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Paper 39
Entered: September 7, 2016

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

QUALCOMM INC.,
Petitioner,

v.

BANDSPEED, INC.,
Patent Owner.

Case IPR2015-00316[1]
Patent 7,477,624 B2

Before BART A. GERSTENBLITH, DAVID C. McKONE, and PATRICK M. BOUCHER, *Administrative Patent Judges*.

BOUCHER, *Administrative Patent Judge.*

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

[1] Case IPR2015-01581 has been joined with this proceeding

I. INTRODUCTION

A. Background

Marvell Semiconductor, Inc., MediaTek Inc., and MediaTek USA, Inc., filed a Petition (Paper 1, "Pet.") to institute an *inter partes* review of claims 9–12 and 21–24 of U.S. Patent No. 7,477,624 B2 ("the '624 patent"). Bandspeed, Inc. ("Patent Owner") did not file a Preliminary Response. Prior to institution, we granted a motion to terminate the proceeding with respect to Marvell Semiconductor, Inc. Paper 11. Pursuant to 35 U.S.C. § 314, in our Institution Decision (Paper 12, "Dec."), we instituted this proceeding as to each of the challenged claims.

After institution, Qualcomm Inc. filed substantially the same petition in IPR2015-01581 (IPR2015-01581, Paper 1), together with a Motion for Joinder of IPR2015-01581 with the instant proceeding (IPR2015-01581, Paper 2). On September 17, 2015, we granted a motion to terminate this proceeding with respect to MediaTek Inc. and MediaTek USA, Inc., but not as to Patent Owner, leaving only Patent Owner as a party to the proceeding. Paper 20. On November 16, 2015, we granted Qualcomm Inc.'s Motion for Joinder, joining Qualcomm Inc. to the instant proceeding. Paper 21. Qualcomm Inc. ("Petitioner") is now the sole petitioner.

After institution of trial, Patent Owner filed a Response (Paper 26, "PO Resp."), and Petitioner filed a Reply to the Patent Owner's Response (Paper 27, "Reply"). An oral argument was held on May 26, 2016, and the transcript was entered into the record. Paper 38 ("Tr.").

Petitioner relies on the testimony of Zhi Ding, Ph.D. Ex. 1002 ("Ding Decl."); Ex. 1017 ("Supp. Ding Decl."). Patent Owner relies on the testimony of Jose Luis Melendez, Ph.D. Ex. 2001 ("Melendez Decl.").

We have jurisdiction under 35 U.S.C. § 6(c). This Decision is a final written decision under 35 U.S.C. § 318(a) as to the patentability of the challenged claims. Based on the record before us, Petitioner has demonstrated, by a preponderance of the evidence, that claims 9, 10, 12, 21, 22, and 24 are unpatentable, but has not demonstrated that claims 11 and 23 are unpatentable.

B. The '624 Patent

The '624 patent was filed on April 3, 2006, as a continuation of U.S. Patent Application No. 09/948,488, which was filed on September 6, 2001, and issued as U.S. Patent No. 7,027,418. Ex. 1001 [63]. The '624 patent also claims the benefit of the filing date of U.S. Provisional Application No. 60/264,594, filed on January 25, 2001. *Id.* at [60].

The '624 patent relates to managing the use of communications channels based on channel performance. Ex. 1001, col. 1, ll. 46–48. Figure 2 of the '624 patent is reproduced below.

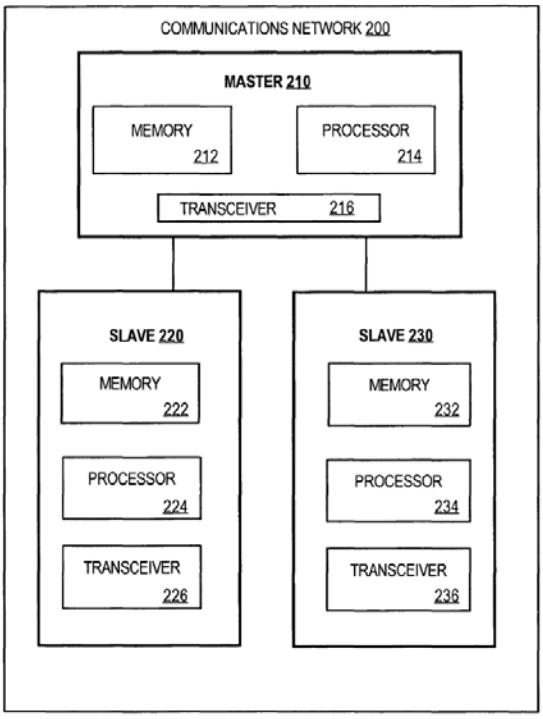

Figure 2 is a block diagram that depicts a communications network having "master" communications device 210 and multiple "slave" communications devices 220 and 230, each of which includes a memory, a processor, and a transceiver. *Id.* at col. 9, ll. 53–63. To manage the use of communications channels between the master and slaves via the respective transceivers, an initial set of channels is selected based on selection criteria at the start-up of the communications network. *Id.* at col. 6, ll. 19–21. Additional sets of channels then are selected periodically for adaptive avoidance of interference. *Id.* at col. 6, ll. 21–23.

For example, master 210 may select a set of communications channels from default communications channels for a specified communications protocol, generate identification data for the selected set of channels, and transmit the identification data to slave 220. *Id.* at col. 9, l. 64–col. 10, l. 3. If slave 230 is incapable of using the selected set of channels, master 210

communicates with slave 220 using the selected set of communications channels and communicates with slave 230 using the default communications channels for the specified communications protocol. *Id.* at col. 10, ll. 4–15.

The ’624 patent describes various techniques for assessing performance of communications channels that include the use of special test packets (*id.* at col. 10, l. 33–col. 12, l. 35), a received signal strength indicator (“RSSI”) (*id.* at col. 12, l. 37–col. 13, l. 2), and cyclic redundancy checks (“CRC”) (*id.* at col. 13, l. 50–col. 14, l. 6). Communications channels are classified based on channel performance as determined by such assessments and according to classification criteria. *Id.* at col. 14, ll. 63–65. In a particular implementation, a “referendum” approach is used in which participant devices “vote” whether to use a particular channel. *Id.* at col. 16, ll. 65–66. The votes may be used according to various approaches, such as through the use of weighted votes, in determining final channel classifications. *Id.* at col. 17, ll. 25–34.

C. Illustrative Claim

Independent claim 9 (as amended by a Certificate of Correction dated March 17, 2009) is illustrative of the claims at issue:

> 9. A computer-readable medium carrying instructions for managing the use of communications channels for a communications system, wherein processing of the instructions by one or more processors causes:
>
> selecting, based upon performance of a plurality of communications channels at a first time, a first set of two or more communications channels from the plurality of communications channels;

the first set of two or more communications channels to be used for communications between a pair of participants;

selecting, based upon performance of the plurality of communications channels at a second time that is later than the first time, a second set of two or more communications channels from the plurality of communications channels; and

the second set of two or more communications channels to be used for communications between the pair of participants instead of the first set of two or more communications channels,

wherein the pair of participants includes a first participant and a second participant, wherein a default set of two or more communications channels is associated with a hopping sequence and is not changed based on the performance of the plurality of communications channels, and the computer-readable medium further comprising instructions, which when processed by the one or more processors, cause:

the first participant communicating with a third participant over the default set of two or more communications channels while communicating with the second participant over the first set of two or more communications channels and while communicating with the second participant over the second set of two or more communications channels.

