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Paper 61
Date: January 29, 2021

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SPRINT SPECTRUM L.P.,
Petitioner,

v.

GENERAL ACCESS SOLUTIONS, LTD.,
Patent Owner.

IPR2017-01889
Patent 7,230,931 B2

Before KALYAN K. DESHPANDE, DAVID M. KOHUT, and MELISSA A. HAAPALA, *Administrative Patent Judges.*

HAAPALA, *Administrative Patent Judge.*

JUDGMENT
Final Written Decision on Remand
Determining Some Challenged Claims Unpatentable
35 U.S.C. §§ 144, 318(a) and 37 C.F.R. § 42.73

Sprint Spectrum L.P. ("Petitioner") filed a Petition pursuant to 35 U.S.C. §§ 311–319 to institute an *inter partes* review of claims 1–29 of U.S. Patent No. 7,230,931 B2 ("the '931 patent"). Paper 1 ("Pet."). General Access Solutions, Ltd. ("Patent Owner") did not file a Preliminary Response. Applying the standard set forth in 35 U.S.C. § 314(a), we granted Petitioner's request to institute an *inter partes* review of all challenged claims. Paper 5 (instituting on claims 1, 3–10, 12–19, and 21–29); Paper 8 (instituting on remaining challenged claims 2, 11, and 20 and modifying our initial institution decision to include all of the grounds presented in the Petition).

During the trial, Patent Owner timely filed a Response (Paper 25, "PO Resp."), to which Petitioner timely filed a Reply (Paper 29, "Reply"). Patent Owner further submitted a Sur-Reply (Paper 34, "Sur-Reply") to Petitioner's Reply. An oral hearing was held on December 6, 2018, and a copy of the transcript was entered into the record. Paper 42 ("Tr."). Following the oral hearing and pursuant to our authorization (Paper 37), both parties each submitted claim construction briefs (Papers 38, 39); each party also submitted a reply to the other party's brief (Papers 40, 41).

After consideration of the fully developed record, we issued a Final Written Decision ("Decision") in which we entered adverse judgment against Patent Owner with respect to claims 1, 10, and 19, and we concluded that Petitioner had not shown that claims 2–9, 11–18, and 20–29 of the '931 patent are unpatentable. Paper 43 ("Dec.").

Petitioner appealed our Decision to the Federal Circuit as to claims 2–9, 11–18, and 20–29. *Sprint Spectrum L.P. v. General Access Solutions, Ltd.*, 812 F. App'x. 999, 1000–02 (Fed. Cir. 2000). The Federal Circuit vacated our Decision as to claims 2–9, 11–18, and 20–27 and remanded for

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further consideration of whether claims 2–9, 11–18, and 20–27 are unpatentable in light of the Court's construction of a disputed limitation recited in claims 2, 11, and 20. *Id.* at 1005, 1007. The Federal Circuit affirmed our Decision as to claims 28–29, and thus, those claims are not before the Board on remand. *Id.* at 1007. Further, with respect to claims 2–9, 11–18, and 20–27, the Federal Circuit affirmed "the Board's finding of no reason to combine Newman and Ahy," and thus, indicated that "on remand the Board need not address the asserted combination of Newman, Ahy, and Andersson notwithstanding [the Federal Circuit's] vacatur and remand on the claim construction issue." *Id.* at 1007 n.9.

On remand, we granted the parties' joint request to submit briefs and responses addressing the patentability of claims 2–9, 11–18, and 20–27 in light of the Federal Circuit's decision. Paper 56. Accordingly, Petitioner filed a Petitioner's Opening Brief on Remand (Paper 57, "Pet. Remand Br.") and Patent Owner filed a Patent Owner's Additional Brief Addressing the Impact of the Remand Decision (Paper 58, "PO Remand Br."). Petitioner subsequently filed a Petitioner's Response to Patent Owner's Additional Brief Addressing the Impact of the Remand Decision (Paper 59, "Pet. Remand Resp.") and Patent Owner subsequently filed a Patent Owner's Response to Petitioner's Opening Brief on Remand (Paper 60, "PO Remand Resp.").

For the reasons discussed below, we conclude Petitioner shows, by a preponderance of the evidence, that claims 2–9, 11–18, and 20–27 are unpatentable.

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I. BACKGROUND

A. The '931 Patent

The '931 patent describes a burst packet transmission media access system using selectively adaptable beam forming in a fixed wireless access network. Ex. 1001, 3:28–31. The fixed wireless network may comprise a plurality of transceiver base stations that transmit forward channel (downlink or downstream) broadband signals to subscriber premises and receive reverse channel (uplink or upstream) broadband signals from subscriber premises. *Id.* at Fig. 1, 11:57–64. Each of the transceiver base stations may cover a cell site that is divided into a plurality of sectors. *Id.* at Fig. 2, 12:25–27. Pre-programmed sets of directed beam patterns are used to cover a cell in an angular fashion, which is referred to as "beam scanning." *Id.* at 28:1–3. The base station establishes a set of beams to cover the cell and, based on physical location in the sector, a specific beam is used to communicate with one or more subscribers that lie in that sector. *Id.* at 28:9–12.

