

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HUAWEI DEVICE CO., LTD.,
Petitioner,

v.

OPTIS WIRELESS TECHNOLOGY, LLC,
Patent Owner.

Case IPR2018-00585
Patent 7,940,851 B2

Before MIRIAM L. QUINN, PATRICK M. BOUCHER, and
JOHN P. PINKERTON, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
35 U.S.C. § 318(a)

In response to a Petition (Paper 2, “Pet.”) filed by Huawei Device Co., Ltd. (“Petitioner”), we instituted an *inter partes* review of claims 1–5 of U.S. Patent No. 7,940,851 B2 (“the ’851 patent”). Paper 6 (“Dec.”). During the trial, Optis Wireless Technology, LLC (“Patent Owner”) filed a Response (Paper 9, “PO Resp.”), to which Petitioner filed a Reply (Paper 10, “Reply”)

and Patent Owner filed a Surreply (Paper 11, “Surreply”). An oral hearing was held with the parties, and a copy of the transcript was entered into the record. Paper 19 (“Tr.”).

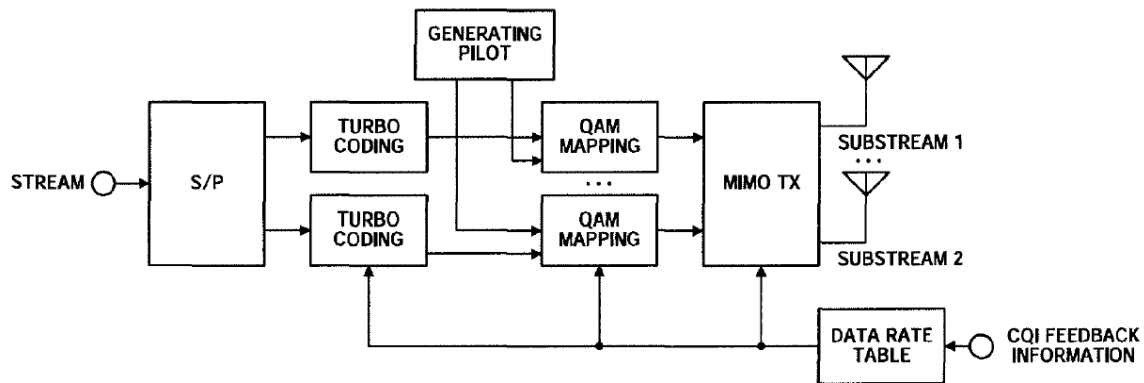
We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has shown, by a preponderance of the evidence, that claims 1–3 and 5 of the ’851 patent are unpatentable, but has not shown that claim 4 is unpatentable.

I. BACKGROUND

A. The ’851 Patent

1. Overview of Disclosure

The ’851 patent claims priority to PCT/JP2006/308461, which was filed on April 21, 2006. Ex. 1001, at codes (22), (86). The patent concerns determining and reporting the quality of a radio channel as measured by a wireless cellular device, such as a mobile telephone. In particular, the ’851 patent “relates to a MIMO [i.e., multi-input multi-output] receiving apparatus and MIMO transmitting apparatus in which the transmitting system performs transmission control on a per antenna basis by feedback information from the receiving system.” *Id.* at 1:6–11. The prior-art context addressed by the ’851 patent is illustrated by Figure 1 of the ’851 patent, which is reproduced below.



PRIOR ART
FIG.1

Figure 1 “shows a configuration of the MIMO transmitting apparatus in the MIMO communication system adopting the conventional MIMO PARC [i.e., Per Antenna Rate Control] scheme.” *Id.* at 1:22–24. The MIMO transmitting apparatus transmits pilot signals on a per-antenna basis by using several subcarriers. *Id.* at 1:24–26.

A receiving apparatus (not shown) measures the received intensity of each pilot signal, generates a channel quality indicator (“CQI”) for each antenna based on the respective channel quality condition, and feeds back the generated CQI values to the MIMO transmitting apparatus. *Id.* at 1:26–32. The MIMO transmitting apparatus uses such information to determine “the optimal modulation scheme . . . and coding rate” on a per-antenna basis, and transmits substreams from the antennas in accordance with that determination. *Id.* at 1:32–36. “In this way, by selecting optimal modulation and coding scheme based on the channel quality condition of each antenna, the maximum peak rate and communication capacity are achieved.” *Id.* at 1:36–40.

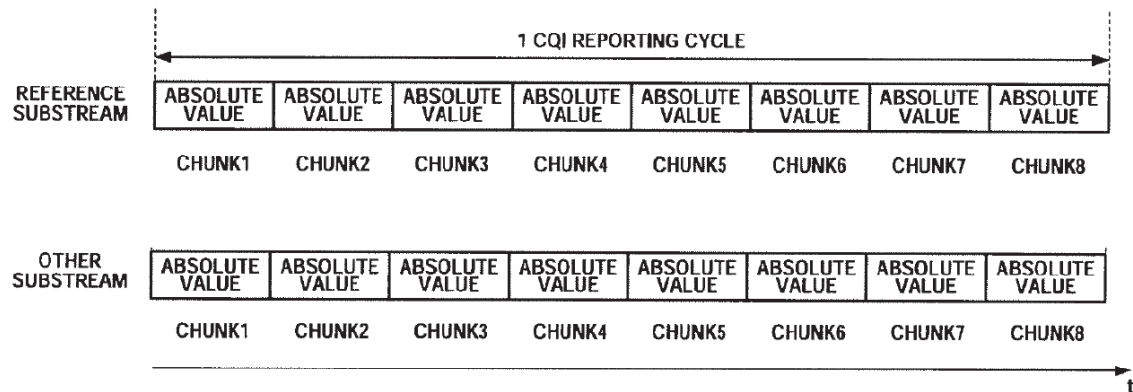
According to the '851 patent, a “conventional MIMO communication system has a problem of increasing the CQI feedback overhead in proportion to the number of antennas (i.e., streams).” *Id.* at 1:47–49. Accordingly, “[i]t is therefore an object of [the '851 patent] to provide a MIMO receiving apparatus and MIMO transmitting apparatus that can reduce the amount of feedback information and system traffic.” *Id.* at 1:53–56.

Petitioner’s expert, Jonathan Wells, Ph.D., testifies that “[t]he transmitting apparatus structure (Ex. 1001, Figs. 3, 7, 9, 13, 16, 19) is generally the same between embodiments” and similarly that “[t]he receiving apparatus structure (*Id.* at Figs. 2, 5, 8, 11, 14, 17) is generally the same between embodiments, but the functionality differs between embodiments.” Ex. 1008 ¶¶ 58, 59. Based on our independent review of the '851 patent, we agree with these assertions. Because the particulars of the structure of the transmitting apparatus and receiving apparatus are not the principal focus of our analysis of the challenged claims, we do not summarize the details of those structures herein.

Rather, what is most relevant to the challenged claims is the calculation of CQI values. Based on our independent review of the '851 patent, we also agree with Dr. Wells’s assertion that “[a]ll of the '851 Patent’s embodiments begin their respective CQI calculations in the same way.” *Id.* ¶ 60. That is, the CQI calculation techniques for each embodiment are based on “blocks,” which the '851 patent alternatively refers to as “chunks” or “subcarrier blocks.” Ex. 1001, 1:51, 5:50–52; *see* Ex. 1008 ¶ 60; Tr. 7:6–8 (Petitioner stating “I think blocks and chunks are generally synonymous. I don’t think there’s a distinction that matters for the purposes of the arguments that have been raised.”). For each of at least two

data substreams, an initial absolute CQI value is calculated for each block or chunk of subcarriers within the frequency domain. Ex. 1001, 3:62–4:4, 5:41–47, 7:58–8:4, 8:10–17, 9:45–47, 16:8–11, 16:44–47; see Ex. 1008 ¶ 60.

Dr. Wells illustrates this initial calculation of an initial absolute CQI value with a modified version of Figure 6 of the '851 patent, which is reproduced below. Ex. 1008 ¶ 60.



Dr. Wells’s modified version of Figure 6 illustrates the result of the initial absolute CQI value determination on two substreams, identified as a “REFERENCE SUBSTREAM” and an “OTHER SUBSTREAM.” *Id.* In a particular embodiment of the '851 patent, “relative chunk CQI values” are calculated for all subcarrier blocks in the “OTHER SUBSTREAM,” as illustrated in unmodified Figure 6, reproduced below.