D. References

Petitioner relies on the following references.

Gerten	US 6,760,319 B1	July 6, 2004	Ex. 1003
Cuffaro	US 6,418,317 B1	July 9, 2002	Ex. 1004
Gendel	US 6,115,407	Sept. 5, 2000	Ex. 1005
Haartsen	US 7,280,580 B1	Oct. 9, 2007	Ex. 1006
Sage	US 5,781,582	July 14, 1998	Ex. 1007

E. Instituted Grounds of Unpatentability

We instituted trial on the following grounds of unpatentability. Dec. 22–23.

Reference(s)	Basis	Claims Challenged
Gerten	§ 102(e)	9, 12, 21, and 24
Gerten and Cuffaro	§ 103(a)	10, 11, 22, and 23
Gendel and Haartsen	§ 103(a)	9, 12, 21, and 24
Gendel, Haartsen, and Sage	§ 103(a)	10 and 22

F. Related Matters

The ’624 patent has been asserted in several lawsuits in the United States District Court for the Western District of Texas. Pet. 1; Paper 6, 2–3. Those cases include *Bandspeed, Inc. v. Qualcomm Inc.*, 1:14-CV-00436 (W.D. Tex.) (“*Qualcomm* Litigation”).

The ’624 patent is also the subject of *inter partes* review in IPR2015-00314 and IPR2015-00315. U.S. Patent No. 7,903,608 B2 (“the ’608 patent”), which issued from a continuation application based on the application issuing as the ’624 patent, is the subject of IPR2015-00237, which was terminated on August 12, 2015 (IPR2015-00237, Paper 19). U.S. Patent No. 8,542,643, which is a divisional of the ’608 patent, is the subject of *Marvell Semiconductor, Inc. v. Bandspeed, Inc.*, Case IPR2015-00531. Cases IPR2015-00314, IPR2015-00315, and IPR2015-00531 were argued together with this proceeding at the May 26, 2016, oral hearing.

II. ANALYSIS

A. Claim Construction

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); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278 (Fed. Cir. 2015) ("We conclude that Congress implicitly approved the broadest reasonable interpretation standard in enacting the AIA."), *aff'd sub nom. Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012).

1. "hopping sequence"

Each of challenged claims 9, 10, 22, and 24 recites a "hopping sequence." Petitioner's declarant, Dr. Zhi Ding, attests that the phrase is "a well-understood term of art." Ding Decl. ¶ 35 (citing Ex. 1016, 127–33). Consistent with Dr. Ding's testimony, we applied a preliminary construction of "hopping sequence" in the Institution Decision as "the order in which the communications network hops among the set of frequencies." Dec. 7. That construction is not contested by Patent Owner, and we adopt it for this Final Written Decision.

2. "votes to use the particular communications channel"

The noun phrase "votes to use the particular communications channel" is recited in each of challenged claims 11 and 23. The term "vote"

is not defined in the Specification of the ’624 patent. In the Institution Decision, we applied a preliminary construction of “votes to use the particular communications channel” as “expressions of preference for using the particular communications channel,” a construction that rejected Petitioner’s further proposal that the phrase alternatively encompasses indications whether the communications channel is “good or bad.” Dec. 7–8. The parties do not present arguments that cause us to reconsider that aspect of the construction.

Patent Owner “submits that ‘votes to use the particular communications channel’ should be construed to mean ‘expressions of preference <u>of participants</u> for using the particular communications channel,’” with underscoring to indicate words it proposes to add to the Board’s preliminary construction. PO Resp. 6. Patent Owner contends that “all of the embodiments” discussed in the Specification of the ’624 patent “are limited to originating from participant devices involved in the communications and are intended to be used to determine the best channels for communication among those same participants.” *Id.* This contention is not disputed by Petitioner, and we find no counterexamples in the Specification. Patent Owner reasons that omission of reference to participants in the construction of the phrase “would be unduly broad and not supported by the specification and would not be how a [person of ordinary skill in the art] would understand that limitation in view of the specification.” *Id.* at 7–8 (citing Melendez Decl. ¶ 27).

We are not persuaded by this reasoning. As Petitioner observes, the embodiments of the ’624 patent identified by Patent Owner are characterized

as "examples," and a person of ordinary skill "would understand that the example scenarios of the specification are not necessarily limiting on the claims." Reply 3 (citing Ding Supp. Decl. ¶ 6). In addition, Petitioner notes that claim language in related patents owned by Patent Owner explicitly refers to participants, evidencing Patent Owner's understanding "how to expressly create participant-specific voting requirements in claims." *Id.* at 3.

At the oral hearing, Patent Owner suggested that explicit reference to participants in such other claim language "was because it wanted to clarify that each participant got a single vote," and explained its position that, in the claims at issue in this proceeding, "participant is implicit in the claim language as it is." Tr. 78:16–25. But the claims are directed to a "communications device," and recite "votes" in the context of what the "particular communications channel" "receives." Nothing within the structure of the claims requires resolving the origin of such votes.

Furthermore, Patent Owner's proposed construction is inconsistent with the construction it agreed to before the district court in the *Qualcomm* Litigation. In that litigation, the parties agreed that the term "vote" should be construed as "a binary expression (to use or not to use)," a construction that makes no reference to the origin of the "vote" as from a participant or otherwise. Ex. 1018, 6. We see no compelling reason to excuse the inconsistency by adopting a narrower construction when the Board applies a claim-construction standard (broadest reasonable interpretation) that could only result in the same or a broader construction. *See Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1351 (Fed. Cir. 2001) ("A patent may not, like a 'nose of wax,' be twisted one way to avoid anticipation and

another to find infringement." (quoting *Sterner Lighting, Inc. v. Allied Elec. Supply, Inc.*, 431 F.2d 539, 544 (5th Cir. 1970))).

Accordingly, we construe "votes to use a particular communications channel" as "expressions of preference for using the particular communications channel."

3. "while"

Independent claim 9 and dependent claim 24 require that different sets of communications channels be used with the second and third communications devices:

> the first participant communicating with a third participant over the default set of two or more communications channels *while* communicating with the second participant over the first set of two or more communications channels and *while* communicating with the second participant over the second set of two or more communications channels

(emphases added). In the Institution Decision, we construed "while" in this context such that the claim language does not require simultaneous communications, only that communication can take place with multiple devices during the same time period, such as with interleaved communications. Dec. 11. Such a construction is consistent with a general-dictionary definition of "while" as "during the time that." *See* Ex. 1012, 1376; Pet. 20 n.7. Patent Owner addresses that construction as follows:

> To the extent the Board is suggesting that a device need not be capable of simultaneous communication with multiple participants over different sets of channels but is still requiring that the device, *in a single configuration*, be capable of communication with multiple participants over different sets of

> channels, Patent Owner does not object to this claim construction.