Figure 14 of the '931 patent is depicted below:

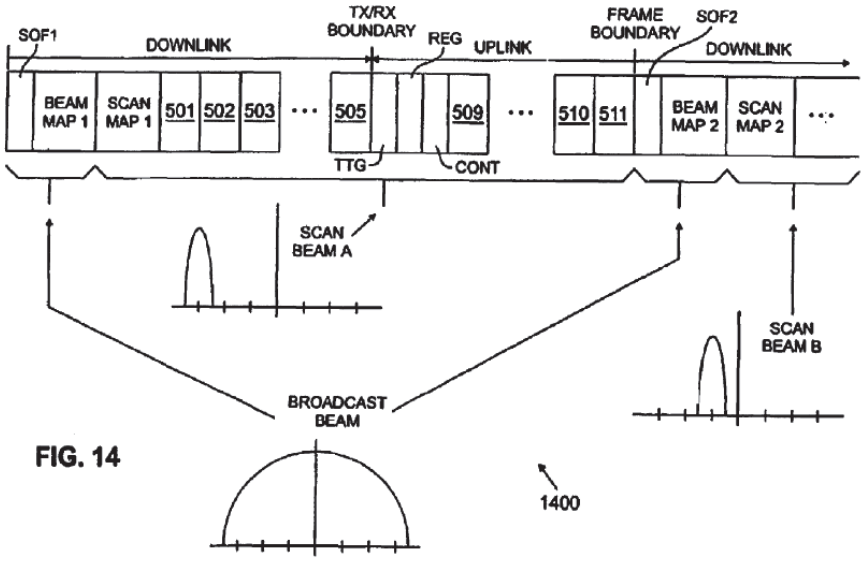

FIG. 14

Figure 14 illustrates the use of broadcast beams and scanning beams in exemplary time division duplex (TDD) signal 1400. *Id.* at 29:3–5. TDD signal 1400 comprises a first TDD frame having a downlink portion comprising a first start-of-frame field (SOF1), a first beam map field (Beam Map 1), and a first scan map field (Scan Map 1). *Id.* at 29:6–10. The first TDD frame is followed by a second TDD frame, which comprises a second start-of-frame field (SOF2), a second beam map field (Beam Map 2), and a second scan map field (Scan Map 2). *Id.* at 29:21–25. A spread spectrum Broadcast Beam is used to transmit start-of-frame fields SOF1, SOF2 and beam map fields Beam Map 1, Beam Map 2 in each TDD frame. *Id.* at 29:26–30. Distinct scan beams (Scan Beam A and Scan Beam B) are used to transmit the scan map fields (Scan Map 1 and Scan Map 2) and the remainder of the uplink and downlink portions of each TDD frame. *Id.* at 29:30–33.

Broadcast Beam Maps 1, 2 provide data indicating which scanning beam (or beams) are used at which time for the frame and also transmit a synchronization field so that all subscribers can maintain synchronization. *Id.* at 29:34–36, 29:47–50. Scanning Beam Maps A, B provide the uplink and downlink map, which state at which time in the frame, using the scanning beam described in the associated Broadcast Beam Map, the downlink modulation groups and specific uplink slots are allocated for the frame using the specific scanning beam. *Id.* at 29:38–43.

B. Illustrative Claim

Claim 2 is illustrative of the subject matter at issue:

> 2. The transceiver as set forth in claim 1 wherein said broadcast beam signal further comprises a first beam map containing scanning beam information usable by said wireless access devices to detect said directed scanning beam signals.

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C. Grounds of Unpatentability

Petitioner relies on the following references:

1. U. Vornefeld, et al., *SDMA Techniques for Wireless ATM*, IEEE Communications Magazine (Nov. 1999) ("Vornefeld") (Ex. 1004).
2. U.S. Patent No. 6,470,177 B1, issued Oct. 22, 2002 ("Andersson") (Ex. 1005).
3. U.S. Patent No. 7,366,133 B1, issued Apr. 29, 2008 ("Ahy") (Ex. 1006).[1]

The following grounds of unpatentability are at issue on remand:

Claims Challenged	35 U.S.C. §	Reference(s)
2, 3, 6, 7, 11, 12, 15, 16, 20, 21, 24, 25	102(b)	Vornefeld
4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, 27	103(a)	Vornefeld and Ahy
2, 3, 6, 7, 11, 12, 15, 16, 20, 21, 24, 25	103(a)	Vornefeld and Andersson
4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, 27	103(a)	Vornefeld, Andersson, and Ahy

In support of its contentions, Petitioner submitted a declaration by its witness, Mr. James A. Proctor, Jr. Ex. 1003. In response, Patent Owner submitted a declaration by its witness, Kurt D. Humphrey. Ex. 2001. Both witnesses were cross-examined during the trial, and transcripts of their depositions are in the record. Ex. 1011 (Proctor deposition); Ex. 1012 (Humphrey deposition).

[1] We note the first named inventor of U.S. Patent 7,366,133 is Majidi-Ahy. Ex. 1006, 1. However, as both parties refer to this reference as "Ahy" (*see e.g.,* Pet. 17; PO Resp. 18), we use the same shortened form for consistency and to avoid confusion.

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D. Related Proceedings

Petitioner and Patent Owner identify the following district court litigation involving the '931 patent: *General Access Sol., Ltd. v. Sprint Spectrum L.P.*, No. 2:16-cv-465-RWS (E.D. Tex.). Pet. 2; Paper 3, 1.

