

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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QUALCOMM INC.,  
Petitioner,

v.

BANDSPEED, INC.,  
Patent Owner.

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Case IPR2015-00531<sup>1</sup>  
Patent 8,542,643 B2

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

McKONE, *Administrative Patent Judge*.

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

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<sup>1</sup> Case IPR2015-01582 has been joined with this proceeding.

## I. INTRODUCTION

### A. Background

Marvel Semiconductor, Inc., MediaTek Inc., and MediaTek USA, Inc., filed a Petition (Paper 4, “Pet.”) to institute *inter partes* review of claims 1–15 of U.S. Patent No. 8,542,643 B2 (Ex. 1001, “the ’643 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 Decision to Institute (Paper 12, “Dec.”), we instituted this proceeding as to each of the challenged claims.

After institution, Qualcomm Inc. filed substantially the same petition in IPR2015-01582 (IPR2015-01582, Paper 1) along with a Motion for Joinder of IPR2015-01582 with the instant proceeding (IPR2015-01582, Paper 3). On September 17, 2015, we granted a motion to terminate the 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. Paper 38 (“Tr.”).

Petitioner relies on the testimony of Zhi Ding, Ph.D. Ex. 1002 (“Ding. Decl.”); Ex. 1012 (“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 1–4, 6–9, and 11–14 are unpatentable. Petitioner has not demonstrated, by a preponderance of the evidence, that claims 5, 10, and 15 are unpatentable.

#### *B. Related Matters*

The ’643 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 ’643 patent is a divisional of U.S. Patent No. 7,903,608 B2 (“the ’608 patent”), which is the subject of *Marvell Semiconductor, Inc. v. Bandspeed, Inc.*, Case IPR2015-00237.

The ’608 patent is a continuation of U.S. Patent No. 7,477,624 B2, which is the subject of *Marvell Semiconductor, Inc. v. Bandspeed, Inc.*, Case IPR2015-00314, *Marvell Semiconductor, Inc. v. Bandspeed, Inc.*, Case IPR2015-00315, and *Marvell Semiconductor, Inc. v. Bandspeed, Inc.*, Case IPR2015-00316. IPR2015-00314, IPR2015-00315, and IPR2015-00316 were argued together with this proceeding at the May 26, 2016, oral argument.

*C. References Relied Upon*

Petitioner relies on the following references:

|          |          |                 |               |
|----------|----------|-----------------|---------------|
| Ex. 1003 | Gerten   | US 6,760,319 B1 | July 6, 2004  |
| Ex. 1004 | Haartsen | US 7,280,580 B1 | Oct. 9, 2007  |
| Ex. 1005 | Dicker   | US 6,249,540 B1 | June 19, 2001 |

*D. The Asserted Grounds*

We instituted a trial on the following grounds (Dec. 17):

| Reference(s)        | Basis    | Claims Challenged       |
|---------------------|----------|-------------------------|
| Haartsen            | § 103(a) | 1–3, 6–8, and 11–13     |
| Haartsen and Dicker | § 103(a) | 4, 5, 9, 10, 14, and 15 |
| Gerten              | § 103(a) | 1–4, 6–9, and 11–14     |
| Gerten and Dicker   | § 103(a) | 5, 10, and 15           |

## II. ANALYSIS

*A. The '643 Patent*

The '643 patent generally relates to selecting communications channels in systems that use frequency hopping protocols, such as Bluetooth, that change communication channel frequency according to a predetermined schedule. Ex. 1001, 1:58–60, 2:44–58. Such frequency hopping systems operate in the unlicensed 2.4 GHz band. *Id.* A concern with such systems is that other devices will operate on or generate noise on a particular channel, causing interference and degraded performance. *Id.* at

3:24–54, 6:59–63. The interference can change with time, such that a “good” channel with relatively low interference now could become a “bad” channel with high interference later. *Id.* at 3:48–54, 4:4–9.

Channel quality can be determined by testing a characteristic such as bit error rate (BER). If the BER for a channel exceeds a specified threshold, the channel can be classified as “good” and if it does not exceed the threshold, it is classified as “bad.” *Id.* at 6:45–59.

The ’643 patent describes a technique for replacing “bad” channels with “good” channels. Figure 5B, reproduced below, illustrates an example:

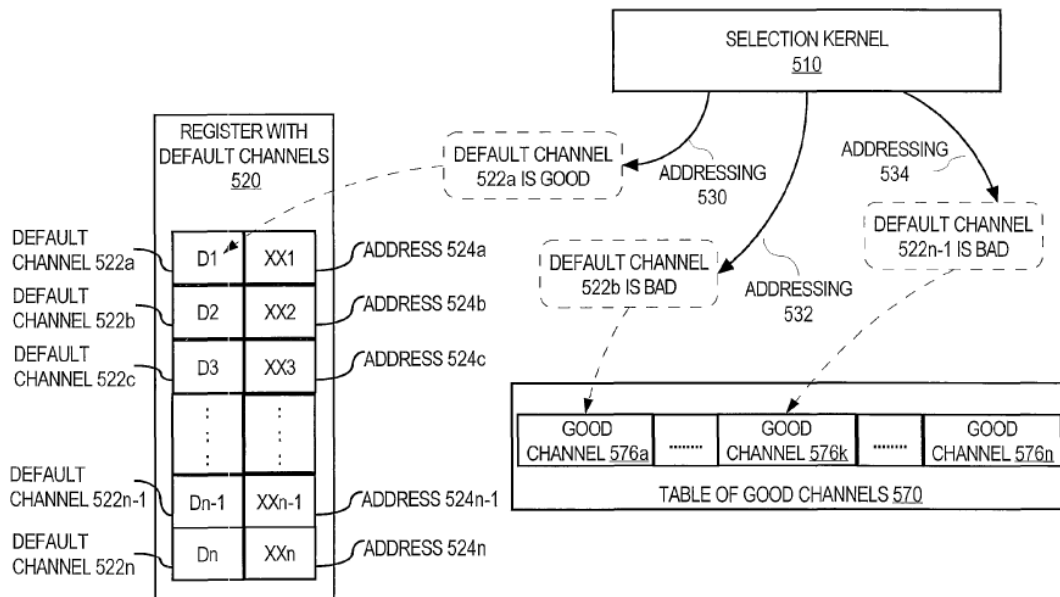


**FIG. 5B**

Figure 5B is a block diagram depicting the replacement of bad channels with good channels in a default set of channels in a channel register. *Id.* at 5:49–52.

Register with default channels 520 is loaded with channel numbers 522a–522n, representing a default set of hopping frequencies for a particular

frequency hopping protocol being used by the communications network. *Id.* at 20:5–9. A set of selected good channels is depicted as table of good channels 570. *Id.* at 20:18–19. Selection kernel 510 addresses channels in register 520. *Id.* at 20:12–14. If selection kernel 510 addresses a default channel in register 520 that is classified as bad (e.g., default channel 522b), the bad channel is replaced with a good channel that is randomly selected from table of good channels 570 (e.g., good channel 576a). *Id.* at 20:41–67.

The '643 patent also describes setting a good channel usage timeout (GCUT) value. *Id.* at 21:14–16. This is to account for the changing nature of network interference. *Id.* at 21:17–25. After the expiration of the GCUT time period (e.g., five minutes), the participants of the communications network switch back to the original default set of communications channels, after which additional performance testing can be performed and another set of communications channels can be selected. *Id.* at 21:25–33.

Claim 1, reproduced below, is illustrative of the claimed subject matter:

1. A method, comprising:  
loading a set of default channels into a default channel register;  
loading a set of good channels into a good channel register;  
if a selection kernel addresses a bad channel stored in a particular location of the default channel register, then replacing, by the selection kernel, the bad channel stored in the particular location of the default channel register with a good channel selected from the set of good channels loaded in the good channel register;  
wherein the method is performed using one or more computing devices.

*B. Claim Construction*

We interpret 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); *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2155–56 (2016). Claim terms generally are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *See In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

1. “*replacing . . . the bad channel stored in the particular location of the default channel register with a good channel selected from the set of good channels loaded in the good channel register*”

In the Decision to Institute, we preliminarily determined that “replacing” a bad channel with a good channel, as recited in claims 1, 6, and 11, is broad enough to encompass replacing a bad channel with a good channel in a logical sequence and not just a physical location, and that neither the claim language nor the Specification requires a particular physical mechanism for replacement. Dec. 6–7. Patent Owner does not challenge this determination and, instead, presents its arguments consistent with this determination. PO Resp. 5. Petitioner does not challenge this determination in the Reply. We maintain it on the full record.