PO Resp. 8 (emphasis added). Patent Owner's characterization presents a gloss on the construction we applied in the Institution Decision by requiring that a device communicate over different sets of channels "in a single configuration." But Patent Owner provides insufficient reasoning to support a contention that the claim language is limited to "a single configuration" in the manner proposed.

We construe "while," as recited in claims 9 and 24, as requiring that communication take place with multiple devices during the same time period, such as with interleaved communications, but not requiring simultaneous communication with the multiple devices.

B. Grounds Based on Gerten

Gerten relates to improving noise and interference immunity by "removing channels in a frequency hopping scheme having strong interference or interferers in a wireless communication system." Ex. 1003, col. 2, ll. 34–37. Figure 1 of Gerten is reproduced below.

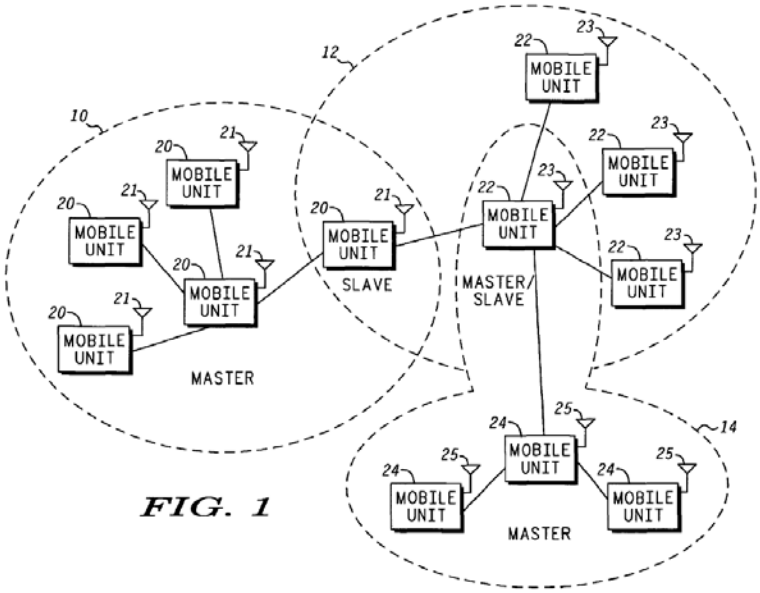

FIG. 1

Figure 1 illustrates operation of three piconets 10, 12, and 14 that form a scatternet. *Id.* at col. 3, ll. 8–10. A piconet is a collection of devices that can be connected via Bluetooth technology in an ad hoc fashion. *Id.* at col. 3, ll. 10–12. As shown in the drawing, first piconet 10 has a plurality of mobile units 20 that include a master mobile unit and multiple slave mobile units, one of which is also a slave of second piconet 12. *Id.* at col. 3, ll. 27–33. Gerten defines a "master unit" as a "device in a piconet whose clock and hopping sequence are employed to synchronize other devices in the piconet—devices in a piconet that are not the master are typically slaves." *Id.* at col. 3, ll. 22–26.

In determining channels to be avoided, a master device in the piconet determines which channels have the strongest interference. *Id.* at col. 4, ll. 50–51. This may be accomplished with "signal strength measurements on N number of channels (N being an integer) of the frequency hopping scheme to determine M number of channels (M being an integer less than or equal to N) to avoid." *Id.* at col. 2, ll. 37–41. The frequency hopping scheme then is

modified to avoid transmission over the M channels, and the M channels to avoid can be communicated to wireless units involved in the communication system, allowing members of the communication system to frequency hop together over the remaining N–M good channels in a modified frequency hopping scheme. *Id.* at col. 2, ll. 41–52, col. 4, ll. 47–58. "[T]he master device periodically updates the channels to be avoided," resulting in a similar modification to the frequency hopping sequences. *Id.* at col. 4, ll. 58–65.

1. Claim 9

Petitioner challenges independent claim 9 as anticipated by Gerten. Pet. 13–20. In its analysis drawing a correspondence between the limitations of independent claim 9 and the disclosure of Gerten, Petitioner identifies the piconet of Gerten as a "communications system," noting that the central control system in the master mobile unit includes a computer-readable medium and one or more processors to cause the device to perform functions. Pet. 13–14 (citing Ex. 1003, col. 3, ll. 8–12, 40–48, col. 3, ll. 1–6). Petitioner further draws a correspondence between the recited "first participant" and the master mobile unit of Gerten, and identifies the slave units as functioning as "second" and "third" participants. *Id.* at 18. In addition, Petitioner identifies the recited selection of communications channels as disclosed by Gerten's description of modified hopping schemes, noting Gerten's specific disclosure of periodic updating of the modified frequency hopping schemes to conclude that Gerten discloses selection at different times. *Id.* at 14–15, 16–17. As Petitioner observes, the

communications channels are used for communications by an identified pair of participants. *Id.* at 16, 17. We agree with Petitioner's identified correspondences and find that these claim limitations are disclosed by Gerten.

In addressing independent claim 9's specific requirement that different sets of channels be used with the second and third communications devices, Petitioner reasons that the process summarized above may be applied by the master device to each of the slave devices separately: "the master device of Gerten performs a service discovery request to determine if *each* slave device has interference avoidance capabilities." *Id.* at 19 (emphasis added) (citing Ding Decl. ¶ 53; Ex. 1003, col. 4, ll. 38–51). Thus, Petitioner argues, if one slave has such interference avoidance capabilities, communications with that slave may take place using a modified frequency hopping scheme; if another (legacy) slave lacks such interference avoidance capabilities, communications take place using a normal mode with default communications channels that are not changed based on channel performance. *Id.* (citing Ding Decl. ¶ 54); *see id.* at 17–18. Thus, Petitioner concludes, the recited communications with the third communications device over default communications channels occur "while" communicating with the second communications device over the first and second sets of communications channels, as we have construed the term "while." Petitioner supports this reasoning with testimony by Dr. Ding, which we credit. *Id.* at 19–20 (citing Ding Decl. ¶¶ 52–54).

Patent Owner responds that "the Gerten device is not capable of and expressly teaches away from performing this functionality." PO Resp. 15

(citing Melendez Decl. ¶ 32). Patent Owner contends that "Gerten's disclosure is directed toward eliminating channels for use in *an entire piconet* as opposed to eliminating channels for use by certain participants within a piconet." *Id.* (emphasis added). Patent Owner argues that Gerten does not disclose a selection kernel capable of maintaining synchronization between a master and more than one slave in a piconet, with the master and one slave using a default set of channels while the same master and a different slave use a different set of channels. *Id.* We are not persuaded that the absence of a specific teaching of such a selection kernel supports the conclusion that one of skill in the art would understand Gerten to function in the manner Patent Owner suggests.

In this instance, Petitioner refers to two embodiments of Gerten "in which a first participant communicates with a second participant via a normal sequence and with another participant via an adaptive hopping sequence." Reply 5. First, Figure 3 of Gerten is reproduced below.