E. Real Parties in Interest

Petitioner identifies the following additional real parties in interest: Virgin Mobile USA, L.P.; Boost Mobile, LLC; Clearwire Corporation; Clearwire Communications LLC; and Clear Wireless LLC. Pet. 1. Petitioner further identifies Sprint Corporation as a real party in interest only for purposes of this proceeding and only to the extent Patent Owner contends the separate legal entity should be named a real party in interest in this proceeding. *Id.* Patent Owner does not identify any additional real parties in interest. *See* Paper 3, 1.

II. ANALYSIS

A. Legal Principles

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). Although the elements must be arranged or combined in the same way as in the claim, "the reference need not satisfy an *ipsissimis verbis* test," i.e., identity of terminology is not required. *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009).

A claim is unpatentable under § 103(a) 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."

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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) objective evidence of non-obviousness, i.e., secondary considerations such as commercial success, long felt but unsolved needs, and failure of others.[2] *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). The obviousness inquiry further 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")).

B. Level of Ordinary Skill in the Art

Petitioner asserts a person of ordinary skill in the art at the time of the filing date of the '931 patent would have had at least a Bachelor of Science in Computer Science, Computer Engineering, Electrical Engineering, or an equivalent field, and at least two years of academic or industry experience in any type of wireless networking field. Pet. 9–10. Patent Owner asserts a person of ordinary skill would have been a telecommunications engineer or technologist working in the wireless networking sector and have a least a bachelor's degree in engineering and relevant work experience, including at least two years of academic, practical, or industry experience in the wireless networking and/or telecommunications field. PO Resp. 6.

[2] The record does not include arguments or evidence regarding objective indicia of non-obviousness.

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Our decision does not turn on the minor differences between the definitions. Both Petitioner and Patent Owner advocate a similar level of experience and both agree that a person of ordinary skill would have a bachelor's degree in engineering. We accept the level of skill advocated by Petitioner as the identified undergraduate academic degrees are consistent with the prior art of record.

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 in which they appear. *See* 37 C.F.R. § 42.100(b) (2017)[3]; *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Under that standard, "words of the claim must be given their plain meaning, unless such meaning is inconsistent with the specification and prosecution history." *Tri Vascular, Inc. v. Samuels*, 812 F.3d 1056, 1062 (Fed. Cir. 2016).

In our Final Written Decision, we construed the term "a first beam map" as recited in claims 2, 11, and 20, as "scheduling information for one or more beams," in light of the '931 patent's disclosure of a broadcast beam map and a transmission of map information for beam scheduling via a

[3] The 2018 amendment to this regulation does not apply here because the Petition was filed before November 13, 2018. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340 (Oct. 11, 2018) (amending 37 C.F.R. § 42.100(b) effective November 13, 2018).

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spread spectrum broadcast beam.[4] Dec. 11–12 (citing Ex. 1001, 29:26–43; Fig. 14). We construed "scanning beam information usable by said wireless access devices to detect said directed scanning beam signals," as "data indicating which scanning beam is used at which time." *Id.* at 14. Accordingly, based on the '931 patent's disclosure, we provided our complete construction of "a first beam map containing scanning beam information usable by said wireless access devices to detect said directed scanning beam signals," as "scheduling information for one or more beams that provides data indicating which scanning beam is used at which time." *Id.* at 14–15.

The Federal Circuit determined our construction was overly narrow and instead determined that the "scanning beam information usable by said wireless access devices to detect said directed scanning beam signals" must be broad enough to include "any information that is 'usable by said wireless access devices to detect said directed scanning beam signals.'" *Sprint Spectrum*, 812 F. App'x. at 1005. In so construing the term, the Federal Circuit distinguished its construction from our earlier construction: "[c]ertainly, [scanning beam information] can include 'data indicating which scanning beam is used at which time,' as recited in the Board's construction. But the broadest reasonable interpretation of 'scanning beam information' is not limited to that kind of data, nor must it include that kind of data." *Id.*

In accordance with the Federal Circuit's claim construction, we construe "a first beam map containing scanning beam information useable by said wireless access devices to detect said scanning beam signals" as

[4] As noted by the Federal Circuit, our construction of the "first beam map" portion of the claim was not disputed. *See Sprint Spectrum*, 812 F. App'x at 1003 n.8.

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"scheduling information for one or more beams containing any information usable by said wireless access devices to detect said scanning beam signals."

D. Anticipation by Vornefeld and Obviousness over Vornefeld and Andersson

Petitioner challenges claims 2, 3, 6, 7, 11, 12, 15, 16, 20, 21, 24, and 25 as anticipated under 35 U.S.C. § 102(b) by Vornefeld. Pet. 25–34. Petitioner further challenges these claims as obvious under 35 U.S.C. § 103(a) over Vornefeld and Andersson. *Id.* at 50.

1. Scope and Content of Vornefeld

Vornefeld describes space-division multiple access (SDMA) techniques in the context of the HIPERLAN/2 system, which provides wireless network broadband services with guaranteed quality of service. Ex. 1004, 52. The system deploys a smart array antenna with several antenna systems that provides the ability to set up multiple antenna beams, which can be directed adaptively to the mobile terminal (MT) locations and allows different users to be served on the same frequency channel at the same time. *Id.* Depending on the number of antenna elements and the applied beamforming algorithm, array antennas are able to simultaneously direct several beams conveying individual user signals to different positions. *Id.* at Fig. 2, 53. The system uses a Medium Access Control (MAC) protocol to coordinate the access of MTs to the shared radio channel. *Id.* at 54.