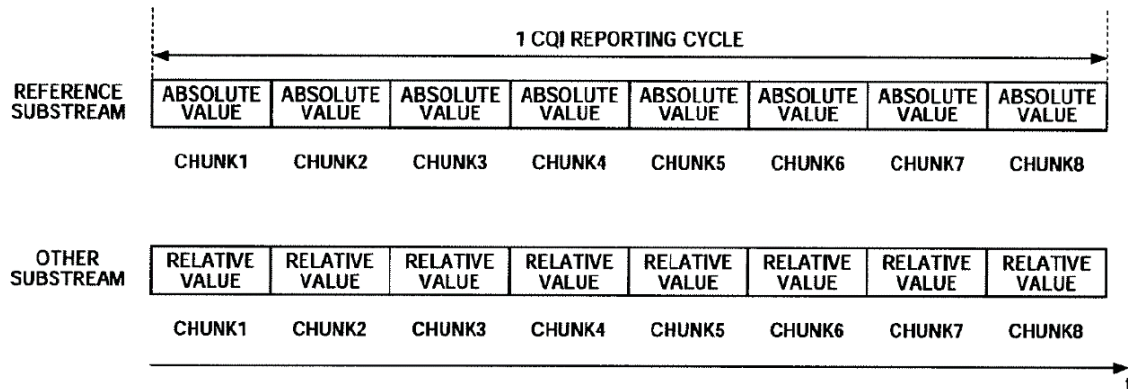


FIG.6

Unmodified Figure 6 of the '851 patent illustrates calculated “relative chunk CQI values found for the streams other than the reference substream.”

Ex. 1001, 8:28–29.

2. Illustrative Claim

Challenged independent claim 1 is illustrative of the claims at issue:

1. A radio communication apparatus comprising:

a receiving unit configured to receive first data and second data, which are transmitted from a plurality of antennas for spatial-multiplexing using a plurality of blocks, into which a plurality of consecutive subcarriers in a frequency domain are divided;

a calculating unit configured to calculate a first absolute channel quality indicator (CQI) value per each of the blocks for the first data and a second absolute CQI value per each of the blocks for the second data, and calculate a relative CQI value of the second absolute CQI value with respect to the first absolute CQI value, per each of the blocks, from the first absolute CQI value and the second absolute CQI value in the same block; and

a transmitting unit configured to transmit the first absolute CQI value and the relative CQI value of the second absolute CQI value in the same block,

wherein the relative CQI value of the second absolute CQI value in the first block of the plurality of blocks for the second data is calculated with respect to the first absolute CQI value in the first block of the plurality of blocks for the first data, and the relative CQI value of the second absolute CQI value in the second block of the plurality of blocks for the second data is calculated with respect to the first absolute CQI value in the second block of the plurality of blocks for the first data.

Ex. 1001, 16:2–27.

We also reproduce claim 4 because it was the subject of particular focus by the parties during the trial.

4. The radio communication apparatus according to claim 1, wherein the absolute CQI value indicates a code rate and a modulation scheme.

Id. at 16:35–37.

3. *Prosecution History*

During prosecution, the application that matured into the '851 patent received one substantive Office Action that rejected all claims as obvious over U.S. Patent Pub. No. 2006/0023745 (“Koo”) (Ex. 1016) and 3 GPP TSG RAN WG1 Ad Hoc on LTE, R1-050590, *Physical Channels and Multiplexing in Evolved UTRA Downlink* (“R1-050590”) (Ex. 1017). Ex. 1002, 213–221. The Examiner found that Koo disclosed all limitations “except for specifically teaching into which a plurality of consecutive subcarriers in a frequency domain are divided and calculate a relative value of the second CQI value relative to the first CQI value, per each of the blocks, from the first CQI value and the second CQI value in the same block.” *Id.* at 217. For this feature, the Examiner relied on R1-050590. *Id.* at 217–218.

In a responsive Amendment, the applicant acknowledged that “Koo describes calculating a CQI value for ‘groups of sub-carriers per transmit antenna, or groups of sub-carriers across all transmit antennas.’” *Id.* at 235. The applicant further acknowledged that R1-050590 discloses providing “chunks” grouped along a frequency axis such that the chunks correspond to “a plurality of blocks, into which a plurality of consecutive subcarriers in a frequency domain are divided,” as recited in the “receiving unit” limitation of issued independent claim 1 and in the “receiving” limitation of issued independent claim 5. *Id.* at 236.

To secure allowance of the application, the applicant amended the claims, particularly by adding the “wherein” clause that appears in both issued claims 1 and 5, “to further clarify that the relative value of the second absolute CQI value is calculated with respect to the first absolute CQI value *in the same block* (i.e., both in the ‘first block’).” *Id.* at 231–233, 238. Additional amendments were made by the Examiner with the Notice of Allowability to clarify which recited CQI values were “absolute” CQI values, and which were “relative” CQI values. *Id.* at 244–245.

B. Evidence Relied Upon

Petitioner relies on the following references. Pet. 5.

Kim	US 8,014,455 B2	Sept. 6, 2011	Ex. 1003
Yoon	US 2005/0068884	Mar. 31, 2005	Ex. 1005

3GPP TSG RAN WG1 #42, R1-050942, *AMC and HARQ Using Frequency Domain Channel-dependent Scheduling in MIMO Channel Transmission* (Ex. 1006) (“R1-050942”)

3GPP TSG-RAN WG1 #42, R1-050903, *Description and link simulations of MIMO schemes for OFDMA based E-UTRA downlink evaluation* (Ex. 1007) (“R1-050903”)

In addition, Petitioner relies on the Declaration by Jonathan Wells, Ph.D. (Ex. 1008). Dr. Wells was not cross-examined by Patent Owner. *See* Tr. 6:5–7. Patent Owner did not file any expert testimony of its own. *See id.*

C. Grounds of Unpatentability

We instituted review of claims 1–5 on the following grounds. Dec. 7, 25.

Claims Challenged	Statutory Basis	References
1–5	§ 103(a)	Kim and Yoon
1–5	§ 103(a)	R1-050942 and R1-050903

D. Real Parties in Interest

Petitioner identifies Huawei Device Co., Ltd., Huawei Technologies Co., Ltd., Huawei Device USA Inc., Huawei Investment & Holding Co., Ltd., Huawei Device (Dongguan) Co., Ltd., Huawei Tech. Investment Co., Ltd., and Huawei Device (Hong Kong) Co., Ltd., as real parties in interest. Pet. 3. Patent Owner identifies Optis Wireless Technology, LLC, and PanOptis Patent Management, LLC, as real parties in interest. Paper 4, 2.

F. Related Matters

Both parties identify *Optis Wireless Technology, LLC v. Huawei Technologies Co. Ltd.*, No. 2:17-cv-00123-JRG-RSP (E.D. Tex.) (“the related litigation”) as a related matter. Pet. 3; Paper 4, 2.

II. ANALYSIS

A. Legal Principles

Petitioner advances only obviousness challenges. A claim is unpatentable for obviousness under 35 U.S.C. § 103(a)¹ 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 said 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) when in evidence, objective indicia of non-obviousness, i.e., secondary considerations.² *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

¹ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. §§ 102 and 103 that became effective on March 16, 2013. Because the ’399 patent issued from an application filed before March 16, 2013, we apply the pre-AIA versions of the statutory bases for unpatentability.

² The parties do not address objective indicia of non-obviousness, which accordingly do not form part of our analysis.

(Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

To prevail on its challenges, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). “In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden never shifts to Patent Owner. See *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review). Furthermore, Petitioner does not satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

B. Level of Skill in the Art

Supported by the testimony of Dr. Wells, Petitioner contends that a person of ordinary skill in the art “would have had at least a bachelor’s degree in computer science or engineering, or a related field, and at least two years of education or training in developing wireless communication applications.” Pet. 6 (citing Ex. 1008 ¶ 34). Relying on a Declaration of Alexander M. Haimovich, Ph.D., filed by Patent Owner in the related litigation, Petitioner asserts that “Patent Owner concurs.” *Id.* (citing

Ex. 1010 ¶ 19). Patent Owner neither disputes the assertion nor advances its own proposal for the level of skill in the art.

