

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD.,
SAMSUNG ELECTRONICS AMERICA, INC., and APPLE INC.,
Petitioner,

v.

SMART MOBILE TECHNOLOGIES LLC,
Patent Owner.

IPR2022-01004
Patent 9,614,943 B1

Before HYUN J. JUNG, NATHAN A. ENGELS, and
PAUL J. KORNICZKY, *Administrative Patent Judges*.

JUNG, *Administrative Patent Judge*.

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

I. INTRODUCTION

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons that follow, we determine that Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Apple Inc. (collectively, “Petitioner”) have shown by a preponderance of the evidence that claims 1, 5–9, and 12–14, but not claims 2–4 and 15–20, of U.S. Patent No. 9,614,943 B1 (Ex. 1001, “the ’943 patent”) are unpatentable.

A. Background and Summary

Petitioner filed a Petition (Paper 2, “Pet.”) requesting institution of an *inter partes* review of claims 1–9 and 12–20 of the ’943 patent. Smart Mobile Technologies LLC (“Patent Owner”) filed a Preliminary Response (Paper 6). After receiving authorization, Petitioner filed a Reply to the Preliminary Response (Paper 7), and Patent Owner filed a Sur-reply (Paper 8). Pursuant to 35 U.S.C. § 314, we instituted an *inter partes* review of claims 1–9 and 12–20 of the ’943 patent on all presented challenges. Paper 13 (“Inst. Dec.”), 2, 71.

After institution, Patent Owner filed a Response (Paper 24, “PO Resp.”), to which Petitioner filed a Reply (Paper 29, “Pet. Reply”), and Patent Owner thereafter filed a Sur-reply (Paper 35, “PO Sur-reply”). An oral hearing in this proceeding was held on September 15, 2023; a transcript of the hearing is included in the record. Paper 39 (“Tr.”).

B. Real Parties in Interest

Petitioner identifies Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., and Apple Inc. as real parties in interest. Pet. 88. Patent Owner only identifies itself as a real party in interest. Paper 4, 1.

C. Related Matters

The parties identify *Smart Mobile Techs. LLC v. Apple Inc.*, 6:21-cv-00603 (W.D. Tex.) and *Smart Mobile Techs. LLC v. Samsung Electcs. Co., Ltd.*, 6:21-cv-00701 (W.D. Tex.) as related matters. Pet. 89; Paper 4, 1. Related patents are challenged in IPR2022-00766, IPR2022-01005, IPR2022-01222, IPR2022-01248, and IPR2022-01249.

D. The '943 Patent (Ex. 1001)

The '943 patent issued on April 4, 2017 from an application filed on September 17, 2012, which is a continuation application of several previously filed continuation and continuation-in-part applications, the earliest of which was filed on December 16, 1996. Ex. 1001, codes (22), (45), (63), 1:8–18.

The '943 patent states that an unfulfilled need exists for multiple transmitters and receivers (“T/R”) in a cellular telephone or mobile wireless device (“CT/MD”). Ex. 1001, 1:48–49. Figure 5A of the '943 patent is reproduced below.

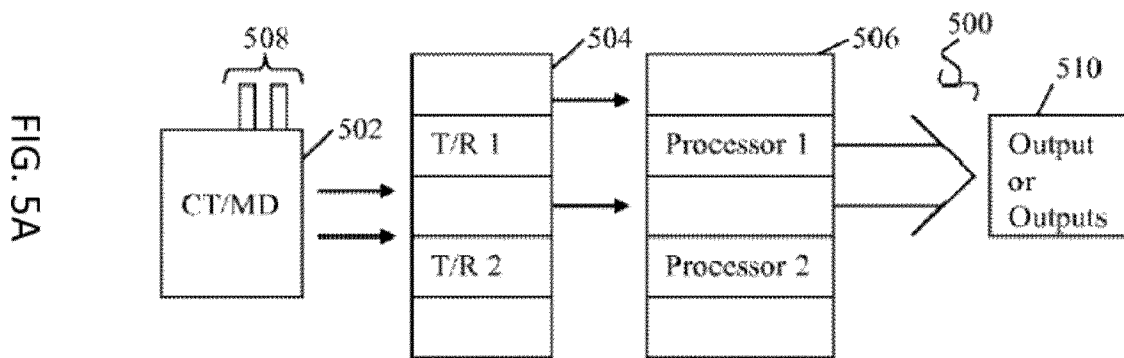


Figure 5A shows a “a dual antenna, dual T/R unit in a CT/MD interfacing with a dual processor.” Ex. 1001, 2:15–16. Dual antenna 508 and dual T/R unit 504 interface with dual processor 506 in dual band system 500. Ex. 1001, 4:39–41. System 500 can communicate through

outputs 510, which can be “fibre optic channel, ethernet, cable, telephone, or other.” *Id.* at 4:44–47.

“The multiple processors 506 allow for parallel and custom processing of each signal or data stream to achieve higher speed and better quality of output.” Ex. 1001, 4:54–56. Alternatively, there can be “a single processor that has the parallelism and pipeline capability built in for handling one or more data streams simultaneously.” *Id.* at 4:56–59. Processors 506 include “DSP, CPU, memory controller, and other elements essential to process various types of signals.” *Id.* at 4:59–61.

“The processor contained within the CT/MD 502 is further capable of delivering the required outputs to a number of different ports such as optical, USB, cable and others” and “capable of taking different inputs, as well as wireless.” Ex. 1001, 4:63–67. “Thus the CT/MD 502 has universal connectivity in addition to having a wide range of functionality made possible through the features of multiple antennas, multiple T/R units 504 and processors 506.” *Id.* at 5:3–6.

“[T]he CT/MD may use one or more transmission protocols as deemed optimal and appropriate,” and “the CT/MD determines the required frequency spectrum, other wireless parameters such as power and signal to noise ratio to optimally transmit the data.” Ex. 1001, 11:8–10, 11:12–15. The CT/MD has “the ability to multiplex between one or more transmission protocols such as CDMA, TDMA to ensure that the fast data rates of the optical network or matched closely in a wireless network to minimize the potential data transmission speed degradation of a wireless network.” *Id.* at 11:15–20.

Also, the '943 patent states “by having each of the data streams sampled at differing clock frequencies the performance can be better

optimized.” Ex. 1001, 4:36–38. “Each channel may be sampled and clocked individually as necessary to optimally process each data stream and combine the individual data packets.” *Id.* at 7:50–52.

E. Illustrative Claim

The ’943 patent includes 20 claims, of which Petitioner challenges claims 1–9 and 12–20. Of the challenged claims, claims 1, 5, 8, and 12 are independent, and claim 1 is reproduced below.

1. A wireless communication device comprising:
 - a plurality of antennas; and
 - a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver,
 - wherein the communication component is configured to communicate via a first frequency band using a wireless communication protocol; and
 - wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually; and
 - wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel.

Ex. 1001, 11:63–12:9.

Independent claims 5, 8, and 12 also recite a “wireless communication device” and the limitations “a plurality of antennas,” “a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver,” “wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually,” and “wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in

parallel.” Ex. 1001, 12:26–30, 12:42–47, 12:55–59, 13:1–6, 13:17–21, 14:1–6.

The remaining limitations of independent claims 5, 8, and 12 differ from claim 1 and require, for example, “at least one additional transmitter” (claim 5), “at least one additional receiver” (claim 8), and “a first set of antennas . . . and a second set of antennas” (claim 12). Ex. 1001, 12:31–32, 12:60–61, 13:23–28.

F. Asserted Prior Art and Proffered Testimonial Evidence

Petitioner identifies the following references as prior art in the asserted ground of unpatentability:

Name	Reference	Exhibit
Billström	US 5,590,133, issued Dec. 31, 1996	1010
Pillekamp	US 5,594,737, issued Jan. 14, 1997	1009
Johnston	US 5,784,032, issued July 21, 1998	1006
Raleigh	US 6,144,711, filed Aug. 27, 1997, issued Nov. 7, 2000	1005
Byrne	EP 0 660 626 A2, published June 28, 1995	1008
WO748	WO 98/27748, published June 25, 1998	1007

Pet. 2. Petitioner states that “[t]he references qualify as prior art to the ’943 patent’s earliest claimed priority date (06/04/1999; ‘Critical Date’),” but “Petitioner does not concede that the ’943 patent is entitled to priority.” *Id.* According to Petitioner, Byrne, Pillekamp, and Billström are prior art under § 102(b); Raleigh and WO748 are prior art under § 102(e); and Johnston is prior art under §§ 102(a) and (e).¹ *Id.* Petitioner also provides a Declaration

¹ The relevant sections of the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (Sept. 16, 2011), took effect on March 16, 2013. Because the ’943 patent claims priority to an application filed before that date, our citations to 35 U.S.C. §§ 102 and 103 in this Decision are to their pre-AIA versions. *See also* Pet. 2 (stating but not conceding that “the ’943 patent’s earliest claimed priority date” is “06/04/1999”).

of Dr. Michael Allen Jensen (Ex. 1003) and a Second Declaration of Dr. Michael Allen Jensen (Ex. 1048).

Patent Owner provides a Declaration of Dr. Todor Cooklev. Ex. 2004.

Deposition transcripts for Dr. Jensen (Exs. 2006, 2007, 2018) and Dr. Cooklev (Ex. 1049) were filed.

G. Asserted Grounds

Petitioner asserts that claims 1–9 and 12–20 are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1, 5–9	103(a)	Byrne
3, 4	103(a)	Byrne, WO748
12	103(a)	Byrne, Johnston, Pillekamp
13, 14	103(a)	Byrne, Johnston, Pillekamp, Billström
1, 2, 5–9	103(a)	Raleigh, Byrne
3, 4	103(a)	Raleigh, Byrne, WO748
12, 15, 18–20	103(a)	Raleigh, Byrne, Pillekamp
13, 14	103(a)	Raleigh, Byrne, Pillekamp, Billström
16, 17	103(a)	Raleigh, Byrne, Pillekamp, WO748

Pet. 1.

II. ANALYSIS

A. Legal Standards

In *inter partes* reviews, the petitioner bears the burden of proving unpatentability of the challenged claims, and the burden of persuasion never shifts to the patent owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015). To prevail in an *inter partes* review, the petitioner must support its challenges by a preponderance of the evidence. 35 U.S.C. § 316(e) (2018); 37 C.F.R. § 42.1(d) (2021).

Petitioner contends that the challenged claims of the '943 patent are unpatentable under § 103. Pet. 1. A claim is unpatentable under § 103 if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). When evaluating a combination of teachings, we must also “determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

B. Level of Ordinary Skill in the Art

Petitioner asserts that one of ordinary skill in the art “would have had a Bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field, and at least two years of experience related to the design or development of wireless communication systems, or the equivalent.” Pet. 3 (citing Ex. 1003 ¶¶ 27–28). Petitioner also states that “[a]dditional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.” *Id.* (citing Ex. 1003 ¶¶ 27–28). We preliminarily adopted Petitioner’s proposed level of ordinary skill in the art. Inst. Dec. 9.

According to Patent Owner, Petitioner’s declarant testified that one of ordinary skill in the art

would have “a demonstrated capability in just designing some component of the system and working on that’ and ‘starting to work at a higher level” where “maybe they’re only designing some piece based on the expertise, but they’re understanding the architecture into which their piece will fit and how their design is going to impact that architecture and the overall functioning of the system.”

PO Resp. 6 (citing Ex. 2006, 29:13–31:5). Patent Owner also argues that Petitioner’s declarant confirmed the proposed level of ordinary skill and that nothing would change it. *Id.* (citing Ex. 2006, 13:8–14:15). “For this proceeding, Patent Owner does not contest Petitioner’s definition of a [person of ordinary skill in the art]” with the above-described clarifications. *Id.* at 6–7 (citing Ex. 2004 ¶¶ 18–22).

Based on the full record, we maintain and reaffirm that one of ordinary skill in the art “would have had a Bachelor’s degree in electrical engineering, computer engineering, computer science, or a related field, and at least two years of experience related to the design or development of wireless communication systems, or the equivalent” and that “[a]dditional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.” Pet. 3 (citing Ex. 1003 ¶¶ 27–28).

C. Claim Construction

In an *inter partes* review, the claims are construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

37 C.F.R. § 42.100(b); *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc).

Petitioner states that “no formal claim constructions are necessary in this proceeding.” Pet. 2. Patent Owner does not propose an interpretation for any claim term. *See generally* PO Resp.

Petitioner filed a Claim Construction Order that was issued in *Smart Mobile Techs. LLC v. Samsung Elects. Co., Ltd.*, 6:21-cv-00701 (W.D. Tex.). Ex. 1099. Both parties do not believe that the Claim Construction Order affects their positions in this proceeding. Tr. 23:11–18 (Petitioner’s counsel stating that “I did not see any issue that was resolved [in the Claim Construction Order] that would have had any impact on today’s proceeding”), 47:12–17 (Patent Owner’s counsel stating that “[w]e don’t believe that there is anything in the claim construction order that has any material bearing on the issues in this proceeding”).

Based on the full record, we determine that no claim term requires express interpretation. *Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms that . . . are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

D. Asserted Obviousness Based on Byrne

1. Byrne (Ex. 1008)

Byrne particularly relates “to a radio telephone operable for more than one system.” Ex. 1008, 1:2–3. Figure 1 of Byrne is reproduced below.

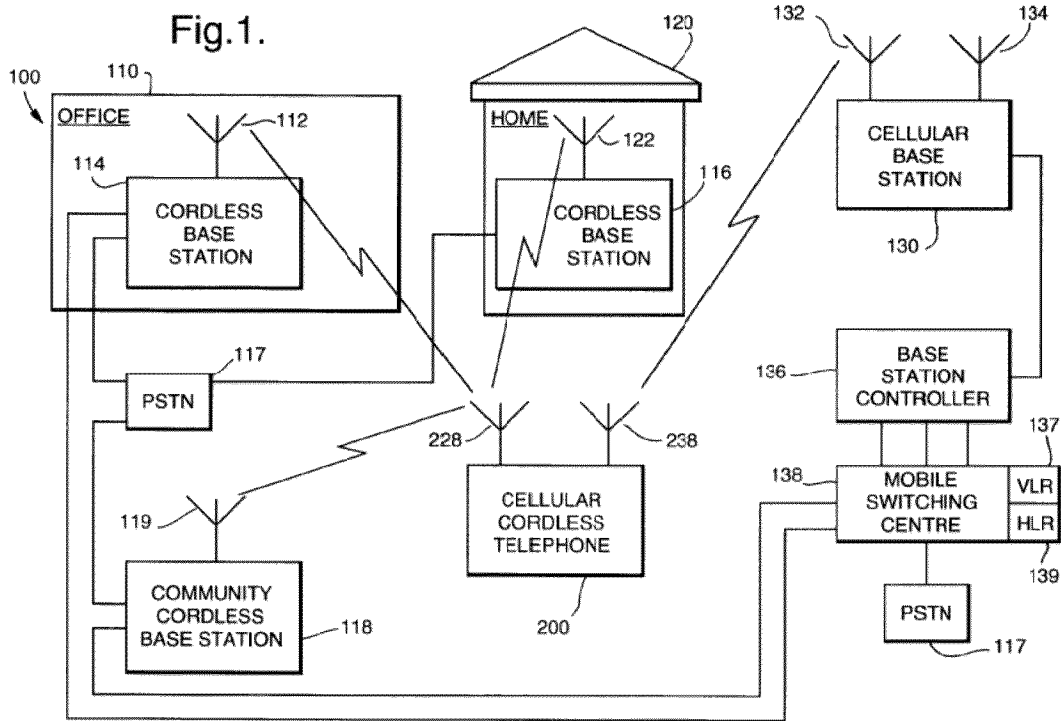


Figure 1 is a block diagram of a cellular cordless telephone system.

Ex. 1008, 6:19–20, 6:36–37. Cellular cordless telephone system 100 includes cordless base stations 114, 116, 118 that communicate with cellular cordless telephone (“CCT”) 200 via antennas 112, 119, 122. *Id.* at 6:38–47. System 100 also includes cellular base station 130 with receive antenna 132 and transmit antenna 134 for communicating with CCT 200. *Id.* at 7:4–10. Byrne describes that its CCT 200 uses cordless telephone systems “CT-2 or DECT² which are digital systems” and GSM³ or DCS (Digital Cellular System) cellular telephone systems. *Id.* at 1:41–44, 7:19–24, 10:53.

² Pillekamp indicates that DECT stands for “Digital European Cordless Telecommunication.” Ex. 1009, 2:59–60.

³ Billström indicates that GSM stands for “Global System for Mobile communication.” Ex. 1010, 1:62.

CCT 200 includes antenna 228 for cordless communication and antenna 238 for cellular communication. Ex. 1008, 7:13–15. Figure 2 of Byrne is reproduced below.