Figure 3 of Vornefeld is depicted below:

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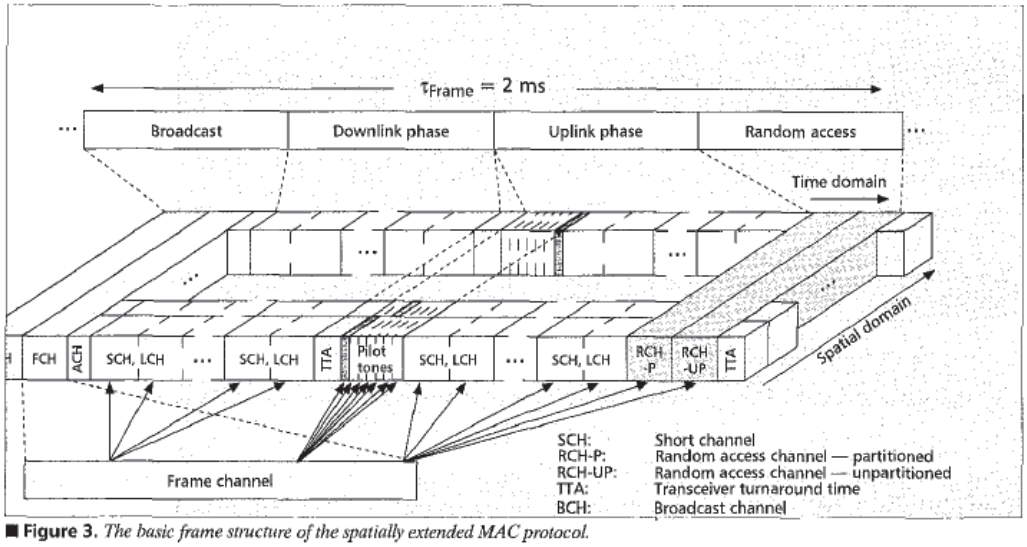

■ **Figure 3.** *The basic frame structure of the spatially extended MAC protocol.*

Figure 3 illustrates the basic MAC frame structure of the spatially extended MAC protocol. *Id.* at Fig. 3. MAC frame starts with broadcast channel (BCH), followed by frame channel (FCH), then a downlink phase, an uplink phase, and random access channels (partitioned, RCH-P, and unpartitioned, RCH-UP). *Id.* at 54. BCH conveys signaling information concerning the whole radio cell in the downlink direction and announces the location of the FCH and RCH within the actual MAC frame. *Id.* FCH is broadcast in the downlink direction and transmits information about the structure of the MAC frame for the up- and downlink phases; it contains announcements and reservations of long and short transport channels the individual MTs have to transmit or receive. *Id.* Short Channel (SCH) conveys data link control information and Long Channel (LCH) serves to transmit user data bi-directionally on the up- and downlink. *Id.* RCH-P and RCH-UP are contention channels. *Id.* As depicted in Figure 3, a number of MAC frames can be transmitted concurrently by extension into the space domain using the smart antenna system. *See id.* at Fig. 3, 53, 55. A space-time scheduler is used to determine the temporal transmission sequence of MAC PDUs

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(protocol data unit) as well as the MTs that can simultaneously be addressed or allowed to concurrently transmit their bursts. *Id.* at 55.

2. Scope and Content of Andersson

Andersson describes adaptive sectorization to solve problems associated with sectorization of cells in cellular communication systems. Ex. 1005, 3:37–40, 4:31–34. A transceiver structure located at a base station is connected to a set of sector antennas and each sector antenna is used to cover a sector of the cell. *Id.* at 4:42–44; *see also* Fig. 2 (depicting an antenna configuration with six sectors). The beacon carrier is also connected to an omni-directional antenna, which provides the same coverage area as all of the sector antennas together. *Id.* at 4:58–60.

3. Claims 2, 11, and 20

Claim 2 depends from claim 1 and recites "wherein said broadcast beam signal further comprises a first beam map containing scanning beam information usable by said wireless access devices to detect said directed scanning beam signals."[5] Claims 11 and 20 depend from claims 10 and 19, respectively, and recite limitations substantially similar to the limitation set forth in claim 2.

Petitioner contends Vornefeld discloses the first beam map limitation. Pet. 25–26 (citing Ex. 1003 ¶¶ 151–152); *see also id.* at 50 (citing to the analysis of "Ground 1" to support the assertion that claims 2, 11, and 20 are obvious over Vornefeld and Andersson). Specifically, Petitioner asserts the frame channel (FCH) described in Vornefeld is equivalent to the claimed 'first beam map" because Vornefeld discloses the

[5] As noted in our Decision, we entered adverse judgement against Patent Owner with respect to independent claims 1, 10, and 19. *See* Dec. 2, 7, 31–32. These claims are not before us on remand.

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FCH is broadcast in the downlink direction, transmits information about the structure of the MAC frame for the up-and downlink phases and contains announcements and reservations of long and short transport channels the individual MTs have to transmit or receive in. *Id.* at 26 (citing Ex. 1004, 54–55; Ex. 1003 ¶ 152); *see also* Pet. Remand Br. 1.