We find Petitioner's articulation of the level of skill in the art reasonable as it is consistent with the '851 patent and the asserted prior art. Accordingly, on the record before us, we adopt Petitioner's statement.

C. Claim Construction

In an *inter partes* review proceeding based on a petition filed prior to November 13, 2018, the Board interprets claims of an unexpired patent using the broadest reasonable construction in light of the specification of the patent in which they appear. *See* 37 C.F.R. § 42.100(b)(2017); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Under the broadest reasonable interpretation standard, claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

In the Institution Decision, we addressed three claim-construction issues in light of arguments advanced by Petitioner and in light of a Claim Construction Memorandum issued by the district court in the related litigation.³ Dec. 8–11. Neither party disputes our preliminary claim-construction conclusions, which we adopt for this Decision. PO Resp. 2

³ Although the district court applied a different claim-construction standard, we discerned no compelling reason to reach different claim-construction positions under the standard applicable here, and neither party has argued otherwise. *See* Dec. 8–9.

(“Patent Owner takes no position on Petitioner’s proposed construction of certain terms No particular constructions are relied upon by Patent Owner in overcoming the prior art at issue”); *see* Reply 1 (Petitioner noting that Patent Owner does not dispute Petitioner’s proposed claim constructions). For completeness, we briefly summarize those issues here.

First, independent claims 1 and 5 recite “transmit/transmitting the first absolute CQI value and the relative CQI value of the second absolute CQI value in the same block.” Ex. 1001, 16:16–18, 16:52–54. Consistent with the construction in the related litigation, we construe these limitations as “transmit/transmitting the absolute CQI value calculated for each block of the first data plurality of blocks and the relative CQI value calculated for each block of the second data plurality of blocks.” Dec. 9.

Second, independent claims 1 and 5 include a “wherein” clause that recites “wherein the relative CQI value of the second absolute CQI value in the first block of the plurality of blocks for the second data is calculated with respect to the first absolute CQI value in the first block of the plurality of blocks for the first data, and the relative CQI value of the second absolute CQI value in the second block of the plurality of blocks for the second data is calculated with respect to the first absolute CQI value in the second block of the plurality of blocks for the first data.” Ex. 1001, 16:19–27, 16:55–63. Consistent with the construction in the related litigation and Petitioner’s proposed construction, we accord this “wherein” clause its plain and ordinary meaning. *See* Dec. 10; Pet. 16–17; Ex. 1018, 53. We agree with the district court that this clause requires only that the recited “first block” and “second block” be the first and second of the recited “plurality of blocks,” without any temporal limitation. Dec. 10 (citing Ex. 1018, 53). In

addition, we note our agreement with the district court that the claim language, read in light of the Specification and prosecution history, provides no limitation on the particular method of calculating the relative value between the reference substream and the other stream. *Id.* (citing Ex. 1018, 52).

Third, we do not construe “calculating unit,” recited in independent claim 1, as invoking the provisions of 35 U.S.C. § 112, ¶ 6. *Id.* at 10–11. Not only do the parties appear to be in agreement, but our analysis of the issues before us is unaffected by whether the term is construed as a means-plus-function limitation. *See, e.g., Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Ltd.*, 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))).

D. Kim and Yoon

1. Scope and Content of the Prior Art

a. Kim

i. Disclosure

Kim “relates generally to communication, and more specifically to techniques for sending channel state information.” Ex. 1003, 1:16–18. Kim generally describes a structure for a wireless communication system that includes a base station and a terminal, which respectively include components that operate as a MIMO transmitting unit and a MIMO receiving unit. *See id.* at 3:6–4:56. In doing so, Kim teaches that “channel state information” may comprise “[s]patial state information used for MIMO

transmission” and “CQI information used for subband scheduling, rate selection, etc.” *Id.* at 5:4–6.

Figure 1 of Kim is reproduced below.

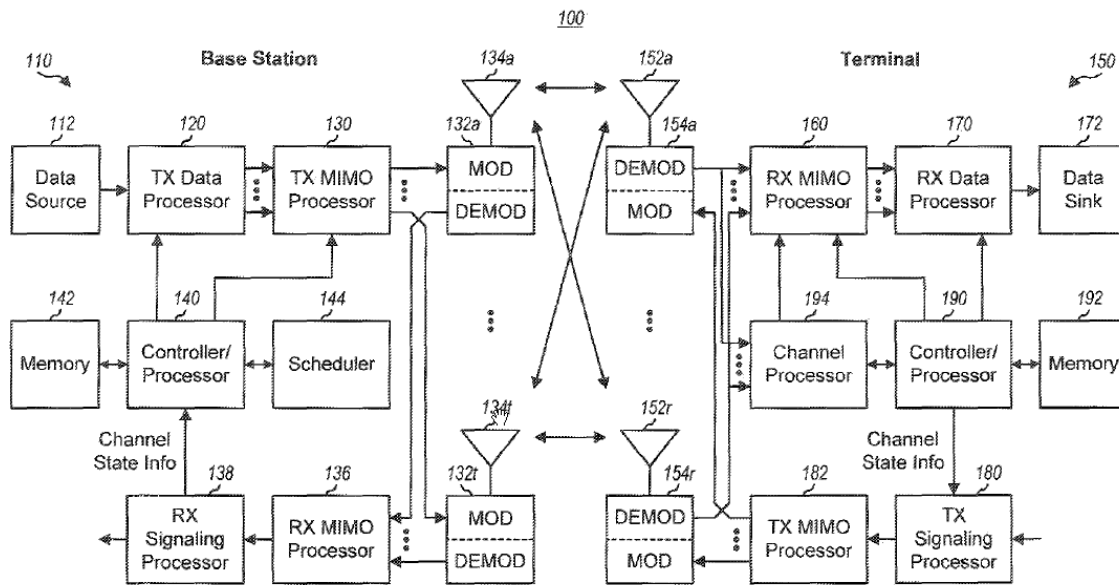


FIG. 1

Figure 1 is a block diagram of base station 110 and terminal 150 in wireless communication system 100. *Id.* at 3:6–8. Certain aspects of this structure are relevant to our analysis. First, within terminal 150, antennas 152 receive downlink signals and provide the received signals to respective demodulators 154. *Id.* at 3:50–52. Among other functions, demodulators 154 provide received pilot symbols to channel processor 194, which “may estimate the response of the MIMO channel from base station 110 to terminal 150 based on the received pilot symbols and provide channel estimates to [receive] MIMO processor 160.” *Id.* at 3:59–63.

Controller/processor 190 controls operation of terminal 150, which “may evaluate the channel conditions and send channel state information to base station 110.” *Id.* at 4:1–2, 4:18–19. “The channel state information may be processed (e.g., encoded, interleaved, and symbol mapped) by

[transmit] signaling processor 180, spatially processed by [transmit] MIMO processor 182, and further processed by modulators 154a through 154r to generate R uplink signals, which are transmitted via antennas 152a through 152r.” *Id.* at 4:2–8.

Second, within base station 110, transmit processor 130 “may perform transmitter spatial processing on the data and pilot symbols based on direct MIMO mapping, precoding, etc.” *Id.* at 3:37–39. Modulators 132 may perform modulation on the output symbols to obtain output chips, and may further process such output chips to generate downlink signals that are transmitted from modulators 132 via antennas 134. *Id.* at 3:41–49.

Figure 2 of Kim is reproduced below.

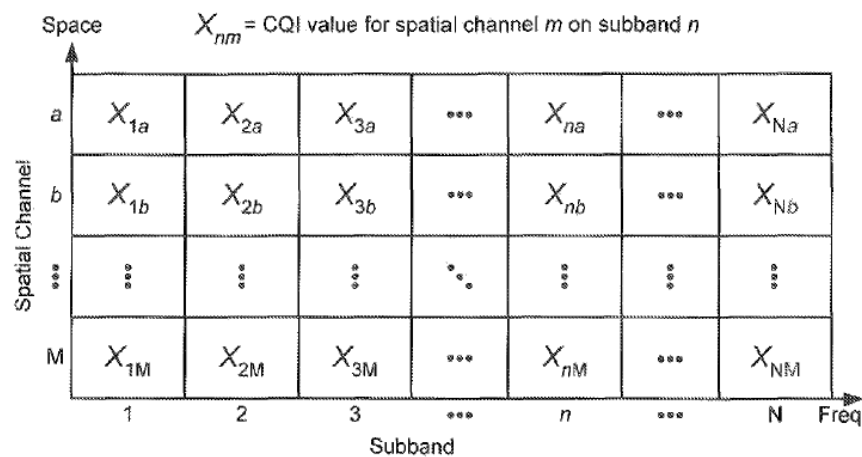


FIG. 2

Figure 2 “shows CQI values for M spatial channels on N subbands.” *Id.* at 5:49–50. As illustrated in the figure, a CQI value X_{nm} may be obtained for each spatial channel m on each subband n , with Kim observing that the number of CQI values is therefore “proportional to the product of the number of spatial channels and the number of subbands.” *Id.* at 5:50–53.