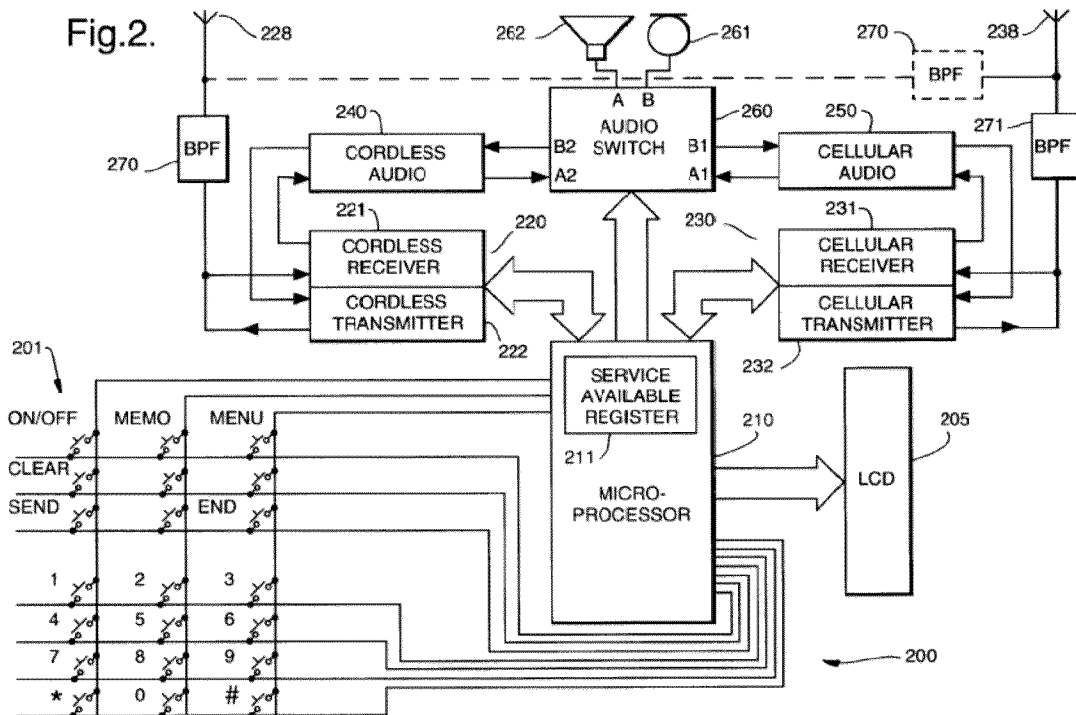


Figure 2 is a block diagram of a cellular cordless telephone. Ex. 1008, 6:22–23, 7:25–26. CCT 200 also includes microprocessor 210, cordless telephone transceiver 220, and cellular telephone transceiver 230. *Id.* at 7:27–30. Microprocess 210 “is adapted to operate in accordance with the flow charts illustrated in Figures 3–4.” *Id.* at 7:56–58; *see also id.* at 8:44–9:30 (describing steps used by microprocessor 210 for receiving and placing cellular or cordless telephone calls), 9:31–10:8 (describing the monitoring of availability of cellular and cordless systems).

When operating as a cordless telephone, “microprocessor 210 enable[s] cordless receiver 221 and cordless transmitter 222.” Ex. 1008, 8:16–18. “[M]icroprocessor 210 controls the CCT 200 in a similar way when operating as a cellular telephone, but appropriately modified for the

signal[ing] protocols and data encryption used in the cellular system.” *Id.* at 8:29–33. Byrne states that “signal[ing] protocols, data encryption techniques and the like used in respective telephone systems are well known in the art.” *Id.* at 8:33–35.

“CCT 200 may operate, as far as a user is concerned, simultaneously as a cellular telephone and a cordless telephone.” Ex. 1008, 8:3–6. Byrne explains that “CCT 200 can be arranged such that both cellular and cordless operations are in progress at the same time.” *Id.* at 8:6–9.

2. *Claim 1*

a) *“A wireless communication device comprising:”*

Petitioner argues that Byrne teaches the preamble of claim 1, if it is limiting, because Byrne teaches a cellular cordless telephone. Pet. 6 (citing Ex. 1003 ¶ 69; Ex. 1008, 7:11–13); Ex. 1001, 11:63; *see also* Pet. vii (labeling the preamble “1[pre]”).

The cited portion of Byrne describes that its “CCT 200 may be a mobile unit installed in a vehicle, a so called transportable unit or a hand held portable unit.” Ex. 1008, 7:11–13. We also credit Petitioner’s testimonial evidence regarding the preamble of claim 1 because Byrne supports it. Ex. 1003 ¶ 69. Patent Owner does not provide a responsive argument for the preamble of claim 1. *See* PO Resp. 7–22.

Therefore, based on the full record before us, because Byrne describes its CCT 200 as “a hand held portable unit,” Petitioner persuades us by a preponderance of the evidence, and we find, that Byrne teaches or suggests the preamble of claim 1, if it is limiting.

b) *“a plurality of antennas”*

Petitioner also argues that, because Byrne teaches antenna 228 for cordless communication and antenna 238 for cellular communication, Byrne

teaches “a plurality of antennas.” Pet. 6 (citing Ex. 1003 ¶ 70; Ex. 1008, 7:13–15); Ex. 1001, 11:64; *see also* Pet. vii (labeling the limitation “1[a]”).

The cited portion of Byrne describes that “CCT 200 comprises an antenna 228 for cordless communication and an antenna 238 for cellular communication.” Ex. 1008, 7:13–15. We also credit Petitioner’s testimonial evidence regarding the plurality of antennas because Byrne supports it. Ex. 1003 ¶ 70. Patent Owner does not provide a responsive argument for the required antennas of claim 1. *See* PO Resp. 7–22.

Therefore, based on the full record before us, because Byrne describes antennas for cordless and cellular operations, Petitioner persuades us by a preponderance of the evidence, and we find, that Byrne teaches or suggests “a plurality of antennas.”

- c) *“a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver”*

For above-quoted limitation, Petitioner contends that Byrne teaches its CCT has (1) cordless transceiver 220 with cordless receiver 221 and cordless transmitter 222, (2) cellular transceiver 230 with cellular receiver 231 and cellular transmitter 232, and (3) microprocessor 210. Pet. 6–7 (citing Ex. 1003 ¶ 71; Ex. 1008, 7:26–32, 7:56–8:2, Fig. 2; Ex. 1001, 11:65–67; *see also* Pet. vii (labeling the limitation “1[b]”). Petitioner also contends that one of ordinary skill in the art would have understood that transceivers 220, 230 and microprocessor 210 would be a communication component coupled to antennas 228, 238. *Id.* at 7 (citing Ex. 1003 ¶ 72).

The cited portions of Byrne describe separate cordless and cellular operations using separate components that include cordless receiver 221, cordless transmitter 222, cellular receiver 231, cellular transmitter 232, and

microprocessor 210. Ex. 1008, 7:26–32, 7:56–8:28, Fig. 2. We credit Petitioner’s testimonial evidence that one of ordinary skill in the art would have understood Byrne’s microprocessor 210 and cordless or cellular transceiver 220, 230 to constitute a communication unit coupled to antennas 228, 238 because Byrne supports it. Ex. 1003 ¶ 71; Ex. 1008, Fig. 2. Patent Owner does not provide a responsive argument for the “communication component” of claim 1. *See* PO Resp. 7–22.

Based on the full record before us, for the reasons above, Petitioner persuades us by a preponderance of the evidence, and we find, that Byrne teaches or suggests “a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver.”

d) “wherein the communication component is configured to communicate via a first frequency band using a wireless communication protocol”

For the wherein clause quoted above, Petitioner argues that Byrne teaches its CCT operating on cordless protocols and frequency bands and cellular protocols and frequency bands. Pet. 7–8 (citing Ex. 1003 ¶ 73; Ex. 1008, 7:19–24); Ex. 1001, 12:1–3; *see also* Pet. vii (labeling the limitation “1[c]”).

The cited portion of Byrne describes that “[t]ypically in the UK cordless systems operate in frequency bands at 49 MHz (CTO), 860 MHz (CT2) and 1880–1900 MHz (DECT) and cellular telephone systems in frequency bands 890–905 MHz and 935–950 MHz (TACS), 905–915 MHz and 950–960 MHz (GSM) or 1800 MHz (DCS).” Ex. 1008, 7:19–24. We also credit Petitioner’s testimonial evidence that Byrne would have used either cordless protocols and frequency bands or cellular protocols and

frequency bands because the cited portion of the record supports the testimony. Ex. 1003 ¶ 73; Ex. 1008, 7:19–24. Patent Owner does not provide a responsive argument for the above-quoted wherein clause. *See* PO Resp. 7–22.

Based on the full record before us, for the reasons above, Petitioner persuades us by a preponderance of the evidence, and we find, that Byrne teaches or suggests “wherein the communication component is configured to communicate via a first frequency band using a wireless communication protocol.”

- e) *“wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually”*

For the wherein clause quoted above, Petitioner argues that Byrne teaches subtasks and channels in a manner consistent with the ’943 patent’s disclosure. Pet. 8 (citing Ex. 1001, 7:1–8:41, Figs. 9–12; Ex. 1003 ¶ 77); Ex. 1001, 12:4–6; *see also* Pet. vii (labeling the limitation “1[d]”). According to Petitioner, the ’943 patent describes multiple transceivers processing multiple data streams, and “[e]ach subtask being processed can be assigned to a separate channel.” *Id.* (citing Ex. 1001, 7:1–8:16, Figs. 10, 11).

Petitioner contends that, because Byrne describes cordless and cellular channels, Byrne teaches two channels as separate communication pathways for two data streams that are processed separately. Pet. 8 (citing Ex. 1003 ¶ 77). Petitioner specifically contends that Byrne teaches cordless audio channel 240 and cellular audio channel 250, and that cordless and cellular subtask are assigned to cordless and cellular channels, respectively. *Id.* at 8–

10 (citing Ex. 1003 ¶¶ 74–76; Ex. 1008, 6:36–8:43, Fig. 2; Ex. 1042, 1:55–2:8, Ex. 1043, 4:23–5:59; Ex. 1044, 4:23–5:59).

Petitioner also contends that one of ordinary skill in the art “would have found it obvious that Byrne’s cordless and cellular radio channels are *sampled and clocked individually* according to different specifications required in the respective protocols.” Pet. 10 (citing Ex. 1003 ¶ 78). Petitioner further contends that one of ordinary skill in the art “would have recognized and/or found obvious that Byrne’s cordless and cellular channels require or at least benefit from separate and individual sampling and clocking.” *Id.* (citing Ex. 1003 ¶ 78).

Petitioner additionally contends that it was well known to sample continuous signals and reconstruct signals from a set of samples and that many receivers sample a signal at higher than twice the bandwidth of the signal, also called the Nyquist rate. Pet. 11 (citing Ex. 1003 ¶ 79; Ex. 1020, 4–5, 10; Ex. 1024, 10; Ex. 1026, 6; Ex. 1030). Petitioner provides examples of such sampling in the DECT and GSM protocols and argues that one of ordinary skill in the art “would have recognized and/or found obvious that the DECT and GSM systems, which are examples of standards used for Byrne’s cordless and cellular channels, are sampled individually at different rates that accommodate different bandwidths.” *Id.* at 11–12 (citing Ex. 1003 ¶ 80; Ex. 1024; Ex. 1025; Ex. 1026; Ex. 1035, 4:14–18; Ex. 1036, 3:4–7; Ex. 1039, 3).

According to Petitioner, a clock would provide timing to a processor and an analog-to-digital converter (“ADC”) that would be used to sample a received signal. Pet. 12 (citing Ex. 1003 ¶ 81; Ex. 1038, 1, 3, 4, 6; Ex. 1039, 4–5, 10, 11–15). Petitioner, thus, argues that one of ordinary skill in the art

would have understood that the clock driving the ADC at a receiver is the same as, or at least derived from, a clock driving the computational processor, as the samples created by the ADC stream into and are processed by the processor, and therefore the samples from the ADC should be synchronized with the computations at the processor.

Id. (citing Ex. 1003 ¶ 81; Ex. 1039, 4–5, 11–15).

Petitioner also argues that the clock rate would control processor speed and be associated with the data rate. Pet. 12–13 (citing Ex. 1003 ¶ 81; Ex. 1038, 2–4; Ex. 1039, 1–4). Petitioner contends that one of ordinary skill in the art “would have recognized and/or found obvious that the dependence among various parameters including the sampling rate, the processor clock rate, the information data rate, and the computational requirements results in a clocking rate that is determined for each communication protocol.” *Id.* at 13 (citing Ex. 1003 ¶ 82).

Petitioner provides examples of the data rate, channels, and other parameters for DECT and GSM. Pet. 13 (citing Ex. 1014, 13; Ex. 1018, 1; Ex. 1038, 3; Ex. 1039, 3). Petitioner argues that one of ordinary skill in the art would have known “that a processor (such as in, or associated with, a transceiver) and its clock rate in each of these systems depends on the computational demands determined based on these parameters.” *Id.* at 13–14 (citing Ex. 1003 ¶ 83; Ex. 1020, 10; Ex. 1029, 4–5). Petitioner also argues that, because DECT and GSM parameters differ, one of ordinary skill in the art “would have found it obvious that Byrne’s cordless (e.g., DECT) channel is clocked separately and differently from Byrne’s cellular (e.g., GSM) channel.” *Id.* at 14 (citing Ex. 1003 ¶ 83; Ex. 1008, 7:39–49).

In Petitioner’s view, Byrne’s processors and associated components supporting cordless and cellular channels would need to be clocked

differently for different data rates and communication parameters, and, thus, one of ordinary skill in the art would have found it obvious that Byrne's cordless and cellular channels are sampled and clocked individually at their separate receivers. Pet. 14 (citing Ex. 1003 ¶ 84). Petitioner also argues that "the '943 patent's limited disclosure of *individual sampling and clocking* aligns with Byrne's description" and knowledge in the art. *Id.* at 14–15 (citing Ex. 1001, 4:32–38, 7:50–52; Ex. 1003 ¶ 85).

Petitioner cites portions of Byrne that describe and show "CCT 200 comprises a cellular telephone transceiver 230, and antenna 238, a cordless telephone transceiver 220 and antenna 228" along with other components and that CCT 200 communicates with cordless base stations 114, 116, 118 and cellular base station 130 using different frequency bands, protocols, and encryption. Ex. 1008, 6:36–8:43, Fig. 2. We credit Petitioner's testimonial evidence that Byrne teaches cordless audio channel 240 and cellular audio channel 250, that cordless and cellular subtask are assigned to their respective channels, and that Byrne, thus, teaches two channels as separate communication pathways for two data streams that are processed separately. Ex. 1003 ¶¶ 74–76. The cited portions of the record support the testimony. Ex. 1008, 6:36–8:43, Fig. 2; Ex. 1042, 1:55–2:8; Ex. 1043, 1:34–2:50; Ex. 1044, 4:23–5:59.

We also credit Petitioner's testimonial evidence that one of ordinary skill in the art "would have found it obvious that the cordless radio channel and the cellular radio channel in Byrne were sampled and clocked individually according to different specifications required in the respective protocols" and would have understood or found obvious "that the cordless and cellular channels in Byrne require or at least would benefit from separate and individual sampling and clocking." Ex. 1003 ¶¶ 78, 84. The

testimony is supported by evidence that individual sampling and clocking were known in the art and applicable to Byrne's CCT. Ex. 1003 ¶¶ 79–83; Ex. 1008, 7:39–49; Ex. 1014, 3; Ex. 1018, Abstr.; Ex. 1020, 4–5, 10; Ex. 1024, 10; Ex. 1025; Ex. 1026, 6; Ex. 1029, 4–5; Ex. 1030; Ex. 1035, 4:14–18; Ex. 1036, 3:4–7; Ex. 1038, 1, 2–4, 6; Ex. 1039, 1–5, 10, 11–15.

Patent Owner does not provide a responsive argument for “wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually.” See PO Resp. 7–22.

Based on the full record before us, for the reasons above, Petitioner persuades us by a preponderance of the evidence, and we determine, that Byrne teaches, suggests, and would have rendered obvious “wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually.”

f) “wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel”

For the final wherein clause of claim 1, Petitioner argues that the '943 patent provides a limited disclosure of channels in processors, and that Byrne teaches or would have rendered obvious a processor with parallel cordless and cellular channels. Pet. 15–16 (citing Ex. 1001, 4:24–29; Ex. 1003 ¶ 86; Ex. 1008, 7:25–43, Fig. 2); Ex. 1001, 12:7–9; *see also* Pet. vii (labeling the limitation “1[e]”). Petitioner also argues that Byrne can operate simultaneously as a cordless and cellular telephone, and thus, one of ordinary skill in the art would have understood, or found obvious, cordless and cellular data streams are being processed in parallel. *Id.* at 16–17 (citing Ex. 1003 ¶ 87; Ex. 1008, 8:2–15).

Petitioner further argues that, if the limitation requires a single processor, Byrne teaches single microprocessor 210 and that it would have been known or obvious to use a single processor with multiple channels for processing cordless and cellular communications. Pet. 17 (citing Ex. 1001, 4:15–31; Ex. 1003 ¶ 87; Ex. 1008, 7:26–9:30, Figs. 2, 3; Ex. 1045; Ex. 1046). Petitioner additionally contends that Byrne teaches processing data streams because it uses digital protocols for cordless and cellular voice and control data. *Id.* (citing Ex. 1003 ¶ 88; Ex. 1008, Abstr., 7:15–24, 8:16–23, 8:29–38).

(1) Patent Owner’s Response

Patent Owner responds that Petitioner fails to show “a processor [that] comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel” because the relied-upon processor “never receives the data stream in order to process it.” PO Resp. 7 (citing Ex. 2004 ¶ 34). Patent Owner argues that Petitioner’s declarant admitted that Byrne’s data streams are streams of transmitted and received data carrying digital information or digital information carried by the signal received over the antennas. *Id.* at 8–9 (citing Pet. 17; Ex. 1003 ¶ 88; Ex. 2004 ¶ 36; Ex. 2007, 19:6–17).

Patent Owner contends that Petitioner “submitted no evidence that either of the data streams received by the antennas are processed by the processor” and that Petitioner “point[s] to two arrows between the cordless and cellular transceivers and the microprocessor” that “do not convey the data streams received by the antennas to the microprocessor.” PO Resp. 9. According to Patent Owner, “it is impossible for the microprocessor to have processed the data streams” and “Byrne makes clear that the microprocessor

controls the transceivers and audio switch but does not process the incoming data streams received by the[] antennas.” *Id.* (citing Ex. 2004 ¶ 37).