Petitioner further asserts that because each of the SCH and LCH portions of the frame are transmitted in different signals (or directed beams) in the spatial domain, the base station must inform each subscriber unit when it should listen for its specific directive beam signal. Reply 5 (citing Ex. 1011, 29:12–30:3 (testimony of Mr. Proctor)). Mr. Proctor testifies that the FCH, which is broadcast to all users, will have a map in it that describes which time slots particular mobile terminals should decode on the downlink phase. Ex. 1011, 30:15–19. Mr. Proctor further testifies that this information sent in Vornefeld would be sufficient to demodulate or detect the downlink signal and that downlink is a directed beam signal. *See id.* at 47:18–48:2; *see also* Tr. 31 (Petitioner's assertion that the FCH includes information sufficient to allow the subscriber units to detect the directed scanning beam signal that is sent out). Petitioner further asserts, citing the testimony of Mr. Proctor, that one would not need to include information about the beams themselves to be a beam map as the claim only requires information be usable to demodulate a directed signal. Reply 12–13 (citing Ex. 1011, 47:2–11).

Thus, Petitioner asserts Vornefeld's FCH discloses the claimed "first beam map" because the FCH contains scheduling information for one or more beams. Pet. Remand Br. 2. Petitioner notes the Federal Circuit's exemplary list of types of information that fall within its construction of "scanning beam information" includes a downlink time slot. *Id.* (citing

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Sprint Spectrum, 812 F. App'x. at 1005). In light of the Federal Circuit's construction of "scanning beam information," Petitioner contends Vornefeld's downlink time slot reservations discloses the claimed "scanning beam information usable by said wireless access devices to detect said directed scanning beam signals." *Id.* at 2–3.

Patent Owner contends that Vornefeld does not disclose a beam map containing scanning beam information and asserts that the FCH signal cited by Petitioner is not "equivalent" to the recited "first beam map." PO Resp. 20–21. Patent Owner asserts the FCH signal includes only information about the structure of the frame (when the base station will be sending and receiving information) and does not include information about what scanning beam signal will be used to cover the sector, or when it will be used. *Id.* at 21. Patent Owner further asserts that Vornefeld accomplishes beam forming with the use of algorithms and says nothing about using beam maps in a broadcast beam signal. *Id.* at 21–22 (citing Ex. 1004, 53; Ex. 2001 ¶ 43); *see also* Tr. 61:2–4 (asserting the reason Vornefeld does not disclose a beam map is because Vornefeld discloses an algorithm for determining where beams would be directed and it does not need to send maps). Patent Owner asserts that Vornefeld also does not inherently disclose the recited beam map because a beam forming station may inform each subscriber unit when it should listen for its specific directive beam signal in any number of ways. Sur-Reply 4. Mr. Humphrey testifies that one of ordinary skill in the art would not assume that the start of frame information would include beam map information because beam maps are unnecessary in schemes that broadcast with beams cycled in round robin rotation as noted in the '931 patent or using various multiple antenna diversity techniques. *See* Ex. 2001 ¶¶ 46–47.

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Patent Owner contends the Federal Circuit did not alter the Board's construction of "first beam map," as recited in claims 2, 11, and 20, and thus, regardless of the meaning of "scanning beam information," the Board's determinations in its Decision that the Board is "persuaded by Mr. Humphrey's testimony that Vornefeld discloses beam forming is accomplished with the use of algorithms and not a beam map," and that the Petitioner did not provide sufficient analysis to satisfy its burden of demonstrating that Vornefeld discloses the claimed beam map, should stand. PO Remand Br. 1–2 (citing Dec. 20–21); PO Remand Resp. 1–5. Patent Owner further contends the Federal Circuit's construction does not change the fact that Petitioner failed to meet its burden in demonstrating that Vornefeld discloses "scanning beam information" because Vornefeld does not provide scheduling information for beams, as the claims require. PO Remand Br. 2–3; PO Remand Resp. 5–6. Instead, as contended by Patent Owner, Vornefeld's BCH and FCH signals provide synchronization information for a frame, rather than a beam. PO Remand Br. 3–5; PO Remand Resp. 5–6.

In our Decision, our determination that Petitioner had not demonstrated that claims 2, 11, and 20 either were anticipated by Vornefeld or would have been obvious over Vornefeld and Andersson was expressly based on our previous construction of "a first beam map containing scanning beam information usable by said wireless access devices to detect said directed scanning beam signals" as "scheduling information for one or more beams that provides data indicating which scanning beam is used at which time." *See* Dec. 14–15, 20–21. However, in light of the Federal Circuit's construction of "scanning beam information" as "any information that is usable by said wireless access devices to detect said directed scanning beam

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signals," we have accordingly re-reviewed Petitioner's analysis for claims 2, 11, and 20. As a result, we determine that Petitioner demonstrates that claims 2, 11, and 20 are anticipated by Vornefeld and would have been obvious over Vornefeld and Andersson.