2. “*register*”

Each of claims 1, 6, and 11 recites “a default channel *register*” and “a good channel *register*.” Petitioner argues that “a register is, e.g., a ‘set of

bits of high-speed memory within a microprocessor or other electronic device, used to hold data for a particular purpose.” Pet. 18 (quoting MICROSOFT PRESS COMPUTER DICTIONARY 402 (3d ed. 1997) (Ex. 1008)).

Patent Owner equates registers to “localized memories inherent to a processor or a ‘set of bits of high-speed memory within a microprocessor’ or within another processing device using the data for a particular purpose.” PO Resp. 10. Patent Owner draws a distinction between tables and general purpose memories, on one hand, and registers on the other. *Id.*

Petitioner takes issue with Patent Owner’s limitation of registers to a set of bits of high-speed memory within a “processing device,” arguing that Petitioner’s extrinsic evidence shows that a register, more broadly, is a set of bits of high-speed memory within an electronic device. Reply 5–6.

In the Reply, Petitioner points out that, in the *Qualcomm* Litigation, Petitioner and Patent Owner agreed that “register,” in claims 1, 6, and 11, should be construed as “an area of memory having a set of addressable slots.” *Id.* at 6 n.2 (quoting Ex. 1013, 1 (Second Amended Joint Claim Construction Statement, Exhibit A, in the *Qualcomm* Litigation)). At the oral argument, however, Petitioner appeared to be unaware of the District Court agreement between the parties or that the parties disagree as to the construction in this proceeding. Tr. 14:17–15:13.

At the oral hearing, Patent Owner confirmed that Exhibit 1013 accurately represents the parties’ agreement in the *Qualcomm* Litigation. *Id.* at 15:23–16:7, 46:14–18. Nevertheless, Patent Owner argued that the construction it agreed to in district court was “improperly broad,” but that it agreed to the construction because the District Court previously had

endorsed it and because “this issue did not seem like an issue, at least on the infringement side of the case.” *Id.* at 46:24–48:2. Patent Owner now asks us to take a “fresh look” at the construction of this term and adopt its construction so that Patent Owner can go back to the District Court and attempt to overturn its agreement. *Id.* at 48:12–20.

Patent Owner’s approach is improper. Patent Owner all but admitted that it agreed to a broad construction in the District Court because it was advantageous to its infringement allegations. Tr. 47:25–48:4. Now, faced with potentially invalidating prior art, Patent Owner seeks to narrow its construction, despite that the Board applies a claim construction standard (broadest reasonable interpretation) that only could result in a broader construction. This is precisely the sort of gamesmanship that the United States Court of Appeals for the Federal Circuit has counseled against. *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))).<sup>2</sup>

According to Patent Owner’s representations, the District Court considered the construction of “register” under the stricter standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and

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<sup>2</sup> We note that, by the same reasoning, it would be equally improper for Petitioner, upon agreeing to a broad construction in District Court, to use this forum to attempt to obtain a more narrow construction to upset that agreement and avoid a finding of infringement in the District Court.

concluded that it means “an area of memory having a set of addressable slots.” Both parties then agreed to this construction. We find that it also corresponds to the broadest reasonable interpretation of the term. For example, the Specification does not define “register,” but more broadly describes registers as memories addressed by a selection kernel. Ex. 1001, 20:3–14. To the extent that Petitioner’s dictionary definition is more narrow, the parties have not explained persuasively why such extrinsic evidence should be used to restrict the otherwise broad meaning ascribed by the claim language itself and the Specification. We decline Patent Owner’s request that we undo the parties’ district court agreement. Accordingly, we adopt the parties’ agreed construction from the *Qualcomm* Litigation.

### 3. “*selection kernel*”

Claims 1, 6, and 11 each recite a “selection kernel” that “addresses a bad channel stored in a particular location of the default channel register” and replaces “the bad channel stored in the particular location of the default channel register with a good channel selected from the set of good channels loaded in the good channel register.”

Neither party proposes a construction of “selection kernel.” Nevertheless, it is a technical term that requires construction in order for us to apply the prior art to the claims and resolve the parties’ dispute over the presence of a selection kernel in the prior art.

The Specification does not define “selection kernel.” Nevertheless, it describes a selection kernel (box 510), in connection with Figures 5A and

5B, as a module of software that performs the addressing of the default channel and good channel registers. Ex. 1001, 20:1–21:4.

Consistent with this description, a technical dictionary defines a “kernel” as “[a] software module that encapsulates an elementary function or functions of a system.” IEEE 100, THE AUTHORITATIVE DICTIONARY OF IEEE STANDARDS TERMS 599 (7th ed. 2000) (Ex. 3001). The parties’ applications of the term are consistent as well. See Ex. 1002 (Ding Decl.) ¶ 39 (“As would be understood by one of ordinary skill in the art, a selection kernel **selects** channels to use for transmission of data. The selection kernel outputs an address to address a register and may address the same bad channel multiple times.”); PO Resp. 9 (“The ’643 Patent utilizes a selection kernel 510 that addresses the default channel register 520 and replaces bad channels contained therein with good channels from the good channel register 550.”), 23 (same).

In light of the use of the term in the claims and Specification, we construe “selection kernel” to mean “a software module that encapsulates a register addressing function.”

#### 4. “good channel usage timeout”

Claims 4 and 14 recite “removing a particular good channel from the good channel register, based at least in part on a good channel usage timeout value.” Claim 9 includes a similar recitation. The ’643 patent Specification describes a “good channel usage timeout” value as follows:

According to another embodiment of the invention, implementation of a selected set of communications channels

includes setting a good channel usage timeout (GCUT). Because interference may change over time, such as from other communications systems starting or stopping to be used or as a result of changes of location of the participants of the communications network or of interference sources, it may be useful to periodically change the set of channels being used. For example, some previously good channels may become bad and vice versa, thus impacting the communications system after the set of communications channels is selected and implemented in the communications network. For a Bluetooth or IEEE 802.15.1 FH communications system, a five minute GCUT may be used.

According to one embodiment of the invention, after expiration of the GCUT, the participants of the communications network switch back to the original or default set of communications channels, after which additional performance testing may be performed and another set of communications channels selected.

Ex. 1001, 21:14–33.

Based on this description, Petitioner contends that “good channel usage timeout” means “a timer designed to periodically change the channels being used by the system.” Pet. 25 n.5. Patent Owner does not propose an express construction of “good channel usage timeout,” although it contends that an error counter that does not “cause removal of a particular good channel from a good channel register” is not a good channel usage timeout. PO Resp. 18.

The Specification describes a good channel usage timeout as a timer, but does not specify that the timer changes channels or causes channels to change. Thus, a good channel usage timeout is simply a timer. The behavior of a system that uses a good channel usage timeout is accounted for in the remaining language of claim 4, namely “removing a particular good

channel from the good channel register, based at least in part on” such a timer.

*C. Obviousness over Haartsen*

Petitioner contends that claims 1–3, 6–8, and 11–13 would have been obvious over Haartsen.

A claim is unpatentable under 35 U.S.C. § 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.” We resolve the question of obviousness 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 nonobviousness, i.e., secondary considerations.<sup>3</sup> *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

In an obviousness analysis, some reason must be shown as to why a person of ordinary skill would have combined or modified the prior art to achieve the patented invention. *See Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1374 (Fed. Cir. 2008). A reason to combine or modify the prior art may be found explicitly or implicitly in market forces, design incentives, the “interrelated teachings of multiple patents,” “any need or problem known in the field of endeavor at the time of invention and addressed by the

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<sup>3</sup> The record does not contain any evidence of secondary considerations.

patent,” or the background knowledge, creativity, and common sense of the person of ordinary skill. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328–29 (Fed. Cir. 2009) (quoting *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–21 (2007)).