According to Patent Owner, Byrne describes the functions of its microprocessor, and Petitioner’s declarant admitted that the description does not relate to processing incoming data streams. PO Resp. 9–10 (citing Ex. 1008, 7:56–8:2, 8:16–28; Ex. 2004 ¶¶ 38, 39; Ex. 2006, 169:12–171:2, 172:20–173:2). Patent Owner also argues that Petitioner’s declarant admitted that Byrne does not describe that the microprocessor processes incoming data, that data is passed to the microprocessor, and that the microprocessor sends information to the cordless receiver to go to the cordless audio module. *Id.* at 10–13 (Ex. 2004 ¶¶ 40–43; Ex. 2007, 21:7–23:11, 23:14–24, 24:11–17, 23:17–33:1, 33:11–34:4).

Turning to Byrne’s Figure 3, Patent Owner argues that it does not show the microprocessor receiving or processing data streams, and as admitted by Petitioner’s declarant, the figure shows which interface to use and does not show data from the antennas ending up at the microprocessor. PO Resp. 13–14 (citing Ex. 1008, 8:44–47; Ex. 2004 ¶ 44; Ex. 2006, 175:20–176:7; Ex. 2007, 28:12–21, 29:6–19). Patent Owner also argues that Figure 4, as admitted by Petitioner’s declarant, does not show the microprocessor processing data streams from the antennas. *Id.* at 14 (citing Ex. 1010, 9:31–10:1; Ex. 2004 ¶ 45; Ex. 2006, 176:16–20; Ex. 2007, 29:6–19).

Patent Owner further argues that the description of audio switch 260 confirms that Byrne’s microprocessor does not process data streams. PO Resp. 14 (citing Ex. 1008, 8:39–43; Ex. 2004 ¶ 46). In Patent Owner’s view, “the microprocessor does nothing more than open gates for the data streams to flow elsewhere.” *Id.* Patent Owned contends that cordless or

cellular audio could be data streams, but they are never received or processed by the microprocessor. *Id.* at 14–15 (citing Ex. 1008, Fig. 2; Ex. 2004 ¶¶ 47–49).

Patent Owner also contends that Petitioner’s testimonial evidence is conclusory and Petitioner’s declarant admitted that Byrne does not disclose processor 210 processing cellular and cordless data streams. PO Resp. 16 (citing Inst. Dec. 30; Ex. 1003 ¶¶ 86, 87; Ex. 2004 ¶ 50). Patent Owner further contends that Petitioner does not explain why Byrne needs to process cordless and cellular data streams, like the ’943 patent, when such data streams bypass Byrne’s microprocessor. *Id.* at 17–18 (citing Inst. Dec. 30; Ex. 1001, 4:16–22, Fig. 4; Ex. 1008, Fig. 2; Ex. 2004 ¶¶ 51–53).

According to Patent Owner, one of ordinary skill in the art “would not have understood Byrne to be teaching any benefit of processing the cordless and cellular data streams through a single processor (such as microprocessor 210).” PO Resp. 18–19. Patent Owner argues that “the information exchange between the transceivers and the microprocessor relate to the initiation and other control aspects of each system and not to actually processing data streams *because the microprocessor never receives the data streams and therefore cannot process them.*” *Id.* at 19 (citing Ex. 2004 ¶ 54).

Patent Owner also responds that Petitioner fails to show that Byrne processes first and second data streams in parallel. PO Resp. 19. Patent Owner argues that Petitioner’s declarant confirms that there is no express disclosure of processing data streams in parallel. *Id.*

Patent Owner also argues that Petitioner relies on Byrne’s statements that cellular and cordless operations are in progress at the same time, but “Byrne does not explain what it means by ‘operations’ that ‘are in progress,’

and additional context indicates that it does not refer to simultaneous streaming of data.” PO Resp. 20 (citing Pet. 17; Ex. 1003 ¶ 87; Ex. 2004 ¶¶ 55–56). According to Patent Owner, “the operations disclosed are not actual open connections,” and Petitioner’s declarant agrees that Byrne is not describing handling an active call. *Id.* at 20–21 (citing Ex. 1008, 8:16–28; Ex. 2004 ¶¶ 57, 58; Ex. 2006, 169:12–171:2, 172:20–173:2). Patent Owner also contends that Petitioner’s declarant admitted that Byrne does not describe how audio from both cordless and cellular can be sent to the audio switch at the same time. *Id.* at 21 (citing Ex. 2004 ¶ 58; Ex. 2007, 38:11–39:4). Patent Owner further contends that Petitioner’s declarant acknowledges that “Byrne’s ‘in progress at the same time’ outcome could have been accomplished in a variety of ways,” such as parallel processing in other components or multiplexing. *Id.* at 22 (citing Ex. 2007, 103:16–104:4).

Regarding whether it would have been obvious to provide parallel processing, Patent Owner argues that Petitioner provides only conclusory testimonial evidence and a few references that show “multi-channel microprocessors were known in the art.” PO Resp. 21 (citing Ex. 1003 ¶ 87). Patent Owner contends that merely showing it was known in the art without providing “any non-conclusory evidence” is insufficient to prove it was obvious to modify Byrne to use parallel processing. *Id.* at 21–22.

(2) Petitioner’s Reply

Petitioner replies that, based on Byrne’s disclosure and knowledge in the art, the ordinarily skilled artisan “would have understood or found obvious that Byrne’s microprocessor receives and processes data streams,” as shown by Byrne’s Figure 2 and testimonial evidence. Pet. Reply 1–3 (citing PO Resp. 7–13; Ex. 1008, 8:16–28, Fig. 2; Ex. 1048 ¶¶ 1–4;

Ex. 1049, 20:13–21:4), 7 (citing Ex. 1008, 8:16–31, 8:39–43; Ex. 1048 ¶¶ 19–21). Petitioner argues that Patent Owner does not provide any corroborating evidence that Byrne’s transceivers send instructions to its microprocessor. *Id.* at 3.

Petitioner also argues that one of ordinary skill in the art “would not have understood transceivers as sending instructions to a microprocessor, but instead as sending *data* to a microprocessor for processing,” as supported by Byrne’s description of monitoring signals from the transceivers for detecting signal strength and received data and for monitoring control signals. Pet. Reply 3 (citing Ex. 1008, 8:19–21, 8:23–24; Ex. 1048 ¶¶ 3–5). Petitioner further argues that Byrne’s control signals are data, not instructions. *Id.* at 3–4 (citing Ex. 1008, 8:23–28).

Petitioner contends that Byrne’s description confirms that its microprocessor receives and processes data streams during cellular operation, specifically signaling and data encryption. Pet. Reply 4–5 (citing Ex. 1008, 8:29–38; Ex. 1048 ¶ 6; Ex. 1075, 6:5–58; Ex. 1076, 18:10–15). Petitioner also contends that Patent Owner’s declarant confirmed that data encryption requires a processor, such processors were known before the critical date, and that he was not aware of transmitters and receivers that could perform encryption. *Id.* at 5 (citing Ex. 1049, 19:5–23:10, 24:5–25:8, 26:18–28:15, 31:19–32:3). Petitioner further contends that Byrne does not describe any other component for data encryption and so would have been understood or rendered obvious that the microprocessor processes cordless and cellular data streams. *Id.* (citing Ex. 1008, 7:25–55, 8:39–43; Ex. 1048 ¶¶ 7–8; Ex. 1049, 36:4–12, 46:1–47:4).

Petitioner points to Byrne’s microprocessor communicating data with display 205 and argues that one of ordinary skill in the art would have

understood or found obvious data sent from transceivers 220, 230 to microprocessor 210 for sending to display 205. Pet. Reply 6 (citing Ex. 1008, 8:54–56; Ex. 1048 ¶ 9; Ex. 1049, 32:4–24). According to Petitioner, Patent Owner reads too narrowly the broad disclosure of Byrne. *Id.* (citing Ex. 1048 ¶ 10). Petitioner also faults Patent Owner’s declarant for testifying without support that processing could occur in the transceivers, instead of the microprocessor. *Id.* at 6–7 (citing Ex. 1008, 7:39–41, 7:48–49; Ex. 1049, 39:14–20, 40:2–41:6, 43:16–44:1, 46:1–47:4). In Petitioner’s view, evidence shows that the transceivers did not perform data processing around the Critical Date. *Id.* at 7 (citing Ex. 1048 ¶¶ 11–18); *see also id.* at 2 (labeling “06/04/1999” as the “Critical Date”).

Petitioner also replies that Byrne’s microprocessor processes data streams in parallel because Byrne describes simultaneous cellular and cordless operations that would have been understood or made obvious parallel processing of data streams. Pet. Reply 7–8 (citing PO Resp. 20–22; Ex. 1008, 8:1–2, 8:6–9; Ex. 1048 ¶ 22). Petitioner contends that Byrne also describes parallel monitoring of cellular and cordless signal characteristics and, thus, parallel open connections. *Id.* at 8–9 (citing Ex. 1008, 4:46–56; Ex. 1048 ¶ 23).

Petitioner also argues that Byrne references another disclosure that evidences that simultaneous cellular and cordless operations were known and, thus, Byrne would have been understood or would have rendered obvious parallel processing of data streams. Pet. Reply 9 (citing Ex. 1008, 1:27–29, 2:42–3:11, 8:1–15, 10:37–39; Ex. 1048 ¶ 24; Ex. 1052, 1:62–66, 3:26–31, 6:35–7:16). Petitioner further argues that Byrne’s handover also supports that Byrne’s microprocessor processes cellular and cordless data

streams in parallel. *Id.* at 9–10 (citing Ex. 1008, 4:9–14, Figs. 3, 4; Ex. 1048 ¶ 25; Ex. 1069, 5–6; Ex. 1070, 7–9; Ex. 1071, 4, 10–12).

In Petitioner’s view, the ordinarily skilled artisan “would have found it obvious that Byrne’s microprocessor processes cellular/cordless data streams simultaneously in performing the control operations,” because “Byrne describes its microprocessor considering in parallel signal strength and bit/frame error rate.” Pet. Reply 10 (citing Ex. 1008, 4:46–56; Ex. 1048 ¶ 26). Petitioner also contends that Byrne describes processing broadcast information while a cellular call is in progress, which would be parallel processing. *Id.* at 10–11 (citing Ex. 1008, 8:23–28; Ex. 1048 ¶ 26). Petitioner further contends that the claims do not require simultaneously processing audio from two networks and that simultaneous processing of control information would satisfy the claims. *Id.* at 11 (citing Ex. 1048 ¶ 26).

(3) Patent Owner’s Sur-reply

Patent Owner replies that Petitioner only contends that one of ordinary skill in the art would have understood that Byrne’s microprocessor received and processed data from the antennas. PO Sur-reply 1–2 (citing Pet. Reply 1–2). Patent Owner argues that Petitioner does not dispute that data from the antennas are sent to the transceivers and then to the audio switch. *Id.* at 2 (citing Pet. Reply 3). Patent Owner also argues that the information received by the microprocessor is not information received by the receiver, as confirmed by Byrne’s description and Petitioner’s declarant. *Id.* at 2–3 (citing Ex. 2004 ¶ 41; Ex. 2007, 33:11–34:4).

Patent Owner further argues that Byrne describes control signals being sent from the transceiver to the microprocessor. PO Sur-reply 3 (citing Ex. 1008, 8:23–28). According to Patent Owner, Petitioner argues

for the first time that Byrne's microprocessor would have been understood to receive and process cellular data because of the reference to encryption, in response to Patent Owner showing that signals received by the antenna are passed to the audio switch bypassing the microprocessor. *Id.* at 3–5 (citing Pet. 16–17; Pet. Reply 4; Ex. 1008, 8:39–46, Fig. 2; Ex. 2004 ¶¶ 46–47), 8.

Patent Owner argues that Petitioner also fails to show that Byrne's microprocessor encrypts or decrypts and that Petitioner's evidence shows that encryption was done sequentially. PO Sur-reply 5 (citing Ex. 1075, 6:5–58). Patent Owner also argues that Byrne does not describe its microprocessor sending decrypted audio to the audio switch. *Id.* at 5–6 (citing Ex. 1008, 8:39–43, Fig. 2; Ex. 2004 ¶¶ 46–47; Ex. 2007, 26:17–28:2).

Patent Owner further argues that Petitioner mischaracterizes its declarant's testimony that also included statements that encryption could be performed by several types of components or software and the issue of whether transmitters could encrypt was not investigated. PO Sur-reply 6 (citing Pet. Reply 5; Ex. 1049, 18:14–25, 19:12–13, 19:24–20:8, 26:14–28:15). Patent Owner additionally argues that its declarant confirmed that information from the transceivers is sent directly to the audio block. *Id.* at 6–7 (citing Ex. 1049, 46:2–53:13). Patent Owner contends Petitioner's exhibits fail to prove that no transceiver did digital processing. *Id.* at 8.

As for information sent to a display, Patent Owner argues that Byrne describes updating the display before a connection is established and, thus, before data streaming, and that there is no evidence that a data stream is processed for updating the display. PO Sur-reply 7 (citing Ex. 1008, 8:54–56, Fig. 3; Ex. 2006, 175:20–176:7). Regarding narrowly reading Byrne, Patent Owner argues that it does not argue that Byrne's processor lacked the

power to process data streams, but instead, data streams from the antennas never pass through the microprocessor. *Id.* (citing PO Resp. 9–15).

Turning to processing data in parallel, Patent Owner argues that Petitioner does not rebut argument and evidence that Byrne does not operate cellular and cordless systems simultaneously. PO Sur-reply 8 (citing Pet. Reply 7–8). Patent Owner also argues that Petitioner newly argues the processing of control signals in parallel. *Id.* at 9 (citing Pet. 16–17; Ex. 1008, 8:2–15). Patent Owner further argue that the relied-upon control signals “are merely ‘predetermined criteria’ for a selected radio system” and monitored intermittently, not simultaneously. *Id.* at 9–10 (citing Pet. Reply 8; Ex. 1008, 4:46–56, 5:9–12, 5:20–23, 5:25–29).

As for Petitioner’s three-way linking argument, Patent Owner contends that it is untimely and the associated arguments and exhibits should be disregarded. PO Sur-reply 10 (citing Pet. 16–17; Pet. Reply 9–10; Ex. 1048 ¶¶ 24–25; Ex. 1052; Ex. 1069; Ex. 1070; Ex. 1071). Patent Owner also contends that the argument is wrong because Byrne never references three-way linking and disparages the user selection requirement of three-way linking. *Id.* at 11 (citing Pet. Reply 9; Ex. 1008, 1:27–29, 2:42–3:11, 10:37–39; Ex. 1052, 6:58–65, Fig. 7).

Patent Owner argues that Byrne’s control operations do not relate to cellular and cordless data streams, but instead to control streams that have information different from that received from the antennas. PO Sur-reply 12 (citing Pet. Reply 10). Patent Owner also argues that Byrne describes sequential processing of control signals. *Id.* (citing Pet. Reply 10; Ex. 1008, 5:20–23; Ex. 2007, 103:16–104:4).

g) Petitioner Shows by the Preponderance of the Evidence that Claim 1 is Unpatentable

For “wherein the processor comprises multiple ones of the one or more channels,” Petitioner relies on portions of Byrne that describe and show “CCT 200 comprises a cellular telephone transceiver 230, and antenna 238, a cordless telephone transceiver 220 and antenna 228,” and other components. Ex. 1008, 7:25–43, Fig. 2. We credit Petitioner’s testimonial evidence regarding a processor comprising multiple channels because the cited portions of Byrne support it. Ex. 1003 ¶ 86; Ex. 1008, 7:25–43, Fig. 2.

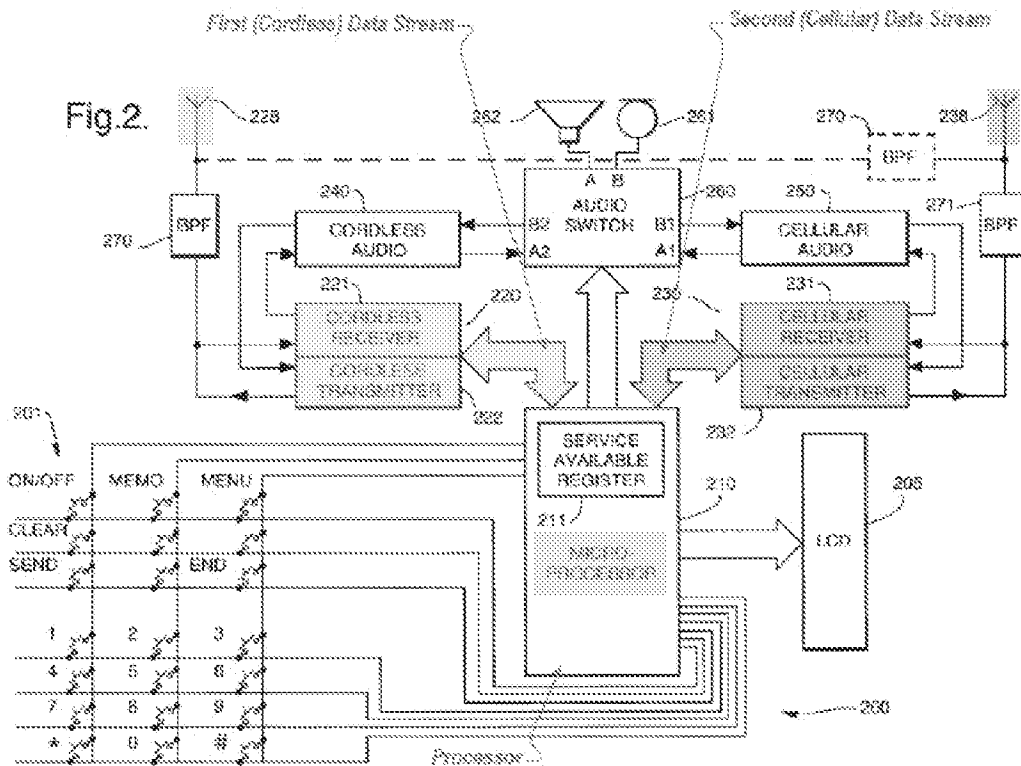
We also agree with Petitioner that Byrne’s asserted “processing” matches the ’943 patent’s description that a “single processor may have multiple channels for parallel processing of each data stream to process accurately two distinct signals 408 that were more optimally received by two dedicated antennas and two separate T/R units contained within the CT/MD.” Pet. 15 (citing Ex. 1001, 4:24–29); Ex. 1001, 4:24–25.

