Access (CDMA) mobile communication. *See* Ex. 1010 ¶¶ 42, 56. The transmitter includes Cyclic Redundancy Check (CRC) adder 210, channel encoder 220, rate controller 230, interleaver 240, bit rearranger 250, rearrangement controller 255, modulator 260 and controller 270. *See id.* ¶ 56. Yoon discloses, “[i]n the embodiment of the present invention, coded bits are rearranged at retransmission to be mapped to different symbols from those at an initial transmission.” *Id.* ¶ 56. Bit rearranger 250 rearranges interleaved bits of a modulation symbol under control of rearrangement controller 255, which activates bit rearranger 250 depending on whether the current transmission is an initial transmission or a retransmission. *See id.* ¶ 61. At an initial transmission, bit rearranger 250 outputs the interleaved bits without rearrangement. *See id.* ¶¶ 61, 78. At a retransmission, bit rearranger 250 rearranges the interleaved bits of each modulation symbol. *See id.* ¶¶ 61, 79. By rearranging the coded bits to be mapped, the bit rearranger 250 creates a mapping that has a different error probability at retransmission than the error probability at an initial transmission. *See id.* ¶ 62. Controller 270 determines the modulation scheme of modulator 260 according to the radio channel condition. *Id.* ¶ 64. Controller 270 also

processes a retransmission request and feeds the request to rearrangement controller 255. *Id.*

Figure 9 of Yoon is reproduced below

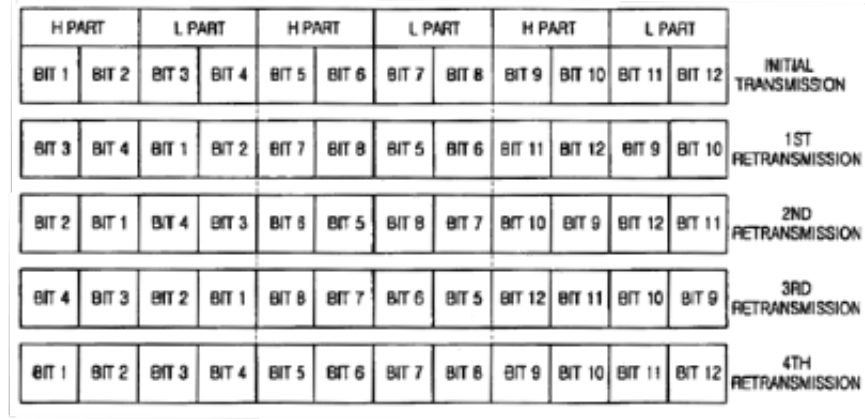


Figure 9 depicts a bit rearrangement in the transmitter when 16QAM (16-ary Quadrature Amplitude Modulation) is used. *See* Ex. 1010 ¶¶ 47, 99. Coded bits 1, 2, 5, 6, 9, and 10 are mapped to have high reliability and coded bits 3, 4, 7, 8, 11, and 12 are mapped to have low reliability in modulation symbols at an initial transmission. *Id.* ¶ 99. At a first retransmission, coded bits 1, 2, 5, 6, 9, and 10 with high reliability at initial transmission are retransmitted with low reliability and coded bits 3, 4, 7, 8, 11, and 12 with low reliability at initial transmission are retransmitted with high reliability. *Id.* ¶ 100. At a second retransmission, the coded bits are rearranged in their mapping such that I-channel bits and Q-channel bits are exchanged with each other. *Id.* ¶ 101. At a third retransmission, the coded bits are rearranged in their mapping such that the high-reliability bits are exchanged with the low-reliability bits and then the I-channel bits are exchanged with the Q-channel bits. *Id.* ¶ 102. From a fourth retransmission on, the rearrangement procedure is repeated beginning with the initial transmission pattern. *Id.* ¶ 103.

Figure 10 of Yoon is reproduced below.

H PART	M PART	L PART	H PART	M PART	L PART	
BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	INITIAL TRANSMISSION
BIT 7	BIT 8	BIT 9	BIT 10	BIT 11	BIT 12	
BIT 5	BIT 6	BIT 1	BIT 2	BIT 3	BIT 4	1ST RETRANSMISSION
BIT 11	BIT 12	BIT 7	BIT 8	BIT 9	BIT 10	
BIT 3	BIT 4	BIT 5	BIT 6	BIT 1	BIT 2	2ND RETRANSMISSION
BIT 9	BIT 10	BIT 11	BIT 12	BIT 7	BIT 8	
BIT 2	BIT 1	BIT 4	BIT 3	BIT 6	BIT 5	3RD RETRANSMISSION
BIT 8	BIT 7	BIT 10	BIT 9	BIT 12	BIT 11	
BIT 6	BIT 5	BIT 2	BIT 1	BIT 4	BIT 3	4TH RETRANSMISSION
BIT 12	BIT 11	BIT 8	BIT 7	BIT 10	BIT 9	
BIT 4	BIT 3	BIT 6	BIT 5	BIT 2	BIT 1	5TH RETRANSMISSION
BIT 10	BIT 9	BIT 12	BIT 11	BIT 8	BIT 7	
BIT 1	BIT 2	BIT 3	BIT 4	BIT 5	BIT 6	6TH RETRANSMISSION
BIT 7	BIT 8	BIT 9	BIT 10	BIT 11	BIT 12	

Figure 10 depicts a bit rearrangement in the transmitter when 64QAM is used. *See* Ex. 1010 ¶¶ 48, 104. Coded bits 1, 2, 7, and 8 are mapped to have high reliability, coded bits 3, 4, 9, and 10 are mapped to have medium reliability, and coded bits 5, 6, 11, and 12 are mapped to have low reliability in modulation symbols at an initial transmission. *Id.* ¶ 104. At a first retransmission, the initially transmitted coded bits are rearranged by a 2-bit right rotation in their mapping to modulation symbols. *Id.* ¶ 105. At a second retransmission, the coded bits are rearranged by a 4-bit right rotation in their mapping to modulation symbols. *Id.* ¶ 106. At a third retransmission, the coded bits are rearranged in their mapping such that the I-channel bits are exchanged with the Q-channel bits. *Id.* ¶ 107. At a fourth retransmission, the coded bits are rearranged by a 2-bit right rotation and there is an exchange between I-channel bits and the Q-channel bits in mapping to modulation symbols. *Id.* ¶ 108. At a fifth retransmission, the coded bits are rearranged by a 4-bit right rotation and there is an exchange

between I-channel bits and the Q-channel bits in mapping to modulation symbols. *Id.* ¶ 109. From a sixth retransmission on, the rearrangement procedure is repeated beginning with the initial transmission pattern. *Id.* ¶ 110.

Figure 11 of Yoon is reproduced below.

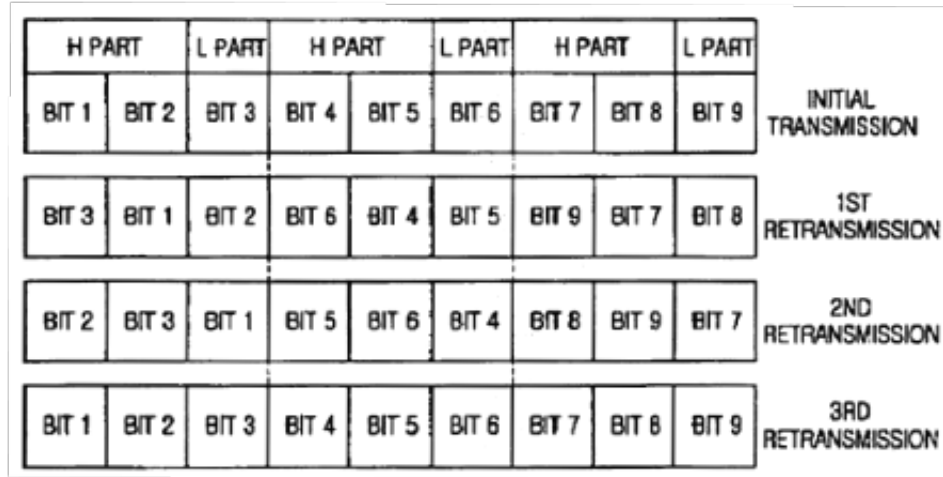


Figure 11 depicts a bit rearrangement in the transmitter when 8PSK (8-ary Phase Shift Keying) is used. *See* Ex. 1010 ¶¶ 49, 111. Coded bits 1, 2, 4, 5, 7, and 8 are mapped to have high reliability, and coded bits 3, 6, and 9 are mapped to have low reliability in modulation symbols at an initial transmission. *Id.* ¶ 111. At a first retransmission, the initially transmitted coded bits are rearranged by a 1-bit right rotation in their mapping to modulation symbols. *Id.* ¶ 112. At a second retransmission, the coded bits are rearranged by a 2-bit right rotation in their mapping to modulation symbols. *Id.* ¶ 113. From a third retransmission on, the rearrangement procedure is repeated beginning with the initial transmission pattern. *Id.* ¶ 114.

2. Analysis

Petitioner contends that Yoon discloses all of the limitations recited in independent claims 1, 2, 4, and 5. *See* Pet. 30–57. For the reasons that follow, we are persuaded that Petitioner has established by a preponderance of the evidence that Yoon discloses all of the limitations recited in claims 1, 2, 4, and 5.

a. Claims 1 and 4

Claim 1 preamble: “A method for transmitting data represented by a plurality of coded bits”

Claim 4 preamble: A transmitter to transmit data represented by a plurality of coded bits”

Petitioner contends that Yoon discloses the preamble recitations of claims 1 and 4, based on Yoon’s disclosures of a transmitting/receiving apparatus for packet retransmission in a mobile communication device and that coded bits are rearranged as retransmission to be mapped to different symbols from the initial transmission. *See* Pet. 34–35 (reproducing Ex. 1010, Fig. 4; quoting Ex. 1010, code (57), ¶ 56; citing Ex. 1002 ¶¶ 117–120); *id.* at 54 (quoting Ex. 1010 ¶ 56; citing Ex. 1010, Fig. 4).