Because transmission of all such values “may consume a significant amount of uplink resources,” Kim teaches that “differential encoding may be

used to reduce the amount of channel state information to send.” *Id.* at 5:57–61. In Kim, “[d]ifferential encoding refers to conveying differences between values instead of actual values,” which allows fewer bits to be conveyed, thereby “provid[ing] good performance while reducing signaling overhead.” *Id.* at 5:61–67.

Table 1 of Kim is reproduced below.

TABLE 1	
Symbol	Description
X	Full CQI value (e.g., an SNR value) for a spatial channel on a subband.
Y	Difference in CQI values for two spatial channels on the same subband.
ΔX	Difference in CQI values for a given spatial channel on two subbands.
ΔY	Difference in Y values for two subbands.
$\Delta\Delta X$	Difference in ΔX values for two time intervals.
$\Delta\Delta Y$	Difference in ΔY values for two time intervals.

Table 1 “lists different information that may be sent for CQI information.” *Id.* at 6:4–5. The various pieces of information that may be sent are self-explanatory from the table, with Kim noting that “[a] differential CQI value may convey the difference between two full CQI values (e.g., Y or ΔX) or the difference between two differential CQI values (e.g., ΔY , $\Delta\Delta X$, or $\Delta\Delta Y$).” *Id.* at 6:6–9. “In general, differential CQI information may comprise any information indicative of differences in full and/or differential CQI values, e.g., Y, ΔX , ΔY , $\Delta\Delta X$, and/or $\Delta\Delta Y$ in Table 1.” *Id.* at 6:9–12.

ii. Availability as Prior Art

Kim was filed later than the April 21, 2006, priority date claimed by the ’851 patent, but claims the benefit of the March 27, 2006, filing date of U.S. Provisional Patent Appl. No. 60/786,445 (“Kim provisional

application”). *Id.* at code (60). “A reference patent is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for the claims in the reference patent in compliance with [35 U.S.C.] § 112, ¶ 1.” *Dynamic Drinkware*, 800 F.3d at 1381 (Fed. Cir. 2015) (citing *In re Wertheim*, 646 F.2d 527, 537 (CCPA 1981)). In its Petition, Petitioner includes charts that identify written-description support for claims 1 and 4 of Kim in the Kim provisional application. Pet. 24–27. We have reviewed those charts, and find that they satisfy Petitioner’s burden on this issue. Patent Owner does not challenge the sufficiency of Petitioner’s showing. See Reply 1 (Petitioner noting that Patent Owner does not dispute “Petitioner’s showing that *Kim* is prior art as of the filing date of its provisional application”); Tr. 16:16–17 (Patent Owner stating “[w]e’ve not disputed that Kim is prior art”).

For example, in addressing apparatus claim 1 of Kim, Petitioner observes that Figure 2 of the Kim provisional application (not reproduced here) includes coupled processor 270 and memory 272, corresponding to the recited “processor” and “memory.” Pet. 25–26 (citing Ex. 1004, Fig. 2). Processor 270 assembles feedback that includes CQI values “for all spatial streams for a given sub-band” across *N* subbands, meeting the limitation of “obtain[ing] channel quality indicator (CQI) values for multiple spatial channels on multiple subbands.” Ex. 1004 ¶¶ 29, 30; Ex. 1003, 17:42–44. Such feedback includes “pivot CQI” and “differential CQI” covering “all spatial streams,” with the pivot feedback being “spatially-differential channel state information” for a “pivot sub-band” and with “the CQI values for all the other sub-bands [] differentially encoded relative to the pivot sub-band.” Ex. 1004 ¶¶ 24, 29. This meets the limitation of claim 1 of Kim that

recites “differentially encod[ing] the CQI values across the multiple spatial channels with respect to a reference CQI value to obtain differential CQI information.” Ex. 1003, 17:44–46. And the Kim provisional application discloses receiving traffic for “a number of data streams” that is modulated, conditioned, and transmitted back to transmitter system 210. Ex. 1004 ¶ 20. This meets the limitation of Kim’s claim 1 that recites “send[ing] the differential CQI information as feedback, wherein the reference CQI value comprises a CQI value for a designated spatial channel.” Ex. 1003, 17:46–49. Petitioner makes a similar showing for corresponding method claim 4 of Kim. Pet. 26–27.

Accordingly, we conclude that at least claims 1 and 4 of Kim are supported by the Kim provisional application, and that Kim is thus available as prior art to the ’851 patent under 35 U.S.C. § 102(e). *See* Pet. 23.

b. Yoon

Yoon “relates generally to a communication system utilizing an Orthogonal Frequency Division Multiplexing (‘OFDM’) scheme, and in particular, to an apparatus and method for dynamically assigning resources using channel quality information that is separately fed back on subbands.” Ex. 1005 ¶ 3. Figure 3 of Yoon is reproduced below.

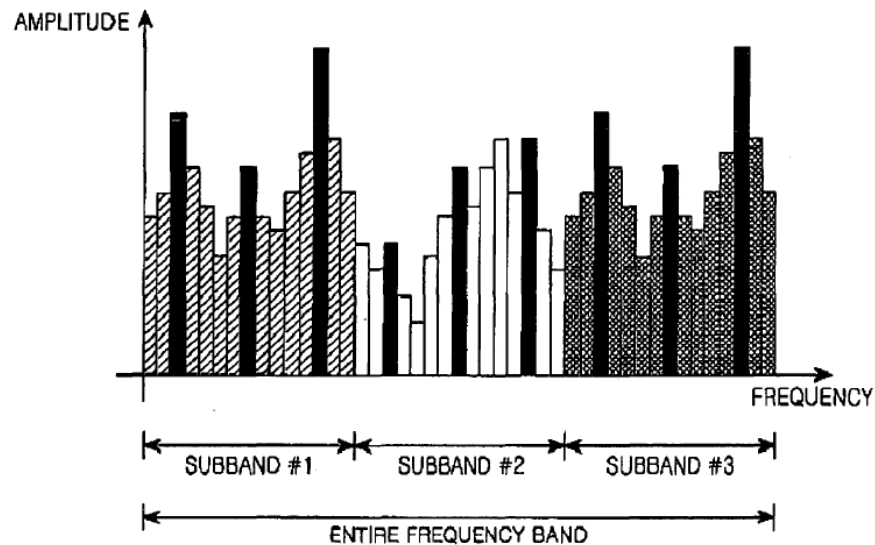


FIG.3

Figure 3 is a diagram that schematically illustrates the division of a frequency band of an OFDM system into a plurality of subbands, each including a plurality of subcarriers that transmit a data signal or a pilot signal (with pilot signals indicated by solid black bars). *Id.* ¶ 62, 63.

According to Petitioner, Yoon teaches that it is conventional to use signal-to-noise ratios as CQI values, performed on a subband basis, with subsequent processing outputting a CQI value for each subband. *See* Pet. 28 (citing Ex. 1005 ¶¶ 63–65). Dr. Wells supports this characterization of Yoon’s teaching. Ex. 1008 ¶ 80.