1. *Scope and Content of the Prior Art—Overview of Haartsen*

Haartsen describes techniques, applicable in frequency hopping schemes such as Bluetooth, for skipping certain hops in a frequency hopping sequence. Ex. 1004, 1:7–11, 2:12–44. Haartsen describes avoiding “forbidden” channels, e.g., channels for which a substantial amount of interference has been detected, in favor of “allowed” channels. *Id.* at 7:63–8:11. Figure 6, reproduced below, illustrates an example:

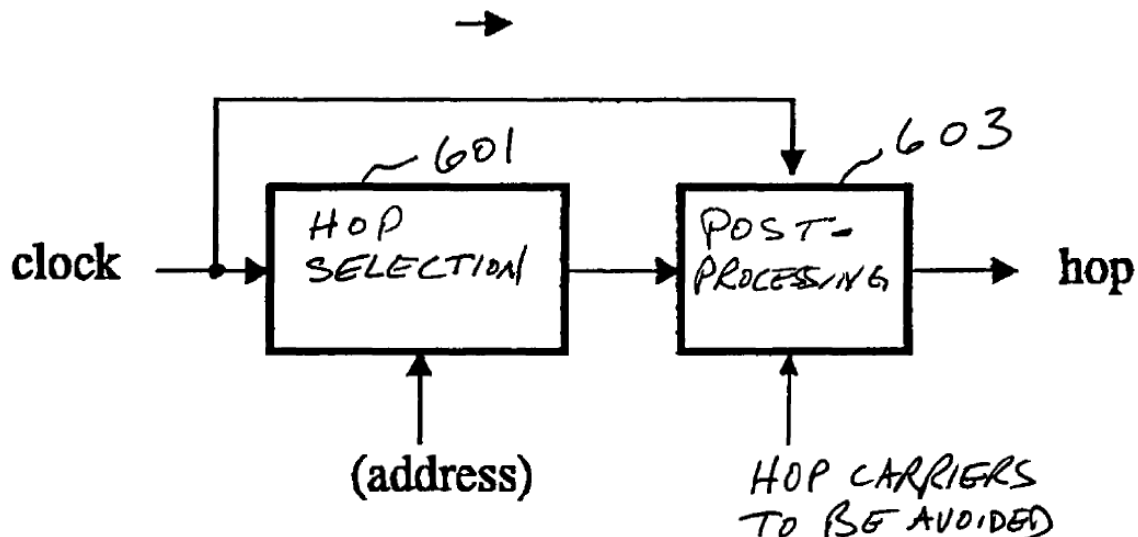


FIG. 6

Figure 6 is a block diagram of a hop avoidance scheme. *Id.* at 7:30–31.

An original sequence of hop frequencies is stored in an addressable memory. *Id.* at 10:13–15. To address a hop frequency in the memory, an address selector receives a phase value and converts it into an address for the memory location storing the hop frequency. *Id.* at 10:15–17. Hop selection function 601 generates a present hop frequency based on a pre-stored sequence using the address selector to receive a phase value and convert it into an address for retrieving the frequency. *Id.* at 10:15–17, 11:4–8. Post-processing function 603 receives the hop selection supplied by hop selection function 601 and compares it to a set of forbidden hops. *Id.* at 11:18–25. If the hop selection is a forbidden hop, post-processing function 603 maps the hop to a different hop in the pre-stored sequence that is not within the set of forbidden hops. *Id.* at 11:32–37.

As shown in Figure 7, reproduced below, Haartsen describes a system with a total of N1 hop channels in a pre-stored sequence. *Id.* at 11:49–50.

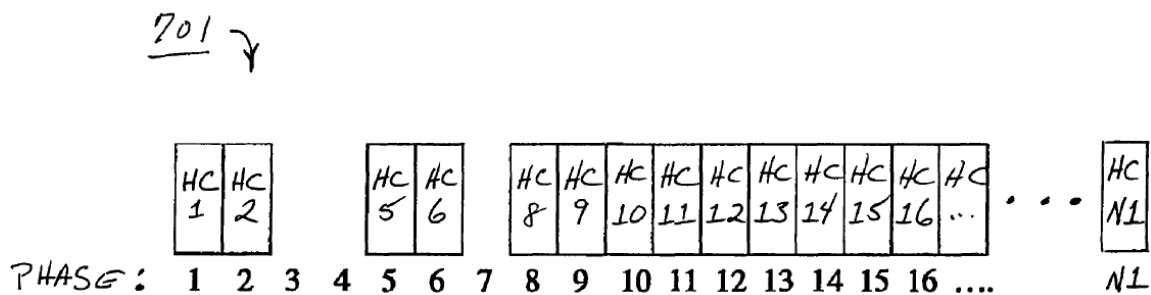


FIG. 7

Figure 7 is a diagram of a hop sequence having N1 hop channels. *Id.* at 7:32–33. Hop channels HC3, HC4, and HC7, associated with phase values 3, 4, and 7, respectively, are shown as forbidden and are not included with the set of allowable hop channels. *Id.* at 11:49–54. Figure 8, reproduced below, illustrates a hop sequence with the forbidden channels removed:

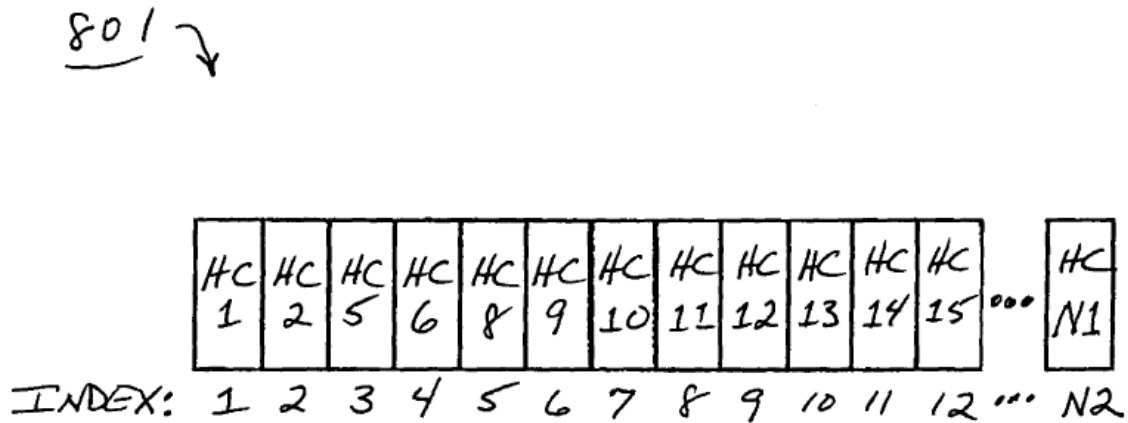


FIG. 8

Figure 8 is a diagram of a set of N2 hop channels remaining after hop channels HC3, HC4, and HC7 are removed. *Id.* at 7:34–36, 11:54–57.

Allowed hops can be stored in a table in an addressable memory, such as a RAM. *Id.* at 12:19–21. Techniques can be used to ensure that substitute channels chosen from N2 are chosen at random. *Id.* at 12:46–61.

## *2. Level of Ordinary Skill in the Art*

Relying on Dr. Ding’s testimony, Petitioner contends that a skilled artisan would have had a B.S. degree in Electrical and/or Computer Engineering and at least 3–5 years of academic or industry experience in the wireless communications field. Pet. 7 (citing Ex. 1002 ¶¶ 14–16). Relying on Dr. Melendez’s testimony, Patent Owner argues that a skilled artisan would have had a B.S. degree in Electrical Engineering or Computer Science or “equivalent work experience.” PO Resp. 4 (citing Ex. 2001 ¶¶ 29–31).

Although the parties’ statements of the level of ordinary skill are not significantly different, and the parties do not argue that the differences would affect the outcome of this proceeding, we agree with Petitioner that a skilled artisan would have had both a B.S. degree in a relevant field (e.g., Electrical or Computer Engineering, or Computer Science), as well as work experience (3–5 years is reasonable). The level of skill also is reflected by the prior art or record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995); *In re Oelrich*, 579 F.2d 86, 91 (CCPA 1978).

## *3. Differences Between the Prior Art and Claims 1–3, 6–8, and 11–13; Reasons to Modify*

Petitioner contends that Haartsen’s pre-stored sequence N1 is “a set of default channels” and that set N2 is “a set of good channels,” as recited in claim 1. Pet. 16–18. Patent Owner argues that Haartsen’s pre-stored sequence is not a “set of channels” because it is not acted upon by post-processing function 603. PO Resp. 12. According to Patent Owner, “the

post processing function 603 would presumably compare the output of the construct of Figure 4(a) of Haartsen to the entirety of a set of channels to be avoided, an inefficient and time consuming process that does not make use of ‘registers.’” *Id.* To the extent we understand Patent Owner’s argument, Patent Owner does not explain why claim 1 should be read to require Haartsen’s post-processing function 603 to act upon the pre-stored sequence itself rather than the output of hop selection function 601 (a hop selection). Dr. Melendez merely repeats Patent Owner’s argument, without providing additional clarity as to that argument. Ex. 2001 ¶ 39. In any case, N1 represents the total of all hop channels in Haartsen’s pre-stored sequence, including allowable and forbidden channels. Ex. 1004, 11:49–54. We find that sequence N1 teaches a set of default channels. N2 represents only allowable, and thus “good,” channels. *Id.* at 11:54–57. We find that sequence N2 teaches a set of good channels.