Patent Owner does not dispute Petitioner’s assertions addressing the preambles of claims 1 and 4. *See* PO Resp. 24–40. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

Based on the entire record, we find that Yoon discloses the preamble recitations of claims 1 and 4. *See* Pet. 34–35, 54.

Claim 4: “a processor included in the transmitter”

Petitioner contends that Yoon discloses “a processor included in the transmitter” as recited in claim 4, based on Yoon’s disclosure of a transmitter including a bit rearranger configured to perform a circular shift and a modulator which receives coded bits from the bit rearranger and is configured to transmit the circularly shifted coded bits. *See* Pet. 54–55 (citing Ex. 1010 ¶¶ 61, 63, Fig. 4). Petitioner asserts that a person of ordinary skill in the art would have understood Yoon’s bit rearranger and/or modulator to constitute a part of the processor of the transmitter, which Petitioner contends is consistent with general knowledge in the art. *See id.* at 55 (citing Ex. 1002 ¶¶ 153–155).

Patent Owner does not dispute Petitioner’s assertions addressing this limitation of claim 4. *See* Prelim. Resp. 24–40. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the entire record, we find that Yoon discloses “a processor included in the transmitter,” as recited in claim 4. *See* Pet. 54–55.

Claims 1 and 4: “[the processor being configured to] perform[ing] a circular shift, with a variable length related to a modulation order and a number of transmissions, on ones of the plurality of coded bits”

Petitioner contends that Yoon discloses “performing a circular shift, with variable length related to a modulation order and a number of transmissions, on ones of the plurality of coded bits,” as recited in claim 1, and recited similarly in claim 4 as “the processor being configured to perform” *See* Pet. 36–47, 56. Petitioner bases its contentions on Yoon’s disclosure of a bit rearranger that rearranges coded bits at retransmission by performing a rotation operation that shifts the coded bits

by an amount that varies based on the number of times transmission had been attempted and the modulation order of the modulation scheme (e.g., modulation order 6 for 64QAM, modulation order 3 for 8PSK) used. *See id.* at 36–37 (quoting Ex. 1009 ¶ 115; Ex. 1010 ¶¶ 56, 61, 64, 65; Ex. 1011 ¶ 115; Ex. 1017, 12⁷; citing Ex. 1010 ¶¶ 78, 79, Fig. 4; Ex. 1002 ¶¶ 122–124, 129; Ex. 1018, 11⁸), 56 (citing Ex. 1002 ¶¶ 159–160).

Petitioner asserts that Yoon discloses, in Figure 10, a bit rearrangement operation performed by the transmitter for a 64QAM modulation scheme having a modulation order of 6 where the coded bits are rearranged by a 2-bit right rotation for a first retransmission, and rearranged by 4-bit right rotation for a second retransmission. *See id.* at 38–41 (reproducing Ex. 1010, Fig. 10 (with annotations and excerpts); quoting Ex. 1010 ¶¶ 48, 62, 104, 106; citing Ex. 1010 ¶¶ 104–110; Ex. 1002 ¶¶ 125–128). Petitioner contends that Yoon also discloses that the length of the circular shift resulting from the right rotation also varies in relation to the modulation order, asserting that Yoon discloses in Figure 11 a bit rearrangement operation performed by the transmitter for an 8PSK modulation scheme having a modulation order of 3, where the coded bits are rearranged by a 1-bit right rotation for a first retransmission and by a 2-bit right rotation for a second retransmission. *See id.* at 41–43 (reproducing Ex. 1010, Fig. 11 (with annotations and excerpts); quoting Ex. 1010 ¶¶ 111–113, 106; citing Ex. 1010 ¶¶ 104–110; Ex. 1002 ¶¶ 129, 131, 132). Petitioner contends that a

⁷ Petitioner refers to page 624 of the reference instead of the page of the exhibit.

⁸ Petitioner refers to page 603 of the reference instead of the page of the exhibit.

person of ordinary skill in the art would have understood that Yoon's transmitter performed each of the bit rearrangement processes described in Yoon such that Yoon's transmitter performed circular shifts of variable lengths related to the modulator order being used and the number of times transmission had been attempted because Yoon discloses the transmitter's controller determines the modulation scheme according to the current radio channel condition and according to a received retransmission request. *See id.* at 43–45 (quoting Ex. 1010 ¶¶ 64–65, 80, claims 1, 6; citing Ex. 1010 ¶¶ 77–79; Ex. 1002 ¶¶ 133–134).

Patent Owner argues that, based on its proposed construction, Yoon does not disclose a circular shift on “ones of the plurality of coded bits” because Yoon discloses only intra-symbol rearranging, i.e., rearranging coded bits within a single modulation symbol. *See* PO Resp. 24–34. Patent Owner repeats many of its arguments, addressed above in the Section II.A., that “ones of the plurality of coded bits” should be construed as “ones of the plurality of coded bits, spanning multiple modulation symbols.” *Compare* PO Resp. 24–26, 29–30 *and* Ex. 1002 ¶ 73, *with* PO Resp. 15–23 *and* Ex. 1002 ¶ 62.

Petitioner contends that Patent Owner's argument is entirely dependent on the Board adopting Patent Owner's proposed construction. *See* Pet. Reply 9. Petitioner asserts that Patent Owner's argument fails should the Board continue to reject Patent Owner's proposed claim construction. *See id.* at 10. Petitioner also contends that “Patent Owner tries to limit the scope of the claims using its expert's interpretation about how a [person of ordinary skill in the art] would understand the '326 Patent's disclosure.” Pet. Reply 10 (citing PO Resp. 30–34). Petitioner asserts that

Patent Owner attempts, through its expert, to create a claim construction argument about the length of the sequence of coded bits, which its expert labels as the value “K.” *Id.* (citing PO Resp. 24–25). Petitioner argues that the ’326 Patent does not place limits on the length of the sequence of coded bits and does not refer to a value of “K.” *Id.*

In the Sur-reply, Patent Owner contends that Petitioner’s arguments mischaracterize the relevant legal standard. *See* PO Sur-reply 8. According to Patent Owner, “Dr. Vojcic’s testimony accurately sets out how one of skill in the art would understand the disclosure of the ’326 Patent,” which, according to Patent Owner, “is the proper legal standard.” *Id.* (reproducing PO Resp. 10; *Ariad*, 598 F.3d at 1351); *see id.* at 9 (similar argument, citing *Ariad*, 598 F.3d at 1351). Patent Owner also argues that the ’326 Patent discloses a value “k,” which is the number of transmissions, and is used in an exemplary formula relating to circular shifts. *See id.* at 9–10 (reproducing Ex. 1001, 13:5–10, 13:13–29; citing Ex. 2001 ¶ 89).

We agree with Petitioner that Patent Owner’s arguments are dependent on adoption of Patent Owner’s proposed claim construction. Because we decline to adopt Patent Owner’s proposed narrow construction for “ones of the plurality of coded bits,” that would require “spanning multiple modulations symbols,” as explained above in Section II.A., we do not agree with Patent Owner’s arguments that Yoon does not disclose the disputed claim limitation. We also do not agree with Patent Owner’s Sur-reply arguments regarding Dr. Vojcic’s testimony and “the proper legal standard” because, as explained above in Section II.A., Dr. Vojcic’s testimony is entitled to little weight and Patent Owner’s reliance on *Ariad* is misplaced. Finally, Patent Owner’s sur-reply argument that the ’326 Patent

discloses a value “k,” which is the number of transmissions, used in an exemplary formula relating to the circular shifts (*see* PO Sur-reply 9–10) does not meaningfully address Petitioner’s assertion that the ’326 Patent does not address the length of the sequence of coded bits and does not refer to a value of “K” (*see* Pet. Reply 10).

Patent Owner further argues that Yoon does not disclose a circular shift of variable length that is related to modulation order and a number of transmissions. *See* PO Resp. 35–40; PO Sur-reply 11–16. More specifically, Patent Owner contends that Yoon does not disclose a circular shift with a variable length related to a modulation order on the basis that Yoon’s circular shift is the same 2-bit shift as for the first retransmission for different modulation orders in 16QAM and 64QAM, as shown in Figures 9 and 10. *See id.* at 35–36 (reproducing Ex. 2001 ¶ 88); *see also* PO Sur-reply 16 (similar argument, citing Pet. Reply 16–17). In support of its arguments, Petitioner reproduces Figures 9 and 10, as annotated by Dr. Vojcic. *See* PO Resp. 36.

Figures 9 and 10 of Yoon, annotated by Dr. Vojcic, are reproduced below.