For a processor “further configured to process a first data stream and a second data stream,” Petitioner relies on portions of Byrne that describe “[t]ypically in the UK cordless telephone systems operate in frequency bands at 49 MHz (CTO), 860 MHz (CT2) and 1880–1900 MHz (DECT) and cellular telephone systems in frequency bands 890–905 MHz and 935–950 MHz (TACS), 905–915 MHz and 950–960 MHz (GSM) or 1800 MHz (DCS).” Ex. 1008, 7:19–24.

Other cited portions of Byrne describe that “microprocessor 210 also monitors signals from the cordless receiver 221 indicating received signal strength and for detecting receive data, and from the cordless transmitter 222 for sending transmit data,” “monitors control signals from the cordless transceiver 220 for detecting incoming calls (ringing), security codes and

broadcast information relevant to the cordless system, and for sending dialing information,” and “controls the CCT 200 in a similar way when operating as a cellular telephone, but appropriately modified for the signaling protocols and data encryption used in the cellular system,” which “are well known in the art.” Ex. 1008, 8:19–23, 8:29–36. We credit Petitioner’s testimonial evidence regarding a processor configured to process first and second data streams because the cited portions of Byrne support it. Ex. 1003 ¶ 88, 7:15–24, 8:16–38.

Petitioner provides an annotated Figure 2 from Byrne, reproduced below, that shows the asserted processor and the asserted first and second data streams.



EX-1008, Figure 2

Petitioner’s annotated Figure 2 is a block diagram of Byrne’s CCT with different coloring for the asserted cordless and cellular data streams,

antennas 228, 238, cordless transceiver 220, and cellular transceiver 230 and labels for “Processor,” “First (Cordless) Data Stream,” and “Second (Cellular) Data Stream.” Pet. 16; Ex. 1008, 6:22–23, 7:25–26. Figure 2 shows bi-directional arrows between microprocessor 210 and cordless receiver 221, and cellular receiver 231. *See* Pet. 16; Ex. 1008, Fig. 2.

For a processor configured to process data streams “in parallel,” Petitioner relies on portions of Byrne that describe “CCT 200 may operate, as far as a user is concerned, simultaneously as a cellular telephone and a cordless telephone” and “it should be noted that the CCT 200 can be arranged such that both cellular and cordless operations are in progress at the same time.” Ex. 1008, 8:3–9. We credit Petitioner’s testimonial evidence regarding a processor configured to process data streams in parallel because the cited portions of the record support it. Ex. 1003 ¶ 87; Ex. 1008, 7:26–9:30, Figs. 2, 3; Ex. 1045; Ex. 1046.

Turning to Patent Owner’s responsive argument that Byrne’s microprocessor does not process the asserted data stream received by antennas 228, 238, Petitioner argues that one of ordinary skill in the art “would have understood or found obvious that Byrne’s cordless and cellular systems involve *data streams* being processed, which include digital voice and control data generated for telephone calls.” Pet. 17; Ex. 1003 ¶ 88. As discussed above, we find that Petitioner’s cited portions of Byrne describe that microprocessor 210 “monitors signals” from cordless and cellular receivers 221, 231 “indicating received signal strength and for detecting receive data, and . . . for sending transmit data” and “monitors control signals” from transceivers 220, 230 “for detecting incoming calls (ringing), security codes and [relevant] broadcast information . . . , and for sending dialing information.” Ex. 1008, 8:19–23, 8:29–36; *see also* Tr. 32:8–13

(Patent Owner’s counsel agreeing that “control signals are being sent back and forth between the transceiver and the microprocessor”).

Even if digital voice data does bypass Byrne’s microprocessor, as argued by Patent Owner, Petitioner shows that Byrne’s microprocessor monitors at least a portion (the control data) of the asserted data streams. Ex. 1008, 8:19–23, 8:29–36; *see also* PO Sur-reply 3 (arguing “Byrne . . . says that the control signals are sent from the transceiver to the microprocessor”) (citing Ex. 1008, 8:23–28); Tr. 32:8–34:23 (discussing control signals of Byrne).

As we pointed out previously, arguments by Patent Owner imply an interpretation for “process a first data stream and a second data stream in parallel.” Inst. Dec. 30–31; *see also* Tr. 43:14–44:15 (discussing what constitutes processing on data streams). An interpretation for “process a first data stream and a second data stream in parallel,” however, was not proposed. *See generally* PO Resp.

Turning to Patent Owner’s responsive argument that Byrne does not disclose a processor configured to process first and second data streams “in parallel,” as discussed above, we find that Byrne describes “CCT 200 may operate, as far as a user is concerned, simultaneously as a cellular telephone and a cordless telephone” and “can be arranged such that both cellular and cordless operations are in progress at the same time.” Ex. 1008, 8:3–9.

The cited portion of Byrne expressly states that cellular and cordless operations are “performed at the same time.” Ex. 1008, 8:7–9. That cited portion also states that “[a]lternatively, if components are shared between cellular and cordless parts, cellular and cordless operations can be performed at different times although this would be done at a speed sufficient for it to

be undetectable by the user and therefore appear to be simultaneous operation.” *Id.* at 8:9–15.

Byrne’s alternative embodiment where cellular and cordless operations are “performed at different times” is an express distinction that indicates the previous statement “performed at the same time” would have been understood to mean both cellular and cordless operations are occurring simultaneously. *See* Ex. 1008, 8:3–15. One of ordinary skill in the art would have, thus, understood that, to support simultaneous cellular and cordless operation, Byrne’s microprocessor “monitors signals” from cordless and cellular receivers 221, 231 simultaneously for “indicating received signal strength and for detecting receive data, and . . . for sending transmit data” and “monitors control signals” from transceivers 220, 230 simultaneously to detect “incoming calls (ringing), security codes and [relevant] broadcast information” and to send “dialing information” Ex. 1008, 8:19–23, 8:29–36

“Once all relevant facts are found, the ultimate legal determination [of obviousness] involves weighing of the fact findings to conclude whether the claimed combination would have been obvious to an ordinary artisan.” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1361 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)). Based on full record before us, we provide our factual findings regarding (1) the level of ordinary skill in the art, (2) the scope and content of the prior art, (3) any differences between the claimed subject matter and the prior art, and (4) objective evidence of nonobviousness.

In particular, we find that (1) Petitioner’s proposed level of ordinary skill in the art is consistent with the prior art of record, (2) Byrne teaches or

suggests substantially all the limitations of claim 1, (3) one of ordinary skill in the art would have understood Byrne teaches, suggests, and would have rendered obvious the remaining limitations, and (4) no objective evidence of nonobviousness is presented in relation to any of the challenged claims. Weighing these underlying factual determinations, a preponderance of the evidence persuades us that claim 1 of the '943 patent is unpatentable over Byrne. *Arctic Cat*, 876 F.3d at 1361.

3. *Independent Claim 5*

- a) *“A wireless communication device comprising: a plurality of antennas; and a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver,”*

Like claim 1, independent claim 5 recites a “wireless communication device” that comprises “a plurality of antennas,” and “a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver.” *Compare* Ex. 1001, 12:26–30 *with id.* at 11:63–67.

For these recitations, Petitioner refers to its arguments for claim 1. Pet. 17–18 (citing Ex. 1003 ¶¶ 89–91); *see also id.* at viii (labeling these recitations as “5[pre],” “5[a],” and “5[b]”). Patent Owner does not provide a response for these recitations of claim 5. *See* PO Resp. 7–31.

For the reasons discussed above for claim 1, Petitioner persuades us by a preponderance of the evidence, and we find, that Byrne teaches or suggests the preamble of claim 5, to the extent it is limiting, and the recited antennas and communication component.

b) *“wherein the communication component includes at least one additional transmitter”*

For the wherein clause quoted above, Petitioner argues that Byrne’s CCT has cordless transmitter 222 and cellular transmitter 232, thereby teaching a transmitter and at least one additional transmitter. Pet. 18 (citing Ex. 1003 ¶ 92; Ex. 1008, 7:26–32, 7:56–8:28); Ex. 1001, 12:31–32; *see also* Pet. viii (labeling the limitation “5[c]”).

The cited portions of Byrne describe that CCT 200 comprises cordless transceiver 220 and cellular transceiver 230 and that cordless transceiver 220 includes cordless transmitter 222. Ex. 1008, 7:26–32, 7:56–8:28. Figure 2 of Byrne also shows that cellular transceiver 230 includes cellular transmitter 232. We credit Petitioner’s testimonial evidence because the cited portions of Byrne support it. Ex. 1003 ¶ 92; Ex. 1008, 7:26–32, 7:56–8:28. Patent Owner does not provide a response for the above-quoted wherein clause of claim 5. *See* PO Resp. 7–31.

Based on the full record before us, Petitioner persuades us, and we find, that Byrne teaches or suggests “wherein the communication component includes at least one additional transmitter.”

c) *“wherein the transmitter is configured to transmit on a first frequency and the at least one additional transmitter is configured to transmit on a second frequency”*

For the wherein clause quoted above, Petitioner argues that Byrne teaches that cordless transmitter 222 transmits on a cordless frequency band and cellular transmitter 232 transmits on a cellular frequency band. Pet. 18 (citing Ex. 1003 ¶ 93; Ex. 1008, 7:19–32, 8:16–38); Ex. 1001, 12:33–35; *see also* Pet. ix (labeling the limitation “5[d]”).

The cited portions of Byrne describe the frequency bands of cordless and cellular telephone systems and that CCT 200 uses the appropriate

protocol and encryption for each of the cordless and cellular telephone systems. Ex. 1008, 7:19–32, 8:16–38. We credit Petitioner’s testimonial evidence because the cited portions of Byrne support it. Ex. 1003 ¶ 93; Ex. 1008, 7:19–32, 8:16–38. Patent Owner does not provide a response for the above-quoted wherein clause of claim 5. *See* PO Resp. 7–31.

Based on the full record before us, Petitioner persuades us, and we find, that Byrne teaches or suggests “wherein the transmitter is configured to transmit on a first frequency and the at least one additional transmitter is configured to transmit on a second frequency.”

- d) “wherein the transmitter is configured to transmit using a first communication protocol and the at least one additional transmitter is configured to transmit using a second communication protocol, wherein the first communication protocol is different than the second communication protocol”*

For the wherein clauses quoted above, Petitioner argues that Byrne teaches cordless transmitter 222 using a cordless protocol and cellular transmitter 232 using a cellular protocol, which would be different from the cordless protocol. Pet. 18 (citing Ex. 1003 ¶ 94; Ex. 1008, 7:19–32, 8:16–38); Ex. 1001, 12:36–41; *see also* Pet. ix (labeling the limitation “5[e]”).

As discussed above, the cited portions of Byrne describe the frequency bands of cordless and cellular telephone systems and that CCT 200 uses the appropriate protocol and encryption for each of the cordless and cellular telephone systems. Ex. 1008, 7:19–32, 8:16–38. We also credit Petitioner’s testimonial evidence because the cited portions of Byrne support it. Ex. 1003 ¶ 94; Ex. 1008, 7:19–32, 8:16–38. Patent Owner does not provide a response for the above-quoted wherein clause of claim 5. *See* PO Resp. 7–31.

Based on the full record before us, Petitioner persuades us, and we find, that Byrne teaches or suggests “wherein the transmitter is configured to transmit using a first communication protocol and the at least one additional transmitter is configured to transmit using a second communication protocol, wherein the first communication protocol is different than the second communication protocol.”

- e) *“wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually; and wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel.”*

For the wherein clauses quoted above, Petitioner refers to its arguments for claim 1. Pet. 19 (citing Ex. 1003 ¶¶ 95, 96); Ex. 1001, 12:42–47; *see also* Pet. ix (labeling these limitations “5[f]” and “5[g]”).

Patent Owner responds that Byrne does not disclose “wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel” for the same reasons summarized above for claim 1. PO Resp. 7–22.

For the reasons discussed above for claim 1, Petitioner persuades us, and we determine, that Byrne teaches, suggests, and would have rendered obvious the above-quoted wherein clauses.

- f) *Petitioner Shows by the Preponderance of the Evidence that Claim 5 is Unpatentable*

Weighing our underlying factual determinations, a preponderance of the evidence persuades us that claim 5 of the ’943 patent is unpatentable over Byrne. *Arctic Cat*, 876 F.3d at 1361.

4. *Dependent Claim 6*

Claim 6 depends from claim 5 and recites “in communication with a server configured with a controller in communication with a plurality of network devices wherein the server supervises the connection of a plurality of wireless devices.” Ex. 1001, 12:48–51.

Petitioner argues that Byrne’s CCT communicates with Mobile Switching Centre (“MSC”) 138, and that MSC 138 includes Base Station Controller 136 in communication with base stations 130. Pet. 19–20 (citing Ex. 1008, 7:4–10, 10:52–13:32, Figs. 1, 5). Petitioner also argues that it would have been known, or obvious, that each MSC has a controller for communicating with and supervising base station controllers. *Id.* at 19 (citing Ex. 1003 ¶ 97; Ex. 1010, 7:28–39; Ex. 1019, 3:9–14). Petitioner further argues that “the MSC routes voice calls and provides other services for connected telephones and other wireless devices.” *Id.* (citing Ex. 1003 ¶ 97; Ex. 1008, 7:4–10, 10:52–13:32).

The cited portions of Byrne describe CCT 200 communicating with MCS 138 that includes Base Station Controller 136 communicating with base stations 130. Ex. 1008, 7:4–10, 10:52–13:32, Figs. 1, 5. We credit Petitioner’s testimonial evidence because the cited portions of the record support it. Ex. 1003 ¶ 97; Ex. 1008, 7:4–10, 10:52–13:32, Figs. 1, 5; Ex. 1010, 7:28–39; Ex. 1019, 3:9–14.

Patent Owner does not provide a responsive argument specifically for claim 6. *See* PO Resp. 7–31. Based on the full record before us, Petitioner persuades us, and we determine, that Byrne teaches, suggests, and would have rendered obvious the limitations of claim 6.

Weighing the underlying factual determinations, a preponderance of the evidence persuades us that claim 6 of the '943 patent is unpatentable over Byrne. *Arctic Cat*, 876 F.3d at 1361.

5. *Dependent Claim 7*

Claim 7 depends from claim 6 and recites “wherein the device operates with a plurality of streams including a first stream and a second stream and multipath communication.” Ex. 1001, 12:52–54.

Petitioner argues that Byrne’s CCT operates with a cordless stream and a cellular stream distinct from the cordless stream. Pet. 21 (citing Ex. 1003 ¶¶ 98, 99; Ex. 1008, 6:36–8:43, 10:52–13:32, Figs. 1, 5).

The cited portions of Byrne describe cordless and cellular operations and communicating with multiple cordless and cellular base stations 114, 116, 118, 130. Ex. 1008, 6:36–8:43, 10:52–13:32, Figs. 1, 5. We also credit Petitioner’s testimonial evidence because Byrne supports it. Ex. 1003 ¶¶ 98, 99; Ex. 1008, 6:36–8:43, 10:52–13:32, Figs. 1, 5.

Patent Owner does not provide a responsive argument specifically for claim 7. *See* PO Resp. 7–31. Based on the full record before us, Petitioner persuades us, and we find, that Byrne teaches or suggests the limitations of claim 7.

Weighing these underlying factual determinations, a preponderance of the evidence persuades us that claim 7 of the '943 patent is unpatentable over Byrne. *Arctic Cat*, 876 F.3d at 1361.

6. *Independent Claim 8*

- a) *“A wireless communication device comprising: a plurality of antennas; and a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver”*

For the recitations quoted above, Petitioner refers to its arguments for claim 1. Pet. 22 (citing Ex. 1003 ¶¶ 100–102); *see also id.* at x (labeling these recitations “8[pre],” “8[a],” and “8[b]”). Patent Owner does not provide a response for these recitations of claim 8. *See* PO Resp. 7–31.

For the reasons discussed above for claim 1, Petitioner persuades us by a preponderance of the evidence, and we find, that Byrne teaches or suggests the preamble of claim 8, to the extent it is limiting, and the recited plurality of antennas and the communication component coupled to the plurality of antennas.

- b) *“wherein the communication component includes at least one additional receiver”*

For the wherein clause quoted above, Petitioner argues that Byrne’s CCT includes cordless receiver 221 and cellular receiver 231, and, thus, Byrne teaches the above-quoted wherein clause. Pet. 22 (citing Ex. 1003 ¶ 103; Ex. 1008, 7:26–32, 7:56–8:28, Fig. 2); Ex. 1001, 12:60–61; *see also* Pet. x (labeling this wherein clause “8[c]”).

The cited portions of Byrne describe that CCT 200 comprises cordless transceiver 220 and cellular transceiver 230 and that cordless transceiver 220 includes cordless receiver 221. Ex. 1008, 7:26–32, 7:56–8:28. Figure 2 of Byrne shows that cellular transceiver 230 includes cellular receiver 231. We credit Petitioner’s testimonial evidence because the cited portions of Byrne support it. Ex. 1003 ¶ 103; Ex. 1008, 7:26–32, 7:56–8:28, Fig. 2. Patent

Owner does not provide a response for the above-quoted wherein clause of claim 8. *See* PO Resp. 7–31.