Petitioner cites to Haartsen’s disclosure of storing the N1 and N2 hop sequences in different tables of memory as teaching “loading a set of default channels into a default channel register” and “loading a set of good channels into a good channel register,” as recited in claim 1. Pet. 16–19. As Petitioner notes, Haartsen describes storing N1 and N2 in different tables in a memory such as a RAM. *Id.* at 17 (citing Ex. 1004, 10:12–15, 12:19–21). Petitioner notes that Haartsen does not describe explicitly that the memories storing N1 and N2 are registers. *Id.* at 18. Nevertheless, Dr. Ding testifies that using registers to store N1 and N2 would have been an obvious design choice. Ex. 1002 ¶¶ 52, 72, 91.

Patent Owner contends that Haartsen does not teach loading channels into registers. PO Resp. 10–12. According to Patent Owner, “the ’643 patent makes use of both tables and registers in performing adaptive frequency hopping communications,” while “Haartsen, in contrast, only makes use of tables that store channel values in a general purpose memory and does not disclose nor even mention registers.” *Id.* at 10. Patent Owner argues that transferring channel data from tables into registers offers several “important advantages,” including “direct access to the channel identification information by the processor” and “significant performance advantages over the use of tables alone.” *Id.* at 11; *accord id.* at 12 (“Because of how the invention of the ’643 Patent operates, there is a clearly understood benefit, specifically claimed in the independent claims of the ’643 Patent, to loading a table already stored in memory into a register.”). Patent Owner characterizes Haartsen’s technique as “an inefficient and time consuming process that simply does not make use of ‘registers.’” *Id.* at 12.

Patent Owner’s arguments are unpersuasive for several reasons. First, under the construction Patent Owner agreed to, and which we adopt, Haartsen’s tables in memory are registers. *See* Section II.B.2 above. At the oral argument, Patent Owner conceded that a table in memory would meet the construction of “register” it agreed to in District Court. Tr. 47:5–14. Consistent with this concession, we find that Haartsen’s tables in memory are “registers” as we construe the term.

Second, Patent Owner’s argument that the ’643 patent describes and claims advantages of transferring channels from tables in memory to registers is unsupported by evidence. We see nothing in the challenged

claims that requires loading channels from tables into registers. As to the purported advantages of such an arrangement, Patent Owner's Response does not identify any disclosure in the '643 patent describing such advantages. Patent Owner conceded at trial that it relies only on expert testimony, rather than any disclosure in the '643 patent, to show advantages:

JUDGE McKONE: Is there any description in the '643 patent about the advantages of using registers as opposed to any other kind of memory?

MR. PRICE: I am not familiar with it, if there are.

JUDGE McKONE: Did the parties cite to any?

MR. PRICE: I don't think so, Your Honor.

JUDGE McKONE: Okay. Any evidence that we have of an advantage of using registers, that would be extrinsic evidence in the form of expert testimony?

MR. PRICE: That's my understanding, Your Honor.

Tr. 45:3–13. As to such expert testimony, Dr. Melendez simply repeats Patent Owner's argument, without citation to the bases for his testimony. Ex. 2001 ¶¶ 37–40. We accord this testimony little weight. See 37 C.F.R. § 42.65(a) ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.").

Third, even assuming that a register is a set of bits of high-speed memory within a microprocessor or other processing device, as Patent Owner argues (PO Resp. 10), Petitioner has shown that such a register would have been an obvious design choice. According to the testimony of Dr. Ding, choosing high-speed memory to store a table would have been obvious in applications, such as Haartsen, because of the speed required to

access hop carriers during a frequency hopping sequence. Ex. 1002 ¶ 52. Patent Owner contends that Petitioner’s argument “ignores the disclosure and claims of the ’643 Patent that require the loading of registers from tables already in memory.” PO Resp. 13. As explained above, Patent Owner has shown no requirement in the challenged claims of loading from tables into registers. We agree with Petitioner and find that choosing an appropriate type of memory, out of a finite number of well-known types of memory, would have been routine given the level of skill in the art. *See KSR*, 550 U.S. at 421 (“When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense.”).

Upon consideration of Petitioner’s and Patent Owner’s respective evidence and argument, we find that Haartsen teaches “loading a set of default channels into a default channel register” and “loading a set of good channels into a good channel register,” as recited in claim 1.

Petitioner further contends that Haartsen’s address selector 601 and post-processing function 603, together, constitute a “selection kernel,” as recited in claims 1. Pet. 19. As Petitioner notes, hop selection function 601 uses an address selector to convert a phase value into an address for retrieving a next hop from a table in memory. *Id.* (citing Ex. 1004, 10:15–17). Likewise, Haartsen describes post-processing function 603 as mapping a forbidden hop to a different hop in the set of allowable hops (N2), which, as we note above, is in a different table in memory from the set of all hops

(N1). Ex. 1004, 11:32–37. Thus, post-processing function 603 must be addressing that separate table. Together, address selector 601 and post-processing function 603 constitute a software module that performs an addressing function, meeting our construction of “selection kernel.” See Section II.B.3 above. Thus, this module is a selection kernel that “addresses a bad channel stored in a particular location of the default channel register,” as recited in claim 1.

According to Petitioner, Haartsen’s description of post-processing function 603 substituting a channel in set N2 for a forbidden channel in set N1 teaches “replacing, by the selection kernel, the bad channel stored in the particular location of the default channel register with a good channel selected from the set of good channels loaded in the good channel register,” as recited in claim 1. *Id.* at 19–20.

Patent Owner argues that Haartsen describes selecting a hop channel from a sequence as a function of a present phase. PO Resp. 13. Patent Owner further argues that Haartsen describes generating an index to address an entry in a table to retrieve a substitute hop channel. *Id.* at 14. According to Patent Owner, “in Haartsen, the use of tables necessitates slower software calculations acting on ‘the sequence’ generated from said calculations, whereas a processor of the ’643 Patent may directly address a default or good channel register.” *Id.* at 13–14. As explained above, Patent Owner’s arguments regarding the construction of, and advantages of, a “register” are not persuasive.

Upon consideration of the parties’ respective evidence and argument, we find that Haartsen teaches “replacing, by the selection kernel, the bad

channel stored in the particular location of the default channel register with a good channel selected from the set of good channels loaded in the good channel register,” as recited in claim 1.

In sum, we find that Haartsen teaches each limitation of claim 1. Moreover, even under Patent Owner’s proposed construction of “register,” we find that a skilled artisan would have selected a register as a matter of routine design choice. The parties make the same arguments, citing the same evidence, for independent claims 6 and 11, treating them together with claim 1. Pet. 14–21; PO Resp. 9–14. For the reasons given for claim 1, we find that Haartsen teaches each limitation of claims 6 and 11.

Claim 2 depends from claim 1; claim 7 depends from claim 6; and claim 12 depends from claim 11. Claims 2 and 12 add “wherein the good channel is randomly selected from the set of good channels loaded in the good channel register.” Similarly, claim 7 adds “randomly selecting the good channel from the set of good channels loaded in the good channel register.” As Petitioner argues (Pet. 21–22), Haartsen describes that substitute hop channels are selected, in part, using “random (or pseudo-random) number generators.” Ex. 1004, 12:54–61. Patent Owner does not present separate argument for claims 2, 7, and 12. PO Resp. 14. Based on Petitioner’s evidence, we find that Haartsen teaches the additional limitations of claims 2, 7, and 12.

Claim 3 depends from claim 1; claim 8 depends from claim 6; and claim 13 depends from claim 11. Claims 3, 8, and 13 add “performing a channel hopping sequence in an order determined by the order of default channels stored in the default channel register.” As Petitioner argues

(Pet. 22–23), Haartsen describes that, in conventional systems, fixed, limited-sized hopping sequences were stored in a list in memory. Ex. 1004, 3:57–65. Dr. Ding testifies that an address selector retrieving hop carriers from a conventional memory would have done so in the order of default channels stored in that memory. Ex. 1002 ¶ 63. Patent Owner does not present separate argument for claims 3, 8, and 13. PO Resp. 14–15. Based on Petitioner’s evidence, we find that Haartsen teaches the additional limitations of claims 3, 8, and 13.

#### *4. Conclusion of Obviousness*

As explained above, we find, based on Petitioner’s evidence, that Haartsen teaches each limitation of claims 1–3, 6–8, and 11–13. We have considered Patent Owner’s arguments to the contrary and find them unpersuasive. The parties do not introduce or rely on objective indicia of nonobviousness. After weighing the evidence, we conclude that Petitioner has shown, by a preponderance of the evidence, that claims 1–3, 6–8, and 11–13 would have been obvious over Haartsen.

#### *D. Obviousness over Haartsen and Dicker*

Petitioner contends that claims 4, 5, 9, 10, 14, and 15 would have been obvious over Haartsen and Dicker.