*2. Differences Between the Claimed Subject Matter and
the Prior Art*

a. Claim 1

Petitioner provides a detailed analysis setting forth its position that independent claim 1 is unpatentable under 35 U.S.C. § 103(a) over the combination of Kim and Yoon. Pet. 35–46. That analysis relies on Kim’s disclosure of a radio communication apparatus with a receiving unit and a transmitting unit, contending that the combination of references meets the various limitations related to calculation of absolute and relative CQI values. *Id.*

Petitioner provides multiple explanations why a person of ordinary skill in the art would have combined Kim and Yoon to calculate absolute and relative CQI values for subcarrier blocks in multiple data streams of a frequency domain, and to transmit those CQI values back to a transmitting apparatus. *Id.* at 45–46. First, Petitioner observes that the references relate to the same field of art, namely OFDM wireless communication systems using CQI feedback, and that both teach improvement of data throughput by division of the full system bandwidth into subbands. *Id.* at 45 (citing Ex. 1008 ¶ 137). Second, Petitioner identifies the explicit teaching in Kim of the desirability of reducing CQI feedback on a per subband basis in the spatial domain, as well as Yoon’s teaching of the desirability of dividing subcarriers into subbands. *Id.* at 45–46. Petitioner reasons that the mutual advantages of such teachings would have been apparent to one of skill in the art, which is supported by uncontroverted testimony of Dr. Wells. *Id.* at 46 (citing Ex. 1008 ¶ 138). Third, also supported by testimony of Dr. Wells, Petitioner contends that the combination would have been “simple and

straightforward,” and that a person of skill in the art would have had a reasonable expectation of success. *Id.* (citing Ex. 1008 ¶ 139).

We find that these explanations articulate a sufficient basis, with rational underpinning, to effect the combination Petitioner proposes. We also find Petitioner’s analysis with respect to each of the limitations of independent claim 1 sufficient. Patent Owner does not dispute Petitioner’s showing with respect to claim 1. Nevertheless, we highlight specific aspects of Petitioner’s analysis below for emphasis.

In addressing the requirement that the receiving unit be “configured to receive first data and second data, which are transmitted from a plurality of antennas for spatial-multiplexing using a plurality of blocks, into which a plurality of consecutive subcarriers in a frequency domain are divided,” Petitioner refers to Kim’s Figure 2, reproduced above. *Id.* at 35–37. As Petitioner observes, that figure shows multiple spatial channels (a through M), each of which occupies a frequency domain partitioned into N subbands. *Id.* at 36 (citing Ex. 1003, 5:49–51; Ex. 1004 ¶¶ 22, 29). For each spatial channel M , having N subbands, there is a CQI value for each subband X_{nm} . *Id.* (citing Ex. 1003, 5:49–51; Ex. 1004 ¶ 29). Petitioner acknowledges that Kim does not explicitly teach dividing consecutive subcarriers in a frequency domain into a plurality of blocks, and relies on Yoon for such disclosure. *Id.* (citing Ex. 1005 ¶ 61). We find this reasoning sufficient to support Petitioner’s contention with respect to this limitation.

For the requirement that the calculating unit be “configured to calculate a first absolute channel quality indicator (CQI) value per each of the blocks for the first data and a second absolute CQI value per each of the blocks for the second data, and calculate a relative CQI value of the second

absolute CQI value with respect to the first absolute CQI value, per each of the blocks, from the absolute CQI value and the second absolute CQI value in the same block,” Petitioner relies on Kim. *Id.* at 38–41. In particular, Petitioner points to Kim’s Table 1 and its disclosure of full and differential CQI values as corresponding to the recited “absolute” and “relative” CQI values. *Id.* at 38–39. As part of its argument, Petitioner contends that “the term ‘relative CQI’ of the ’851 Patent claims and the term ‘differential CQI’ as used in *Kim* and the *Kim Provisional* are not substantively different.” *Id.* at 40. On the record before us, we are persuaded by this contention because we agree with Petitioner that “the ’851 Patent is silent as to any special meaning or interpretation for the ‘relative CQI’ term.” *See id.*

In addressing the limitation that a “transmitting unit” be “configured to transmit the first absolute CQI value and the relative CQI value of the second absolute CQI value in the same block,” Petitioner observes that, as illustrated in Figure 4A of Kim (not reproduced herein), a full CQI value and a corresponding differential CQI value “may be sent for each of the N subbands.” *Id.* at 42 (quoting Ex. 1003, 9:35–37, Fig. 4A; Ex. 1004 ¶¶ 29–32). Referring to the structure of terminal 150 in Figure 1 of Kim, reproduced above, Petitioner further observes that Kim discloses that a processor evaluates the channel conditions and sends channel state information, which includes the calculated absolute and relative CQI values, to the base station. Pet. 43 (citing Ex. 1003, 4:1–17; Ex. 1004 ¶¶ 19–20, Fig. 2). Petitioner identifies the recited “transmitting unit” as encompassed by antennas 152, modulators 154, transmit MIMO processor 182, and transmit signaling processor 180. *Id.* at 43–44 (citing Ex. 1008 ¶ 132). We agree with this identification, which is not disputed by Patent Owner.

With respect to the requirements set forth in the “wherein” clause of claim 1, Petitioner contends that Kim “describes calculating absolute/relative CQI pairs for all subbands in a spatially multiplexed system,” and that Kim “shows a full or absolute CQI value for each subband X_n in spatial channel a (the claimed ‘first data’), and a differential or relative CQI value for each subband Y_n in spatial channel b (the claimed ‘second data’).” *Id.* at 44. On the record before us, we agree with this assertion.

We conclude that Petitioner shows, by a preponderance of the evidence, that independent claim 1 is unpatentable under 35 U.S.C. § 103(a) over Kim and Yoon.

b. Claims 2 and 3

Claim 2 depends from claim 1 and recites that “said transmitting unit transmits feedback information comprising the first absolute CQI value and the relative CQI value of the second absolute CQI value.” Ex. 1001, 16:28–31. By reciting “feedback information” that comprises “the first absolute CQI value and the relative CQI value of the second absolute CQI value,” this limitation is a generalization of independent claim 1’s “transmitting unit” limitation. The specification of the ’851 patent uses “feedback information” broadly. *See, e.g., id.* at 6:1–9 (“feedback information” includes a CQI value determined based on an average received level and relative CQI values). In light of that breadth, the transmission of the first absolute CQI value and the relative CQI value of the second absolute CQI value is also encompassed by “feedback information” that comprises those values. We thus agree with Petitioner that “*Kim* transmits feedback

information comprising absolute and relative CQI values.” Pet. 46. Patent Owner does not dispute this aspect of Petitioner’s analysis.

Claim 3 depends from claim 1 and recites that “said receiving unit receives the first data and the second data, which are modulated per each one of the data.” Ex. 1001, 16:32–34. In addressing this limitation, Petitioner refers to the operation of Kim’s base station 110 (shown in Figure 2, reproduced above), in which modulation is performed by “[e]ach modulator” to create a downlink signal transmitted from its respective antenna. Pet. 47 (citing Ex. 1003, 3:37–49; Ex. 1004 ¶¶ 14–16, Fig. 2). Petitioner supports its reasoning with testimony by Dr. Wells. Ex. 1008 ¶ 142. That reasoning is not disputed by Patent Owner, and we find that reasoning sufficient.

We conclude that Petitioner shows, by a preponderance of the evidence, that claims 2 and 3 are unpatentable under 35 U.S.C. § 103(a) over Kim and Yoon.

c. Claim 4

Claim 4 depends from claim 1 and recites that “the absolute CQI value indicates a code rate and a modulation scheme.” Ex. 1001, 16:35–37. The Petition presents only brief statements that this limitation is disclosed by Kim or Yoon. In addressing Kim, the Petition asserts that “*Kim* discloses that a CQI value for a given subband (or block) for a given spatial channel is used to select an appropriate packet format, which may indicate a code rate, a modulation scheme, a data rate, and other transmission parameters.” Pet. 47 (citing Ex. 1003, 6:57–63, Fig. 3B; Ex. 1004 ¶¶ 20–21, 29–32). Patent Owner makes a number of arguments addressing the sufficiency of this showing, including: (1) the cited portions of Kim, i.e., Exhibit 1003,

“are wholly unrelated to using CQI values to determine the coding rate and modulation scheme,” PO Resp. 8; (2) the cited portions of the Kim provisional application, i.e., Exhibit 1004, incorporated by reference into Kim, at best require that *both* the absolute CQI value and differential CQI value are needed to indicate a packet format, rather than “only the absolute CQI value,” *id.* at 10–11; and (3) Petitioner does not sufficiently explain “[h]ow Kim’s ‘packet format’ corresponds to a coding rate and modulation scheme,” *id.* at 11–12.