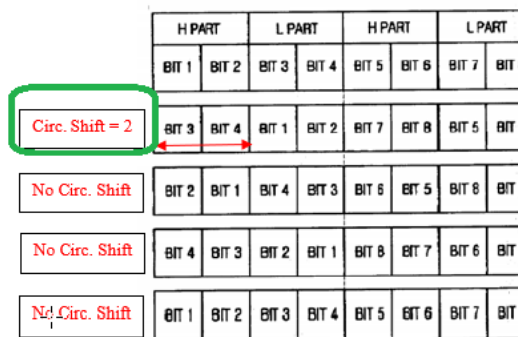


FIG.9

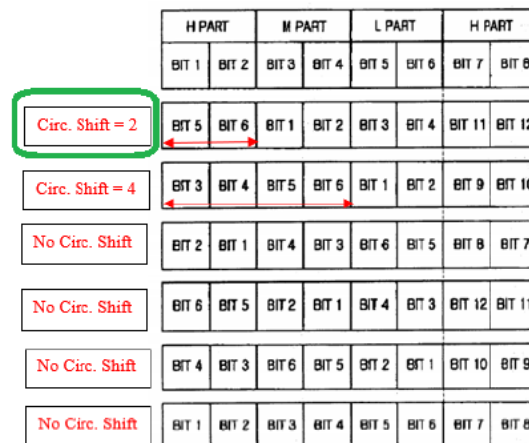


FIG.10

Annotated Figure 9 depicts the bit rearrangement when 16QAM is used and annotated Figure 10 depicts the bit rearrangement when 64QAM is used, with Figures 9 and 10 each including Dr. Vojcic's added labels regarding the circular shifts for each retransmission. Ex. 2001 ¶ 88; Ex. 1010 ¶¶ 47, 48, 99, 109. Patent Owner contends that in contrast to Yoon's disclosure, "the '326 Patent discloses different shifts for different modulation orders, as claimed." *Id.* at 36 (quoting Ex. 2001 ¶ 88). Patent Owner further asserts that the '326 Patent discloses an exemplary formula relating to circular shift, and discloses that the variable related to circular shift D is specifically related to both the number of transmissions k and the modulation order m. *See id.* at 36–37 (reproducing Ex. 1001, 13:5–10, 13:13–29; citing Ex. 2001 ¶ 89); *see* Sur-reply 9–10 (similar argument, reproducing Ex. 1001, 13:5–10, 13:13–29; citing Ex. 2001 ¶ 89). Patent Owner asserts that Yoon does not consider these variables, but instead relies on a predetermined rearrangement pattern. *See* PO Resp. 37–38 (quoting Ex. 1010 ¶¶ 34–37, 79; citing Ex. 2001 ¶ 90); *see* Sur-reply 10 (similar argument, quoting Ex. 1010 ¶¶ 34–37, 79; citing Ex. 2001 ¶ 90).

In the Reply, Petitioner contends that Patent Owner's argument is erroneous because it ignores Yoon's disclosure in Figure 11. *See* Pet. Reply 17 (citing Dec. 33–34). According to Petitioner, Yoon's "Figure 11 discloses a 1-bit right circular shift for the first retransmission of an 8 PSK modulation (modulation order of 3) in contrast to a 2-bit right circular shift for each of Figures 9 (modulation order 4) and 10 (modulation order 6), demonstrating that the amount of circular shift on retransmission is not the same for all modulation orders and, therefore, 'related to' modulation order." *Id.* (citing Dec. 33–34, 36).

In the Sur-reply, Patent Owner contends that reference to Figure 11 does not cure the shortcoming of Yoon's Figures 9 and 10 showing bit patterns matching the same 2-bit cyclic shift (for certain retransmissions), "because *Yoon* provides no indication that its predetermined rearrangement pattern matching a 1-bit circular shift for modulation order 3 relates at all to the fact that it is applied to modulation order 3." PO Sur-reply 16 (citing Pet. Reply 16–17). Patent Owner asserts that the fact that the predetermined rearrangement patterns for modulation orders 4 and 6 match the same 2-bit circular shift indicates that the circular shift size is not related to modulation order, and the fact that the circular shift for modulation order 3 happens to be different may not be related to modulation order, but due to other factors. *See id.* at 16–17.

We do not agree with Patent Owner's arguments because they are not commensurate in scope with the claim limitations. Claims 1 and 4 do not recite or require a different circular shift for different modulation orders and the same transmission number, as suggested by Patent Owner. Likewise, claims 1 and 4 do not preclude the same circular shift for different modulation orders and the same transmission number. Patent Owner's arguments also appear to be premised on the '326 Patent's disclosure of a circular shift length variable "related to" a modulation order. Claims 1 and 4, however, do not recite or otherwise require a circular shift length variable as disclosed in the '326 Patent. Claims 1 and 4 also do not preclude the use of predetermined rearrangement patterns for different modulation orders, as disclosed by Yoon. In any event, even if different circular shifts for different modulation orders were required by the claims, as set forth in the Petition, Yoon discloses, in Figure 10, a 2-bit right rotation for a first

retransmission and a 4-bit right rotation for a second retransmission for a 64QAM modulation scheme having a modulation order of 6, and, in Figure 11, a 1-bit right rotation for a first retransmission and a 2-bit right rotation for a second retransmission for an 8PSK modulation scheme having a modulation order of 3. *See* Pet. 38–43.

Patent Owner also argues that Yoon does not disclose a circular shift of variable length that is related to a number of transmissions because Yoon’s circular shifts within a single symbol incidentally happen only in certain retransmissions and not others, showing that a circular shift is not actually implemented. *See* PO Resp. 35. In support of its arguments, Patent Owner reproduces paragraph 88 of Dr. Vojcic’s Declaration, including Dr. Vojcic’s annotated reproduction of Yoon’s Figures 9 and 10. *See id.* at 36 (reproducing Ex. 2001 ¶ 88). Patent Owner further argues that the Board’s rejection in the Institution Decision of Patent Owner’s argument is legal erroneous in this instance, because Petitioner’s expert, Dr. Roy, admits that “literally any arrangement of bits can be attained using compound circular shifts.” *Id.* at 38–39 (reproducing Ex. 2014, 51:21–52:9); *see* PO Sur-reply 12 (citing Ex. 2012, 49:6–20), 13 (citing Ex. 2012, 49:6–20). According to Patent Owner, “Petitioner relies on ‘compound shifts’ to show that Yoon allegedly discloses the bit patterns that would be attained using the ’326 Patent’s circular shift.” PO Resp. 39 (citing Ex. 2014, 41:14–42:23). Patent Owner asserts that “one can take any bit arrangement sequence . . . , and prove that it could have been attained using a circular shift. This is classic hindsight reconstruction that does not sufficiently disclose the invention of the ’326 Patent to a [person of ordinary skill in the art].” PO Resp. 39; *see* PO Sur-reply 13–14 (similar arguments). According

to Patent Owner, “just because some of the retransmission[s] may coincide with the result attained from a circular shift (referenced in [the Institution Decision] at 34) does not mean that a [person of ordinary skill in the art] would have been able to ascertain the teachings of the ’326 Patent therefrom.” PO Resp. 39; *see* PO Sur-reply 12 (“Finding a pattern that just so happens to match a circular shift would teach a [person of ordinary skill in the art] nothing about the invention of the ’326 patent.”).

Patent Owner also contends that what is important is not that the result attained by Yoon’s rearrangement table matches the end result, but how that result is achieved because the ’326 Patent is a method Patent. *See* PO Resp. 39; *see also* PO Sur-reply 12 (“At a minimum, claims 1 and 4 of the ’326 patent, which claim “perform[ing] a circular shift,” are not obvious by a predetermined arrangement bit pattern, even if that happens to match the expected output of the circular shift.”). Patent Owner asserts that, because “*Yoon* only teaches bits within a single modulation symbol are rearranged according to a predefined pattern,” a person of ordinary skill in the art “would understand that *Yoon* does not apply a variable length circular shift at all and does not take into account modulation order and number [of transmissions in determining a shift length] as claimed.” PO Resp. 39. (quoting Ex. 2001 ¶ 91); *see* PO Sur-reply 12 (“*Yoon* does not implement circular shifts at all, but instead relies on a ‘predetermined rearrangement pattern,’” citing Ex. 1010 ¶¶ 34–37, 79)), 14 (“At best, *Yoon* discloses a predetermined rearrangement pattern[] that happens to match the expected outcome of a circular shift in certain—but not all—retransmissions.”).

In the Reply, Petitioner contends that Yoon’s Figures 9, 10, and 11 demonstrate that the circular shift in Yoon is related to the number of

transmissions. *See* Pet. Reply 11. -Specifically addressing Yoon’s Figure 9, Petitioner asserts that Figure 9 illustrates 16QAM transmissions with 4-bit modulation symbols, where for the first transmission, the bits are right shifted by two bits. *See id.* Petitioner contends that Patent Owner does not contest that a circular shift occurs on a first retransmission within each modulation symbol. *See id.* In response to Patent Owner’s assertion that no circular shift happens in Yoon’s Figure 9 after the first retransmission, Petitioner asserts that Figure 9 illustrates that for the second retransmission the bits are shifted the equivalent of four bits with the addition of swapping the channel and Q channel bits within each of the H and L parts respectively. *See id.* at 12 (citing PO Resp. 36; Ex. 1010 ¶ 101, Fig. 9; Ex. 2014, 36:1–40:16). Petitioner contends that the swapping within the H and L parts is an additional 1-bit circular shift within each of the H and L parts, respectively. *See id.* (citing Ex. 2014, 41:14–42:16). Petitioner asserts that “[a]ll of the claims are written using ‘comprising’ and nothing in the ’326 Patent precludes more than one level of circular shifting – i.e. compound shifting.” *Id.* at 12–13. Petitioner asserts that Dr. Vojcic agreed regarding the scope of the claims, and asserts that the ’326 Patent actually discloses additional intra-symbol circular shifts. *See id.* at 13 (quoting Ex. 1001, 11:9–13, 11:48–51, 12:9–13; citing Ex. 1001, 12:48–51; Ex. 1041, 78:11–19); *see id.* at 15 (similar argument, quoting Ex. 1001, 11:9–13, 11:48–51, 12:9–13; citing Ex. 1001, 12:48–51; PO Resp. 38–39). Petitioner contends that, on this basis, the second retransmission shown in Yoon’s Figure 9 satisfies the circular shift limitation. *See id.* at 13. Petitioner also asserts that, in the third retransmission of Figure 9, the bits are right circularly shifted an additional two bits from their positions in the second

retransmission and, in the fourth retransmission, the bits are right circularly shifted an additional two bits back to their original positions with an additional 1-bit shift within each of the H and L parts. *See id.* at 13–14.