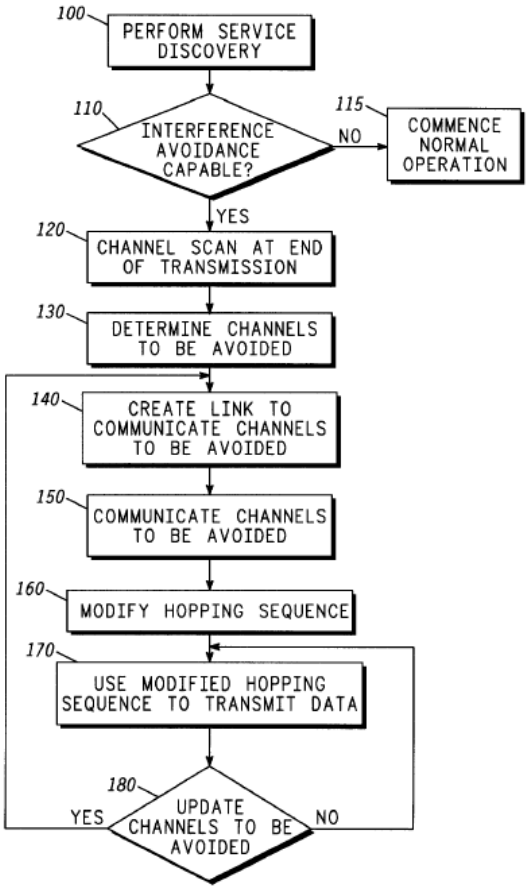

FIG. 3

Figure 3 illustrates "methodology for determining and communicating channels to be avoided to a remote device." Ex. 1003, col. 2, ll. 4–6. As illustrated in the drawing, a master unit performs a discovery process (block 110) upon connecting with a new slave unit. Ding Decl. ¶¶ 58, 61. If the slave unit is capable of using interference avoidance, the master unit begins the process of determining a modified set of channels for use (block 120). *Id.* ¶ 46. If a second slave unable to use interference avoidance enters the piconet, standard frequency hopping is used. Supp. Ding Decl. ¶ 9. Under Patent Owner's characterization of Gerten, entry of the second slave into the network would require the first slave necessarily to revert back

to the default hopping sequence. *Id.* ¶ 10. But this would undermine the stated benefits of Gerten, which explicitly discloses:

> The above process can be applied to a Bluetooth example and includes identification of a Bluetooth device's ability to support interference avoidance, the measurements of signal strength on all channels and identification of which channel should not be used without violating the FCC rules, a method of modifying the Bluetooth hop sequence so that *it will avoid channels containing strong or fixed interferers while still supporting standard Bluetooth hopping* with other non-enabled members of the piconet and a method of relating necessary interference avoidance information to the remote Bluetooth devices.

Ex. 1003, col. 4, l. 66–col. 5, l. 9 (emphasis added).

Second, Figure 1 of Gerten, reproduced above, illustrates an embodiment in which a single mobile unit acts as a master in one piconet and acts as a slave in a second piconet, where the two piconets are expressly described as "independent" and "non-synchronized." Ex. 1003, col. 3, ll. 15–39. As a slave in one piconet, the mobile unit may use interference avoidance while maintaining a normal hopping sequence in another piconet with a legacy slave unable to use adaptive methods. *See* Supp. Ding Decl. ¶ 12. Accordingly, a first participant (i.e., the mobile unit that acts as both master and slave) is able to communicate with a participant via a standard

hopping sequence while communicating with a different participant via an adaptive hopping sequence. *See* Reply 7–8[2]; Supp. Ding Decl. ¶ 12.

Nor are we persuaded by Patent Owner's contention that Gerten teaches away from the claim limitations. *See* PO Resp. 15. A prior-art reference does not teach away from the claimed subject matter unless the prior-art reference also criticizes, discredits, or otherwise discourages the solution claimed. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004). In support of this contention, Patent Owner relies on testimony by Dr. Melendez that "the only selection kernels (Gerten Fig. 6 and Fig. 7) disclosed for the transceiver (Gerten Fig. 2) in Gerten are expressly not capable of providing the subject claimed limitations of the [']624 patent as is discussed below, and so would serve only to teach away from the claim." Melendez Decl. ¶ 32. Even if Dr. Melendez's statement is accurate, such examples in Gerten do not meet the "teaching away" standard because the mere use of examples in a reference that function in a different way does not criticize, discredit, or otherwise discourage the solution claimed. In addition, "[t]eaching away is irrelevant to anticipation." *Seachange Int'l, Inc. v. C-Cor, Inc.*, 413 F.3d 1361, 1380 (Fed. Cir. 2005).

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that independent claim 9 is anticipated by Gerten.

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[2] Petitioner's argument regarding this embodiment was not made in the Petition, but is properly responsive to Patent Owner's argument that the Gerten device is not capable of performing the functionality recited in the claims. Nevertheless, we note that our decision does not hinge on this embodiment because of the other Gerten embodiment discussed above.

2. Claim 12

Petitioner challenges claim 12 as anticipated by Gerten. Pet. 20–23. Dependent claim 12 recites instructions that cause sets of communications channels to be loaded into registers of the communications devices after selecting the sets of communications channels. In addressing these limitations, Petitioner observes that Gerten discloses that the master device and slave devices include register banks that are loaded with synthesizer code words. *Id.* at 20–21 (citing Ex. 1003, col. 2, ll. 47–52, col. 7, ll. 11–18). Petitioner contends that references in claim 12 to "causing the . . . set[s] of two or more communications channels to be loaded into . . . register[s]" does not require that the channels themselves be loaded into registers, but that channel *identifiers* be loaded. *Id.* at 20.

Although the claim does not expressly recite "identifiers," Petitioner's contention is consistent with the Specification of the '624 patent, which explains that "'after a participant has received the set of selected communications channels, the participant stores **data that indicates the new set of selected channels**.'" *Id.* at 21 (quoting Ex. 1001, col. 19, ll. 27–30, emphasis by Petitioner). Petitioner's reasoning that the synthesizer code words described by Gerten act to identify channels used in the frequency hopping sequences and are loaded in registers of the master and slave devices is supported by the declarant testimony of Dr. Ding, which we credit. *See* Ding Decl. ¶ 58.

Patent Owner does not raise an argument directed to the express limitations of claim 12, and particularly does not challenge Petitioner's contention that Gerten's teaching of loading channel identifiers discloses this

limitation. Patent Owner's only position with respect to claim 12 is that it "depends from independent claim 9 and, therefore, contains all of the limitations of claim 9." PO Resp. 19. Because we disagree with Patent Owner's position expressed with respect to claim 9, we also disagree with it with respect to claim 12.

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claim 12 is anticipated by Gerten.

3. Claims 21 and 24

Petitioner challenges claims 21 and 24 as anticipated by Gerten. Pet. 23–24. Independent claim 21 and dependent claim 24 each recite a combination of limitations that appear in claims 9 and 12. Petitioner provides a chart explaining where Petitioner addresses these limitations in its analysis of claims 9 and 12. Patent Owner does not address claim 21.[3] For claim 24, Patent Owner asserts that the "first participant communicating . . ." limitation of claim 9 is recited in those claims and refers to its arguments regarding that limitation as presented in the context of claim 9. PO Resp. 19. We have reviewed Petitioner's claim charts, and we agree that Gerten discloses each and every element of claims 21 and 24 for the same reasons discussed with respect to claim 9.