##### *1. Overview of Dicker*

Dicker describes a frequency hopping technique for avoiding interference in a cordless telephone system. Ex. 1005, Abstract. In a

cordless telephone system, a base station communicates with several handsets using radio frequency, for example in the unlicensed 2.4 GHz range. *Id.* at 3:1–5, 4:13–15. The frequency range used for frequency hopping is divided into twelve subsets of channels and each subset is divided into eight channels. *Id.* at 4:21–28.

Dicker describes a scheme for avoiding “bad” frequency subsets. *Id.* at 4:29–31. Figure 4, reproduced below, illustrates an example:

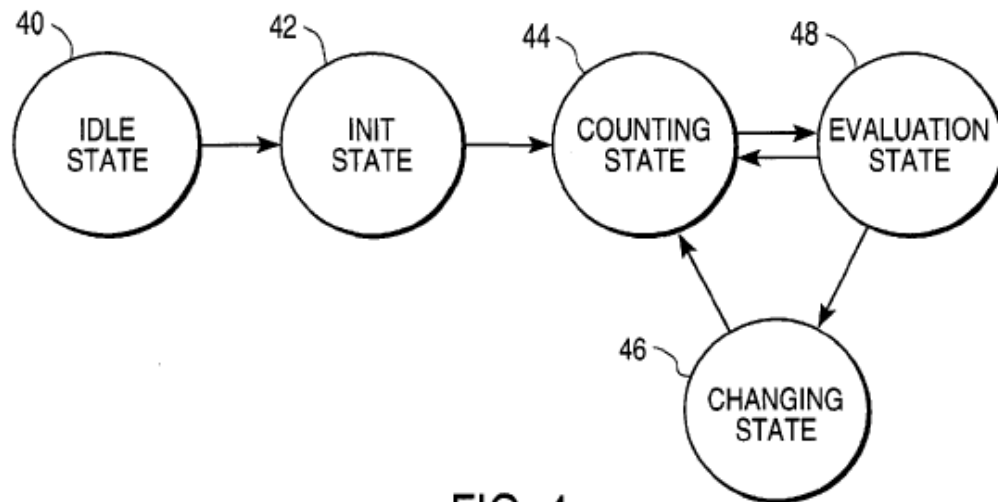


FIG. 4

Figure 4 is a state diagram of a method, implemented by a base station, for avoiding bad frequency subsets in a frequency hopping cordless telephone system. *Id.* at 2:54–56, 4:57–62. The method selects, for use, the current best ten subsets out of the twelve available subsets, and blocks the remaining two subsets. *Id.* at 4:65–5:1.

When frequency selection is initiated, the method moves from idle state 40 to init state 42. *Id.* at 5:29–33. At init state 42, short-term and long-term error counters for each subset are initialized. *Id.* at 5:33–34. Short-

term counters reset every one second; long-term counters reset every five seconds. *Id.* at 5:6–12. During counting state 44, both of the counters for a subset increment if an error is encountered on that subset. *Id.* at 5:12–16, 5:44–47. Errors can include bad packet data or bad cyclic redundancy code (CRC). *Id.* at 5:12–16. If, during any one-second period, a sufficient number of errors is counted by any of the short-term counters, the method progresses to changing state 46. *Id.* at 5:6–8, 5:47–52. Otherwise, after five seconds, the method progresses to evaluate state 48, where the long-term error counters are evaluated. *Id.* at 5:52–58. If the number of errors for an active subset is greater than the number of errors for a blocked subset, the method progresses to changing state 46. *Id.* at 5:58–61. At changing state 46, a blocked subset is made active and an active subset is blocked. *Id.* at 5:62–63.

As to the subsets that are blocked, every five seconds the error count for each of the blocked subsets is reduced by 2.5%. *Id.* at 5:22–23. This can be repeated up to six times, such that the error count of a blocked subset can be reduced to 85% of its original value. *Id.* at 5:23–26.

*2. Differences Between the Prior Art and Claims 4, 9, and 14;  
Reasons to Combine*

Claim 4 depends from claim 1; claim 9 depends from claim 6; and claim 14 depends from claim 11. Each of these claims recites “[removing/removal of] a particular good channel from the good channel register, based at least in part on a good channel usage timeout value.” Petitioner contends that Dicker’s five-second duration of the long-term

counter for a subset is a good channel usage timeout. Pet. 24–25; *see also* Tr. 18:21–25 (confirming that the Dicker’s five-second counter, rather than its one-second counter, is the good channel usage timeout value). As Petitioner notes (Pet. 24–25), Dicker describes that, after the expiration of the five-second counter, the frequency subsets are evaluated and, if a blocked subset has less errors than an active subset, then those subsets are swapped, with the active subset becoming blocked and the blocked subset becoming active. Ex. 1005, 5:53–67.

Petitioner, citing Dr. Ding’s testimony, argues that a skilled artisan would have used the concept of a five-second error counter to evaluate interference on Haartsen’s hop channels, including those in the set N2 of allowable hop channels. Pet. 26 (citing Ex. 1002 ¶¶ 107, 120–21, 133–34). Petitioner argues that Haartsen itself provides motivation to combine the references in its statement that:

[i]t will also be recognized that the designation of a hop channel as alternatively “forbidden” or “allowed” need not be static, but can instead be determined and changed dynamically. For example, an allowed hop channel may become “forbidden” in response to the detection of interference on that hop channel, and may later be again designated as “allowed” when it is detected that the interference has sufficiently abated.

*Id.* (quoting Ex. 1004, 8:24–31). We agree with Petitioner that Haartsen suggests removing and replacing a particular hop channel when interference has changed. We also agree with Petitioner that a skilled artisan would have chosen a technique, such as that taught in Dicker, for determining when to make such a substitution.

Patent Owner argues that Dicker does not teach removal of “a particular good channel” because it “does not contemplate making any decisions or performing any actions based on individual channels,” and instead “focuses on the performance of subsets containing multiple channels and performs actions based on the aggregate performance of all of the channels contained in a given subset.” PO Resp. 17.

In the Reply, Petitioner accuses Patent Owner of attacking Dicker individually without taking into account how its teachings would be applied to Haartsen. Reply 9. Relying on Dr. Ding’s testimony, Petitioner contends that a skilled artisan would have implemented Dicker’s error counters to remove and replace particular hop frequencies. *Id.* (citing Ex. 1002 ¶107). According to Dr. Ding,

it would have been obvious to implement similar error counters in Haartsen and to remove a particular hop carrier from the table in memory storing the set of N2 allowable hop carriers and replace the particular hop carrier with a hop carrier in the set of S carriers to be avoided if the error count for the particular hop carrier, after five seconds or some other appropriate amount of time, is greater than that for the hop carrier in the set of S carriers.  
Ex. 1002 ¶ 107.

Patent Owner’s argument is not persuasive, as it does not address Petitioner’s proposed combination. As explained above, Haartsen teaches that allowed and forbidden channels can be changed dynamically. Petitioner cites to Dicker for teaching triggering a change, in part, based on the expiration of a timer. Petitioner does not propose, nor does it need to show, that a skilled artisan would have bodily incorporated Dicker’s technique into Haartsen’s. *See In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for

obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.”).

We note, also, that removing a subset of channels necessarily would result in removing each of the particular channels of that subset. Thus, Patent Owner’s argument is unpersuasive for this additional reason.

Patent Owner further contends that, because Dicker teaches selecting and testing subsets of channels rather than individual channels, as Haartsen teaches, the combination of Haartsen with Dicker would defeat Dicker’s principle of operation. PO Resp. 32–33. Patent Owner does not support this argument with evidence. In any case, “[i]t is well-established that a determination of obviousness based on teachings from multiple references does not require an actual, physical substitution of elements.” *In re Mouttet*, 686 F.3d 1322, 1332 (Fed. Cir. 2012) (rejecting an argument that a combination destroyed the principle of operation of one of the constituent prior art references). Patent Owner’s argument is unpersuasive.

Patent Owner also argues that the five second counter is not a good channel usage timeout because Dicker describes replacing a subset of channels only if the associated long-term error counter exceeds a deprecated blocked subset error count. PO Resp. 18. According to Patent Owner, the five-second counter does not cause removal of a good channel from a good channel register at the five second interval. *Id.*

We are not persuaded by Patent Owner’s argument. As Petitioner points out, claim 4 recites removing a particular channel “based **at least in part** on a good channel [usage] timeout value.” Reply 9–10. Dicker teaches removing and replacing channels based in part on a five second interval and

in part on a comparison of the number of errors counted during that interval to the error counts of blocked subsets. Ex. 1005, 5:53–67. Thus, Dicker teaches “removing a particular good channel from the good channel register, based at least in part on a good channel usage timeout value,” as recited in claim 4, and similarly recited in claims 9 and 14.