Petitioner asserts that Yoon’s Figure 10 illustrates 64QAM transmissions with 6-bit modulation symbols, where there is a 2-bit circular shift for a first retransmission and a 4-bit circular shift for the second retransmission. *See* Pet. Reply 14 (citing PO Resp. 36, Ex. 1041, 70:7–72:20). Petitioner contends that Patent Owner’s argument that Yoon does not anticipate the claims because no circular shift occurs for the third and later transmissions is erroneous because the claims do not require a circular shift for every retransmission. *See id.* (citing PO Resp. 36; Dec. 33, 35–36). Petitioner further argues that, even if a circular shift for every retransmission was required, the third retransmission of Figure 10 reflects an additional circular 2-bit shift in combination with a 1-bit circular shift within each of the H, L, and M parts. *See id.* (citing Dec. 27–28).

Petitioner asserts that Yoon’s Figure 11 illustrates 8PSK transmissions with modulation order 3 showing a 1-bit right circular shift on a first retransmission, a 2-bit right circular shift on a second retransmission, and a 3-bit right circular shift right on a third retransmission. Pet. Reply 16 (citing Ex. 1010, Fig. 10; citing Ex. 1002 ¶¶ 129–131). Petitioner asserts that Patent Owner ignores Figure 11, and Patent Owner’s flawed arguments as to Yoon’s Figures 9 and 10 cannot be applied to Figure 11. *See id.*

In the Sur-reply, Patent Owner disputes Petitioner’s assertion with respect to Figure 9 that Patent Owner does not contest that a circular shift occurs on a first retransmission within each modulation symbol. *See* PO Sur-reply 12 (quoting Pet. Reply 11). Patent Owner reiterates its assertion

that Yoon teaches a predetermined rearrangement pattern and does not implement circular shifts at all. *See id.* Patent Owner also contends, with respect to Yoon's Figure 10, that Petitioner mischaracterizes Patent Owner's position and Yoon's disclosure. *See* PO Sur-reply 14 (citing Pet. Reply 14). Patent Owner reiterates its assertion that Yoon teaches a predetermined rearrangement pattern that happens to match the expected outcome of a circular shift in certain retransmissions, but not all retransmissions. *See id.* Patent Owner also disputes Petitioner's assertions with respect to claim 11 by reiterating its contention that Yoon does not "perform a circular shift" but only implements a predetermined rearrangement pattern, and performs the same 1-bit circular shift during each for the first, second, and third retransmissions. *See* PO Resp. 15 (quoting Pet. Reply 16).

We do not agree with Patent Owner's arguments because the arguments are not commensurate in scope with the claim limitations. Contrary to Patent Owner's arguments, claims 1 and 4 do not recite or require performing a circular shift for each and every retransmission, as suggested by Patent Owner. Claims 1 and 4 recite "performing a circular shift," which may mean performing **one** or more circular shifts. *See KCI Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1356 (Fed. Cir. 2000). ("[A]n indefinite article 'a' or 'an' in patent parlance carries the meaning of 'one or more' in open-ended claims containing the transitional phrase 'comprising.'"). Thus, to meet the limitations of the claim, Yoon need only disclose performing one circular shift, with a variable length related to a modulation order and a number of transmissions. We also do not agree with Patent Owner's arguments that Yoon does not disclose performing a circular shift on the basis that Yoon discloses a predetermined rearrangement pattern.

Claims 1 and 4 do not preclude the use of a “predetermined arrangement pattern” for “performing a circular shift.” Patent Owner’s arguments also overlook Yoon’s explicit disclosures, relied on by Petitioner (*see* Pet. 30–45) of performing a “2-bit right rotation” for a first retransmission, and a “4-bit right rotation” for a second retransmission for the 64QAM scheme (modulation order 6) of Figure 10, and performing a “1-bit right rotation” for a first retransmission, and a “2-bit right rotation” for a second retransmission 8PSK scheme (modulation order 3) of Figure 11. *See* Ex. 1010 ¶¶ 104–105, 111–113, Figs. 10–11. Notwithstanding Petitioner’s assertions addressing Yoon’s disclosures of a 1-bit-circular shift within each of the H and L parts of a modulation symbol and compound circular shifts, Yoon’s aforementioned explicit disclosures pertaining to Figures 10 and 11 disclose “performing a circular shift, with variable length related to a modulation order and a number of transmissions, on ones of the plurality of coded bits,” in accordance with the full scope of the claim limitations.

In addition, Patent Owner’s following arguments are misplaced: (1) Petitioner uses hindsight reconstruction of Yoon’s disclosures that do not sufficiently disclose the invention of the ’326 Patent to a person of ordinary skill in the art (*see* PO Resp. 39–40; PO Sur-reply 12–15), and (2) the claimed subject matter would not have been obvious (PO Sur-reply 12, 15). Obviousness and hindsight are not the relevant inquiries to the patentability challenge based on anticipation by Yoon. “[A] claim is anticipated ‘if each and every limitation is found either expressly or inherently in a single prior art reference.’” *King Pharm.*, 616 F.3d at 1274

Based on the entire record, we determine Petitioner shows by a preponderance of the evidence that Yoon discloses “performing a circular

shift, with variable length related to a modulation order and a number of transmissions, on ones of the plurality of coded bits.” *See* Pet. 36–45.

Claims 1 and 4: “and transmit[ting] the circularly shifted ones of the plurality of coded bits”

Petitioner contends that Yoon discloses “transmitting the circularly shifted ones of the plurality of coded bits,” as recited in claim 1, and recited similarly in claim 4 as “the processor being configured to . . . transmit.” *See* Pet. 47–48, 56–57. Petitioner bases its contentions on Yoon’s disclosure that bit rearranger 250 transmits the shifted coded bits to modulator 260 which transmits to shifted coded bits to a receiver. *See id.* at 47–48 (quoting Ex. 1010 ¶¶ 61, 98; citing Ex. 1010 ¶¶ 63, 79, Fig. 4; Ex. 1002 ¶¶ 140–141), 56–57 (citing Ex. 1010 ¶¶ 61, 63, 79, 98, Fig. 4; Ex. 1002 ¶ 161).

Patent Owner does not dispute Petitioner’s assertions addressing these limitations of claims 1 and 4. *See* PO Resp. 24–40. Nonetheless, the burden remains on Petitioner to demonstrate unpatentability. *See Dynamic Drinkware*, 800 F.3d at 1378.

Based on the entire record, we find that Yoon discloses “transmitting the circularly shifted ones of the plurality of coded bits,” as recited in claim 1, and recited similarly in claim 4. *See* Pet. 47–48, 56–57.

b. Claims 2 and 5

Claims 2 and 5 are substantially similar to claims 1 and 4, respectively, in that claims 1 and 2 are method claims and claims 4 and 5 are directed to a transmitter. Different from claim 1, claim 2 recites “*allocating ones of the plurality of coded bits, the allocating resulting in a circular shift, with a variable length related to a modulation order and a number of transmissions, of the ones of the plurality of coded bits; and transmitting the*

allocated ones of the plurality of coded bits.” Claim 5 has similar differences compared to claim 4. To address the limitations of claims 2 and 5, Petitioner presents arguments similar to those addressing the limitations of claims 1 and 4 (*compare* Pet. 48–54, 57, *with id.* at 34–47, 54–57) and incorporates by reference its arguments addressing the similar limitations of claims 1 and 4. *See* Pet. 48–54 (citing Pet. 34–47), 57 (citing Pet. 48–57).

Patent Owner does not present separate arguments addressing the limitations of claims 2 and 5 apart from the limitations recited in claims 1 and 4. *See* PO Resp. 23–40; PO Sur-reply 7–17.

We have reviewed Petitioner’s contentions and cited supporting evidence addressing how Yoon discloses the limitations of claims 2 and 5. *See* Pet. 34–57. Based on the record before us, Petitioner establishes sufficiently that Yoon discloses the limitations of claims 2 and 5. For the same reasons as those explained above in Section II.D.2.a, we do not agree with Patent Owner’s arguments that Yoon does not disclose “a circular shift, with a variable length related to a modulation order and a number of transmissions, on ones of the plurality of coded bits.”

c. Summary

Based on the entire record, Petitioner has established by a preponderance of the evidence that claims 1, 2, 4, and 5 are unpatentable under 35 U.S.C. § 102 as anticipated by Yoon.

E. Unpatentability of Claim 3 under 35 U.S.C. § 103(a) over Yoon and Naka

1. Overview of Naka (Ex. 1015)

Naka discloses an interleave apparatus and method for preventing an increase in the number of retransmissions and improving throughput. *See* Ex. 1015 ¶¶ 1, 12, 16. Naka discloses a radio communication device that has an error correction encoding section, an interleaver, a mapping section, a modulating section, and a transmission section. *See id.* ¶ 20, Fig. 2. The interleaver has a data holding section, a first index calculating section, second index calculating section, third index calculation section and a reading out section. *See id.* ¶ 21, Fig. 2. The data holding section arranges and holds the bit streams outputted from the error correction encoding section in two dimensions. *See id.* ¶ 24. The data holding section writes bits to be mapped to one symbol in a predetermined number of rows and columns and holds the bits. *See id.* The data holding section takes the writing order of the bits and an index. *See id.* The first index calculating section sequentially calculates first indexes for reading out the bit streams arranged in a row direction at data holding section in a column direction according to a first equation. *See id.* ¶¶ 25–26. The second index calculating section sequentially calculates second indexes for reversing the order of higher and lower bits read out from the columns of even number while reading out bit streams held in the data holding section according to the first indexes according to a second equation. *See id.* ¶¶ 27–28. The third index calculating section sequentially calculates third indexes for reading out bit streams held in the data holding section from different start positions according to the number of retransmissions, according to a third equation. *See id.* ¶¶ 29–30. The reading out section reads out bit streams held in the

data holding section in the order according to the third indexes and outputs the bit streams to the mapping section. *See id.* ¶ 32. The mapping section maps the bit streams from the interleaver to the corresponding subcarriers. *See id.* ¶ 33. The RF transmission section performs radio transmission processing on and transmits the result via an antenna. *See id.* ¶ 37.