Based on the full record before us, Petitioner persuades us, and we find, that Byrne teaches or suggests “wherein the communication component includes at least one additional receiver.”

- c) *“wherein the receiver is configured to receive using a first communication protocol and the at least one additional receiver is configured to receive using a second communication protocol, wherein the first communication protocol is different than the second communication protocol”*

For the wherein clauses quoted above, Petitioner argues that Byrne teaches that its cordless receiver 221 uses a cordless protocol and its cellular receiver 231 uses a cellular protocol that is different from the cordless protocol. Pet. 22 (citing Ex. 1003 ¶ 104; Ex. 1008, 7:19–32, 8:16–38); Ex. 1001, 12:62–67; *see also* Pet. x (labeling both wherein clauses “8[d]”).

The cited portions of Byrne describe the frequency bands of cordless and cellular telephone systems and that CCT 200 uses the appropriate protocol for each of cordless and cellular telephone systems. Ex. 1008, 7:19–32, 8:16–38. We credit Petitioner’s testimonial evidence because the cited portions of Byrne support it. Ex. 1003 ¶ 104; Ex. 1008, 7:19–32, 8:16–38. Patent Owner does not provide a response for the above-quoted wherein clauses of claim 8. *See* PO Resp. 7–31.

Based on the full record before us, Petitioner persuades us, and we find, that Byrne teaches or suggests the above-quoted wherein clauses.

- d) “*wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually; and wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel*”

For the wherein clauses quoted above, Petitioner refers to its arguments for claim 1. Pet. 22–23 (citing Ex. 1003 ¶¶ 105, 106); Ex. 1001, 13:1–6; *see also* Pet. x–xi (labeling these wherein clauses “8[e]” and “8[f]”).

Patent Owner responds that Byrne does not disclose “wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel” for the same reasons summarized above for claim 1. *See* PO Resp. 4–9. Patent Owner also responds that Byrne does not disclose “wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually” for the same reasons summarized above for claim 1. *See id.* at 9–14.

For the reasons discussed above for claim 1, Petitioner persuades us, and we determine, that Byrne teaches, suggests, and would have rendered obvious the above-quoted wherein clauses.

- e) *Petitioner Shows by the Preponderance of the Evidence that Claim 8 is Unpatentable*

Weighing our underlying factual determinations, a preponderance of the evidence persuades us that claim 8 of the ’943 patent is unpatentable over Byrne. *Arctic Cat*, 876 F.3d at 1361.

7. *Dependent Claim 9*

Claim 9 depends from claim 8 and recites “wherein the device is enabled to operate on a plurality of frequencies including a higher frequency and lower frequencies.” Ex. 1001, 13:7–9.

Petitioner argues by referring to its contentions for claims 1 and 5 that Byrne's CCT is enabled to operate on cordless and cellular frequencies. Pet. 23 (citing Ex. 1008, 7:19–32, 8:16–38). Petitioner also argues that one of ordinary skill in the art would have understood that one of those frequencies would have been higher. *Id.* (citing Ex. 1003 ¶ 107).

The cited portions of Byrne describe the frequency bands of cordless and cellular telephone systems and that CCT 200 uses the appropriate protocol for each of cordless and cellular telephone systems. Ex. 1008, 7:19–32, 8:16–38. We also credit Petitioner's testimonial evidence because the cited portions of Byrne support it. Ex. 1003 ¶ 107; Ex. 1008, 7:19–32, 8:16–38.

Patent Owner does not provide a response for the above-quoted wherein clause of claim 9. *See* PO Resp. 7–31. Based on the full record before us, Petitioner persuades us, and we find, that Byrne teaches or suggests the limitations of claim 9.

Weighing the underlying factual determinations, a preponderance of the evidence persuades us that claim 9 of the '943 patent is unpatentable over Byrne. *Arctic Cat*, 876 F.3d at 1361.

E. Asserted Obviousness Based on Byrne and WO748

1. WO748 (Ex. 1007)

WO748 relates “particularly to wireless communications systems employing optical fibers.” Ex. 1007, 1:3–4.⁴ WO748 states that “wireless communications systems . . . include cellular telephone networks, cordless telephones, wide area data networks, wireless local area networks, personal

⁴ Like Petitioner, we also use the page numbering of WO748, instead of the exhibit page numbering.

communications systems, personal communications networks, paging/messaging networks and satellite mobile systems.” *Id.* at 1:16–18.

WO748 “seeks to provide an improved distributed antenna network for microcells” and “a signal optical fiber network which is used simultaneously for a number of wireless communications systems.”

Ex. 1007, 1:28–30. Figure 1 of WO748 is reproduced below.

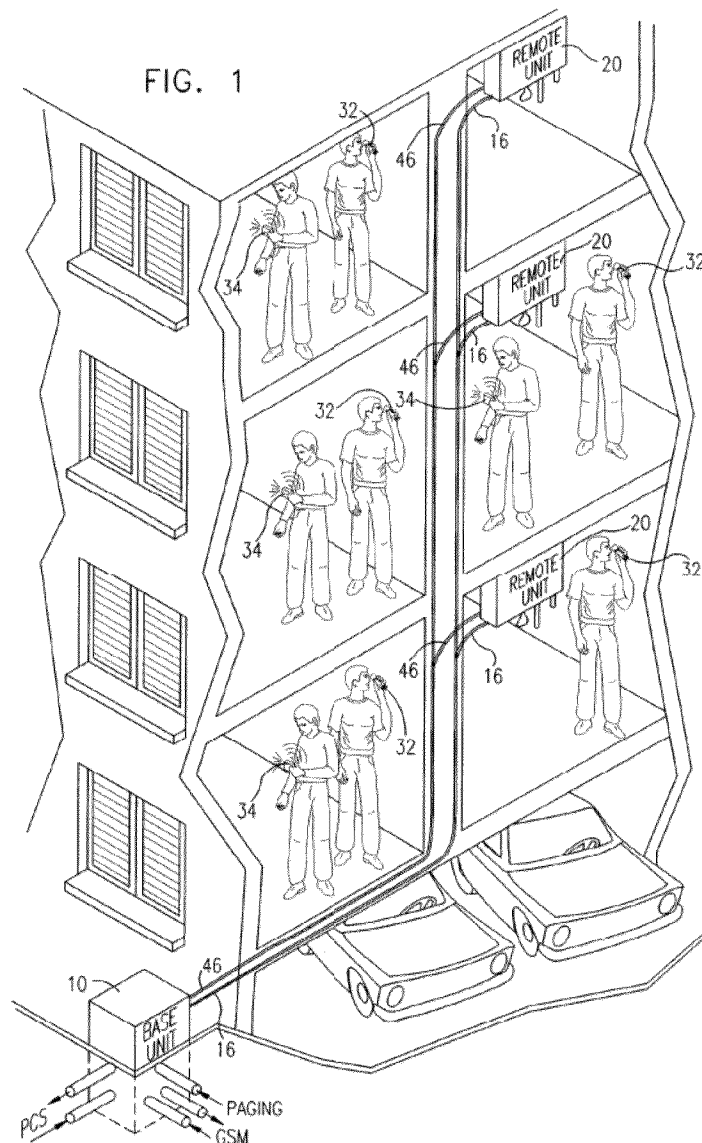


Figure 1 illustrates “part of a wireless communications station.”

Ex. 1007, 3:28–30. WO748 states that “[i]n a typical system a plurality of

wireless network services, such as PCS, GSM and other wireless telephone and radio services . . . , each communicate via an appropriate antenna (not shown) with one or more multi-system stations.” *Id.* at 4:21–23.

In WO748, “each station comprises a base unit 10 which communicates with each of the required wireless network services.” Ex. 1007, 4:26–28. WO748 also states that “any other suitable systems may also be connected to the base unit 10.” *Id.* at 4:30.

2. *Dependent Claims 3 and 4*

Claim 3 depends from claim 1 and recites “further in communication with a network switch box configured with a plurality of ports and configured to connect to a plurality of networks to forward packets between different networks and join a virtual network.” Ex. 1001, 12:16–20.

Petitioner argues that WO748’s remote units 20 are like Byrne’s CCT and correspond to a network switch box “because it is connected to ‘base unit 10’ which communicates with multiple different wireless network services (***configured to connect to a plurality of networks***)” and because it aligns with the description in the ’943 patent. Pet. 27–28 (citing Ex. 1001, 3:16–20, 5:43–48; Ex. 1003 ¶¶ 115, 116; Ex. 1007, 4–5, 6–7, Fig. 1).

Petitioner also argues that WO748’s remote unit uses antennas to receive from, and transmit signals to, subscriber units and base unit 10 and has at least two ports for connecting to fiber optic cables 16, 46. *Id.* at 28–29 (citing Ex. 1003 ¶¶ 117, 118; Ex. 1007, 7, Fig. 1; Ex. 1027, 6).

Claim 4 depends from claim 3 and recites “further in communication with a second network switch box, wherein the first network switch box is configured to transmit and receive a plurality of data packets from and to the second network switch box over at least one network path.” Ex. 1001, 12:21–25.

Petitioner relies on WO748's remote units for teaching the second network switch box. Pet. 30 (citing Ex. 1003 ¶ 121; Ex. 1007, 4–5, 6–7, Fig. 1). Petitioner alternatively argues that WO748's base unit 10 would have been considered the second network switch box. *Id.* at 30–31 (citing Ex. 1003 ¶ 122; Ex. 1007, 4–5, Fig. 1).

a) Reason to Combine

Petitioner contends that one of ordinary skill in the art would have found it obvious to modify Byrne in view of WO748 so that it communicates with remote unit 20 which has ports for connecting to base unit 10 and a plurality of networks. Pet. 29–30 (citing Ex. 1003 ¶ 119; Ex. 1007, 4–5, 7). Petitioner additionally contends that it would have been known that Byrne's CCT and WO748's remote and base units are part of a virtual network and that one of ordinary skill in the art would have been motivated to configure such components to join a VPN. *Id.* at 30 (citing Ex. 1003 ¶ 120; Ex. 1028, 1–2).

According to Petitioner, one of ordinary skill in the art would have been motivated to use WO748's multi-station system for Byrne's CCT so that Byrne's CCT could communicate with WO748's remote units 20 connected to base unit 10 which communicates with other wireless network services. Pet. 25 (citing Ex. 1003 ¶¶ 109, 110; Ex. 1007, 1, 3–5, 10). Petitioner argues that the proposed modification would have improved wireless coverage, maintained communications at various locations, enhanced the CCT's flexibility, improved the CCT's ease of use, increased signal quality in areas where it would deteriorate, and enabled communications on different wireless services. *Id.* at 25–27 (Ex. 1003 ¶¶ 111–113; Ex. 1007, 1, 4, 5; Ex. 1008, 1:44–2:2, 6:36–57).

Petitioner also argues that one of ordinary skill in the art would have had a reasonable expectation of success because the modification would have yielded predictable results and combined known elements according to known methods. Pet. 27 (citing Ex. 1003 ¶ 114). Petitioner further argues that the modification would not have changed “hallmark aspects” of either Byrne or WO748 and they “would work in combination similarly to as they did apart.” *Id.* (citing Ex. 1003 ¶ 114).

b) Patent Owner’s Response

Patent Owner responds that Petitioner fails to show that WO748 discloses “configured to . . . join a virtual network.” PO Resp. 22. Patent Owner argue that Petitioner relies on unsupported testimony. *Id.* at 23 (citing Pet. 30; Ex. 1003 ¶ 120). Patent Owner also argues that Petitioner’s declarant acknowledged that the network switch box must be configured to join a virtual network and that WO748 does not describe the asserted network switch box joining a virtual network. *Id.* at 23–24 (citing Ex. 2007, 44:13–45:1, 45:6–9, 48:8–49:3).

Patent Owner further argues that the asserted benefits of joining a virtual network would not be obtained by modifying WO748. PO Resp. 24 (citing Ex. 2007, 47:14–49:22, 50:1–9). According to Patent Owner, the asserted security benefits would be mooted because one of ordinary skill in the art would have needed “to make the modification to include a VPN, but then develop an authentication mechanism to do the exact thing Dr. Jensen claimed simply adding a VPN would do.” *Id.* at 24–25.

Patent Owner also responds that Petitioner fails to show a reasonable expectation of success because the proposed modification would have been beyond ordinary skill as of 1999. PO Resp. 25, 27. Patent Owner argues that a person with the level of skill proposed by Petitioner would not have

been able to make the asserted combination, and Petitioner’s declarant testified that expertise in wireless and wired communication systems would have been needed to make significant modifications to the wireless infrastructure, including adding a virtual network that is not disclosed in the references. *Id.* at 26–27 (citing Ex. 2006, 29:13–31:5; Ex. 2007, 42:2–11, 45:6–9, 48:8–49:3).

Patent Owner, thus, argues that Petitioner’s proposed person of ordinary skill in the art, “who had the ability to design one component of a wireless communication system in a device, but not all, would not have then designed a network infrastructure replete with virtual and physical networks, for access to things like the cloud.” PO Resp. 27.

c) Petitioner’s Reply

Petitioner replies that it showed virtual networks were known and commonly used, and, thus, implementing a VPN as proposed would have been known and obvious. Pet. Reply 11–12 (citing Pet. 30; PO Resp. 22–25; Ex. 1003 ¶ 120; Ex. 1007, Fig. 1; Ex. 1048 ¶¶ 27–28; Ex. 1068, 1:13–43, 4:16–26, 4:64–5:35). Petitioner argues that, because “virtual networks and VPNs were well-known and regularly implemented,” it would have been obvious to “consider use of VPNs in WO748’s network given their ‘strong demand,’ prevalent use, and known benefits, such as ‘taking advantage of the efficiencies of a common communications infrastructure’ and ‘communications privacy.’” *Id.* at 13 (citing Ex. 1048 ¶ 29; Ex. 1072, 3; Ex. 1073, 2:3–21; Ex. 1074, 1:48–54). Petitioner also argues that the ordinarily skilled artisan “would have found it obvious to implement VPNs in the WO748’s system without explicit instructions or detailed guidance in WO748.” *Id.* (citing Ex. 1048 ¶¶ 29–30).

Petitioner also replies that it showed how the infrastructure of WO748 would fit Byrne's CCT and would be obvious to modify to accommodate Byrne's CCT. Pet. Reply 13–14 (citing Pet. 25–27; PO Resp. 26; Ex. 1048 ¶¶ 31, 32; Ex. 2006, 29:13–31:5). Petitioner also argues that the proposed combination would have been predictable and within the capabilities of one of ordinary skill in the art, because of the technical similarities between the references. *Id.* at 14 (citing Ex. 1007, 5; Ex. 1008, 13:4–7). Petitioner contends that the ordinarily skilled artisan “would have found it routine and predictable to add Byrne's standard-based networks (e.g., GSM, DECT) to the WO748 network, which already describes how to accommodate multiple networks for multiple devices that resemble Byrne's phones.” *Id.* at 14–15 (citing Ex. 1048 ¶ 33).

Petitioner also points to the '943 patent's limited disclosure of a network switch box and virtual network to argue that the '943 patent relies on knowledge and skill in the art for implementing the network switch box and virtual network. Pet. Reply 15 (citing Ex. 1001, 3:16–20, 4:47–51, 8:17–9:4, 10:43–60; Ex. 1048 ¶ 34; Ex. 1065, 80:3–81:25). According to Petitioner, the limited disclosure “confirms that a [person of ordinary skill in the art] would have had sufficient knowledge and skill to implement the techniques of Byrne and WO748 and their combination.” *Id.* at 15–16.

d) Patent Owner's Sur-reply

Patent Owner replies that Petitioner presents a new argument its reply with new exhibits to support it. PO Sur-reply 13 (citing Pet. Reply 11–13; Ex. 1048 ¶¶ 27–30; Ex. 1068; Ex. 1072; Ex. 1074). Patent Owner argues that Petitioner's declarant testified that the combination was the device, not the network switch box, and confirmed that WO748 does not disclose a virtual network or joining such a network. *Id.* (citing Ex. 2007, 48:8–9).

Patent Owner also replies Petitioner still fails to show that its proposed person of ordinary skill in the art would have been able to make the proposed combination. PO Sur-reply 14 (citing Pet. Reply 14; Ex. 2006, 29:13–31:5). According to Patent Owner, Petitioner refers to the architecture of the device of its combination, not the architecture of the building-wide network. *Id.* (citing Ex. 2006, 29:13–31:5). Patent Owner contends that Petitioner fails to address that its proposed person of ordinary skill in the art “lacks the capabilities to modify more than one aspect of a wireless communication system in a device, let alone modify a building-wide networking infrastructure and a wireless device on their own.” *Id.* at 14–15 (citing PO Resp. 25–27).

e) Petitioner Fails to Show a “Network Switch Box . . . Configured to . . . Join a Virtual Network”

Petitioner does not cite to any portion of WO748 for teaching or suggesting a “network switch box . . . configured to . . . join a virtual network,” as required by claim 3 and claim 4 by dependency from claim 3. *See* Pet. 30; Ex. 2007, 45:6–9 (Petitioner’s declarant testifying that “my recollection is WO748 does not disclose a virtual network or the remote unit or the base unit joining a virtual network”), 48:19–21 (Petitioner’s declarant testifying that “there is no disclosure about that remote – that remote box connecting to a virtual network”). Based on the full record, we agree with Patent Owner that the asserted references fail to teach or suggest a network switch box configured to join a virtual network.

Petitioner relies on knowledge in the art with support from testimonial evidence and Exhibit 1028 to contend that “[v]irtual networks, such as Virtual Private Networks (VPNs), have been known and used to offer various benefits.” *See* Pet. 30 (citing Ex. 1003 ¶ 120; Ex. 1028, 1–2).