*3. Conclusion of Obviousness as to Claims 4, 9, and 14*

We have considered Petitioner’s evidence and argument and find that Dicker teaches the additional limitations of claims 4, 9, and 14, and that a skilled artisan would have had reason with rational underpinning for combining the teachings of Haartsen and Dicker. We have considered Patent Owner’s arguments to the contrary and find them unpersuasive. The parties do not introduce or rely on objective indicia of nonobviousness. After weighing the evidence, we conclude that Petitioner has shown, by a preponderance of the evidence, that claims 4, 9, and 14 would have been obvious over Haartsen and Dicker.

*4. Differences Between the Prior Art and Claims 5, 10, and 15;  
Reasons to Combine*

Claim 5 depends from claim 1; claim 10 depends from claim 6; and claim 15 depends from claim 11. Each claim adds “rescanning the default channels, based at least in part on the number of good channels.” Petitioner has three theories as to how Haartsen and Dicker teach the subject matter of

claims 5, 10, and 15.<sup>4</sup> The first two theories are not persuasive. The third was not presented in the Petition and is, instead, an improper reply argument.

First, Petitioner argues that Dicker teaches rescanning default channels based at least in part on a number of good channels and that a skilled artisan would have applied that teaching to Haartsen. Pet. 28–30. According to Petitioner, Dicker discloses that at least 10 active frequency subsets are needed to meet an FCC requirement for frequency hopping in the frequency band in which Dicker operates. *Id.* at 28–29 (citing Ex. 1005, 4:21–28, 4:62–5:3). Petitioner points to Dicker’s disclosure of moving to changing state 46 when any short-term counter exceeds an error count threshold. *Id.* According to Petitioner, at changing state 46, a previously blocked subset is activated when an active subset is blocked, keeping the number of active subsets to be at least ten when a subset develops interference. *Id.* at 29. Petitioner contends this disclosure teaches rescanning the default channel based at least in part on the number of good channels. *Id.* Petitioner, citing to Dr. Ding’s testimony, argues that

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<sup>4</sup> At the oral argument, Petitioner was unable to state with particularity which theory it was proceeding under. Tr. 24:6–10 (“We’re utilizing Dicker as the trigger of changing out a set based on the number of good channels. The channel rescan, in the original grounds of rejection we’ve always utilized Haartsen as teaching the rescan.”); *id.* at 24:22–23 (“We utilized Haartsen for the rescan. We did not utilize Dicker.”); *id.* at 99:1–101:10 (arguing that Petitioner primarily relied on Dicker to show rescanning, while presenting evidence that Haartsen teaches rescanning in connection with claim 4). In any case, we address all three theories.

combining Haartsen and Dicker would have been predictable, keeping Haartsen's allowable hop carriers above a regulatory minimum and permitting Haartsen to adapt the set of allowable hop carriers based on changes in interference over time. Pet. 29–30 (citing Ex. 1002 ¶¶ 114–15, 127–28, 140–41).

Patent Owner responds that Dicker does not teach rescanning channels. PO Resp. 19–20. We agree. As Patent Owner points out (*id.*), for a subset that is inactive, Dicker describes reducing its error count by a set amount (2.5%) to estimate changing conditions rather than rescanning that subset to determine if its condition has changed. Ex. 1005, 5:23–27. Thus, Petitioner's first combination of Haartsen and Dicker does not teach the additional limitations of claims 5, 10, and 15.

Second, Petitioner argues that Haartsen describes rescanning the hop channels in the set S of forbidden channels (not the set N1 Petitioner maps to the set of default channels). Pet. 30–31. Petitioner argues that set S of forbidden channels consists of channels that also are default channels and that Haartsen could be modified to rescan this set of forbidden channels when the number of channels in set N2 (allowable hop channels) dropped below the FCC minimum, as taught in Dicker. *Id.* at 31.

We are not persuaded by Petitioner's argument. Claims 5, 10, and 15 recite “rescanning *the default channels*, based at least in part on the number of good channels” (emphasis added). Based on their plain language, the claims are referring to the “set of default channels” loaded into the default channel register, as recited, for example, in claim 1. This is not a reference

to forbidden channels that might also appear in the default channel register.

The Specification is consistent with this view, explaining that,

if a channel previously classified as good is retested and determined to be bad, the communications network may switch back to the default channel set to allow for rescanning of the channels to select a new set of communications channels that account for changes in interference since the previous set was selected.

Ex. 1001, 21:61–67. Here, the Specification describes rescanning the entire set of default channels if a good channel is retested and determined to be bad.

In its third theory, Petitioner argues that “Haartsen also expressly discloses rescanning the default set of channels elsewhere in its disclosure,” and points to an incorporation by reference of U.S. Patent No. 6,519,460 (“the ’460 patent”). Reply 12–13. Petitioner further relies on new testimony from Dr. Ding in support of this argument. *Id.* at 13 (citing Ex. 1012 ¶ 17).

Our rules state that “[a]ll arguments for the relief requested in a motion must be made in the motion. A reply may only respond to arguments raised in the corresponding opposition or patent owner response.” 37 C.F.R. § 42.23(b). The Patent Office has provided the following guidance as to the proper scope of a reply:

A reply may only respond to arguments raised in the corresponding opposition. § 42.23. While replies can help crystalize issues for decision, a reply that raises a new issue or belatedly presents evidence will not be considered and may be returned. The Board will not attempt to sort proper from improper portions of the reply. Examples of indications that a new issue has been raised in a reply include new evidence necessary to make out a *prima facie* case for the patentability or

unpatentability of an original or proposed substitute claim, and new evidence that could have been presented in a prior filing.

Office Trial Practice Guide, 77 Fed. Reg. 48,756, 48,767 (Aug. 14, 2012).

The third theory, the '460 patent, and Dr. Ding's new testimony were not presented in the Petition. Thus, Patent Owner did not have an opportunity to respond to this new argument and evidence. We conclude that Petitioner's third theory is a new *prima facie* case, rather than a response to arguments presented in the Patent Owner Response. We decline to consider Petitioner's third theory as it is an improper reply.

In sum, Petitioner has failed to show that Haartsen and Dicker teach "rescanning the default channels, based at least in part on the number of good channels," as recited in claims 5, 10, and 15. Accordingly, Petitioner has not shown, by a preponderance of the evidence, that claims 5, 10, and 15, would have been obvious over Haartsen and Dicker.

#### *E. Obviousness over Gerten*

Petitioner contends that claims 1–4, 6–9, and 11–14 would have been obvious over Gerten.

##### *1. Scope and Content of the Prior Art—Overview of Gerten*

Gerten describes a technique for improving noise and interference immunity in frequency hopping systems, such as those employing Bluetooth. Ex. 1003, 1:6–9, 1:13–35. Gerten describes performing signal strength measurements on an integer N number of channels to determine an integer M number of channels to avoid. *Id.* at 2:37–41. Synthesizer codes

for the N total channels and N-M good channels can be stored in register banks. *Id.* at 2:47–55, 4:1–3. Gerten describes the Bluetooth standard as having 79 available channels. *Id.* at 5:66–6:1. According to Gerten, the Bluetooth standard includes additional unused frequencies at the top and bottom of the frequency range (2.401 GHz, 2.481 GHz, 2.482 GHz, and 2.483 GHz), referred to as “guardbands.” *Id.* at 5:66–6:10.

Gerten describes a channel scanning algorithm that includes scanning the N channels (79, in the case of the Bluetooth standard) and determining whether the signal strength of each is above two thresholds (with higher signal strength indicating more interference). If a channel is above the first threshold, it is placed on a level 1 list. If it is above the second threshold, it is placed on a level 2 list. *Id.* at 5:19–66.