2. Analysis

Petitioner contends the combined teachings of Yoon and Naka render obvious the additional limitations recited in dependent claim 3. *See* Pet. 64–69. For the reasons that follow, we are persuaded that Petitioner establishes by a preponderance of the evidence that the combination of Yoon and Naka renders obvious the subject matter of claim 3.

Claim 3 depends from claim 2 and further recites “generating a reordered index sequence of the ones of the plurality of coded bits; and allocating the ones of the plurality of coded bits based on the reordered index sequence.” Ex. 1001, 14:33–38. Petitioner contends Naka teaches the limitations of claim 3 based on Naka’s teaching of a data holding section within an interleaver that stores the coded bits in a two-dimensional array and generates an index of coded bits according to the writing order, as well as three index calculating sections, which generate a reordered index sequence of the plurality of coded bits stored in the data holding section based on the initial index and three equations. *See* Pet. 65–66 (quoting Ex. 1015 ¶¶ 18–24; citing Ex. 1015 ¶¶ 8–10, 16; Ex. 1002 ¶¶ 173–175). Petitioner further asserts that Naka teaches the interleaver identifies coded bits and reads them out based on the index sequence generated by index calculating section. *See id.* at 66 (quoting Ex. 1015 ¶ 26; citing Ex. 1002 ¶ 176).

Petitioner asserts that it would have been obvious to one of ordinary skill in the art to incorporate Naka's techniques of generating a reordered index sequence of coded bits and allocating coded bits based on the reordered index sequence because a person of ordinary skill in the art would have understood that it was one of a finite number of ways that Yoon's interleaver could have generated a reordered sequence of coded bits, such as directly or by using an index sequence. *See* Pet. 66 (citing Ex. 1010 ¶¶ 60–61; Ex. 1002 ¶ 177); *id.* at 68 (quoting *KSR*, 550 U.S. at 421; citing Ex. 1002 ¶ 175). According to Petitioner, “[u]sing a standard data structure such as [an] array . . . or lookup table to implement the reordered index sequence would have been ‘within a [person of ordinary skill in the art]’s technical grasp,’ and a [person of ordinary skill in the art] would thus have had a good reason to pursue this option.” *Id.* at 66–67 (citing Ex. 1015 ¶¶ 8, 10, 16, 18; Ex. 1002 ¶ 177; *KSR*, 550 U.S. at 421). Petitioner further contends that a person of ordinary skill in the art would have had a reasonable expectation of success in making the combination because Naka's interleaver functioned like Yoon's interleaver and bit rearranger. *See id.* at 68–69 (citing Ex. 1010 ¶¶ 60–61; Ex. 1015 ¶¶ 17–26, 55–58, Fig. 2; Ex. 1002 ¶¶ 180–181).

Patent Owner does not challenge Petitioner's assertions addressing the combined teachings of Yoon and Naka. *See* PO Resp. 44; PO Sur-reply 17.

Based on Petitioner's citations to Yoon, Naka, and Dr. Roy's supporting testimony (Ex. 1002), we are persuaded Petitioner has set forth sufficient articulated reasoning with rational underpinning to support the conclusion that it would have been obvious to one of ordinary skill in the art

to incorporate Naka's techniques with Yoon's method. *See* Pet. 66–67 (citing Ex. 1015 ¶¶ 8, 10, 16, 18; Ex. 1002 ¶ 177; *KSR*, 550 U.S. at 421).

2. Secondary Considerations

We next consider Patent Owner's proffered evidence of secondary considerations before reaching our conclusion on obviousness as to the subject matter of claim 3. *See WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1328 (Fed. Cir. 2016). Patent Owner asserts that there is evidence of commercial success and licensing of the '326 Patent to industry leaders in the wireless chip industry. *See* PO Resp. 45 (citing Exs. 2007–2010). Exhibit 2007 is a notice regarding withdrawn claims entered in *UNM Rainforest Innovations v. Dell Technologies, Inc.*, No. 6:20-cv-00468-ADA (W.D. Tex.). Exhibit 2008 is a notice regarding withdrawn claims entered in *UNM Rainforest Innovations v. ASUSTek Computer, Inc.*, No. 6:20-cv-00142-ADA (W.D. Tex.). Exhibits 2009 and 2010 are a joint motion to dismiss with prejudice, and an order of dismissal, respectively, entered in *UNM Rainforest Innovations v. Apple Inc.*, No. 1:20-cv-00351 (W.D. Tex.). According to Patent Owner, "[t]hese attractive licenses, negotiated by wireless industry leaders, provide strong evidence of secondary considerations supporting a finding of non-obviousness of the patent[] at issue in this IPR." *Id.* In the Reply, Petitioner contends that Patent Owner made no showing of a nexus, and, therefore, did not establish secondary considerations of non-obviousness. *See* Pet. Reply 21–22.

Factual inquiries for an obviousness determination include evaluation and crediting of evidence of secondary considerations. *Graham*, 383 U.S. at 17 (1966). "For objective evidence of secondary considerations to be accorded substantial weight, its proponent must establish a nexus between

the evidence and the merits of the claimed invention.” *ClassCo, Inc. v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016). Ultimately, “[t]he patentee bears the burden of showing that a nexus exists.” *WMS Gaming, Inc. v. Int’l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999). Our reviewing court “specifically requires[s] affirmative evidence of nexus where the evidence . . . presented is a license, because it is often ‘cheaper to take licenses than to defend infringement suits.’” *Iron Grip Barbell Co. Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1324 (Fed. Cir. 2004) (quoting *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 908 (Fed. Cir. 1985)).

Exhibits 2007 through 2010 proffered by Patent Owner are not license agreements, rather they are documents settling Patent Owner’s disputes with several defendants in different District Court proceedings. *See* Exs. 2007–2010. Patent Owner fails to provide evidence that any license agreement has a nexus to the merits of the claimed invention. Accordingly, Patent Owner’s evidence of secondary considerations of non-obviousness is entitled to little weight.

3. Summary

After considering the parties’ arguments, the entire record, and weighing the evidence of obviousness and the secondary considerations of nonobviousness of the subject matter of claim 3, we determine that Petitioner’s showing of obviousness is strong and outweighs the minimally weighted evidence of secondary considerations of nonobviousness. Accordingly, based on the entire record, Petitioner has established by a preponderance of the evidence that claim 3 is unpatentable under 35 U.S.C. § 103 over Yoon and Naka.

F. Remaining Unpatentability Challenges

Petitioner also challenges the patentability under 35 U.S.C. § 103 of claims 1, 2, 4 and 5 over Yoon and claims 4 and 5 over Yoon and Wengerter. *See* Pet. 45–48, 53, 56–62. We need not determine the merits of those challenges because, as explained above, Petitioner has shown by a preponderance of the evidence that claims 1, 2, 4, and 5 are unpatentable under 35 U.S.C. § 102 by Yoon, and claim 3 is unpatentable under 35 U.S.C. § 103 over Yoon and Naka. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1359 (2018) (holding that a petitioner “is entitled to a final written decision addressing all of the claims it has challenged”); *Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984) (finding an administrative agency is at liberty to reach a decision based on a single dispositive issue because doing so “can not only save the parties, the [agency], and [the reviewing] court unnecessary cost and effort,” but can “greatly ease the burden on [an agency] faced with a . . . proceeding involving numerous complex issues and required by statute to reach its conclusion within rigid time limits”); *Bos. Sci. Scimed, Inc. v. Cook Grp. Inc.*, 809 F. App’x 984, 990 (Fed. Cir. 2020) (non-precedential) (recognizing that the “Board need not address issues that are not necessary to the resolution of the proceeding” and, thus, agreeing that the Board has “discretion to decline to decide additional instituted grounds once the petitioner has prevailed on all its challenged claims”).

III. CONTINGENT MOTION TO AMEND

A. Introduction

Contingent on the determination that claims 1–5 are unpatentable, Patent Owner requests that we cancel claims 1–5 of the '326 Patent and replace these claims with proposed substitute claims 6–10, respectively. *See* Mot. Amend 1, 11 (App'x A). As discussed above in Section II, Petitioner has established by a preponderance of the evidence that claims 1–5 are unpatentable. Therefore, we consider Patent Owner's Motion to Amend.

In the proceeding before us, Patent Owner requested preliminary guidance from the Board in its Motion to Amend. *See* Mot. Amend 1; Notice Regarding a New Pilot Program Concerning Motion to Amend Practice and Procedures in Trial Proceedings under the America Invents Act before the Patent Trial and Appeal Board, 84 Fed. Reg. 9497 (Mar. 15, 2019) ("MTA Pilot Program Notice"). After Petitioner filed its Opposition to the Motion to Amend, the Board issued Preliminary Guidance. *See* PG. Patent Owner filed a Reply to Petitioner's Opposition to which Petitioner filed a Sur-reply. *See* PO Reply MTA; Pet. Sur-reply MTA.