With respect to the first of Patent Owner’s arguments, Petitioner conceded at the oral hearing that “the portions of the Kim patent that [Petitioner] cited do not actually disclose the limitation of Claim 4.” Tr. 14:7–10. The second argument implicates whether the claim language that “the absolute CQI value indicates . . .” requires that *only* the absolute CQI value indicate a code rate and a modulation scheme, a point on which the parties disagree. See PO Resp. 11; Reply 2. We need not resolve this dispute because Patent Owner’s third argument is persuasive.

That is, we agree with Patent Owner that “[h]ow Kim’s ‘packet format’ corresponds to a coding rate and modulation scheme is not explained by Petitioner.” PO Resp. 11. Although Patent Owner made this argument in its Response, Petitioner did not address it in its Reply. See Surreply 1 (Patent Owner observing that the question of whether “there is information in Kim’s ‘packet format’ that is relevant to and/or indicates modulation schemes or data rates . . . is not addressed in the Petition, nor is it in Petitioner’s Reply.”). Although Dr. Wells’s Declaration makes the same statement as the Petition, Dr. Wells provides no explanation beyond a bare assertion. Ex. 1008 ¶ 143. We give no weight to that assertion because Dr.

Wells’s testimony “does not disclose the underlying facts or data on which the opinion is based.” 37 C.F.R. § 42.65(a).

In addressing Yoon, Petitioner and Dr. Wells merely assert that “Yoon also discloses the selection of a code rate and modulation scheme based on the CQI value.” Pet. 47 (citing Ex. 1005 ¶¶ 43, 96); Ex. 1008 ¶ 143. But as Patent Owner observes, the cited portions of Yoon do not discuss *absolute* or *relative* CQI values. PO Resp. 12. “Instead, Yoon simply discusses CQI values, generally.” *Id.* Because of this deficiency, we agree with Patent Owner that Petitioner makes an insufficient showing, an argument that is also not addressed by Petitioner in its Reply.

Accordingly, we conclude that Petitioner does not show, by a preponderance of the evidence, that claim 4 is unpatentable under 35 U.S.C. § 103(a) over Kim and Yoon.

d. Claim 5

Independent claim 5 is a method claim that generally corresponds to the independent apparatus claim 1. See Ex. 1001, 16:38–63. For the preamble and each limitation of the claim, Petitioner relies on its analysis for claim 1. Pet. 48–49 (identifying the preamble and each limitation of claim 5 as “substantively identical” to a corresponding limitation in claim 1). Patent Owner does not dispute Petitioner’s showing with respect to claim 5. For the reasons explained in addressing claim 1, we find Petitioner’s analysis sufficient.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 5 is unpatentable under 35 U.S.C. § 103(a) over Kim and Yoon.

E. R1-050942 and R1-050903

1. Scope and Content of the Prior Art

a. R1-050942

R1-050942 describes ways of optimizing adaptive modulation and coding (“AMC”) and hybrid automatic repeat request (“HARQ”) schemes, and their control signaling bits using frequency and time-domain channel-dependent scheduling in MIMO channel transmissions. Ex. 1006, 1.

Figure 3 of R1-050942 is reproduced below.

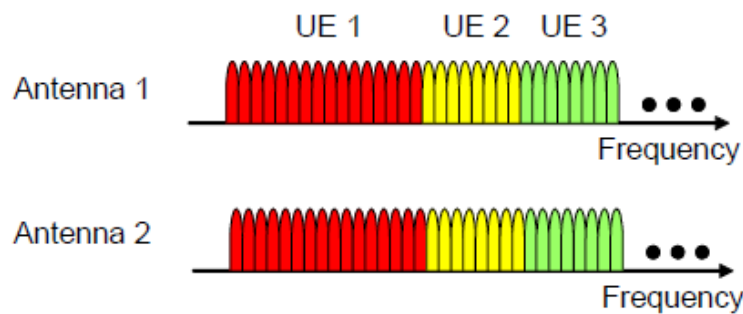


Figure 3 – Proposed chunk assignment in MIMO multiplexing

Figure 3 illustrates a transmission scheme in which the same chunks for all antennas are assigned to the same user. *Id.* at 5–6. As evident from the illustration, two separate data streams, corresponding to “Antenna 1” and “Antenna 2,” and the subcarrier chunks along the frequency domain, are assigned to different user equipment, “UE 1,” “UE 2,” and “UE 3.” *Id.*; see Ex. 1008 ¶ 154. In describing certain base-station architectures, R1-050942 makes reference to “the CQI of each chunk” for adjusting the coding rate or adaptively changing the data modulation. Ex. 1006, 3–4.

b. R1-050903

R1-050903 describes MIMO multiplexing schemes that use signal and multiple codewords for data transmission. Ex. 1007, 1. As part of that description, R1-050903 describes an incremental CQI calculation and reporting technique in which “the number of CQI values, full CQI value for layer one, and the incremental CQI values for the remaining layers” are reported: $(\log_2(M), CQI_1, \Delta_1 = CQI_2 - CQI_1, \Delta_2 = CQI_3 - CQI_2, L, \Delta_{M-1} = CQI_M - CQI_{M-1})$, where M is the number of layers. *Id.* at 8. “The idea is that incremental CQIs will probably require less bits to convey as oppose[d] to the absolute values.” *Id.* As an alternative that may be “more efficient, but may degrade performance on highly correlated channels,” the reference describes reporting the number of CQI values, full CQI value for layer one, and a function of the incremental CQI values for other layers: $(\log_2(M), CQI_1, f(\Delta_1, \Delta_2, L, \Delta_{M-1}))$, where a “simple” example of f “is the average of all CQI increments.” *Id.*

2. Availability as Printed Publications

As asserted by Petitioner, R1-050942 and R1-050903 (collectively, “the 3GPP documents”) are both “contribution document[s] submitted to the 3GPP TSG RAN1 WG1 Working Group for meeting #42 held in London, England on August 29 through September 2, 2005.” Pet. 28 (citing Ex. 1006, 1), 31 (citing Ex. 1007, 1). Petitioner presents evidence through Dr. Wells’s Declaration that these references qualify as publicly available printed publications. See Ex. 1008 ¶¶ 83–113. Although we specifically invited the parties to develop this issue further, Patent Owner does not dispute the sufficiency of Petitioner’s evidence. See Dec. 25 (“We anticipate

that the parties will address the public accessibility of R1-050942 and R1-050903 as printed publications during the trial”); Reply 1 (Petitioner noting that Patent Owner does not dispute Petitioner’s showing that the 3GPP documents were publicly available printed publications as of the effective filing date of the ’851 patent).

Dr. Wells testifies that (1) the 3GPP documents “can be downloaded from the 3GPP website,” *id.* ¶¶ 83, 100; (2) the 3GPP documents were “presented and discussed at meeting #42 of the TSG RAN Working Group1 in London, United Kingdom, on August 29–September 2, 2005,” and cites the meeting list as support for those statements, *id.* ¶¶ 84 (citing Ex. 1008, 184), 101 (citing same); (3) “[t]he 3GPP website allowed both 3GPP members, as well as members of the public, to freely search and download documents, such as contribution documents and specifications,” by navigating to the relevant meeting where the documents were presented, *id.* ¶¶ 86–90, 103–107; and (4) “3GPP uses an email exploder to distribute contribution documents to 3GPP members, as well as to non-3GPP members, and 3PGG considers documents distributed via the email exploder to be public,” and cites evidence confirming that R1-050903 was distributed on August 24, 2005, and that R1-050942 was distributed on August 25, 2005, *id.* ¶¶ 91, 108.

“Because there are many ways in which a reference may be disseminated to the interested public, ‘public accessibility’ has been called the touchstone in determining whether a reference constitutes a ‘printed publication.’” *In re Hall*, 781 F.2d 897, 898–99 (Fed. Cir. 1986). A reference is considered publicly accessible if “persons interested and ordinarily skilled in the subject matter or art, exercising reasonable

diligence, can locate it.” *Acceleration Bay, LLC v. Activision Blizzard Inc.*, 908 F.3d 765, 772 (Fed. Cir. 2018). Among the various avenues by which a member of the public could locate and access the 3GPP documents identified by Dr. Wells, the use of an email exploder is most compelling, even in the absence of evidence that specific persons actually accessed the documents.