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claims 21 and 24 are anticipated by Gerten.

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[3] Patent Owner appears to concede that claim 21 is anticipated by Gerten. *See* PO Resp. 9–10 ("[W]ith the exception of Ground 1 [anticipation by Gerten], claim 21, [the] proposed grounds of unpatentability fail for several reasons.").

4. Claims 10 and 22

Petitioner challenges claims 10 and 22 as unpatentable under 35 U.S.C. § 103(a) over Gerten and Cuffaro. Pet. 24–31. Claims 10 and 22 depend respectively from independent claims 9 and 21, and recite that "only one communications channel" of the first and second sets of two or more communications channels is used at each hop in the hopping sequence. Petitioner relies on Gerten's disclosure of Bluetooth frequency hopping as an example, noting that "[i]n a hopping sequence based on a [frequency hopping] protocol such as used in Bluetooth, only one communications channel is used for communications between a first device and a second device at each hop." *Id.* at 26 (citing Ex. 1001, col. 1, ll. 13–15, col. 1, ll. 39–55; Ding Decl. ¶¶ 94, 95). We agree with this identification.

Each of claims 10 and 22 also recites that "the performance of the plurality of communications channels is based on channel performance data that is transmitted over one or more of the plurality of communications channels based on the hopping sequence according to the frequency hopping protocol." Petitioner acknowledges that "Gerten does not explicitly disclose this limitation." *Id.* at 28. For this limitation, Petitioner relies on Cuffaro, which relates to managing frequency allocations to a cell in cellular telephone systems. Ex. 1004, col. 1, ll. 7–9. Cuffaro discloses transmission of performance data from remote devices to a base station, which Petitioner respectively associates with the slave and master devices of Gerten. *See* Pet. 28–29. A quality metric is obtained from measurements of both assigned and unassigned frequency channels that are reported back to the

base station. Ex. 1004, col. 7, ll. 23–47. Because Cuffaro does not limit the type of communications link used for such reporting, Petitioner reasons, and we agree, that "one skilled in the art would consider it obvious for the slave device in Gerten to perform the interference signal strength measurements" and to communicate channel performance data measured by the slave device over one or more of the plurality of communications channels based on the hopping sequence. Pet. 29. Petitioner supports this reasoning with declaration testimony by Dr. Ding. Ding Decl. ¶ 100.

Petitioner further provides persuasive reasoning why a person of ordinary skill in the art would have combined the relevant teachings of Gerten and Cuffaro, including that "Cuffaro and Gerten are in the same field of endeavor" of selecting channels to avoid interference in a communications system; that measuring interference signal strength at a slave device such as described by Cuffaro provides a more accurate determination of the impact of the receiver unit from the interference on a given channel, and, therefore, would provide more accurate identification of bad channels in Gerten; and that Gerten suggests such a modification by describing that both a master and a slave can participate in identifying channels to avoid. Pet. 29–31. Petitioner supports this reasoning with declaration testimony by Dr. Ding. Ding Decl. ¶¶ 101, 102.

Patent Owner responds by observing that, unlike Gerten, "Cuffaro does not relate to communications systems wherein the devices that are communicating with each other . . . are even transmitting or receiving on the same channels." PO Resp. 21. Instead, the cellular telephone systems described by Cuffaro use separate physical channels for uplink and

downlink. Ex. 1004, col. 4, ll. 9–11. Patent Owner contends that, in Cuffaro, performance data cannot be sent back on the same set of channels on which they were received, and, therefore "[a] mobile station of Cuffaro cannot transmit channel performance data 'over one or more of the plurality of communications channels.'" PO Resp. 21–22. Dr. Melendez agrees. Melendez Decl. ¶¶ 41–43.

Even accepting that Patent Owner's contention regarding Cuffaro is factually accurate does not lead to the conclusion that Petitioner's reasoning regarding the combination of Gerten and Cuffaro is deficient. Petitioner does not propose simply to incorporate the performance-data communication mechanism of Cuffaro into the system of Gerten. Rather, Petitioner relies on Cuffaro's teaching of communicating performance data between devices, and applying that teaching to the system described by Gerten. *See* Reply 9–10. That Cuffaro incidentally uses different frequencies for uplink and downlink communications does not diminish the relevance of the teaching identified by Petitioner.

For these reasons, Patent Owner makes too broad a general assertion that Petitioner's challenge of claims 10 and 22 is "based solely on 'mere conclusory statements' and fail[s] to present any cogent reasoning as to why a [person of ordinary skill in the art] would have or even could have combined Gerten and Cuffaro to arrive at the claimed invention." *See* PO Resp. 38. Patent Owner's contention that "the disclosures of Gerten and Cuffaro are non-analogous" also insufficiently responds to Petitioner's full argument. *See id.* at 39.

> Two criteria have evolved for determining whether prior art is analogous: (1) whether the art is from the same field of

> endeavor, regardless of the problem addressed, and (2) if the reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved.

In re Clay, 966 F.2d 656, 658–59 (Fed. Cir. 1992) (citing *In re Deminski*, 796 F.2d 436, 442 (Fed. Cir. 1986); *In re Wood*, 599 F.2d 1032, 1036 (CCPA 1979)). Patent Owner understates the degree to which Petitioner addresses the analogousness of the art by focusing on Petitioner's contention that Gerten and Cuffaro are in the same field of endeavor. PO Resp. 39–40 (citing Pet. 30). Petitioner also addresses the second prong of the *Clay* test by providing reasons why a person of skill in the art would use the transmitted performance data of Cuffaro in the selection process of Gerten, including improved accuracy in determining the impact on the receiver unit from the interference on a given channel. *See* Pet. 30–31. We agree with Petitioner's reasoning and find that Cuffaro and Gerten are analogous art to the claimed invention at least because they are reasonably pertinent to the particular problem with which the inventor was involved.

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claims 10 and 22 are unpatentable under 35 U.S.C. § 103(a) over Gerten and Cuffaro.

5. Claims 11 and 23

Petitioner challenges claims 11 and 23 as unpatentable under 35 U.S.C. § 103(a) over Gerten and Cuffaro. Pet. 31–36. In addition to reciting that selection of the sets of communications channels is based on the performance of the communications channels, claims 11 and 23 each recite

that "the channel selection criteria specifies that for a particular communications channel to be selected, the particular communications channel receives a specified number of votes to use the particular communications channel from among a plurality of votes." Petitioner acknowledges that Gerten does not disclose such voting criteria and relies on Cuffaro for this limitation. Pet. 31–36. Petitioner identifies a procedure described by Cuffaro in which wireless devices vote "for the unassigned frequency channel or the assigned idle frequency channels based upon the results of the measurements." *Id.* at 32 (citing Ex. 1004, col. 8, ll. 10–12). Depending on the value of adjusted interference measurements, the Cuffaro procedure casts votes for or against particular frequencies. *See* Ex. 1004, col. 7, l. 55–col. 11, l. 6. The unassigned frequency channel that has the maximum number of positive votes is selected to replace the corresponding assigned frequency channel. *Id.* at col. 10, ll. 34–53.