B. Principles of Law

In an *inter partes* review, amended claims are not added to a patent as a matter of right, but instead must be proposed as a part of a motion to amend. 35 U.S.C. § 316(d). "Before considering the patentability of any substitute claims, . . . the Board first must determine whether the motion to amend meets the statutory and regulatory requirements set forth in 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121." *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4 (PTAB Feb. 25, 2019) (precedential). A patent owner bears the burden of persuasion to show: (1) the amendment

proposes a reasonable number of substitute claims; (2) the proposed substitute claims are supported in the original disclosure (and any earlier filed disclosure for which the benefit of filing date is sought); (3) the amendment responds to a ground of unpatentability involved in the trial; and (4) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121(a)(2), (a)(3), (d)(1); *Lectrosonics*, Paper 15 at 4–8. Petitioner, however, “bears the burden of persuasion to show, by a preponderance of the evidence, that any proposed substitute claims are unpatentable.” 37 C.F.R. § 42.121(d)(2); *Lectrosonics*, Paper 15 at 4 (citing *Aqua Prods. Inc. v. Matal*, 872 F.3d 1290, 1311 (Fed. Cir. 2017); *Bosch Auto. Serv. Sols. LLC v. Iancu*, 878 F.3d 1027, 1040 (Fed. Cir. 2017)).

C. Analysis

Because the Preliminary Guidance issued in this proceeding is not binding on the Board, we consider anew Patent Owner’s Motion to Amend and Petitioner’s Opposition, along with Patent Owner’s Reply and Petitioner’s Sur-reply. We begin our analysis with an overview of proposed substitute claims 6–10, followed by a discussion of Patent Owner’s compliance with the statutory and regulatory requirements for a motion to amend, and then we address Petitioner’s assertions of unpatentability of the proposed substitute claims.

1. Overview of Proposed Substitute Claims 6–10

Proposed substitute independent claim 6, to replace independent claim 1, is reproduced below with underlined text showing Patent Owner’s amendments:

6. A method for transmitting data represented by a plurality of coded bits, the method comprising:
performing a circular shift, with a variable length related to a modulation order and a number of transmissions, on ones of the plurality of coded bits; and transmitting the circularly shifted ones of the plurality of coded bits;
wherein the plurality of coded bits spans multiple modulation symbols.

Mot. Amend 11 (App'x A). Proposed substitute claims 7, 9, and 10, corresponding to independent claims 2, 4, and 5 respectively, include identical amendments. *See id.* at 11–12. Proposed substitute claim 8 is identical to claim 3, apart from an amendment to change the dependency to proposed substitute claim 7. *See id.* at 12.

2. Reasonable Number of Substitute Claims

Patent Owner's proposal to substitute a single claim for each of challenged claims 1–5 (*see* Mot. Amend 2) meets the requirement for a reasonable number of substitute claims. *See* 37 C.F.R. § 42.121(a)(3) (establishing a rebuttable presumption that only one substitute claim is needed to replace each challenged claim).

3. Enlargement of Claim Scope

Patent Owner asserts that proposed substitute claim 6 does not seek to enlarge the scope of the originally issued claim 1 because proposed substitute claim 6 is narrower than claim 1 with the addition of a claim element. *See* Mot. Amend 3–4. Petitioner does not dispute Patent Owner's contention that proposed substitute claim 6 does not seek to enlarge the scope of the claims of the '326 Patent. *See generally* Pet. Opp. MTA. Based on the entire record, we determine that proposed substitute claims 6–10 do not enlarge the scope of the claims of the '326 Patent. *See*

37 C.F.R. § 42.121(a)(2)(ii) (“A motion to amend may be denied where . . . [t]he amendment seeks to enlarge the scope of the claims of the patent . . .”).

4. Support for Proposed Substitute Claims / New Matter

Patent Owner asserts that the narrowing limitations of proposed substitute claim 6 is supported by the original disclosure of the '326 Patent. *See* Mot. Amend 4–8 (reproducing Ex. 2001 ¶¶ 48–50, 62; quoting Ex. 2001 ¶¶ 48, 62; citing Ex. 2001 ¶¶ 55–57, 81; Ex. 2013⁹ ¶¶ 64, 65, Figs. 8A–8B); PO Reply MTA 7–11 (reproducing Ex. 2001 ¶¶ 48–50, 62; quoting Ex. 2001 ¶¶ 48, 62; citing Ex. 2001 ¶¶ 55–57, 81; Ex. 2013 ¶¶ 64, 65, Figs. 8A–8B).

Petitioner contends that Patent Owner’s Motion to Amend should be denied because it does not comply with the requirement of 37 C.F.R. § 42.121(b) to show support for the entirety of the proposed amended claims. *See* Pet. Opp. MTA 2–4; *see also* 37 C.F.R. § 42.121(a)(2)(ii) (“A motion to amend may be denied where . . . [t]he amendment seeks to . . . introduce new subject matter.”). Petitioner points out that the *Lectrosonics* precedential order makes clear that to meet the statutory requirement the motion must set forth written description support for each proposed substitute claim as a whole, not just the features added by amendment. *See* Pet. Opp. MTA 4 (quoting *Lectrosonics*, Paper 15 at 8). Petitioner contends that Patent Owner’s Motion does not attempt to satisfy this requirement, but only purports to show support for the element added by the amendments. *See id.* (citing Mot. Amend 4–8).

⁹ Patent Owner incorrectly cites Ex. 2012.

In the Preliminary Guidance, we found preliminarily that Patent Owner did not satisfy its burden of establishing that the amendment does not introduce new matter because Patent Owner does not identify sufficient written description support in the originally filed disclosure of the '326 Patent for all of the limitations of the proposed substitute claims. *See* PG 6–7.

In the Reply, Patent Owner supplements its Motion to Amend by asserting Application No. 12/425,004 (Ex. 2013, “'004 Application”), which issued as the '326 Patent, provides written description support for each of the limitations of proposed substitute claims 6–10 by providing, for each limitation, citations to numerous paragraphs of the '004 Application, and in many cases parenthetical quotations and information addressing the specific disclosures relied upon in the respective cited paragraphs. *See* PO Reply MTA 5–7, 12–17.

In the Sur-reply, Petitioner contends that Patent Owner’s attempt to provide a showing of written description support for the original limitations of the proposed substitute claims comes too late. *See* Pet. Sur-reply MTA 1, 4–8. Petitioner contends that the Reply is Patent Owner’s first attempt to show written description support for all the limitations that appeared in the original claims. *See id.* at 5 (citing PO Reply MTA 5–17). Petitioner also asserts that the Reply included new citations to paragraph 77 and Figure 10 of the '004 Application which were not cited in the Motion to Amend. *See id.* (comparing Mot. Amend 4–8, with PO Reply MTA 6). Petitioner contends that Patent Owner was obligated to present all of its arguments and evidence showing written description support for each limitation of the proposed substitute claims in the Motion to Amend. *See id.*

at 5–6 (quoting 37 CF.R. § 42.23(b); *Lectrosonics*, Paper 15 at 8; Trial Practice Guide, 77 Fed. Reg. 48,756, 48,767, (Aug. 14, 2012) (“TPG”)). Petitioner asserts that *Lippert Components, Inc. v Days Corp.*, IPR2018-00777, Paper 28 (PTAB Sept. 24, 2019) confirms that Patent Owner’s showing is too late. *See id.* at 6 (quoting *Lippert*, Paper 28 at 51). Petitioner asserts that *Respironics, Inc. v. Zoll Medical Corp.*, IPR2013-00322, Paper 46 (PTAB Sept. 17, 2014) is consistent with *Lippert*. *See id.* (quoting *Respironics*, Paper 46 at 25). Petitioner contends that only an opposition affords Petitioner a full and fair opportunity to respond to Patent Owner’s written description theories because it is the only paper in which Petitioner is entitled to submit new evidence. *See id.* at 7–8 (quoting MTA Pilot Program Notice 9500; *Lippert*, Paper 28 at 51). On the foregoing bases, Petitioner asserts that the Motion to Amend should be denied. *Id.* at 7 (quoting *Lippert*, Paper 28 at 52).

We do not agree with Petitioner’s arguments that Patent Owner is foreclosed from supplementing its showing that the Motion to Amend meets the statutory and regulatory requirements in the Reply. Petitioner’s Opposition and the Preliminary Guidance raised the issue of an insufficiency of Patent Owner’s showing of support for the proposed amended claims. *See* Pet. Opp. MTA 2–5. As set forth in the MTA Pilot Program Notice, a reply may respond to the preliminary guidance and to the opposition to the motion to amend. *See* MTA Pilot Program Notice 9501. A patent owner also is permitted to file new evidence, including declarations, with its reply. *See id.* In practical application, a patent owner is permitted to supplement its showing that there is support for the proposed substitute claims in a reply.

See, e.g., Orthofix Med. Inc. v. Spine Holdings, LLC, IPR2020-01411, Paper 41 at 72–73 (PTAB Feb. 22, 2022).

Petitioner does not substantively dispute Patent Owner’s citations to the ’004 Application and corresponding parenthetical quotations and explanations provided in the Reply to show support for proposed substitute claims 6, 7, 9, and 10. *See* Pet. Sur-reply MTA 8–9. We have reviewed Patent Owner’s citations to the ’004 Application and the corresponding parenthetical quotations and explanations for the limitations of proposed substitute claims 6, 7, 9, and 10 and find that the ’004 Application provides sufficient support for the limitations of proposed substitute claims 6, 7, 9, and 10.