The Federal Circuit has “consistently held that the standard for public accessibility is whether a person of ordinary skill in the art *could*, after exercising reasonable diligence, access a reference.” *Jazz Pharm., Inc. v. Amneal Pharm., LLC*, 895 F.3d 1347, 1355–56 (Fed. Cir. 2018) (“A reference is considered publicly accessible upon a satisfactory showing that such document has been disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art, exercising reasonable diligence, can locate it. If accessibility is proved, there is no requirement to show that particular members of the public actually received the information.” (internal quotation marks and citations omitted)); *In re Lister*, 583 F.3d 1307, 1314 (Fed. Cir. 2009) (“[O]ur cases have held that once accessibility is shown, it is unnecessary to show that anyone actually inspected the reference.”); *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1569 (Fed. Cir. 1988) (“If accessibility is proved, there is no requirement to show that particular members of the public actually received the information.”). “Thus, a petitioner need not establish that specific persons actually accessed or received a work to show that the work was publicly accessible.” *Samsung Elecs. Co. v. Infobridge Pte. Ltd.*, 929 F.3d 1363, 1374 (Fed. Cir. 2019).

We find Petitioner’s undisputed evidence of public accessibility sufficient. Dr. Wells provides sufficient evidence that the 3GPP documents were distributed by the email exploder before the effective filing date of the ’851 patent, and provides uncontroverted testimony that distribution by the email exploder was “to 3GPP members, as well as to non-3GPP members.” Ex. 1008 ¶¶ 91, 108. Furthermore, Dr. Wells summarizes that “if a non-3GPP member of the public was not subscribed to the . . . email exploder [at the time of distribution] or . . . was unable to locate [the respective 3GPP documents] in the . . . email exploder list archive, the non-3GPP member of the public could have accessed [the respective 3GPP documents] on [the 3GPP website].” *Id.* ¶¶ 92, 109. The availability of multiple alternative avenues for accessing the 3GPP documents reinforces the conclusion that they were sufficiently accessible to those of skill in the art. Accordingly, Petitioner has shown that R1-050942 and R1-050903 are available as prior art to the ’851 patent under § 102(a).

3. Differences Between the Claimed Subject Matter and the Prior Art

a. Claim 1

Petitioner provides a detailed analysis setting forth its position that independent claim 1 is unpatentable under 35 U.S.C. § 103(a) over the combination of R1-050942 and R1-050903. Pet. 50–64. Petitioner provides several explanations why a person of ordinary skill in the art would have combined the references to calculate absolute and relative CQI values for subcarrier blocks in multiple data streams of a frequency domain, and to

transmit those CQI values back to a transmitting apparatus, such as a base station. *Id.* at 61–64.

First, Petitioner observes that both references relate to the same field of art, namely OFDM wireless communication systems using CQI measurements to improve data throughput. *Id.* at 62 (citing Ex. 1008 ¶ 172). Petitioner emphasizes that both references were submitted to and discussed at the same 3GPP conference, and assigned to the same agenda item. *Id.* at 63.

In addition, Petitioner identifies the explicit teaching in R1-050942 of the desirability of reducing CQI feedback on a per chunk basis in the spatial domain, as well as R1-050903’s suggestion of sending back a full CQI value for one datastream, and calculating the CQI values for other data streams such that they are differential values. *Id.* In doing so, Petitioner contends that a person of ordinary skill in the art would have recognized that the method of R1-050903 would yield predictable results in a relatively straightforward way when used with R1-050942. *Id.* at 62–63 (citing Ex. 1008 ¶ 173).

Petitioner further contends, supported by the testimony of Dr. Wells, that the combination would have been “simple and straightforward,” and that a person of skill in the art would have had a reasonable expectation of success. *Id.* at 64 (citing Ex. 1008 ¶ 175).

We find that these explanations articulate a sufficient basis, with rational underpinning, to effect the combination Petitioner proposes. We also find Petitioner’s substantive analysis with respect to each of the limitations of independent claim 1 sufficient. Patent Owner does not dispute

Petitioner's showing with respect to claim 1. Nevertheless, we highlight specific aspects of that analysis below for emphasis.

In addressing the requirement that the receiving unit be “configured to receive first data and second data, which are transmitted from a plurality of antennas for spatial-multiplexing using a plurality of blocks, into which a plurality of consecutive subcarriers in a frequency domain are divided,” Petitioner refers to Figure 3 of R1-050942, reproduced above. Pet. 51–52. Petitioner draws a correspondence between the illustrated data stream for Antenna 1 and the recited “first data,” and between the illustrated data stream for Antenna 2 and the recited “second data.” *Id.* at 51. According to Petitioner, a plurality of blocks are used, into which a plurality of consecutive subcarriers are divided, as indicated by the color coding of the chunk assignment. *Id.* at 51–52. We find this reasoning sufficient to support Petitioner's contention with respect to this limitation, particularly when combined with Petitioner's additional reference to the explicit disclosure of transmitting antennas in R1-050903. *See id.* at 52–53.

For the requirement that the calculating unit be “configured to calculate a first absolute channel quality indicator (CQI) value per each of the blocks for the first data and a second absolute CQI value per each of the blocks for the second data, and calculate a relative CQI value of the second absolute CQI value with respect to the first absolute CQI value, per each of the blocks, from the absolute CQI value and the second absolute CQI value in the same block,” Petitioner relies on the combination of R1-050942 and R1-050903. *Id.* at 54–57. As Petitioner observes, R1-050942 suggests architectures such that each bandwidth chunk, at each transmission antenna, has a CQI value. *Id.* at 54 (citing Ex. 1006, 2 (“according to the CQI of each

chunk at each antenna”), 3–4 (“According to the CQI of each chunk”). Noting R1-050942’s disclosure of calculating absolute CQI values for each block shown in, for example, Figure 3, Petitioner emphasizes that reference’s further teaching of calculating and reporting “differential CQI bits.” *Id.* at 55 (citing Ex. 1006, 8). Although R1-050942 does not disclose any specific algorithms for creating the differential CQI bits, Petitioner points to the express disclosure, discussed above, of such algorithms in R1-050903. *Id.* at 55–57 (citing Ex. 1007, 8).

Referring to the formula on page 8 of R1-050903, Petitioner makes the following correspondences, which we find sufficient: (1) CQI_1 of R1-050903 with the absolute CQI value for each chunk for Antenna 1 of R1-050942; (2) CQI_2 of R1-050903 with the absolute CQI value for each chunk for Antenna 2 of R1-050942; and (3) Δ_1 of R1-050903 with the relative CQI value for each chunk for Antenna 2 of R1-050942. *Id.* at 57 (citing Ex. 1006, 8; Ex. 1008 ¶ 164).

In addressing the limitation that a “transmitting unit” be “configured to transmit the first absolute CQI value and the relative CQI value of the second absolute CQI value in the same block,” Petitioner observes that R1-050942 teaches that “the CQI information of each chunk at each sub-frame (TTI) for each transmission antenna is fed back to the [base station] by the uplink control channel.” *Id.* at 58 (quoting Ex. 1006, 8). Petitioner also observes that R1-050903 teaches that “a more efficient way of CQI reporting is to report the number of CQI values, full CQI value for layer one, and the incremental CQI values for the remaining layers.” *Id.* at 59 (quoting Ex. 1007, 8). Recognizing that R1-050942 “does not explicitly show a specific transmitting unit structure configured to transmit the absolute and

relative CQI values,” Petitioner argues that “[t]o adjust the coding rate and/or the data modulation on a per chunk, per antenna basis, a transmitting unit that transmits all the CQI values back to the base station would be necessarily required.” *Id.* at 58 (citing Ex. 1008 ¶¶ 165–166). Similarly, Petitioner argues that R1-050903 “necessarily teaches a ‘transmitting unit’ in Figures 6 and 7” and “discloses that the CQI values are sent to the base station via an uplink control channel, which requires some manner of a transmitting unit.” *Id.* at 59.