Vornefeld discloses a base station that electronically directs multiple antenna beams to MT locations using a MAC protocol, where the MAC protocol coordinates the access of MTs to a shared radio channel. Ex. 1004, 52–54. A MAC frame includes a BCH and a FCH, where the BCH includes "a location of the FCH . . . within the actual MAC frame," and the FCH is broadcast in the downlink direction and includes "announcements and reservations of long and short transport channels the individual MTs have to transmit or receive in." *Id.* at 54. As conceded by Patent Owner, Vornefeld discloses a broadcast beam. Tr. 57:1–2. Further, we agree with Petitioner that Vornefeld's description of its FCH downlink time slot reservations meets the first beam map limitation as we construe the term ("scheduling information for one or more beams containing any information usable by said wireless access devices to detect said scanning beam signals"). We are not persuaded by Patent Owner's arguments that the FCH signals are not a beam map as they provide synchronization information for a frame and not a beam. *See* PO Remand Br. 3–5. Rather, the MTs use the transport channel information contained within the FCH as part of the overall process of detecting the beams transmitted by the base station and, therefore, the information is usable by the wireless access devices to detect the scanning beam signals.

Accordingly, based on the evidence of record, we conclude Petitioner establishes, by a preponderance of the evidence, that claims 2, 11, and 20 are anticipated by Vornefeld.

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In its challenges based on Vornefeld and Andersson, Petitioner relies on Andersson for the "transceiver" (recited in canceled claim 1) and "broadcast beam" limitations to the extent these limitations are not disclosed by Vornefeld. *See* Pet. 44–50. As noted above, we determine, and Patent Owner concedes that Vornefeld discloses the "broadcast beam" recited in claims 2, 11, and 20. *See* Ex. 1004, 54; Tr. 57:1–2. Further, Petitioner establishes that Andersson also discloses the "broadcast beam" through its description of a broadcast control channel, or beacon and provides sufficient rationale for why one of ordinary skill in the art would have combined Vornefeld and Andersson in the proposed manner. *See* Pet. 46–48. Accordingly, we conclude Petitioner establishes, by a preponderance of the evidence, that claims 2, 11, and 20 would have been obvious over the combination of Vornefeld and Andersson.

4. Claims 3, 6, 7, 12, 15, 16, 21, 24, and 25

Patent Owner contends the Federal Circuit's construction of "scanning beam information" does not alter the Board's conclusion that Vornefeld (or the combination of Vornefeld and Andersson) fails to disclose or suggest all the elements of claims 3, 6, 7, 12, 15, 16, 21, 24, and 25. PO Remand Br. 5–7; PO Remand Resp. 6–7. Petitioner contends the Board has not already determined that Vornefeld (or the combination of Vornefeld and Andersson) fails to disclose or suggest all the elements of the aforementioned claims. Pet. Remand Resp. 7. At most, Petitioner contends, the Board found that Petitioner had previously failed to show that Vornefeld (or the combination of Vornefeld and Andersson) fails to disclose or suggest all the elements of the aforementioned claims by virtue of their dependency on one of claims 2, 11, and 20. *Id.*

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We agree with Petitioner that in our Decision we concluded that Petitioner had not shown that claims 3, 6, 7, 12, 15, 16, 21, 24, and 25 either were anticipated by Vornefeld or would have been obvious over Vornefeld and Andersson based on their dependency on one of claims 2, 11, and 20. Dec. 21–22. In light of our revised determination that Petitioner has shown that claims 2, 11, and 20 are anticipated by Vornefeld and would have been obvious over Vornefeld and Andersson, we reconsider our analysis of the dependent claims.

Claim 3 depends from claim 2 and recites "wherein said scanning beam information identifies a downlink time slot in said downlink portion during which said one of said directed scanning beam signals transmits said downlink data traffic." Claims 12 and 21 depend from claims 11 and 20, respectively, and recite limitations substantially similar to the limitation set forth in claim 3. Petitioner asserts Vornefeld discloses this limitation through its description that the FCH contains "announcements and reservations of long and short transport channels the individual MTs have to transmit or receive in" and these reservations identify the downlink time slot in a downlink portion. Pet. 27 (citing Ex. 1004, 54; Ex. 1003 ¶ 156). Petitioner further asserts that as the feature of these claims is disclosed by Vornefeld, they are, therefore, obvious over Vornefeld in view of Andersson for the same reasons. *Id.* at 50. Patent Owner does not present separate arguments for these claims in its Patent Owner Response; therefore any such arguments are waived. *See Novartis AG v. Torrent Pharms. Ltd.*, 853 F.3d 1316, 1330 (Fed. Cir. 2017); *In re NuVasive*, 842 F.3d 1376, 1381 (Fed. Cir.

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2016).[6] Based on the evidence of record, we find Petitioner establishes, by a preponderance of the evidence, that claims 3, 12, and 21 are anticipated by Vornefeld and would have been obvious over the combination of Vornefeld and Andersson.

Claim 6 depends from claim 2 and recites "receive path circuity associated with said beam forming network capable of receiving uplink data traffic transmitted by at least one wireless access device in an uplink portion of said TDD frame." Claims 15 and 24 depend from claims 11 and 20, respectively, and recite limitations substantially similar to the limitation set forth in claim 6. Petitioner asserts Vornefeld's base station includes circuitry for receiving data traffic transmitted by mobile terminals in an uplink portion of the TDD frame. *See* Pet. 27–28 (citing Ex. 1004, 52, 54; Ex. 1003 ¶ 173). Petitioner further asserts that as the feature of these claims is disclosed by Vornefeld, they are, therefore, obvious over Vornefeld in view of Andersson for the same reasons. *Id.* at 50. Patent Owner does not present separate arguments for these claims.[7] Based on the evidence of record, we find Petitioner establishes, by a preponderance of the evidence, that claims 6, 15, and 24 are anticipated by Vornefeld and would have been obvious over the combination of Vornefeld and Andersson.