Petitioner, however, contends that Patent Owner fails to show support for the limitations of proposed substitute claim 8. *See* Pet. Sur-reply MTA 8. Petitioner asserts that Patent Owner’s attempt to show written description support for proposed substitute claim 8 “was not much more than string citations without meaningful explanation” and does not meet the standard for written description support. *Id.* at 8 (citing PO Reply MTA 13–14; *Intel Corp. v. Alacritech, Inc.*, IPR2017-01392, Paper 81 at 64–65 (PTAB Nov. 26, 2018); *B.E. Tech., L.L.C. v. Google, Inc.*, No. 2015-1827, 2016 U.S. App. LEXIS 20591, *21–22 (Fed. Cir. Nov. 17, 2017)). According to Petitioner, “Patent Owner has not identified support for the claimed index, and Patent Owner’s explanation for limitation 8.a. neither mentions a reordered index sequence nor explains how the string citations relate to the concept of a reordered index sequence.” *Id.* at 9 (citing PO Reply MTA 13). Petitioner asserts that without an index, the claimed allocation cannot be made “based on the reordered index sequence.” *See id.*

Petitioner further contends that the Reply's only mention of a reordered index sequence is the citation to paragraph 58 of the '004 Application cited to address limitation 8.b. *See id.* (citing PO Reply MTA 14). Petitioner contends that paragraph 58 does not mention an index. *See id.* (citing Ex. 2013 ¶ 58).

We have reviewed Patent Owner's citations to the '004 Application and corresponding parenthetical quotations and explanations offered to show support for proposed substitute claim 8. We agree with Petitioner that Patent Owner's parenthetical explanation accompanying the citation to paragraph 58 of the '004 Application is the only mention of a reordered index sequence. We also agree that paragraph 58 of the '004 Application does not disclose a reordered index sequence. *See* Ex. 2013 ¶ 58. Accordingly, we find that the '004 Application does not provide sufficient support for the limitations of proposed substitute claim 8.

Based on the entire record, Patent Owner has sufficiently shown support in the '004 Application for proposed substitute claims 6, 7, 9, and 10. *See* Mot. Amend 4–8; PO Reply MTA 6–17. Based on the entire record, however, Patent Owner has not sufficiently shown support in the '004 Application for proposed substitute claim 8. *See* PO Reply MTA 13–14.

5. Responding to a Ground of Unpatentability

Patent Owner contends that proposed substitute claims 6–10 respond to Petitioner's unpatentability challenges to claims 1–5 based on Yoon, Yoon and Naka, and Yoon and Wengerter because the additional claim element of proposed substitute claims 6, 7, 9, and 10 responds to these grounds of unpatentability. *See* Mot. Amend 2–3. Petitioner does not

dispute Patent Owner's contentions that proposed substitute claims 6–10 are responsive to the grounds of unpatentability in the Petition. *See generally* Pet. Opp. MTA. Based on the entire record, Patent Owner has sufficiently articulated its position for why the added limitations are responsive to the grounds of unpatentability raised in the Petition. *See* Mot. Amend 2–3.

6. Patentability of Proposed Substitute Claims

Petitioner contends that Patent Owner's request to replace claims 1–5 with proposed substitute claims 6–10 should be denied because proposed substitute claims 6, 7, 9, and 10 are unpatentable under 35 U.S.C. § 103 over Yoon. *See* Pet. Opp. MTA 1–2, 6–22. Petitioner explains that the added limitation “wherein the plurality of coded bits spans multiple modulation symbols,” recited in proposed substitute claims 6, 7, 9, and 10, when read in combination with the claim language a “circular shift with a variable length related to a modulation order and a number of transmissions, on ones of the plurality of coded bits,” requires a circular shift of coded bits spanning multiple modulation symbols i.e., an inter-symbol circular shift of coded bits. *See id.* at 9–10.

Petitioner asserts that Yoon discloses a technique for overcoming transmission errors by performing a circular shift on bits within respective modulation symbols – i.e., intra-symbol circular bit shifting. *See* Pet. Opp. MTA 17. Petitioner contends that “[i]t would have been well-known to a [person of ordinary skill in the art] that transmission errors could be corrected by either inter-symbol or intra-symbol bit rearrangement with the use of circular shifts.” *Id.* at 17–18; *see id.* at 11 (asserting intra-symbol and inter symbol interleaving were well-known for use in overcoming transmission errors, citing Ex. 1040 ¶ 19). According to Petitioner,

“[w]hether intra-symbol circular shifting, inter-symbol bit shifting, or both, would have been necessary in a given situation, would have depended on the extent and pattern of the transmission errors induced by the channel.” *Id.* at 18; *see id.* at 12 (asserting circular shifts and interleaving were used to overcome interference and errors in transmission, and that the specific error conditions would determine whether intra-symbol rearrangement, inter-symbol rearrangement, or both would be useful in error correction, citing Ex. 1040 ¶ 19; Ex. 1010 ¶¶ 28, 30, 34; Ex. 1001 1:33–36); Pet. Sur-reply MTA 10 (quoting Ex. 1040 ¶ 19); *id.* at 11–12 (citing Ex. 1040 ¶ 19).

Petitioner asserts that “making the adjustment between intra-symbol and inter-symbol bit shifting would have been trivial to a [person of ordinary skill in the art], potentially a simple implementation choice of adjusting the parameters of a block interleaver implementation for the bit shifting” and “the manner of implementing intra-symbol versus inter-symbol circular bit shifts would have been as simple as modifying the dimensions of a matrix used to perform such a circular shift by reprogramming a bit allocation controller.” Pet. Opp. MTA 18 (citing *id.* at 11–13); *see id.* at 12 (asserting a person of ordinary skill in the art would have known that the choice of matrix parameters could be used to generate an intra-symbol circular shift of an inter-symbol circular shift in relation to modulation symbol length, citing Ex. 1040 ¶ 20; Ex. 1041, 36:5–38:6); Pet. Sur-reply MTA 12 (citing Ex. 1040 ¶ 20).

Petitioner contends that a person of ordinary skill in the art “would have found it obvious for the bit rearrangement processes shown in Yoon’s Figures 9–11 to be performed on an inter-symbol basis by the transmitter of Figures 4 and 6. *See* Pet. Opp. MTA 18 (quoting Ex. 1010 ¶¶ 56, 65, 143);

see id. at 19 (citing Ex. 1040 ¶ 40). According to Petitioner, “[i]t would have been simple to reprogram the bit rearranger and/or rearrangement controller to rearrange bits as between symbols, rather than within them.” *Id.* (citing Ex. 1040 ¶ 48); *see id.* at 16 (similar argument, citing Ex. 1040 ¶ 24); Pet. Sur-reply MTA 10 (similar argument, quoting Ex. 1040 ¶ 24); *id.* at 12 (similar argument, citing Ex. 1040 ¶ 48). Petitioner further asserts that a person of ordinary skill in the art would have known the benefit, taught by Yoon, of reducing interference signals and improving system performance, when applied to inter-symbol circular bit shifts. *See* Pet. Opp. MTA 18 (citing Ex. 1040 ¶ 48); *see* Pet. Sur-reply MTA 12 (similar argument, citing Ex. 1040 ¶ 48).

Petitioner asserts that the modification of using the transmitter of Figure 4 with the bit rearrangement techniques of Figures 9–11 with inter-symbol bit shifting would have been recognized by a person of ordinary skill in the art as a combination of prior art elements according to known methods to yield predictable results—reducing interference, improving performance, and improving decoding efficiency when transmitting data under variable channel conditions. *See* Pet. Opp. MTA 19 (citing Ex. 1010 ¶¶ 8, 64, 147; Ex. 1040 ¶ 48). Petitioner further asserts that a person of ordinary skill in the art would have had a reasonable expectation of success in making the modification and would have recognized that the modification would have used the techniques of Figures 9–11 for their intended purpose. *See id.* at 20 (quoting Ex. 1010 ¶ 64; citing Ex. 1040 ¶¶ 48–49, 52–57). Petitioner asserts that a person of ordinary skill in the art would have known that Yoon’s simple bit rearranger could have performed either intra-symbol or inter-symbol bit shifts. *See id.* at 20–21 (citing Ex. 1040 ¶¶ 48–49, 52–57).

Petitioner points out that Yoon teaches the benefits of combining techniques based on channel conditions and notes that the benefits to “overall system performance” can be achieved “without an increase in system complexity.” *See id.* at 21 (citing Ex. 1010 ¶¶ 6–13, 148).

In the Reply, Patent Owner contends the additional claim element “wherein the plurality of coded bits spans multiple modulation symbols” is not taught or suggested by Yoon, Wengerter, or Naka, in light of the skill of a person of ordinary skill in the art. *See* PO Reply MTA 18. According to Patent Owner, “Petitioner acknowledges that ‘Yoon discloses a technique for overcoming transmission errors by performing a circular shift on bits within respective modulation symbols – i.e., intra-symbol circular bit shifting.’” *Id.* at 18–19 (quoting Pet. Opp. MTA 17 (Patent Owner’s emphasis)). Patent Owner argues that “Dr. Roy cites no support for his *ipse dixit* that that it would have been obvious to change Yoon’s intra-symbol circular shifting of coded bits, to an inter-symbol circular shifting of coded bits (*i.e.*, circular shifting performed on coded bits that span multiple modulation symbols, as recited in claim 6), nor that it would easily have been possible.” *Id.* at 21; *see id.* at 22 (similar argument). Patent Owner further points out that every single disclosure in Yoon relates to intra-symbol bit rearrangements and Yoon makes no reference whatsoever to inter-symbol rearrangements. *See id.* at 21–22 (quoting Ex. 1010 ¶ 143; citing PG 9–10).