According to Petitioner, one of ordinary skill in the art “would have been motivated and found it obvious to configure network components (remote and base units in WO748) to join a VPN for such known benefits.” *Id.* (citing Ex. 1003 ¶ 120). Petitioner’s declarant states that the benefits include “securing the network by stopping third party’s access to the network (e.g., preventing a third party application or website from tracking activities in the network)” and “improv[ing] network scalability by running applications in a cloud environment and providing remote employees access through secure VPN tunnels.” Ex. 1003 ¶ 120 (citing Ex. 1028).

As discussed above for claim 1, Petitioner relies on Byrne’s CCT with cordless and cellular transceivers for the wireless communication device of claim 1. *See also* Pet. 27 (arguing that “the Byrne-WO748 combination does not change the hallmark aspects of either reference,” “Byrne’s telephone would operate similarly to Byrne’s description, as would WO748’s system,” and “[t]he respective teachings would work in combination similarly to as they did apart.”).

Petitioner does not point to any portion of Byrne or WO748 that would indicate to one of ordinary skill in the art that Byrne’s cordless and cellular communications are susceptible to tracking activities by a third-party application or website. *See* Pet. 30; Ex. 1003 ¶ 120; *see also* Ex. 1008, 8:19–23, 8:29–36 (Byrne describing “security codes” for the cordless system and “data encryption used in the cellular system”). Petitioner also does not explain how network scalability in Byrne or WO748 would be improved by running applications in a cloud environment, when neither Byrne nor WO748 describe running any applications. *See* Pet. 30; Ex. 1003 ¶ 120. The full record does not make clear how the asserted benefits of a VPN would apply to the cordless and cellular communications of Byrne’s CCT.

Notably, in its reply arguments, Petitioner does not present any further arguments based on Exhibit 1028, and, instead, turns to Exhibit 1068 to argue that implementation of a VPN would have been known and obvious. *See* Pet. Reply 11–12. The reply argument provides a mapping of WO748’s remote unit, subscriber units, and base unit to Exhibit 1068’s VPN 40 with nodes 50, 52, 54 and VPN 40 communicating with client 46 through network 44. Pet. Reply 11–12. The Reply arguments also cite Exhibits 1072–1074 for the benefits of “‘taking advantage of the efficiencies of a common communications infrastructure’ and ‘communications privacy.’” *Id.* at 13.

As discussed above for claim 1, Byrne describes data encryption for cordless and cellular systems. Ex. 1008, 8:19–23, 8:29–36. Exhibits 1072–1074 do not describe that a VPN would provide additional “communication privacy” on top of Byrne’s data encryption for cordless and cellular systems, and the same exhibits do not describe a phone like Byrne’s communicating with a unit like WO748’s remote unit so that a VPN would be required or beneficial.

We find that these exhibits pertain to network communications, not the cordless and cellular systems like those of Byrne and, thus, would not describe benefits of a VPN for Byrne’s CCT. *See* Ex. 1072, 3 (describing “a public network infrastructure”); Ex. 1073, 2:3–21 (describing “it is difficult to ensure that users of one virtual network do not gain access to private data accessed by users of another virtual network”); Ex. 1074, 1:48–54 (describing “strong demands for forming virtual private networks on the Internet”). There is no indication in the record that a phone like Byrne’s CCT could initiate or connect to a virtual network by its described cordless

and cellular systems, even if WO748 could be configured to join a virtual network.

For the reasons above, Petitioner fails to show by a preponderance of the evidence that one of ordinary skill in the art would have been motivated to modify WO748 to be configured to join a virtual network, as required by claims 3 and 4.

Additionally, as pointed out by Patent Owner, Petitioner does not address whether its proposed person of ordinary skill in the art would have had a reasonable expectation of success in modifying WO748 to join a virtual network. *See* Pet. 30; PO Resp. 25–27; Pet. Reply 11–16; Ex. 1003 ¶¶ 114, 120; Ex. 1048 ¶¶ 31–34. Petitioner provides argument and evidence that one of ordinary skill in the art would have been able to modify Byrne’s CCT to work with WO748 with a reasonable expectation of success. Pet. 27 (citing Ex. 1003 ¶ 114); Ex. 1003 ¶ 114. The cited testimonial evidence relates only to modifying the phone of Byrne, not WO748. *See* Ex. 1003 ¶ 114 (testifying that “the Byrne-WO748 combination would merely result[] in Byrne’s telephone capable of communicating in WO748’s microcells” and “Byrne’s telephone would remain operative similarly to Byrne’s description, as would WO748’s suggested wireless communication system,” “with WO748’s suggestions merely improving Byrne’s telephone when used in the microcell environment”).

Also, Petitioner’s argument and evidence regarding reasonable expectation of success does not address configuring WO748 to join a virtual network in WO748. *See* Pet. 30; Pet. Reply 11–16; Ex. 1003 ¶¶ 114, 120; Ex. 1048 ¶¶ 31–34; *see also* Ex. 2007, 42:2–11 (Petitioner’s declarant confirming that the proposed combination is a “modification to the infrastructure that would support that device”), 48:8–14 (confirming that

WO748's remote unit is "the device joining a virtual network"). Petitioner's reply arguments address modifying Byrne's CCT to operate in WO748's architecture but does not address whether its proposed person of ordinary skill in the art would have had a reasonable expectation of success in modifying WO748 to join a virtual network. Pet. Reply 13–16; Ex. 1048 ¶¶ 31–34. As discussed above, the full record shows that WO748 does not disclose joining a virtual network. The asserted references, thus, do show that one of ordinary skill in the art would have had a reasonable expectation of success in modifying WO748 to join a virtual network.

In view of the above, Petitioner does not show by a preponderance of the evidence that one of ordinary skill in the art would have had a reasonable expectation of success in modifying the asserted network switch box of WO748 to join a virtual network, as required by claims 3 and 4. Pet. 30; Pet. Reply 11–16; Ex. 1003 ¶¶ 114, 120; Ex. 1048 ¶¶ 31–34.

Thus, for the reasons above, Petitioner fails to show by a preponderance of the evidence that claims 3 and 4 are rendered obvious by Byrne and WO748.

F. Asserted Obviousness Based on Byrne, Johnston, and Pillekamp

1. Johnston (Ex. 1006)

Johnston "relates to diversity antenna that can simultaneously receive or transmit two or three components of electromagnetic energy." Ex. 1006, 1:5–7. Johnston states that "[a]ntenna diversity is especially useful for improving radio communication in a multipath fading environment" and that "[w]ithout diversity, power levels must be maintained sufficiently high to overcome these deep fades." *Id.* at 1:10–15.

Johnston also states that "[w]hen a deep signal fade occurs on one channel, signal degradation or loss can usually be avoided by switching to

another channel” and “[c]onsequently, signal reliability can be improved, and power requirements can be reduced while maintaining signal reliability by using antenna diversity.” Ex. 1006, 1:19–24. According to Johnston, “deposition of electromagnetic energy (into the head especially) raises health and legal issues and it also removes EM power from the communications channel,” and, thus, one should “find methods for reducing this electromagnetic energy deposition into the head of a cell phone user.” *Id.* at 2:17–23.

“For most cellular radio applications it is desirable to make the antenna as small as possible but still achieve the necessary electrical performance,” and the “antenna can be made very compactly for a given bandwidth and operating frequency.” Ex. 1006, 7:1–4. Johnston describes connecting antennas 300 to mobile radio transceivers 308, 309. *Id.* at 11:9–22, Figs. 29a, 29b. Johnston also describes its implementation in cell phone 236 and its associated benefits. *Id.* at 11:53–13:5.

2. *Pillekamp (Ex. 1009)*

Pillekamp “relates to an arrangement for controlling a transmitting/receiving device of base stations and/or mobile units in particular of a cordless telephone system.” Ex. 1009, 1:8–10; *see also id.* at 1:29–32 (stating that an object of Pillekamp relates to operating base stations and mobile units of a cordless telephone system).

Pillekamp states that, “in order to reduce the use of energy required for the operation of the base station and/or of the mobile unit” of a cordless telephone system, “the transmitting/receiving device is switched on with a certain time lead . . . occurring at periodic time intervals in the transmission technique (for example TDMA or CDMA methods).” Ex. 1009, 1:52–55, 1:59–63. Pillekamp describes that “for the transmission and reception of

radio signals (for example TDMA or CDMA radio signals) are two antennas A1, A2.” *Id.* at 3:25–28. Pillekamp also describes measuring field strength in the DECT standard. *Id.* at 3:45–49.

3. *Independent Claim 12*

- a) *“A wireless communication device comprising: a plurality of antennas; and a communication component coupled to the plurality of antennas, the communication component including a processor, a transmitter, and a receiver”*

For the preamble and limitations of claim 12 quoted above, Petitioner refers to its arguments for claim 1. Pet. 33 (citing Ex. 1003 ¶¶ 137–139); Ex. 1001, 13:18–22; *see also* Pet. xi (labeling these recitations “12[pre],” “12[a],” “12[b]”). Patent Owner does not provide a response for these recitations of claim 12. *See* PO Resp. 7–31.

For the reasons discussed above for claim 1, Petitioner persuades us by a preponderance of the evidence, and we find, that Byrne teaches or suggests the preamble of claim 12, to the extent it is limiting, and the recited plurality of antennas and communication component coupled to the plurality of antennas. Ex. 1003 ¶¶ 137–139.

- b) *“wherein a first set of antennas of the plurality of antennas is configured to operate in a first frequency band and a second set of antennas of the plurality of antennas is configured to operate in a second frequency band; wherein the first frequency band is different than the second frequency band”*

For the wherein clauses quoted above, Petitioner argues that Byrne’s CCT operates in cordless frequency bands and cellular frequency bands that are different from cordless frequency bands. Pet. 39 (citing Ex. 1003 ¶ 140; Ex. 1008, 7:19–24); Ex. 1001, 13:23–28; *see also* Pet. xi (labeling the limitation “12[c]”).

Petitioner also argues that Johnston teaches employing multiple antennas for a cellular system for antenna diversity. Pet. 40 (citing Ex. 1003 ¶ 142; Ex. 1006, 7:1–4, 11:9–22, 11:59–13:5). Petitioner further argues that Pillekamp teaches using multiple antennas in a cordless system. *Id.* (citing Ex. 1003 ¶ 142; Ex. 1009, 3:25–28, 3:56–61, 4:21–26). The combination, Petitioner argues, would have a first set of antennas operating in a cellular frequency band and a second set of antennas operating in a cordless frequency band. *Id.* (citing Ex. 1003 ¶ 143; Ex. 1008, 7:19–24; Ex. 1009, 5:2–7).

The cited portions of Byrne describe the frequency bands of cordless and cellular telephone systems. Ex. 1008, 7:19–24. The cited portions of Johnston describe that (1) “[f]or most cellular radio applications it is desirable to make the antennas as small as possible but still achieve the necessary electrical performance” (Ex. 1006, 7:1–3), (2) “[t]his antenna can be made very compactly for a given bandwidth and operating frequency” (*id.* at 7:3–4), (3) “the overall configuration” of “a mobile radio transceiver with an antenna” (*id.* at 11:9–22), and (4) “the relationship of the antenna . . . and the balance of the cell phone” that “provides for flexible antenna design” with different antenna forms (*id.* at 11:59–13:5).

The cited portions of Pillekamp describe two antennas A1, A2 for receiving and transmitting radio signals, such as TDMA or CDMA signals (Ex. 1009, 3:25–28), a base station or mobile unit for driving antennas A1, A2 (*id.* at 3:56–61), and a change-over switch DS and selection switch for transmitting or receiving (*id.* at 4:21–26). We credit Petitioner’s testimonial evidence because the cited portions of the record support it. Ex. 1003 ¶¶ 140, 142, 143; Ex. 1006, 7:1–4, 11:9–22, 11:59–13:5; Ex. 1008, 7:19–24; Ex. 1009, 3:25–28, 3:56–61, 4:21–26. Patent Owner does not provide a

response regarding the relied-upon teachings of the references. *See* PO Resp. 7–31.

Based on the full record, Petitioner persuades us by a preponderance of the evidence, and we find, that the proposed combination of Byrne, Johnston, and Pillekamp teaches or suggests “wherein a first set of antennas of the plurality of antennas is configured to operate in a first frequency band and a second set of antennas of the plurality of antennas is configured to operate in a second frequency band.” For the reasons discussed for claim 1, Petitioner persuades us by a preponderance of the evidence, and we find, that Byrne teaches or suggests “wherein the first frequency band is different than the second frequency band.”

- c) *“wherein the first set of antennas of the plurality of antennas is configured to operate using a first communication protocol and the second set of antennas of the plurality of antennas is configured to operate using a second communication protocol; wherein the first communication protocol is different than the second communication protocol”*

For the wherein clauses quoted above, Petitioner refers to its arguments for claims 1 and 5 and the limitation discussed above. Pet. 40–41 (citing Ex. 1003 ¶ 144; Ex. 1006, Abstr., 1:10–32, 3:5–15, 7:1–24, 11:9–23, 11:59–12:46; Ex. 1009, 3:21–28); Ex. 1001, 13:29–35; *see also* Pet. xi–xii (labeling the limitation “12[d]”). Patent Owner does not provide a response for the above-quoted wherein clauses of claim 12. *See* PO Resp. 7–31.

For the reasons discussed above for claims 1 and 5, Petitioner persuades us, and we determine, that Byrne teaches, suggests, and would have rendered obvious the above-quoted wherein clauses. Ex. 1003 ¶ 144.

- d) “wherein one or more subtasks are assigned to one or more channels, and the one or more channels are sampled and clocked individually”*

For the wherein clause quoted above, Petitioner refers to its arguments for claim 1. Pet. 41 (citing Ex. 1003 ¶ 145); Ex. 1001, 14:1–3; *see also* Pet. xii (labeling the limitation “12[e]”). Patent Owner does not provide a response for the above-quoted wherein clause of claim 12. *See* PO Resp. 7–31.

For the reasons discussed above for claim 1, Petitioner persuades us, and we determine, that Byrne teaches, suggests, and would have rendered obvious the above-quoted wherein clause. Ex. 1003 ¶ 145.

- e) “wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel”*

For the wherein clause quoted above, Petitioner also refers to its arguments for claim 1. Pet. 41 (citing Ex. 1003 ¶ 146); Ex. 1001, 14:4–6; *see also* Pet. xii (labeling the limitation “12[f]”).

Patent Owner responds that Byrne does not disclose “wherein the processor comprises multiple ones of the one or more channels and is further configured to process a first data stream and a second data stream in parallel” for the same reasons summarized above for claim 1. PO Resp. 7–22.

For the reasons discussed above for claim 1, Petitioner persuades us, and we determine, that Byrne teaches, suggests, and would have rendered obvious the above-quoted wherein clause. Ex. 1003 ¶ 146.

- f) Asserted Reason to Combine*

According to Petitioner, one of ordinary skill in the art would have been motivated to modify Byrne in view of Johnston and Pillekamp to have

multiple antennas for cordless and cellular communications to achieve the benefits of Johnston’s antenna diversity and Pillekamp’s energy saving techniques. Pet. 33–35 (citing Ex. 1003 ¶¶ 124–127; Ex. 1005, 4:46–56, 5:10–12; Ex. 1006, 1:10–30, 2:17–23, 7:1–4, 11:9–22, 11:53–13:5; Ex. 1009, 3:25–28, 3:56–61, 4:21–26; Ex. 1021, 3; Ex. 1022, 1–6; Ex. 1023, 1–2, 6–7), 36–37 (citing Ex. 1003 ¶¶ 131–133; Ex. 1005, 4:46–56, 5:10–12; Ex. 1006, 1:10–30; Ex. 1009, Abstr., 1:29–33, 1:52–63, 3:21–4:62; Ex. 1021, 3; Ex. 1022, 1–6; Ex. 1023, 1–2, 6–7; Ex. 1040, Abstr.; Ex. 1041, Abstr.).

Petitioner also argues that the proposed modification would have required only routine knowledge of cellular and cordless communications techniques, been within ordinary skill, and involved merely implementing Johnston’s antenna diversity designs and Pillekamp’s multiple antennas without substantially changing Byrne. Pet. 35 (citing Ex. 1003 ¶ 128), 37–38 (citing Ex. 1003 ¶ 134)

Petitioner argues that the modification would have been predictable and merely combined known elements according to known methods. Pet. 33–34 (citing Ex. 1003 ¶ 124; Ex. 1006, 11:59–12:46; Ex. 1009, Abstr., 1:29–33, 4:53–62), 35 (citing Ex. 1003 ¶ 129), 39–40 (citing Ex. 1003 ¶ 141), 38 (citing Ex. 1003 ¶ 135). Petitioner argues that the modification would not have changed “hallmark aspects” of either Byrne, Johnston, or Pillekamp, their purposes are compatible, and those purposes would be accomplished similar to how they are achieved separately and would be achievable in parallel. *Id.* at 35 (citing Ex. 1003 ¶ 129), 38 (citing Ex. 1003 ¶ 135). Petitioner argues that the proposed modification would have had a reasonable expectation of success. *Id.* at 35 (citing Ex. 1003 ¶ 130), 38 (citing Ex. 1003 ¶ 136).

g) Patent Owner's Response

Patent Owner responds that Petitioner fails to show a reasonable expectation of success. PO Resp. 27 (citing Ex. 2004 ¶¶ 60), 31 (citing Ex. 2004 ¶¶ 64). Patent Owner argues that Petitioner's declarant admitted that the proposed combination would require adding antennas and additional circuitry on both cellular and cordless sides, and Patent Owner, thus, argues that one of ordinary skill in the art would have had to change multiple components which would exceed the capabilities of one of ordinary skill in the art. *Id.* at 27–31 (citing Ex. 1008, Fig. 2; Ex. 2004 ¶¶ 60–62; Ex. 2007, 57:16–60:30, 65:3–67:12).

h) Reply Arguments

Petitioner replies that one of ordinary skill in the art “would have expected success when implementing Byrne with well-known implementation details (e.g., addition of multiple antennas), such as those described by Johnston and Pillekamp,” because “antennas, combining circuitry, and a processor for antenna diversity in wireless communications (e.g., cellular and cordless) were well-known long before the Critical Date.” Pet. Reply 16 (citing Pet. 33–38; Ex. 1022, 149; Ex. 1023, 1; Ex. 1040, 141; Ex. 1041, 1532–1536; Ex. 1048 ¶¶ 35–36; Ex. 1079, 1). Petitioner argues that Patent Owner's declarant agreed that antenna diversity and circuits for antenna diversity were known. *Id.* (citing Ex. 1049, 59:24–25, 62:17–63:7). Petitioner also argues that, with these known components, one of ordinary skill with an understanding of the architecture and overall functioning “would have known how to design and fit these known components into the system of Byrne” and “would have expected success in using the well-known technique of adding antenna diversity to each of Byrne's cellular and

cordless systems.” *Id.* at 16–17 (citing Pet. 33–38; PO Resp. 27–31; Ex. 1048 ¶ 37).