Claim 7 depends from claim 6 and recites "wherein said first beam map further contains uplink transmission information identifying an uplink time slot in said uplink portion during which said at least one wireless access

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[6] As in *NuVasive*, the Scheduling Order in this proceeding cautioned Patent Owner that "any arguments for patentability not raised in the response may be deemed waived." Paper 6, 5.

[7] Further, pursuant to our instructions in the Authorization to File Additional Briefing, Patent Owner was not permitted to present new arguments or evidence for these claims in its post-remand briefing. *See* Paper 56.

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device transmits said uplink data traffic." Claims 16 and 25 depend from claims 15 and 24, respectively, and recite limitations substantially similar to the limitation set forth in claim 7. Petitioner asserts that this limitation is disclosed by Vornefeld through its description that the FCH informs the terminals about their individual transmission and reception schedules for the next MAC frame. Pet. 28–29 (citing Ex. 1004, 54; Ex. 1003 ¶¶ 178–179). Petitioner further asserts that as the feature of these claims is disclosed by Vornefeld, they are, therefore, obvious over Vornefeld in view of Andersson for the same reasons. *Id.* at 50. Patent Owner does not present separate arguments for these claims. Based on the evidence of record, we find Petitioner establishes, by a preponderance of the evidence, that claims 7, 16, and 25 are anticipated by Vornefeld and would have been obvious over the combination of Vornefeld and Andersson.

E. Obviousness over Vornefeld and Ahy, and Obviousness over Vornefeld, Andersson, and Ahy

Petitioner challenges claims 4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, and 27 as unpatentable as obvious under 35 U.S.C. § 103(a) over Vornefeld and Ahy. Pet. 35–44. Petitioner further challenges these claims as unpatentable as obvious under 35 U.S.C. § 103(a) over Vornefeld, Andersson, and Ahy. *Id.* at 50–51.

1. Scope and Content of Ahy

Ahy describes adaptive point to multipoint wireless communications. Ex. 1006, 1:65–66. A base station controller (BSC) maintains a set of physical (PHY) parameters and media-access-control (MAC) parameters, each of which is adaptively modified by the BSC for communication with a plurality of customer premises equipment (CPE). *Id.* at 2:15–21, 7:18–20. The BSC adjusts communication with each CPE individually and adaptively

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in response to changes in communication characteristics. *Id.* at 2:21–23. Control of each parameter by the BSC is independent and individual with regard to each CPE. *Id.* at 7:20–22. Each parameter actually has two values: a first value for transmission by the BSC and a second value for transmission by the CPE. *Id.* at 7:65–8:1. The communication parameters that can be adapted include: antenna selection to choose the antenna to be used at the BSC and the CPE; modulation type to determine the bit per symbol rate to use to exchange information; and error code type to choose the error detection and correction technique. *See id.* at 8:50–59, 10:38–48, 11:40–45.

Communications between the BSC and each CPE are conducted using a TDD technique in which time durations are divided into individual frames, each of which includes a "downstream" and "upstream" portion. *Id.* at 7:1–5. The BSC controls transmission for both upstream and downstream directions without specific requests from CPEs. *Id.* at 7:5–9. The TDD frame includes a sequence of parameter setting values for the BSC to use to inform each selected CPE of the PHY and MAC parameters the BSC is using to send messages to that selected CPE, and the PHY and MAC parameters the selected CPE should use to send messages to the BSC during its allocated part of the upstream portion. *Id.* at 15:11–20.

2. Claims 4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, and 27

Patent Owner and Petitioner present contentions regarding claims 4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, and 27 that are similar to their contentions regarding claims 3, 6, 7, 12, 15, 16, 21, 24, and 25. PO Remand Br. 5–7; PO Remand Resp. 6–7. We agree with Petitioner that in our Decision we concluded that Petitioner had not shown that these claims would have been obvious over the Vornefeld-Ahy combination or the combination or

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Vornefeld, Andersson and Ahy based on their dependency on one of claims 2, 11, and 20. Dec. 25–26. Thus, we now reconsider our analysis of these dependent claims.

Claim 4 depends from claim 3 and recites "wherein said scanning beam information identifies at least one modulation format associated with said one of said directed scanning beam signals." Claims 13 and 22 depend from claims 12 and 21, respectively, and recite limitations substantially similar to the limitation set forth in claim 4. We agree with Petitioner that Ahy discloses this limitation through its description that its base station controller (BSC) can communicate a modulation type to customer premises equipment (CPE). *See* Pet. 36–37 (citing Ex. 1006, 10:38–52; Ex. 1003 ¶ 162). We further determine Petitioner provides sufficient rationale for why one of ordinary skill in the art would have combined Ahy with Vornefeld and Andersson because the combination "would have amounted to nothing more than the use of known techniques to improve similar methods in the same way or the combination of prior art elements according to known methods to yield predictable results." *See* Pet. 37–38 (citing Ex. 1003 ¶ 163; *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007).[8] Petitioner asserts that as the feature of these claims is disclosed by Ahy, they are, therefore, obvious over Vornefeld in view of Andersson and Ahy for the same reasons. *Id.* at 50–51. Patent Owner does not present separate arguments for these claims. Based on the evidence of record, we find

[8] Petitioner relies on this rationale in its analysis of the remaining dependent claims challenged based on the combination of Vornefeld and Ahy. *See* Pet. 40–42. We determine Petitioner establishes the proposed combination of Vornefeld and Ahy for the remaining claims would also have been no more than the combination of prior art elements according to known methods to yield predictable results.