Gerten describes two examples of creating hop selection kernels for addressing register banks of channels. In the first, a hop selection kernel is modified to remove the four worst channels of the 79 available channels and the register length is reduced to 75 channels. *Id.* at 7:29–34. This example is illustrated in Figures 6 and 7. Figure 6 is reproduced below:

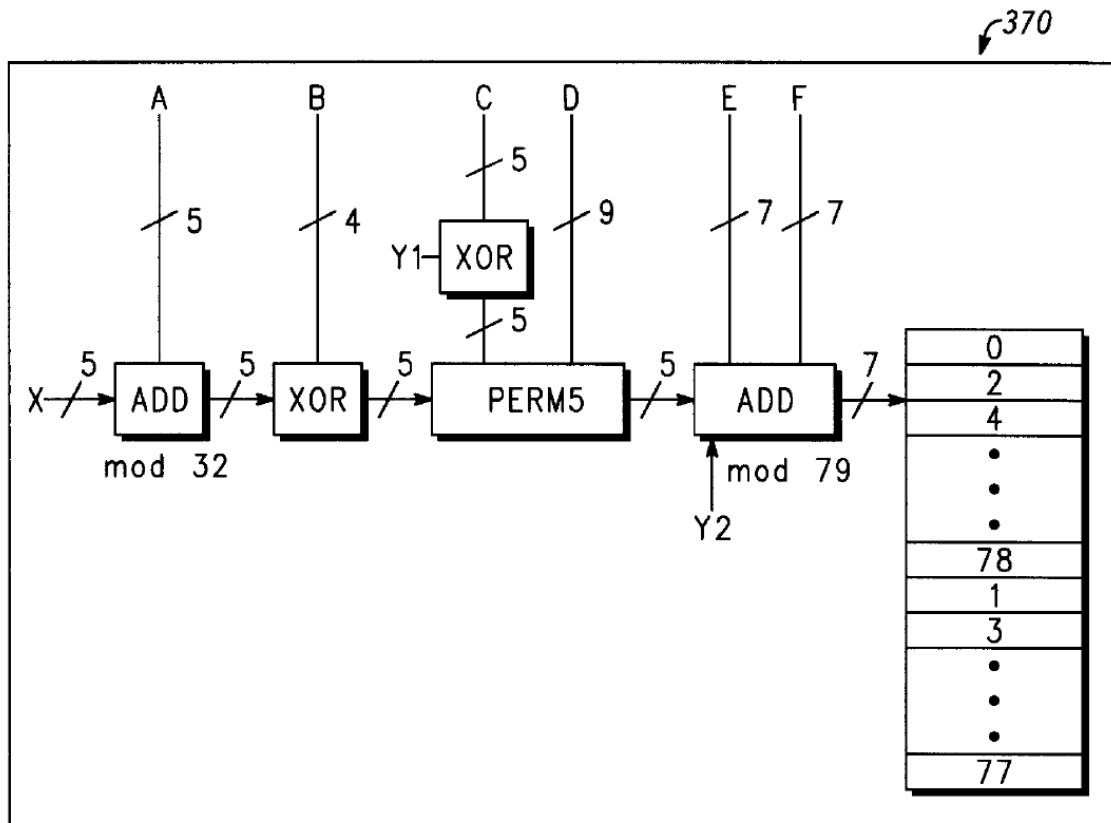


**FIG. 6**

Figure 6 is a block schematic of hop selection kernel 370, having a modulo of 79, for a 79-hop system of the Bluetooth standard. *Id.* at 2:14–17, 7:35–39. According to Gerten, “after the 4 worst interferers have been identified the register bank will have been shortened to length-75, meaning that the hop selection kernel must be modified so that it generated addresses to a bank of 75 registers, instead of 79.” *Id.* at 7:44–48. Hop selection kernel 370 is modified, accordingly, by modifying control signals and changing the modulo of the final add operation from 79 to 75, resulting in modified hop selection kernel 380, shown in Figure 7 (reproduced below). *Id.* at 7:48–54.

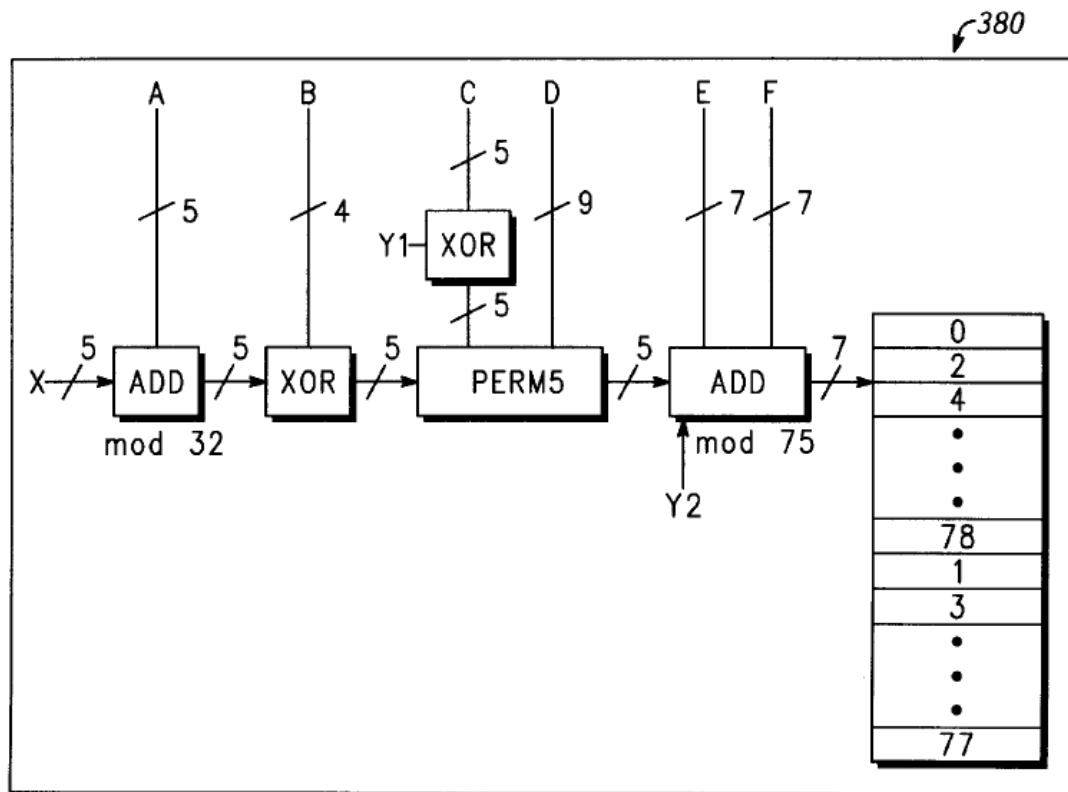


**FIG. 7**

Figure 7 is a block schematic of modified hop selection kernel 380 having a modulo of 75. *Id.* at 2:18–21.

Gerten describes the second example of modifying the hopping sequence as follows:

After the master device and slave identify M channels to be avoided of N total channels, both the master device and the slave device define an alternate code word register bank in step 400. In step 410, the alternate code word register bank is loaded with N synthesizer code words. In step 420, the methodology determines if M channels of N total channels are on the level 2 list. If M channels of N total channels are on the level 2 list (YES), the channels on the level 2 list are replaced with guardband channels in step 425.

*Id.* at 8:32–40.

2. *Differences Between the Prior Art and Claims 1–4, 6–9, and 11–14; Reasons to Modify*

Regarding independent claims 1, 6, and 11, Petitioner contends that Gerten’s set of N channels constitutes “a set of default channels” and that disclosure in Gerten of loading N synthesizer code words into an alternate code word register bank teaches “loading a set of default channels into a default channel register.” Pet. 41–42. Petitioner further contends that Gerten’s guardband channels constitute a set of good channels. *Id.* at 42–43. Petitioner acknowledges that Gerten does not explicitly describe that the guardband channels are loaded into a register. *Id.* at 43. Nevertheless, Petitioner points to general disclosure in Gerten of a plurality of register banks for storing synthesizer codes for frequency hopping. *Id.* In reliance on the testimony of Dr. Ding, Petitioner argues that storing guardband channels in a register would have been an obvious design choice. *Id.* at 43–44 (citing Ex. 1002 ¶¶ 164, 199, 232).

The parties dispute whether Gerten teaches “a *selection kernel* addresses a bad channel stored in a particular location of the default channel register” and “replacing, *by the selection kernel*, the bad channel stored in the particular location of the default channel register with a good channel selected from the set of good channels loaded in the good channel register,” as recited in claims 1, 6, and 11 (emphasis added).

Petitioner contends that Gerten’s substitution of guardband channels for channels on the level 2 list is a teaching of “replacing, by the selection kernel, the bad channel stored in the particular location of the default channel register with a good channel selected from the set of good channels

loaded in the good channel register.” Pet. 46–48. In particular, Dr. Ding testifies that a skilled artisan would understand Gerten to be describing a selection kernel removing a bad channel from the alternate code word register bank and storing a guardband channel in its place. Ex. 1002 ¶¶ 172, 207, 240.