It is not entirely clear whether Petitioner is relying on inherency in making its argument. *See Honeywell Int’l Inc. v. Mexichem Amanco Holding S.A. DE C.V.*, 865 F.3d 1348, 1354 (Fed. Cir. 2017) (“[T]he use of inherency in the context of obviousness must be carefully circumscribed because ‘[t]hat which may be inherent is not necessarily known’ and that which is unknown cannot be obvious.” (quoting *In re Rijckaert*, 9 F.3d 1531, 1534 (Fed. Cir. 1993))). Regardless, we find that Petitioner makes a sufficient showing. Its argument that a transmitting unit is “necessary” in the combination of R1-050942 and R1-050903 is supported by testimony of Dr. Wells, and Petitioner’s obviousness analysis for claim 1 is not disputed by Patent Owner. *See* Ex. 1008 ¶¶ 165–168.

With respect to the requirements set forth in the “wherein” clause of claim 1, Petitioner contends that the combination of R1-050942 and R1-050903 “discloses the calculation of absolute/relative CQI value pairs based on the chunk (or subband) index.” *Id.* at 61 (citing Ex. 1006, 2, 4, 8; Ex. 1007, 8, 10). For the reasons expressed above, in particular R1-050942’s disclosure of architectures that have CQI values for each bandwidth chunk, we agree with that contention. In light of that contention,

Petitioner reasons that “[s]uch a calculation would necessarily result in the CQI values for the first block in the first and second data streams being used in the calculation, and so forth.” *Id.* Because R1-050942 “discloses the assignment of the same chunk or block across the spatial domain to the same user equipment to reduce signal,” as Petitioner asserts, it follows that the block-by-block requirement of the “wherein” clause is thereby satisfied. *See id.*

We conclude that Petitioner shows, by a preponderance of the evidence, that independent claim 1 is unpatentable under 35 U.S.C. § 103(a) over R1-050942 and R1-050903.

b. Claims 2 and 3

As noted above in considering the combination of Kim and Yoon, claim 2 recites a generalization of claim 1’s “transmitting unit” limitation by reciting “feedback information” that comprises “the first absolute CQI value and the relative CQI value of the second absolute CQI value.” Ex. 1001, 16:28–31. In light of the breadth of “feedback information” as used in the specification of the ’851 patent, we agree with Petitioner that the transmission of the first absolute CQI value and the relative CQI value of the second absolute CQI value is also encompassed by “feedback information” that comprises those values. *See* Pet. 64. We thus agree with Petitioner that “the combination of *R1-050942* and *R1-050903* transmits feedback information comprising absolute and relative CQI values.” *Id.* Patent Owner does not dispute this aspect of Petitioner’s analysis.

For claim 3’s recitation that the receiving unit “receives the first data and the second data, which are modulated per each one of the data,”

Petitioner observes that Section 3.2 of R1-050942 “shows several radio communication apparatus architectures, each of which has modulation applied to the data prior to transmission.” *Id.* at 65. As Petitioner and Dr. Wells assert, “[a] data stream transmitted from any of the radio communication apparatus architectures will be modulated prior to transmission and eventual reception at a receiving unit.” *Id.*; Ex. 1008 ¶ 178. Petitioner additionally notes that R1-050903 discloses a receiving unit with multiple OFDM demodulators, which indicates that the first and second data are modulated prior to being received at the receiving unit. Pet. 65–66 (citing Ex. 1007, 8, Fig. 7; Ex. 1008 ¶ 178). These identifications are sufficient, and are not disputed by Patent Owner.

We conclude that Petitioner shows, by a preponderance of the evidence, that claims 2 and 3 are unpatentable under 35 U.S.C. § 103(a) over R1-050942 and R1-050903.

c. Claim 4

Among the architectures of R1-050942 identified by Petitioner in discussing claim 3 is “Structure E,” in which “[a]ccording to the CQI of each chunk, the coding rate is adjusted by rate matching and the appropriate data modulation is assigned.” Ex. 1006, 3–4. Petitioner identifies this disclosure as meeting claim 4’s recitation that “the absolute CQI value indicates a code rate and a modulation scheme.” Pet. 66.

Patent Owner disputes this identification because structure E is disparaged by R1-050942 as “not a good approach.” PO Resp. 13; Ex. 1006, 4. As Patent Owner further notes, the other two structures described in that section of R1-050942 (“Structure F” and “Structure G”), which are not

relied on by Petitioner, “describe different relationships between CQI values on the one hand, and coding rates and modulation schemes, on the other, as compared to Structure E.” PO Resp. 13. According to Patent Owner, “Petitioner wholly fails to explain why a person of ordinary skill in the art would find the solution presented in Claim 4 obvious in light of a document that characterizes the solution as ‘not a good approach,’ and then presents two alternative, preferable solutions.” *Id.* at 13–14.

We agree with Patent Owner that R1-050942 teaches away from the combination that Petitioner relies on for claim 4. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Assoc., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983). Whether a reference teaches away from a claimed invention is a question of fact. *In re Harris*, 409 F.3d 1339, 1341 (Fed. Cir. 2005). “A reference may be said to teach away when a person of ordinary skill, upon reading the reference, . . . would be led in a direction divergent from the path that was taken by the applicant.” *In re Haruna*, 249 F.3d 1327, 1335 (Fed. Cir. 2001) (quoting *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1360 (Fed. Cir. 1999)).

In responding to this argument, Petitioner parses R1-050942’s discussion of “Structure E” to contend that the reference “does not criticize Structure E in its entirety, just the ‘scheme’ by which ‘no channel coding gain is obtained if the channel coding rate is changed according to the chunk size.’” Reply 3 (quoting Ex. 1006, 4). This contention is not persuasive. Rather, we agree with Patent Owner that the isolated language identified by Petitioner “doesn’t even describe a ‘scheme’ and is never characterized in R1-05094[2] as one.” Surreply 5. “Instead, the ‘scheme’ is what is

described in the bullet points under the title ‘the operation of antenna dependent rate control,’ where one of the bullet points contains the language relied on by Petitioner.” *Id.*

Because we agree with Patent Owner that R1-050942 specifically discredits the combination that Petitioner asserts, we find that that the prior art teaches away from that combination. Accordingly, we conclude that Petitioner does not show, by a preponderance of the evidence, that claim 4 is unpatentable under 35 U.S.C. § 103(a) over R1-050942 and R1-050903.

d. Claim 5

Similar to its analysis of claim 5 over Kim and Yoon, Petitioner relies on its analysis of claim 1 to address the corresponding limitations of independent claim 5 as disclosed by the combination of R1-050942 and R1-050903. Pet. 66–68 (identifying the preamble and each limitation of claim 5 as “substantively identical” to a corresponding limitation in claim 1). Patent Owner does not dispute Petitioner’s showing with respect to claim 5. For the reasons explained in addressing claim 1, we find Petitioner’s analysis sufficient.

Accordingly, we conclude that Petitioner shows, by a preponderance of the evidence, that claim 5 is unpatentable under 35 U.S.C. § 103(a) over R1-050942 and R1-050903.

F. Constitutionality of Inter Partes Review

Patent Owner contends that *inter partes* reviews are “unconstitutional as applied retroactively to patents that issued prior to the date of enactment of the America Invents Act.” PO Resp. 17–23. According to Patent Owner,

“[s]ubjecting the ’851 Patent to IPR retroactively is a violation of the Fifth Amendment and constitutes an unconstitutional regulatory taking.” *Id.* at 17. This argument is foreclosed by the Federal Circuit’s recent holding to the contrary. *Celgene Corp. v. Peter*, 931 F.3d 1342, 1362 (Fed. Cir. 2019) (“[W]e also hold that the retroactive application of IPR proceedings to pre-AIA patents is not an unconstitutional taking under the Fifth Amendment.”).

III. CONCLUSION

The table below summarizes our conclusions as to the challenged claims.

References	Basis	Claims	Claims Shown Unpatentable	Claims Not Shown Unpatentable
Kim and Yoon	§ 103(a)	1–5	1–3 and 5	4
R1-050942 and R1-050903	§ 103(a)	1–5	1–3 and 5	4
Overall Outcome			1–3 and 5	4

IV. ORDER

It is

ORDERED that, based on a preponderance of the evidence, claims 1–3 and 5 of U.S. Patent No. 7,940,851 B2 have been shown to be unpatentable;

FURTHER ORDERED that, based on a preponderance of the evidence, claim 4 of U.S. Patent No. 7,940,851 B2 has not been shown to be unpatentable; and

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

IPR2018-00585
Patent 7,940,851 B2

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