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Petitioner establishes, by a preponderance of the evidence, that claims 4, 13, and 22 would have been obvious over the combination of Vornefeld and Ahy and would have been obvious over the combination of Vornefeld, Andersson and Ahy.

Claim 5 depends from claim 3 and recites "wherein said scanning beam information identifies at least one forward error correction code level associated with said one of said directed scanning beam signals." Claims 14 and 23 depend from claims 12 and 21, respectively, and recite limitations substantially similar to the imitation set forth in claim 5. Petitioner asserts Ahy teaches that one of the parameter pairs transmitted from the BSC to the CPE includes forward error detection and correction. *See* Pet. 39–40 (citing Ex. 1006, 11:39–59; Ex. 1003 ¶ 169). Petitioner further asserts that as the feature of these claims is disclosed by Ahy, they are, therefore, obvious over Vornefeld in view of Andersson and Ahy for the same reasons. *Id.* at 50–51. Patent Owner does not present separate arguments for these claims. Based on the evidence of record, we find Petitioner establishes, by a preponderance of the evidence, that claims 5, 14, and 23 would have been obvious over the combination of Vornefeld and Ahy and would have been obvious over the combination of Vornefeld, Andersson and Ahy.

Claim 8 depends from claim 7 and recites "wherein said uplink transmission information further identifies at least one modulation format used by said at least one wireless access device to transmit said uplink data traffic." Claims 17 and 26 depend from claims 16 and 25 respectively, and recite limitations substantially similar to the limitation set forth in claim 8. Petitioner asserts Ahy discloses this limitation through its description that the BSC can inform each CPE individually "the PHY and MAC parameters the selected CPE 130 should use to send messages to the SC 120 during its

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allocated upstream portion." Pet. 40–41 (citing Ex. 1006 15:14–20; Ex. 1003 ¶ 184). Petitioner further asserts that as the feature of these claims is disclosed by Ahy, they are, therefore, obvious over Vornefeld in view of Andersson and Ahy for the same reasons. *Id.* at 50–51. Patent Owner does not present separate arguments for these claims. Based on the evidence of record, we find Petitioner establishes, by a preponderance of the evidence, that claims 8, 17, and 26 would have been obvious over the combination of Vornefeld and Ahy and would have been obvious over the combination of Vornefeld, Andersson and Ahy.

Claim 9 depends from claim 8 and recites "wherein said uplink transmission information further identifies [at least one][9] forward error correction code level used by said at least one wireless access device to transmit said uplink data traffic." Claims 18 and 27 depend from claims 17 and 26, respectively, and recite limitations substantially similar to the limitation set forth in claim 9. Petitioner asserts Ahy teaches that one of the parameter pairs transmitted from the BSC to the CPE includes forward error correction code level. Pet. 42 (citing Ex. 1006, 11:39–59; Ex. 1003 ¶¶ 188–189). Petitioner further asserts that as the feature of these claims is disclosed by Ahy, they are, therefore, obvious over Vornefeld in view of Andersson and Ahy for the same reasons. *Id.* at 50–51. Patent Owner does not present separate arguments for these claims. Based on the evidence of record, we find Petitioner establishes, by a preponderance of the evidence, that claims 9, 18, and 27 would have been obvious over the combination of Vornefeld

[9] Claim 9 recites "at least one at least one forward error correction code level," which appears to be a typographical error. Ex. 1001, 31:18–19.

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and Ahy and would have been obvious over the combination of Vornefeld, Andersson and Ahy.

III. CONCLUSION

Petitioner has demonstrated by a preponderance of the evidence that claims 2–9, 11–18, and 20–27 are unpatentable. [10]

In summary:

Claims	35 U.S.C. §	Reference(s)	Claims Shown Unpatentable	Claims Not shown Unpatentable
2, 3, 6, 7, 11, 12, 15, 16, 20, 21, 24, 25	102(b)	Vornefeld	2, 3, 6, 7, 11, 12, 15, 16, 20, 21, 24, 25	
4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, 27	103(a)	Vornefeld and Ahy	4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, 27	
2, 3, 6, 7, 11, 12, 15, 16, 20, 21, 24, 25	103(a)	Vornefeld and Andersson	2, 3, 6, 7, 11, 12, 15, 16, 20, 21, 24, 25	
4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, 27	103(a)	Vornefeld, Andersson, and Ahy	4, 5, 8, 9, 13, 14, 17, 18, 22, 23, 26, 27	
Overall Outcome			2–9, 11–18, 20–27	

[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).

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IV. ORDER

It is

ORDERED that, based on a preponderance of the evidence, claims 2–9, 11–18, 20–27 of U.S. Patent No. 7,230,931 B2 are held to be unpatentable; and

FURTHER ORDERED that, because this 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.

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