As explained above, Gerten describes several aspects, including a channel scanning algorithm for placing channels in tier 1 and tier 2 lists based on signal strength (Ex. 1003, 5:19–66); a technique for modifying hop selection kernel 370 to remove the four channels with the strongest interference, resulting in modified hop selection kernel 380 that addresses a bank of 75 registers (*id.* at 7:35–8:28); and a method for defining an alternate code word register by modifying a hopping sequence of N channels to remove M tier 2 channels (identified by the channel scanning algorithm) and replacing them with guardband channels (*id.* at 8:29–40). A selection kernel is discussed expressly for only the second aspect, the technique for modifying hop selection kernel 370 to create hop selection kernel 380.

Petitioner cites to this second aspect to argue that the system of Gerten uses a selection kernel to address channels stored in a register, such as the alternate code word register bank. Pet. 45. Petitioner then cites to the first aspect, Gerten’s channel scanning algorithm, to argue that the selection kernel addresses a bad channel stored in a particular location of a default channel register. *Id.* at 45–47. Finally, Petitioner cites to Gerten’s third aspect (defining an alternate code word register by removing tier 2 channels and replacing them with guardband channels) to argue that the selection kernel replaces the bad channel with a good channel from the good channel

register. *Id.* at 47–48. Dr. Ding’s testimony merely repeats, nearly verbatim, the arguments in the Petition, without adding to it meaningfully. Ex. 1002 ¶¶ 166–73.

Patent Owner contends that, in Gerten’s embodiments, the selection kernel only addresses the alternate register bank, rather than the identified default channel register that contains both good and bad channels. PO Resp. 24. In the embodiment of Figures 6 and 7, for example, Patent Owner argues that Gerten’s modified hop selection kernel (Figure 7, item 380) addresses a bank of 75 registers storing only good channels, rather than a 79-register bank holding both good and bad channels. *Id.* at 24–25. According to Patent Owner:

Even in instances where bad channels may be swapped out for guardband channels/good channels to maintain the same number of channels in the alternate register bank, the selection kernel of Gerten would only be addressing good channels stored in this alternate register bank as opposed to addressing a bad channel stored in the default register and replacing it with a good channel because the alternate register bank of Gerten is designed to only store good channels.

*Id.* at 25.

We agree with Patent Owner. Gerten expressly references selection kernels in its description of Figures 6 and 7. Ex. 1003, 7:35–8:28. In that disclosure, hop selection kernel 370 addresses a bank of 79 registers, which equates to N total channels in a Bluetooth example. *Id.* at 7:35–44. However, hop selection kernel 370 does not replace bad channels in N. Rather, to account for bad channels, Gerten describes modifying the hop selection kernel to produce a new hop selection kernel, 380, that addresses a

set of N-M registers with the four worst channels having been removed. *Id.* at 7:44–54. Gerten does not state which entity performs the modification of the hop selection kernel or removal of bad channels. Nevertheless, Petitioner has not introduced persuasive evidence that hop selection kernel 370 modifies itself.

As to Gerten’s description of defining an alternate code word register bank in which bad channels have been replaced by guardband channels (Ex. 1003, 8:32–40), Gerten does not identify which entity is performing this method or how it is implemented. Petitioner has introduced no persuasive evidence that the replacement of bad channels with guardband channels is performed by a selection kernel. At the oral argument, Petitioner was not able to identify any such disclosure in Gerten. Tr. 104:18–105:22. We have reviewed Gerten and find no support for Petitioner’s argument. In any case, Petitioner has not met its burden to show that Gerten teaches “a selection kernel addresses a bad channel stored in a particular location of the default channel register” and “replacing, by the selection kernel, the bad channel stored in the particular location of the default channel register with a good channel selected from the set of good channels loaded in the good channel register,” as recited in claims 1, 6, and 11.

In reply, Petitioner makes three additional arguments not made in the Petition, none of which are persuasive. First, Petitioner argues that the last clause of claim 1 of Gerten (Ex. 1003, 10:41–48) discloses a selection kernel addressing both a default channel register and a good channel register. Reply 18 (citing Ex. 1012 ¶ 22). Claim 1 of Gerten recites, in pertinent part:

a first hop selection kernel component for addressing the first register bank and a second hop selection kernel component for addressing the second register bank, the first hop selection kernel component having a modulo of N for addressing the first register bank and the second hop selection kernel component having a modulo of N-M for addressing the second register bank.

Ex. 1003, 10:41–48. Here, claim 1 recites two hop selection kernels, a first hop selection kernel component and a second hop selection kernel component. This is consistent with Gerten’s description of Figure 6 and 7, in which hop selection kernel 370 is modified to produce modified hop selection kernel 380. *Id.* at 7:35–8:28. Once again, this evidence does not support a finding that the same selection kernel addresses a bad channel stored in a default channel register and then replaces the bad channel with a good channel.

Second, Petitioner argues that “Gerten discloses no component, other than the selection kernel, that interacts with the channel registers.”

Reply 18. To the extent that Petitioner now argues that Gerten inherently discloses a selection kernel that both addresses a bad channel in a default channel register and replaces the bad channel with a good channel, Petitioner has not introduced persuasive evidence that this is necessarily disclosed in Gerten. Petitioner cites to Dr. Ding’s testimony. *Id.* (citing Ex. 1012 ¶ 22). Dr. Ding, however, merely repeats this argument without citing to the basis for his testimony. Accordingly, we give this testimony little weight. *See* 37 C.F.R. § 42.65(a).

Third, Petitioner argues that, “[t]o the extent it is argued that Gerten does not teach that the selection kernel replaces bad channels, it would have

been obvious for a [person of ordinary skill in the art] to modify the selection kernel disclosed by Gerten to perform the recited bad channel replacement.” Reply 19. Relying on new testimony from Dr. Ding, Petitioner argues that the use of a kernel is a common solution to address a register and is one of a limited number of structures known to interact with registers. *Id.* (citing Ex. 1012 ¶ 22). Dr. Ding, however, merely repeats this argument without citing to the basis for his testimony. Once again, we give this testimony little weight. See 37 C.F.R. § 42.65(a). In any case, Petitioner’s vague and conclusory arguments do not explain persuasively why a skilled artisan would have modified the hop selection kernel disclosed in Gerten to both address bad channels in a default channel register and replace those channels with good channels. Accordingly, Petitioner has not shown that these limitations would have been obvious over Gerten.

Claims 2–4 depend from claim 1; claims 7–9 depend from claim 6; and claims 12–14 depend from claim 11. We have considered Petitioner’s additional arguments regarding claims 2–4, 7–9, and 12–14. Pet. 50–54; Reply 19–20. These arguments, however, do not remedy the deficiencies in Petitioner’s evidence as to independent claims 1, 6, and 11.

### *3. Conclusion Regarding Obviousness*

We have considered Petitioner’s evidence and argument regarding claims 1–4, 6–9, and 11–14, and Patent Owner’s arguments and evidence to the contrary. As explained above, we find that Gerten does not teach every limitation of claims 1–4, 6–9, and 11–14. We also find that Petitioner has not shown that a skilled artisan would have modified Gerten to arrive at the

challenged claims. The parties do not introduce or rely on objective indicia of nonobviousness. After weighing the evidence, we conclude that Petitioner has not shown, by a preponderance of the evidence, that claims 1–4, 6–9, and 11–14 would have been obvious over Gerten.

*F. Obviousness over Gerten and Dicker*

Petitioner contends that claims 5, 10, and 15 would have been obvious over Gerten and Dicker. Pet. 54–58; Reply 20–21. We have considered Petitioner’s additional arguments regarding claims 5, 10, and 15. These arguments, however, do not remedy the deficiencies in Petitioner’s evidence as to independent claims 1, 6, and 11. After weighing the evidence, we conclude that Petitioner has not shown, by a preponderance of the evidence, that claims 5, 10, and 15 would have been obvious over Gerten and Dicker.

### III. CONCLUSION

Petitioner has demonstrated by a preponderance of the evidence that claims 1–3, 6–8, and 11–13 would have been obvious over Haartsen. Petitioner also has demonstrated by a preponderance of the evidence that claims 4, 9, and 14 would have been obvious over Haartsen and Dicker. Petitioner has not shown by a preponderance of the evidence that claims 5, 10, and 15 would have been obvious over Haartsen and Dicker; that claims 1–4, 6–9, and 11–14 would have been obvious over Gerten; or that claims 5, 10, and 15 would have been obvious over Gerten and Dicker.

IV. ORDER

For the reasons given, it is

ORDERED, based on a preponderance of the evidence, that claims 1–4, 6–9, and 11–14 of U.S. Patent No. 8,542,643 B2 are held unpatentable;

FURTHER ORDERED that claims 5, 10, and 15 of U.S. Patent No. 8,542,643 B2 are not held unpatentable; and

FURTHER ORDERED, because this is a final written decision, the 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.

IPR2015-00531  
Patent 8,542,643 B2

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