We disagree with Petitioner's assertion that "[t]he **maximum number of positive votes** is a '*specified number of votes*' in the context of claims 11 and 23." Pet. 35. The maximum number of positive votes may vary and is not a "specified number." *See* Melendez Decl. ¶ 47. Petitioner asserts an alternative position in its obviousness challenge that a person of ordinary skill in the art "would recognize that instead of using the 'maximum number of positive votes,' a specific number of positive votes (e.g., +6) could be used to select channels for replacement in Cuffaro." Pet. 35–36 (citing Ding Decl. ¶ 110).

In the Institution Decision, we credited the testimony of Dr. Ding on this point. Dec. 15–16. In light of the full evidence developed during trial,

we reconsider that determination anew.[4] *See In re Magnum Oil Tools Int'l, Ltd.*, No. 2015-1300, 2016 WL 3974202, at *7 (Fed. Cir. July 25, 2016) ("the Board has an obligation to assess the question anew after trial based on the totality of the record"). Dr. Melendez disagrees with Dr. Ding, and characterizes Dr. Ding's statement as "singular and bare, without any support provided." Melendez Decl. ¶ 47. We agree with Dr. Melendez's assessment, and further find that the following additional explanation in Dr. Ding's Supplemental Declaration is insufficient to support a conclusion of obviousness: "Such selections of vote levels reflect threshold levels of quality for a channel and it would be obvious to select any particular threshold for channel quality based on design choices that dictate performance of the overall communication system." Supp. Ding Decl. ¶ 14. Instead, we find the following reasoning provided by Dr. Melendez compelling:

> [T]he "votes" in Cuffaro are . . . for the use of specific "channel equipment" that are either a base station or a mobile station to determine which unassigned frequencies to use, where those frequencies are exclusively used in a "one-way" direction. Stated differently, Cuffaro's referendum is between assigned and unassigned one-way frequencies to determine which unassigned frequency swaps out an assigned frequency. It would make no sense for this to be a specified number, since in Cuffaro's cellular systems there is no option for the number of assigned frequencies used to vary.

[4] Although here we mention expressly that we reconsidered the evidence anew, we have done just that throughout this Decision with respect to each of the elements of the challenged claims and the evidence and arguments contained in the full record before us.

Melendez Decl. ¶ 47. Although Dr. Ding reviewed the Declaration of Dr. Melendez (*see* Supp. Ding Decl. ¶ 2), Dr. Ding does not identify any specific flaw in Dr. Melendez's reasoning, which is consistent with operation of the cellular-telephone systems described by Cuffaro.

We conclude that Petitioner has not demonstrated, by a preponderance of the evidence, that claims 11 and 23 are unpatentable under 35 U.S.C. § 103(a) over Gerten and Cuffaro.

C. Grounds Based on Gendel and Haartsen

Gendel describes a frequency hopping communication system with error detection capabilities. Ex. 1005, col. 1, ll. 17–20. Figure 1 of Gendel is reproduced below.

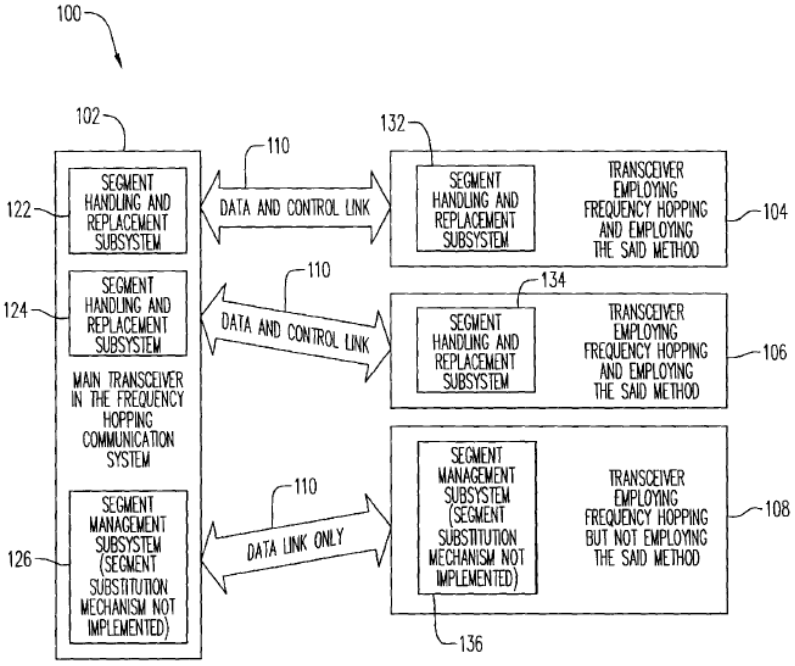

FIG. 1

Figure 1 is a block diagram of the frequency hopping communication system. *Id.* at col. 5, ll. 65–67. Communication system 100 includes primary system 102, which performs frequency hopping communication with secondary systems 104, 106, and 108 across communication links 110. The primary system and the secondary systems include subsystems "adapted to transmit and receive data according to a spreading code designating a segment hopping sequence or pattern (e.g., S_0, S_2, S_5, S_6 and S_7), with the hopping frequencies being contained within the used segments." *Id.* at col. 7, ll. 14–18. Error values are stored for each segment used in the segment hopping sequence and modified in response to detection of reception errors. *Id.* at col. 7, ll. 20–28. When the error value of a particular used segment reaches or exceeds a predetermined threshold, the subsystems replace the used segment and all of its hopping frequencies with an unused segment, and notify the other communicating party of the replacement in the hopping pattern. *Id.* at col. 7, ll. 28–37.

Figures 2A (top) and 2B (bottom) of Gendel are reproduced below.