Patent Owner replies that “Petitioner simply regurgitates its deficient showing from the Petition, adds a few more exhibits” and offers testimonial evidence without support that one of ordinary skill in the art would have had a reasonable expectation of success. PO Sur-reply 15 (citing PO Resp. 27–31). Patent Owner argues that the testimony is contrary to what was said in deposition for a related proceeding. *Id.* (citing Ex. 2006, 29:31–31:5). Patent Owner also argues that Petitioner does not address the need to modify “combining circuitry” and, thus, fails to show one of ordinary skill in the art would have had the ability to make the proposed combination. *Id.* (citing Ex. 2007, 57:16–58:3).

i) Petitioner Shows by the Preponderance of the Evidence that Claim 12 is Unpatentable

Petitioner’s citations to Johnston describe “a mobile radio transceiver” having an antenna configuration shown in Figures 29a and 29b (Ex. 1006, 11:9–22), cell phone 236 with antenna 230 (*id.* at 11:60–63), and its “antenna [being] made very compactly” (*id.* at 7:1–4), and benefits of its antenna design (*id.* at 11:59–12:46).

Petitioner’s citations to Pillekamp describe that its invention is based on cordless telephone base stations and mobile units “with the lowest possible use of energy” (Ex. 1009, 1:29–33) and antennas A1, A2 for transmitting and receiving radio signals, such as TDMA and CDMA (*id.* at 3:25–28).

We credit Petitioner’s testimonial evidence regarding the motivation to combine Byrne and Johnston because the cited portions of the record support it. Ex. 1003 ¶¶ 124–127. We also credit the testimonial evidence

that one of ordinary skill in the art would have been motivated to combine the phone of Byrne modified by Johnston with Pillekamp because the cited portions of the record support it. Ex. 1003 ¶¶ 124, 131–133.

We further credit the testimonial evidence that “the Byrne-Johnston combination requires only routine knowledge of cellular communication techniques” and “would merely involve implementing Johnston’s antenna diversity designs in the cellular system of Byrne’s telephone without substantially changing Byrne’s other structures (e.g., cordless system)” because, as summarized above, Johnston describes implementing its antenna with a cell phone. Ex. 1003 ¶ 128. We agree that the proposed combination would have been “merely combining known prior art elements according to known methods” because Johnston supports the testimony. *Id.* ¶ 129. We, thus, agree that one of ordinary skill in the art would have had a reasonable expectation of success in implementing Johnston’s antenna design in Byrne’s CCT. *Id.* ¶ 130.

We agree with Petitioner’s testimonial evidence that “combining Byrne, Johnston, and Pillekamp requires only routine knowledge of cordless communication techniques” and “Pillekamp’s techniques were readily applicable to . . . Byrne-Johnston’s telephone because such modification would merely involve implementing Pillekamp’s cordless system including multiple antennas in . . . Byrne-Johnston’s telephone without substantially changing the other structures (e.g., cellular system) of . . . Byrne-Johnston’s telephone,” because Pillekamp supports the testimony. Ex. 1003 ¶ 134. We also agree that the proposed combination would have been “merely combining known prior art elements according to known methods,” because Pillekamp supports the testimony. *Id.* ¶ 135. We, thus, agree that one of ordinary skill in the art would have had a reasonable expectation of success

in implementing Pillekamp's cordless antenna design in Byrne's CCT as modified by Johnston. *Id.* ¶ 136.

Johnston and Pillekamp contradict Patent Owner's contention that the proposed addition of antennas and supporting circuitry would lead to multiple changes that would exceed ordinary skill in the art. PO Resp. 27–31. The references show that the required additional components and changes to cellular and cordless telephones to accommodate those additional components were within ordinary skill in the art because the references describe how to apply those components to such phones. *See also* Ex. 1049, 59:24–25 (Patent Owner's declarant acknowledging that "some diversity techniques existed as of 1999"), 62:17–63:7 (acknowledging that antenna diversity existed at the time).

Based on the full record, weighing the underlying factual determinations, a preponderance of the evidence persuades us that claim 12 of the '943 patent is unpatentable over Byrne, Johnston, and Pillekamp. *Arctic Cat*, 876 F.3d at 1361.

G. Asserted Obviousness Based on Byrne, Johnston, Pillekamp, and Billström

1. Billström (Ex. 1010)

Billström "relates to digital TDMA (Time Division Multiple Access) cellular radio mobile telecommunications systems" and "is directed towards apparatuses and mobile stations for providing packet data communications services in current TDMA cellular systems." Ex. 1010, 1:7–12.

Billström states that "[p]roviding the packet data services on a cellular system platform offers potential advantages in terms of widespread availability, possibility of combined voice/data services, and comparatively low additional investments by capitalizing on the cellular infrastructure."

Ex. 1010, 1:54–58. According to Billström, “[o]f particular interest are current TDMA cellular systems, through their spectrum efficiency and world wide penetration” and identifies “GSM (Global System for Mobile communication)” as an example of a TDMA platform. *Id.* at 1:58–62.

Billström provides “general purpose packet data communication services in current digital TDMA cellular systems, based on providing spectrum efficient shared packet data channels optimized for packet data and compatible with cellular requirements” with GSM as a target system and “a mobile station for packet data communication over digital TDMA cellular shared packet data channels.” Ex. 1010, 3:53–59, 4:59–61. Billström also provides “new packet data services in a closely integrated way, utilizing the current TDMA cellular infrastructure” and “with minimum impact on the current TDMA cellular infrastructure.” *Id.* at 3:63–65, 4:5–8. “The basic packet data network service provided is a standard connectionless network (datagram) service based on a standard connectionless IP protocol,” and “IP is here used to denote the Internet Protocol.” *Id.* at 7:58–61; *see also id.* at 5:19 (“Internet Protocol IP”).

2. *Dependent Claim 13*

Claim 13 depends from claim 12 and recites “wherein the device is enabled for internet protocol based data communication.” Ex. 1001, 14:7–8. Petitioner argues that Billström teaches using IP for data communication. Pet. 81 (citing Ex. 1003 ¶¶ 156, 257; Ex. 1010, 7:58–8:21).

The cited portion of Billström describes that “[t]he basic packet data network service provided is a standard connectionless network (datagram) service based on a standard connectionless IP protocol,” and “IP is here used to denote the Internet Protocol.” Ex. 1010, 7:58–61. We credit Petitioner’s

testimonial evidence because the cited portions of the record support it.
Ex. 1003 ¶ 156; Ex. 1010, 7:58–8:21; Ex. 1037, 18.

Patent Owner does not provide a responsive argument specifically for claim 13. *See generally* PO Resp. Based on the full record before us, Petitioner persuades us, and we determine, that Billström teaches or suggests the limitations of claim 13.

3. *Dependent Claim 14*

Claim 14 depends from claim 12 and recites “wherein the device is enabled to send and receive a plurality of streams using multipath communication.” Ex. 1001, 14:9–11. For claim 14, Petitioner refers to its arguments for claim 7. Pet. 81 (citing Ex. 1003 ¶¶ 158, 259).

As discussed above for claim 7, Byrne describe cordless and cellular operations and communicating with multiple cordless and cellular base stations 114, 116, 118, 130. Ex. 1008, 6:36–8:43, 10:52–13:32, Figs. 1, 5. We credit Petitioner’s testimonial evidence because Byrne supports it. Ex. 1003 ¶¶ 98, 99, 158; Ex. 1008, 6:36–8:43, 10:52–13:32, Figs. 1, 5.

Patent Owner does not provide a responsive argument specifically for claim 14. *See generally* PO Resp. Based on the full record before us, Petitioner persuades us, and we determine, that Byrne teaches or suggests the limitations of claim 14.

4. *Asserted Reason to Combine*

Petitioner argues that IP was a well-known technique for communicating data with a cellular telephone. Pet. 78 (citing Ex. 1003 ¶¶ 148, 249), 81 (citing Ex. 1003 ¶¶ 156, 257; Ex. 1010, 7:58–8:21). Petitioner also argues that it would have been obvious to modify based on Byrne operating in a TDMA system using various cellular protocols, Billström’s suggestion to use IP, and the predictable implementation of

Billström’s technique that is built on TDMA. *Id.* at 78–79 (citing Ex. 1003 ¶¶ 149, 250; Ex. 1008, 5:20–33, 7:11–24, 10:52–13:11; Ex. 1010, Abstr., 3:53–4:22), 81 (citing Ex. 1003 ¶¶ 157, 258; Ex. 1010, 7:40–8:46, Figs. 2, 3). Petitioner contends that “IP is used to interconnect networks in the Internet, and thus IP-enabled systems can communicate with different network devices on different network infrastructures.” *Id.* at 81 (citing Ex. 1037, 18).

In Petitioner’s view, one of ordinary skill in the art would have been motivated to modify Byrne-Johnston-Pillekamp based on Billström because the modification would have provided “packet data communication services in current digital TDMA cellular systems” as taught by Billström (Pet. 79 (citing Ex. 1003 ¶¶ 151, 152; Ex. 1010, 3:53–61)), used a well-known technique described by Billström (*id.* (citing Ex. 1003 ¶¶ 151, 252; Ex. 1037, 18; Ex. 1001, claim 13)), provided packet data services using TDMA cellular infrastructure as taught by Billström (*id.* at 79–80 (citing Ex. 1003 ¶¶ 152, 253; Ex. 1010, 3:62–67)), and provided packet data services with minimum impact on TDMA cellular infrastructure (*id.* at 80 (citing Ex. 1003 ¶¶ 153, 254; Ex. 1010, 4:5–20)).

Petitioner contends that “implementing the system in a manner that applies Billström’s suggested packet data communication yields predictable results (e.g., telephone capable of communicating on IP) from combining known prior art elements according to known methods.” Pet. 80 (citing Ex. 1003 ¶¶ 154, 255). Petitioner also contends that the proposed combination would not have “change[d] the hallmark aspects” of the references because modifying in view of Billström uses a known technique and would have minimized the impact on cellular systems. *Id.* (citing Ex. 1003 ¶¶ 154, 255; Ex. 1010, Abstr., 3:53–4:22).

Petitioner further contends that there would have been a reasonable expectation of success due to the overlap in the teachings of the asserted references, the proposed modification “would require only routine knowledge of wireless technologies” within ordinary skill, and the “modification would only change the cellular part of the system so as to enable the combined system for IP-based cellular communication, while only routine modifications would be required for the telephone to implement Billström’s techniques.” Pet. 80–81 (citing Ex. 1003 ¶¶ 155, 256).

We agree with Petitioner’s testimonial evidence that one of ordinary skill in the art would have been motivated to make the proposed combination in the manner asserted with a reasonable expectation of success because the record supports the testimony. Ex. 1003 ¶¶ 148, 149, 151–157. Patent Owner does not provide a responsive argument regarding Petitioner’s asserted motivation to combine Byrne, Johnston, Pillekamp, and Billström. *See generally* PO Resp.

5. *Petitioner Shows by the Preponderance of the Evidence that Claims 13 and 14 are Unpatentable*

Based on the full record, weighing the underlying factual determinations, a preponderance of the evidence persuades us that claims 13 and 14 of the ’943 patent are unpatentable over Byrne, Johnston, Pillekamp, and Billström. *Arctic Cat*, 876 F.3d at 1361.

H. *Asserted Obviousness Based on Raleigh and Byrne*

1. *Raleigh (Ex. 1005)*

Raleigh “relates to digital communication and more particularly to a space-time communication system.” Ex. 1005, 1:18–20. According to Raleigh, there is a need for “a system for more effectively taking advantage

of multiple transmitter antennas and/or multiple receiver antennas.” *Id.* at 1:60–62.

A wireless embodiment of Raleigh “operates with an efficient combination of a substantially orthogonalizing procedure (SOP) in conjunction with . . . a plurality of both transmitter and receiver antenna elements.” Ex. 1005, 2:10–16. Figure 4 of Raleigh is reproduced below.

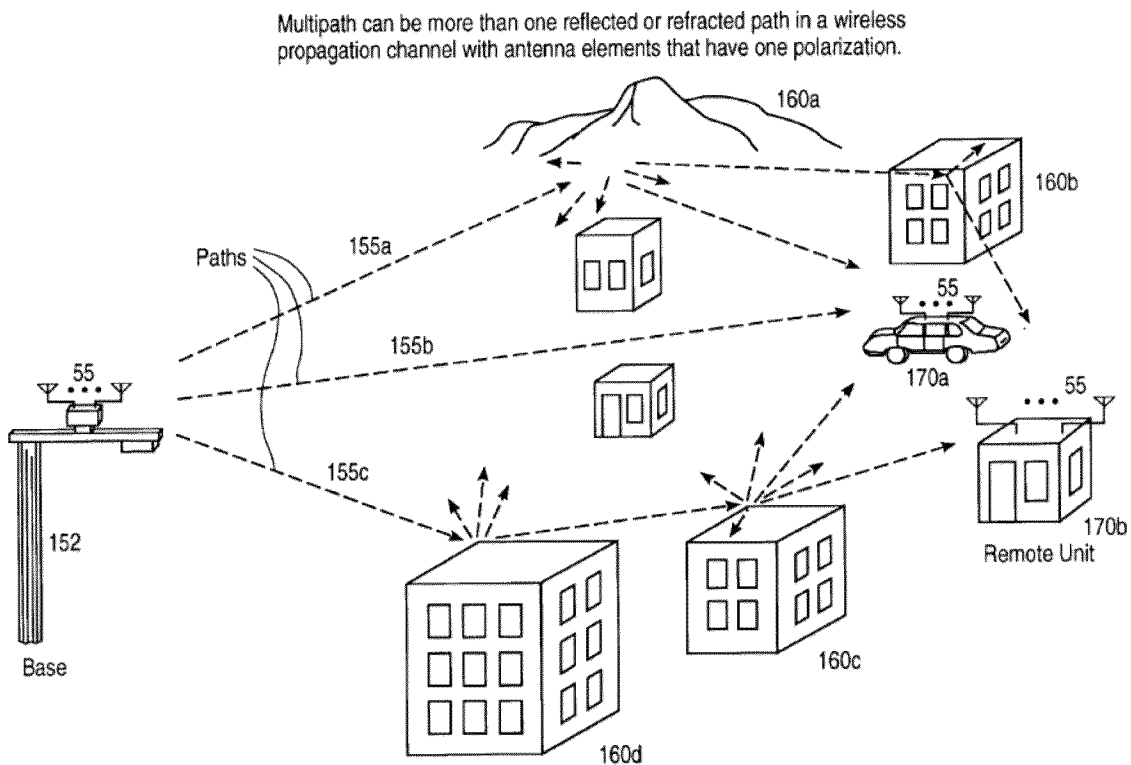


FIG. 4

Figure 4 shows a communication scenario where multipath is found. Ex. 1005, 3:10–11. Base 152 transmits to and receives from remote units 170a, 170b. *Id.* at 10:23–24. Base 152 and remote units 170a, 170b each have one or more antenna elements in array 55. *Id.* at 10:24–27. Transmitted signals propagate along paths 155a–155c. *Id.* at 10:27–29.

Figure 1 of Raleigh is reproduced below.

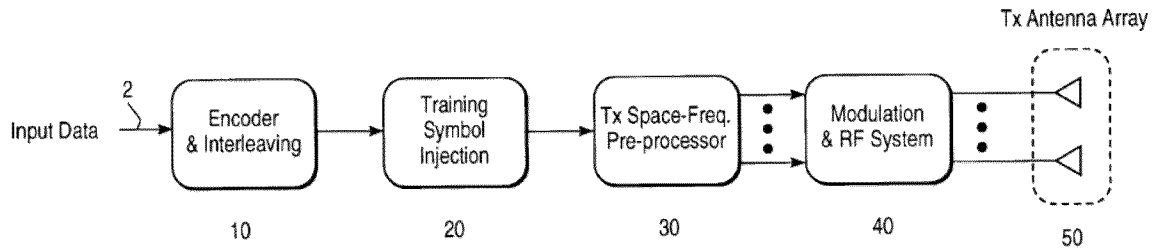


FIG. 1

Figure 1 shows Raleigh's transmitter system. Ex. 1005, 3:3–4, 5:35. Information signal input 2 can be a digital bit sequence or analog data and is fed into Encoder and Interleaving apparatus 10 “where the data is encoded into a symbol stream.” *Id.* at 5:37–41. Training Symbol Injection block 20 “place[s] a set of known training symbol values” in the symbol stream “to provide a known input within a portion of the transmitted symbol stream so that a receiver may estimate the communication channel parameters” and “to aid in demodulation and decoding of the data sequence.” *Id.* at 6:7–14.