In the Sur-reply, Petitioner disagrees with the determination in the Preliminary Guidance that the Opposition and Dr. Roy’s testimony provided an insufficient underlying factual basis for the contention that it would have been obvious to change Yoon’s intra-symbol circular bit shifting to inter-symbol circular bit shifting. *See* Pet. Sur-reply MTA 10–11. According to

Petitioner, “it is it is Dr. Roy’s experience in the field of retransmission schemes, such as those disclosed in Yoon, that provides the factual basis for his opinion that a POSITA dealing with particular interference conditions would have been motivated to and known how to modify Yoon’s system to perform inter-symbol shifting.” *Id.* at 11 (citing Ex. 1002 ¶¶ 8–18; Ex. 1040 ¶¶ 6, 10). According to Petitioner, “[t]his is precisely a place where an expert’s experience is useful in understanding the art from the designer’s perspective.” *Id.* (citing Ex. 1040 ¶¶ 19–20). Petitioner points out that Patent Owner did not cite evidence to refute Petitioner’s contentions. *See id.*

The preponderance of the evidence does not sufficiently support Petitioner’s contentions that it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Yoon to include inter-symbol circular shifts. Dr. Roy does not provide an underlying factual basis to support the following assertions: (1) intra-symbol and inter-symbol circular bit shifting were well-known at the time of the application for the ’326 patent for use in overcoming transmission errors, (*see* Ex. 1040 ¶ 19); and (2) “it would have been well known to a [person of ordinary skill in the art] that transmission errors could be corrected by either inter-symbol or intra-symbol bit rearrangement with the use of circular shifts,” (*see* Ex. 1040 ¶ 52). For example, Dr. Roy does not provide objective evidence, such as prior art, to support his testimony that inter-symbol shifting was well-known at the time of the invention. As another example, Dr. Roy does not provide objective evidence to support his testimony that it was well-known to a person of ordinary skill in the art that transmission errors could be corrected by either inter-symbol or intra-symbol circular shifts. Notwithstanding Dr. Roy’s qualifications in the field of transmission

schemes, as highlighted by Petitioner, we give little weight to Dr. Roy's aforementioned testimony because it is not supported by an underlying factual basis. *See* C.F.R. § 42.65(a). The scope and content of the prior art is one of the foundations for resolving the question of obviousness (*see Graham*, 383 U.S. at 17–18) and Petitioner does not provide an underlying factual basis to show that inter-symbol circular shifting was well-known at the time of the invention.

Compounding the aforementioned deficiencies, Dr. Roy also does not provide any underlying factual basis to support the following assertions:

(1) the specific error conditions would determine whether intra-symbol rearrangement, inter-symbol rearrangement, or both would be useful in error correction, (*see* Ex. 1040 ¶ 19); (2) “[w]hether intra-symbol circular shifting, inter-symbol bit shifting, or both would have been necessary in a given situation, would have depended on the extent and pattern of the transmission errors induced by the channel,” (*see* Ex. 1040 ¶ 52); (3) a person of ordinary skill in the art would have known when to use intra-symbol circular bit shifts, inter-symbol bit shifts, or both, (*see* Ex. 1040 ¶ 19); and (4) a person of ordinary skill in the art would have been motivated to reprogram Yoon's bit arranger 250 and/or rearrangement controller 255 from performing intra-symbol shifting to perform inter-symbol shifting based upon the characteristics of the signal interference that the retransmission scheme was designed to overcome (*see* Ex. 1040 ¶¶ 19, 48). For example, Dr. Roy does not provide objective evidence to support his testimony that a person of ordinary skill in the art would have known when to use intra-symbol circular bit shifts, inter-symbol bit shifts, or both. Again, we give little weight to

Dr. Roy's aforementioned testimony because it is not supported by an underlying factual basis. *See* C.F.R. § 42.65(a).

Even assuming Petitioner provided a sufficient factual basis for showing that inter-symbol shifting was well-known at the time of the invention, Petitioner and Dr. Roy do not provide an apparent reason why one with ordinary skill in the art would have modified Yoon to include inter-symbol circular shifting. *See KSR*, 550 U.S. at 418. For example, Dr. Roy does not attempt to explain the types of transmission error conditions or signal interference characteristics that would warrant an inter-symbol circular bit shift, instead of, or in addition to, an intra-symbol bit shift. That it is may be possible for inter-symbol circular shifts to address transmission errors and signal interference similar to Yoon's disclosed intra-symbol circular shifts, and the proposed modification may have been "simple" or "trivial," does not provide a sufficient articulated reasoning with rational underpinning for modifying Yoon to include inter-symbol circular shifting.

Finally, Petitioner's complaint that Patent Owner did not cite evidence to refute Petitioner's contentions (*see* Pet. Sur-reply MTA 11) is misplaced. It is Petitioner who bears the burden of persuasion to show, by a preponderance of the evidence, that the proposed substitute claims are unpatentable. *See* 37 C.F.R. § 42.121(d)(2); *Lectrosonics*, Paper 15 at 4.

Petitioner also contends that proposed substitute claims 9 and 10 are unpatentable under 35 U.S.C. § 103 over Yoon and Wengerter. *See* Pet. Opp. MTA 22. Petitioner's application of the teachings of Wengerter (*see* Pet. 57–62) do not remedy the deficiencies identified above addressing the patentability of proposed substitute claims 6, 7, 9, and 10 over Yoon.

Petitioner also contends that proposed substitute claim 8 is unpatentable under 35 U.S.C. § 103 over Yoon and Naka. *See* Pet. Opp. MTA 23. We need not address Petitioner's contentions addressing the patentability of claim 8, because, as explained above, Patent Owner has not sufficiently shown support in the '004 Application for proposed substitute claim 8.

For all of the foregoing reasons, and after having analyzed the entire record and assigning appropriate weight to the arguments and cited supporting evidence, Petitioner has not established by a preponderance of the evidence that proposed substitute claims 6, 7, 9, and 10 are unpatentable under 35 U.S.C. § 103 over Yoon or that claims 9 and 10 are unpatentable under 35 U.S.C. § 103 over Yoon and Wengerter.

7. Conclusion

Patent Owner has shown: (1) the amendment proposes a reasonable number of substitute claims; (2) proposed substitute claims 6, 7, 9, and 10 are supported in the original disclosure; (3) the amendment responds to a ground of unpatentability involved in the trial; and (4) the amendment does not seek to enlarge the scope of the claims of the patent or introduce new subject matter. Patent Owner has not shown that proposed substitute claim 8 is supported in the original disclosure. Petitioner has not shown, by a preponderance of the evidence, that proposed substitute claims 6, 7, 9 and 10 are unpatentable. Accordingly, Patent Owner's Motion to Amend is *granted in part* as to claims 6, 7, 9, and 10 and *denied in part* as to claim 8.

IV. PATENT OWNER'S MOTION TO EXCLUDE

Patent Owner moves to exclude Dr. Roy's third Declaration (Ex. 1042) and Exhibits 1043–1045. *See* Mot. Excl. 1. Exhibits 1042–1045 were filed to support an opposition to an improper revised motion to amend. *See* Paper 58. Petitioner's opposition was expunged (*see* Paper 58), and Petitioner's subsequently filed Sur-reply does not cite to Exhibit 1042–1045 (*see generally* Pet. Sur-reply MTA). Because this evidence is not relied upon by Petitioner, Patent Owner's motion to exclude Exhibits 1042–1045 is *dismissed* as moot.

V. CONCLUSION¹⁰

For the foregoing reasons, and after having analyzed the entire record and assigning appropriate weight to the cited supporting evidence, Petitioner has established by a preponderance of the evidence that claims 1–5 of the '326 Patent are unpatentable. In addition, for the foregoing reasons, and after having analyzed the entire record and assigning appropriate weight to the cited supporting evidence, Patent Owner has met the statutory requirements for a motion to amend for proposed substitute claims 6, 7, 9, and 10, Petitioner, however, has not established by a preponderance of the

¹⁰ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

evidence that proposed substitute claims 6, 7, 9, and 10 are unpatentable. Accordingly, Patent Owner's Motion to Amend is *granted in part* as to proposed substitute claims 6, 7, 9, and 10 and *denied in part* as to proposed substitute claim 8.

VI. ORDER

Accordingly, it is

ORDERED that, Petitioner has shown by a preponderance of the evidence that claims 1–5 are unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Amend is *granted in part* as to proposed substitute claims 6, 7, 9, and 10;

FURTHER ORDERED that Patent Owner's Motion to Amend is *denied in part* as to proposed substitute claim 8;

FURTHER ORDERED that Patent Owner's Motion to Exclude is *dismissed*; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 2, 4, 5	102	Yoon	1, 2, 4, 5	
1, 2, 4, 5	103	Yoon ¹¹		
4, 5	103	Yoon, Wengerter ¹²		
3	103	Yoon, Naka	3	
Overall Outcome			1–5	

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	1–5
Substitute Claims Proposed in the Amendment	6–10
Substitute Claims: Motion to Amend Granted	6, 7, 9, 10
Substitute Claims: Motion to Amend Denied	8
Substitute Claims: Not Reached	

¹¹ As explained above in Section II.F., we do not reach this challenge.

¹² As explained above in Section II.F., we do not reach this challenge.

IPR2021-00582
Patent 8,565,326 B2

For PETITIONER:

Jonathan I. Detrixhe
Peter J. Chassman
Jonah D. Mitchell
Christine M. Morgan
REED SMITH LLP
jdetrixhe@reedsmith.com
pchassman@reedsmith.com
jmittchell@reedsmith.com
cmorgan@reedsmith.com

For PATENT OWNER:

Jay P. Kesan
DIMUROGINSBERG, PC
DGKEYIP GROUP
jay@jaykesan.com

Alfonso Chan
SHORE CHAN LLP
achan@shorechan.com