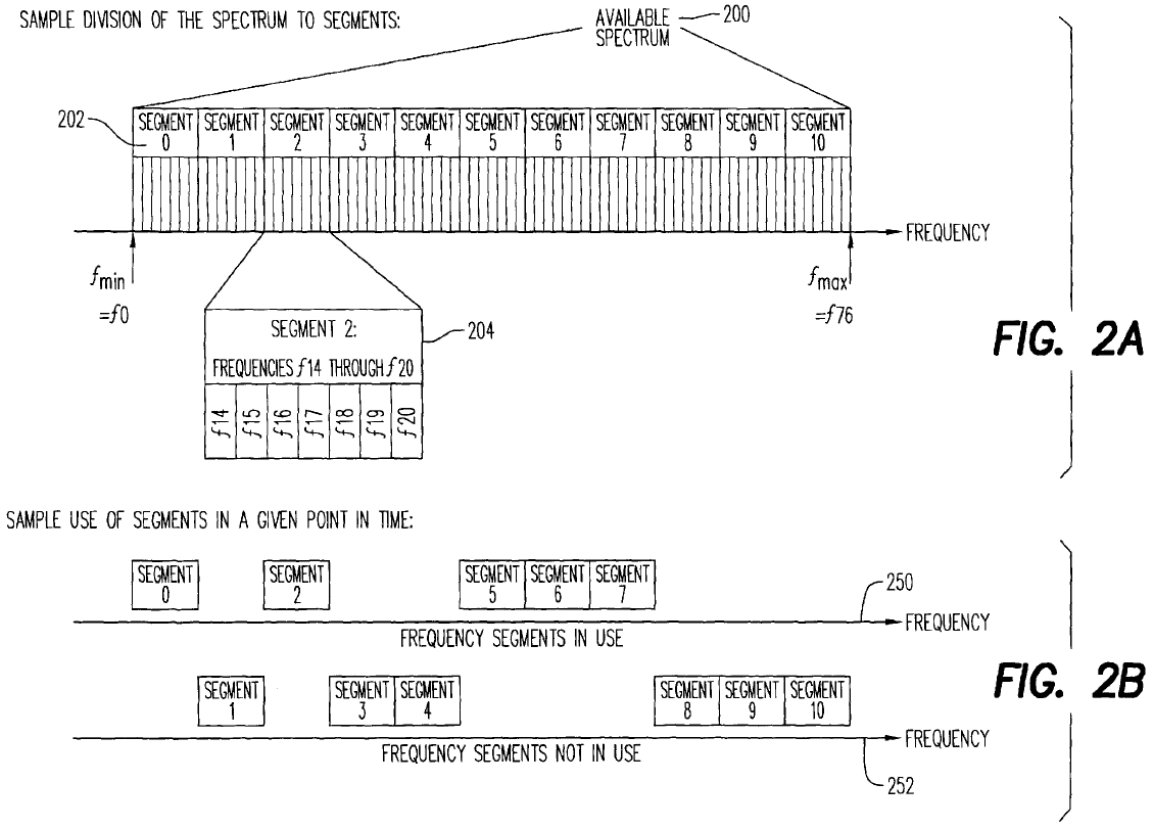

Figure 2A (top) illustrates a sample division of a spectrum and Figure 2B (bottom) illustrates a sample segment hopping pattern at a point in time. *Id.* at col. 5, ll. 49–53. Each segment includes a contiguous subset of available frequencies, and Petitioner draws a correspondence between the "segments in Gendel (and their respective frequencies)" and the "communications channels" recited in the claims of the '624 patent. Pet. 41–42.

Haartsen discloses a "channel hopping communication system that includes a sequence of hop channels, wherein the sequence comprises a set of forbidden hop channels and a remaining set of allowable hop channels." Ex. 1006, col. 5, ll. 53–56. A hop channel selected from the sequence may

be an allowable hop channel, in which case it is used for communication; or it may be a forbidden hop channel, in which case a parameter is used to select a substitute hop channel from the set of allowable hop channels, with the substitute hop channel being used for communication. *Id.* at col. 5, ll. 56–65. "With this strategy, the resultant hopping sequence is identical to the original hopping sequence whenever the original sequence calls for an allowable hop channel," and "[i]n all other cases, a substitute hop channel is dynamically selected from the set of allowable hop channels." *Id.* at col. 5, l. 65–col. 6, l. 3.

1. Claim 9

Petitioner challenges independent claim 9 as unpatentable under 35 U.S.C. § 103(a) over Gendel and Haartsen. Pet. 38–46. In its analysis drawing a correspondence between the limitations of independent claim 9 and the disclosure of Gendel, Petitioner identifies the combination of Gendel's primary and secondary systems as a "communications system," with the primary system acting as the "first participant" and different ones of the secondary systems acting as the "second" and "third" "participants." Pet. 38, 44–45. In addition, Petitioner reasons that the recited "selecting" of sets of communications channels at the "first" and "second" times is "based upon performance" of the communications channels because Gendel teaches replacement of segments as a result of monitoring error values. *Id.* at 40–44.

As part of its analysis, Petitioner contends that communications with a "third communications device" (a second secondary system) can occur over a default set of communications channels "while" communicating with a

second communications device (a first secondary system) "over the first set of two or more communications channels" and "while" communicating with the second communications device "over the second set of two or more communications channels." *Id.* at 45–46. Petitioner supports this contention with testimony by Dr. Ding that "this is achieved because [the] primary system . . . includes a separate subsystem to communicate with each secondary system and because FIG. 1 of Gendel illustrates separate links between [the] primary system . . . and each secondary system." Ding Decl. ¶ 133. As shown in Figure 1, reproduced above, segment management subsystem 126 is distinguished from segment handling and replacement subsystems 122 and 124 by the notation "SEGMENT SUBSTITUTION MECHANISM NOT IMPLEMENTED." *See* Ex. 1005, Fig. 1.

In addressing the preamble recitation of "instructions for managing the use of communications channels," Petitioner identifies Gendel's disclosure of a "spreading code control unit" that has channel selection functionality. Pet. 38–40; *see* Ex. 1005, col. 8, ll. 55–60, col. 8, ll. 63–67. Petitioner acknowledges that "Gendel does not explicitly disclose that the spreading code control unit 317 includes or is embodied in the form of '*[a] computer-readable medium carrying instructions*' and '*one or more processors.*'" Pet. 39. Petitioner asserts that a person of skill in the art "would have immediately recognized that the channel selection functionality of Gendel could be implemented using instructions stored in a computer readable medium and executed on a processor in the communications device," and alternatively relies on Haartsen for "explicitly disclos[ing] such an implementation." *Id.* Petitioner identifies, for example, disclosure in

Haartsen that hop selection functions "'may be embodied in any of a variety of forms, including but not limited to hard-wired circuits, or **a processor executing a suitable set of program instructions stored on a computer readable storage medium such as a random access memory (RAM**).'" *Id.* (emphasis by Petitioner) (quoting Ex. 1006, col. 10, ll. 56–65). We are persuaded by both of Petitioner's analyses, namely that based on Gendel alone and that based on the combination of Gendel with Haartsen.

Patent Owner responds that Gendel and Haartsen fail to disclose claim 9's recitation of:

> the computer-readable medium further comprising instructions, which when processed by the one or more processors, cause:
>
> the first participant communicating with a third participant over the default set of two or more communications channels while communicating with the second participant over the first set of two or more communications channels and while communicating with the second participant over the second set of two or more communications channels.

PO Resp. 30–32. Gendel discloses a single transceiver configured to perform the recited functionality. As shown in Figure 1, reproduced above, subsystems 122, 124, and 126 are part of the "MAIN TRANSCEIVER IN THE FREQUENCY HOPPING COMMUNICATION SYSTEM." Dr. Ding confirms the evident understanding of the drawing as showing that primary system 102 (corresponding to the recited "transceiver"), communicates with secondary system 104 (the recited "second participant") and secondary system 108 (the recited "third participant"). Ding Decl. ¶ 112.

Patent Owner argues that "because Gendel's specification contains no discussion or citation to the 'Segment Management Subsystem (Segment

Substitution Mechanism Not Implemented) 126' that Petitioner alleges relates to the default channel set, it is impossible to ascertain how that subsystem would operate." PO Resp. 31. This argument is not persuasive because "a drawing is available as a reference for all that it teaches a person of ordinary skill in the art." *In re Meng*, 492 F.2d 843, 847 (CCPA 1974). Dr. Ding testifies that "Gendel provides block 126 to support legacy communication systems, such as secondary system 108, that do not support segment substitution. Thus, communication between the primary system 102 and a secondary system uses the 'default set of two or more communications channels.'" Ding Decl. ¶ 158. We credit this testimony, which we find corresponds to the natural inference one would draw from Figure 1. As Petitioner asserts, and we agree, "[i]t would make little sense to create specific Bluetooth interference avoidance systems that do not function with legacy devices." Reply 17.

Patent Owner additionally contends that Gendel does not disclose that the second set of communications channels is selected "based upon performance of the plurality of communications channels" as required by claim 9. PO Resp. 32–33. Patent Owner argues that, to disclose this limitation, Gendel would need to teach testing all channels of the plurality of channels. *Id.* We disagree because even evaluating reception errors only on used channels, and not on unused channels, results in selection "*based upon* performance of the plurality of channels" (emphasis added).

We also are not persuaded by Patent Owner's general argument that a person of ordinary skill in the art "would not be motivated to combine Gendel and Haartsen . . . because the level of resolution for

selection/deselection of channels is vastly different in these two references." *Id.* at 40. Patent Owner distinguishes between Haartsen's selection of individual communications channels and Gendel's selection of segments containing multiple segments to conclude that the combination would change the principle of operation of Gendel. *Id.* at 40–42. This contention is unpersuasive because it is ill-matched to the limited purpose for which Petitioner relies on Haartsen, namely for a computer-readable medium carrying instructions for managing communications channels of a communications system, and using one or more processors to process those instructions. *See* Pet. 38–40. We find that Petitioner has articulated sufficient reasoning to support combining the teachings of Gendel and Haartsen.

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claim 9 is unpatentable under 35 U.S.C. § 103(a) over Gendel and Haartsen.

2. Claim 12

Petitioner challenges claim 12, which depends from claim 9, as unpatentable under 35 U.S.C. § 103(a) over Gendel and Haartsen. Pet. 46–49. In addressing the "register" limitations of dependent claim 12, Petitioner observes that Gendel teaches storing its used segments in a segment hopping table after the selection process is complete and updating the segment hopping table by replacing the particular used segment with the unused segment. Pet. 46–47 (citing Ex. 1005, col. 12, ll. 45–48, Fig. 6, step 662); *see* Ding Decl. ¶ 134. Petitioner acknowledges that "Gendel does not

explicitly describe that the table is stored in a '*register*' in each of the primary system (the first participant of '*the pair of participants*') and the secondary system (the second participant of '*the pair of participants*')." Pet. 47–48. But Petitioner supports its contention that "the use of a register to store a table would have been an obvious design choice for a person of ordinary skill in the art" with testimony by Dr. Ding, which we credit and which we find persuasive. *Id.* at 48 (citing Ding Decl. ¶ 135). In addition, Petitioner observes that "Haartsen discloses a similar table stored in a memory and Gendel discloses using registers to store maximum and minimum reception power levels for used segments." *Id.* (citations omitted) (citing Ex. 1006, col. 13, ll. 4–22; Ex. 1005, col. 14, ll. 9–16). We agree with Petitioner's alternative analyses for the limitation of claim 12, namely the analysis based on Gendel alone and that based on the combination of Gendel and Haartsen.

Patent Owner does not respond to Petitioner's arguments except to rely on the arguments we address above related to underlying independent claim 9. *See* PO Resp. 33–34. For the reasons we explain above, those responses do not persuasively rebut Petitioner's showing.

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claim 12 is unpatentable under 35 U.S.C. § 103(a) over Gendel and Haartsen.

3. Claims 21 and 24

Petitioner challenges claims 21 and 24 as unpatentable under 35 U.S.C. § 103(a) over Gendel and Haartsen. Pet. 49–50. Similar to its

analysis of these claims under the Gerten-based grounds, Petitioner provides a chart, at pages 49–50 of the Petition, explaining where it addresses the various limitations of those claims in its analysis of claims 9 and 12. We have reviewed the chart and agree with Petitioner's analysis. Patent Owner does not raise an argument directed to the express limitations of claims 21 and 21, but responds by referring to arguments we address above in the context of claim 9, and by noting the dependency of claim 24 from claim 21. PO Resp. 34. Because we disagree with Patent Owner's position expressed with respect to claim 9, we also disagree with it with respect to claims 21 and 24.

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claims 21 and 24 are unpatentable under 35 U.S.C. § 103(a) over Gendel and Haartsen.

4. Claims 10 and 22

Petitioner challenges claims 10 and 22 as unpatentable under 35 U.S.C. § 103(a) over Gendel, Haartsen, and Sage. Pet. 53–58. In addressing the limitations recited in these claims, Petitioner observes that Gendel discloses that each subsystem, in transmitting and receiving data according to a spreading code, may use a methodology in which a "hopping frequency may be randomly selected from a used segment or be a predetermined frequency from the used segment." *Id.* at 54 (citing Ex. 1005, col. 7, ll. 18–20). Petitioner reasons that Gendel thus discloses that only one communications channel is used for communications between the primary and secondary systems. *Id.* at 54–55.

Petitioner acknowledges that Gendel "does not explicitly disclose that '*the performance of the plurality of communications channels is based on channel performance data that is transmitted over one or more of the plurality of communications channels based on the hopping sequence according to the frequency hopping protocol*,'" as recited in claims 10 and 22. *Id.* at 56. For this limitation, Petitioner cites Sage's disclosure of a mobile station that determines error-rate statistics of frequencies to perform frequency hopping based on signals received from a base station over those frequencies. *Id.* (citing Ex. 1007, col. 8, ll. 12–19).

Petitioner reasons that a person of ordinary skill in the art would have been motivated to use the error statistics provided by the mobile device in the system of Gendel. *Id.* at 57. Petitioner further reasons that, because the primary and secondary systems in Gendel communicate over frequencies used to perform frequency hopping, it would have been obvious to a person of ordinary skill in the art to send the error statistics from a secondary system to the primary system in Gendel over one or more frequencies. *Id.* at 57–58. We agree with Petitioner's reasoning.

Patent Owner responds with an argument that generally parallels the argument addressed above in connection with the combination of Gerten and Cuffaro for these claims. Specifically, Patent Owner contends that

> a mobile station of Sage cannot transmit channel performance data "over one or more of the plurality of communications channels" as required in claims 10 and 22. Because a mobile station can only transmit to the base station on uplink frequency channels that are separate and apart from the downlink frequency channels on which the mobile station receives transmissions from the base station, the performance data is necessarily sent back to the base station on a different plurality of

> communications channels from which the mobile station receives a transmission from the base station.

PO Resp. 35–36. The argument is not persuasive for the same reasons explained above. That is, even accepting Patent Owner's characterization of Sage as requiring separate uplink and downlink channels does not lead to the conclusion that Petitioner's reasoning regarding the combination of Gendel, Haartsen, and Sage is deficient. "The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference." *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

We conclude that Petitioner has demonstrated, by a preponderance of the evidence, that claims 10 and 22 are unpatentable under 35 U.S.C. § 103(a) over Gendel, Haartsen, and Sage.

III. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, based on a preponderance of the evidence, claims 9, 10, 12, 21, 22, and 24 of U.S. Patent No. 7,477,624 B2 are held unpatentable;

FURTHER ORDERED that claims 11 and 23 of U.S. Patent No. 7,477,624 B2 are not held 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.

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