The data stream is fed into Transmitter Space-Frequency Pre-Processor (“TSFP”) 30 that performs a SOP and spatial processing. Ex. 1005, 6:21–27, 6:41–42. When transmitter and receiver portions of the SOP are combined, parallel bins are created in a manner that information in one bin does not interfere with information in another bin. *Id.* at 6:27–32. TSFP 30 processes its input into a parallel set of sequences that are fed into Modulation and RF System block 40. *Id.* at 7:24–28.

Modulation and RF System block 40 converts the sequences up to the RF carrier frequency. Ex. 1005, 7:28–31. Transmitter Antenna Array 50 radiates the signal. *Id.* at 7:36–37; *see also id.* at 5:21 (stating that “‘antenna array’ is a collection of antenna elements”).

Figure 3 of Raleigh is reproduced below.

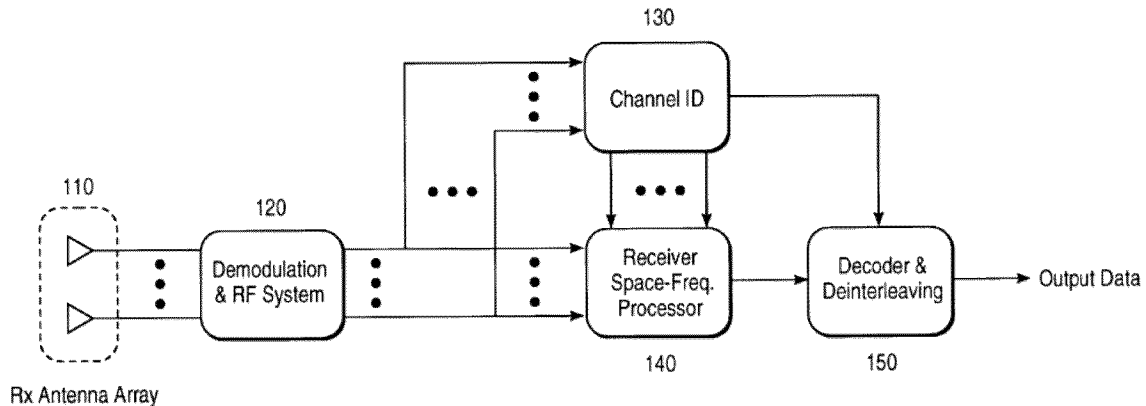


FIG. 3

Figure 3 shows Raleigh’s receiver system. Ex. 1005, 3:8–9, 7:54. RF signals from Antenna Array 110 “are downconverted to digital baseband using a Demodulation and RF System 120.” *Id.* at 7:55–57. The digital baseband signal can be fed into Channel ID 130 where “the characteristics of the digital communication channel are estimated” and provided to Receiver Space-Frequency Processor (“RSFP”) block 140. *Id.* at 7:66–8:4, 8:8–10.

RSFP block 140 performs the receiver portion of the SOP and spatial processing. Ex. 1005, 8:34–36, 8:40–41. The output of RSFP block 140 is fed into Decoder and Deinterleaving block 150 where the symbol sequence is decoded. *Id.* at 9:22–23, 9:25–28.

2. Claim 1

The parties dispute whether Petitioner has shown a motivation to combine Raleigh and Byrne and whether Petitioner’s proposed person of ordinary skill in the art would have had a reasonable expectation of success in making the proposed combination. Pet. 43–49; PO Resp. 39–55; Pet. Reply 22–26; PO Sur-reply 20–24.

Petitioner argues that one of ordinary skill in the art would have been motivated to combine Raleigh's processing for long-range wireless communication with Byrne's cordless communication for the benefits provided by Raleigh's processing and Byrne's use of two different protocols and frequencies. Pet. 43–44 (citing Ex. 1003 ¶ 160; Ex. 1005, 1:60–2:63; Ex. 1008, 1:30–33, 2:42–46, 7:56–8:9). Petitioner also argues that one of ordinary skill in the art would have implemented Raleigh's transmitter and receiver systems with multiple antennas with Byrne's cordless system. *Id.* at 44 (citing Ex. 1003 ¶ 160; Ex. 1005, Abstr., 1:66–2:9; Ex. 1008, 1:30–33, 2:42–46, 7:56–8:9).

Petitioner further argues that one of ordinary skill in the art would have found it obvious to use Raleigh's processing with Byrne's cellular protocols and frequency bands with predictable results. Pet. 44–46 (citing Ex. 1003 ¶¶ 161–163; Ex. 1005, 36:22–28; Ex. 1008, 1:30–33, 7:19–24, 7:39–49, 13:1–11). According to Petitioner, one of ordinary skill in the art would have been motivated to combine the references to obtain their combined benefits of selecting an available radio system, compensating for the disadvantages of wireless signals, reducing complexity, and improving network capacity, coverage, and quality. *Id.* at 46 (citing Ex. 1003 ¶ 164; Ex. 1005, 2:31–63, 5:52–6:5, 6:66–7:4, 8:58–9:7, 11:29–41, 11:60–64, 20:50–22:34, 23:44–47, 25:47–49, 34:38–36:29; Ex. 1008, 3:43–4:57).

Petitioner contends that the proposed combination would have only required routine knowledge of wireless communication and signal processing, would have been within ordinary skill in the art, would have merely required an additional set of components, and would have applied Raleigh's techniques to Byrne without substantially changing other structures or configurations. Pet. 46–47 (citing Ex. 1003 ¶ 165; Ex. 1005,

7:49–52). Petitioner also contends that the proposed modification combines known element according to known methods, “does not change the hallmark aspects of either reference,” accomplishes the compatible purposes of both references in ways similar to how each reference achieves those purposes, and achieves their intended operations in parallel. *Id.* at 47–49 (citing Ex. 1003 ¶¶ 166, 167; Ex. 1005, 1:66–2:63; Ex. 1008, 3:43–4:21).

Petitioner, thus, contends that the ordinarily skilled artisan would have had a reasonable expectation of success in making the proposed modification. *Id.* at 49 (citing Ex. 1003 ¶ 168).

a) Patent Owner’s Response

Patent Owner responds that one of ordinary skill in the art would not have been motivated to make the proposed combination because “most of [Petitioner’s] purported ‘benefits’ do not reflect a motivation at all but merely an alleged capability to make the combination.” PO Resp. 39.

Patent Owner argues that “the purported benefits of Petitioner’s Byrne-Raleigh device are spurious and would have been outweighed by the difficulty and detriments of the combination.” *Id.* at 40 (citing Pet. 46).

Patent Owner contends that Raleigh does not teach nor suggest incorporating into a portable handheld device, that “portability was not an important characteristic for Raleigh’s remote unit,” that Raleigh teaches “an orthogonalizing algorithm and antenna diversity protocol for use in a communication system *as a whole*,” and that there is no specific disclosure of its remote units, other than the figures. PO Resp. 40–41 (citing Ex. 1005, Fig. 4; Ex. 2004 ¶¶ 74–77).

Patent Owner also argues that one of ordinary skill in the art would have been discouraged from incorporating Raleigh into Byrne’s handheld phone “given the complexity of the Raleigh mobile unit and practical

limitations of mobile handheld devices at the Critical Date.” PO Resp. 41 (citing Ex. 2004 ¶ 78). According to Patent Owner, Raleigh’s vehicle example uses a multiple inputs and multiple outputs (“MIMO”) with antenna arrays on multiple bases communicating with multiple antenna arrays spaced apart on opposite ends of the vehicle. *Id.* at 41–42 (citing Pet. 50–51; Ex. 1005, 4:17–25, Figs. 4, 6; Ex. 2004 ¶ 77; Ex. 2011, 297, 298; Ex. 2014, 1; Ex. 2018, 63:6–11).

Patent Owner contends that Raleigh required “special hardware,” had “increased complexity,” and “employed complex space-time coding techniques.” PO Resp. 42–43 (citing Ex. 1005, 1:18–20; Ex. 2004 ¶ 80; Ex. 2013, 1804; Ex. 2016, 277). Patent Owner also contends that it would have been “known that Raleigh’s remote unit was designed to be used in vehicles and buildings so that it could handle additional size, complexity, and hardware needed for the disclosed techniques.” *Id.* at 43 (citing Ex. 2004 ¶¶ 75–77, 82).

According to Patent Owner, “the same is not true for handheld mobile devices like Byrne, which would have been a key design consideration” because handheld mobile devices have inherent limitations, as admitted by Petitioner’s declarant. PO Resp. 44–45 (citing Ex. 2004 ¶¶ 83, 84; Ex. 2008, 68; Ex. 2009, 187; Ex. 2010, 1; Ex. 2012, 1; Ex. 2017, 206; Ex. 2018, 33:6–13, 34:23–35:25, 37:9–13, 38:11–39:2, 40:4–7). Patent Owner also argues that multiple antennas are required for Petitioner’s remote unit, and deploying multiple antennas in a portable handheld device was viewed as not practical. *Id.* at 45 (citing Ex. 2004 ¶¶ 86, 87). According to Patent Owner, “experts in the field were teaching away from using multiple antennas in portable handheld mobile devices when dealing with space-time coding procedures.” *Id.*

Patent Owner further argues that one of ordinary skill in the art “would have known that computationally intensive technologies (such as Raleigh’s complex space-time procedures) were limited, or could not be implemented at all, on portable handheld mobile devices at the Critical Date.” PO Resp. 45–46 (citing Ex. 2004 ¶ 88; Ex. 2009, 187; Ex. 2010, 2; Ex. 2013, 1804; Ex. 2015, 9; Ex. 2017, 206; Ex. 2018, 70:11–19). Patent Owner contends that “even years after the Critical Date, there was little commercial implementation of MIMO in cellular systems due to the complexity required for MIMO receivers.” *Id.* at 46–47 (citing Ex. 2004 ¶ 89; Ex. 2008, 11, 69; Ex. 2011, 297, 298; Ex. 2018, 63:24–64:19, 65:22–6:66). Patent Owner also contends that “there were no commercial implementations of space-time coding techniques in mobile phones or cellular networks at the Critical Date” and Petitioner’s declarant “testified that it would be ‘safe to assume’ that cellular phones did not employ space-time coding techniques for more than five years after the Critical Date.” *Id.* at 47 (citing Ex. 2004 ¶ 59; Ex. 2018, 63:24–65:21).

Patent Owner, thus, contends that the numerous known limitations would teach away from incorporating Raleigh’s vehicle remote unit into a portable handheld device, would have discouraged one of ordinary skill in the art from such implementation, and would have been contrary to accepted wisdom. PO Resp. 47 (citing Ex. 2004 ¶ 91).

In Patent Owner’s view, Petitioner’s motivation that the ordinarily skilled artisan would have wanted to build a better phone with more features is the “type of motivation [that] has been rejected by the Federal Circuit,” and Petitioner, therefore, fails to carry its burden. PO Resp. 48. Patent Owner also argues that Petitioner’s other motivations are generic or variations of the argument that one of ordinary skill in the art would have

had a reasonable expectation of success, such an argument being insufficient to show a motivation to combine. *Id.* at 49–50 (citing Pet. 46–47). Patent Owner also argues that recognizing that Raleigh and Byrne had compatible purposes and in combination would accomplish the purposes in similar ways is likewise insufficient to show obviousness without showing design need or market pressure. *Id.* at 50 (citing Pet. 48–49; Ex. 1003 ¶ 167). Patent Owner further argues that alleging the references are from the same field is also insufficient to show a motivation to combine. *Id.* at 51.

Patent Owner also responds that Petitioner fails to show that one of ordinary skill in the art would have had a reasonable expectation of success. PO Resp. 52. Patent Owner argues that “Petitioner has identified a relatively low level of experience as being ordinary in the field” and that “relative inexperience would have substantially limited that person’s ability to create Petitioner’s proposed device.” *Id.* (citing Pet. 60; Ex. 2004 ¶ 92).

Patent Owner contends that “the MIMO systems and space-time coding procedures used by Raleigh were in their infancy at the Critical Date,” “MIMO systems using space-time coding techniques were still the ‘subject of ongoing research’” even years later, and “[t]here were also ‘substantial implementation issues to be solved before MIMO techniques [could be] used to increase the capacity of mobile communication networks’” in 2004. PO Resp. 53 (citing Ex. 2004 ¶ 93; Ex. 2008, 11; Ex. 2011, 297–298; Ex. 2016, 276). Patent Owner also contends that “even persons having *extraordinary* skill and experience working specifically on MIMO and space-time code systems were struggling to implement the concepts disclosed in Raleigh *years* after the Critical Date.” *Id.* at 54 (citing Ex. 2004 ¶ 94). Patent Owner points to “the number and complexity of the components involved in Petitioner’s proposed combination device” and the

knowledge in the art that “the physical size and power requirements for handheld devices such as Byrne severely limited storage space on such devices at the Critical Date.” *Id.* (citing Ex. 2004 ¶¶ 95, 96; Ex. 2015, 9; Ex. 2018, 46:20–22, 47:18–20, 53:4–10, 54:19–27, 55:19–57:22, 59:12–24). Patent Owner also argue that one of ordinary skill in the art “would have also understood that the proposed Byrne-Raleigh device would have included other components necessary for the phone to operate.” *Id.* at 55. Patent Owner, thus, argues that Petitioner cannot assume that one of ordinary skill in the art would have had a reasonable expectation of success in “modifying the Byrne device to incorporate Raleigh’s SOP.” *Id.* (citing Ex. 2004 ¶ 97).

b) Petitioner’s Reply

Petitioner replies that Patent Owner does not dispute Petitioner’s motivation to combine analysis, as acknowledged by Patent Owner’s declarant, but mischaracterizes the proposed combination. Pet. Reply 22 (citing PO Resp. 39–51; Ex. 1049, 100:9–102:7). According to Petitioner, “Raleigh is the primary reference in the combination and Patent Owner’s analysis is reversed.” *Id.* (citing PO Resp. 39, 40-41, 48, 52; Ex. 1048 ¶¶ 50–51; Ex. 1049, 92:13–18).

Petitioner argues that the challenged claims recite a “wireless communication device” but do not require it to be a handheld device. Pet. Reply 22 (citing Ex. 1048 ¶ 52). Petitioner also argues that Patent Owner’s declarant premised his entire opinion regarding design constraints on application to a consumer product such as a handheld device, instead of devices for vehicles and buildings, and mischaracterized the proposed combination. *Id.* at 22–23 (citing Ex. 1049, 78:8–79:23, 82:23–83:23, 84:5–7, 84:16–85:1).

Petitioner contends that the proposed combination “applied it to devices of various types/sizes contemplated by the teachings of Raleigh and Byrne,” with support from the references and declarant testimony. Pet. Reply 23 (citing Pet. 43–48; Ex. 1005, Figs. 4–6; Ex. 1008, 7:11–13; Ex. 1048 ¶ 53; Ex. 1049, 85:3–86:14, 87:11–20). Petitioner also contends that arguments regarding technical disadvantages and lack of commercial products are incorrect because of the misunderstanding of the proposed combination. *Id.* (citing PO Resp. 39–51; Ex. 1048 ¶ 54; Ex. 1049, 100:9–102:7). Petitioner further contends that, even if the proposed combination were limited to a handheld device, technical disadvantages and lack of commercial products does not negate Petitioner’s obviousness analysis. *Id.* at 23–24 (citing Pet. 43–49; Ex. 1049, 88:7–25).

Petitioner argues that “[p]ortable/mobile devices were not new, and not so challenging to implement as to deter . . . implementation of Raleigh’s techniques in a handheld device.” Pet. Reply 24 (citing Ex. 1048 ¶¶ 55–65). Petitioner also argues that such devices were gaining in popularity and there was “a huge demand for improving their functionalities.” *Id.* (citing Ex. 1048 ¶ 57; Ex. 2008, 22). According to Petitioner, the popularity and demand would have encouraged implementing and improving Raleigh’s remote unit to meet that demand. *Id.* (citing Pet. 44–45; Ex. 1048 ¶¶ 58–59). Petitioner further argues that Raleigh does not limit its “remote unit” and so a person of ordinary skill in the art “would have investigated known solutions, such as well-known handheld devices (e.g. Byrne’s phone).” *Id.* (citing Pet. 43–49; Ex. 1004, 7:18–21, 36:29–34; Ex. 1048 ¶¶ 60–64; Ex. 1065, 92:9–22).

Petitioner points to the limited disclosure of implementation details in the ’943 patent and contends that, “[l]ike Raleigh, the ’943 patent leaves

implementation details up to the [person’s of ordinary skill in the art] knowledge/skill, thereby confirming that handheld device implementation is nothing new or inventive.” Pet. Reply 24–25 (citing Ex. 1048 ¶¶ 65–66; Ex. 1049, 89:1–90:12, 91:17–18, 92:2–3; Ex. 1065, 78:7–15, 79:8–18, 81:20–25). Petitioner also argues that Patent Owner’s evidence only shows “general, technical considerations when implementing handheld devices, but never conveys that such implementations were impossible or impractical.” *Id.* at 25 (citing Ex. 1048 ¶ 67; Ex. 1049, 80:1–82:21). Petitioner argues that Patent Owner’s alleged difficulties “are all general and do not rely on specific evidence that demonstrates impracticability or impossibility of the use of a portable handheld device in Raleigh.” *Id.* (citing PO Resp. 42–44; Ex. 1049, 78:21–25, 79:14–21, 80:1–82:21).

Petitioner also replies that Patent Owner does not dispute the proposed level of ordinary skill in the art and that “the ’943 patent offers very limited disclosure of the components and implementation details necessary for its techniques (e.g., MIMO, handheld device),” therefore relying on knowledge in the art. Pet. Reply 25 (citing Ex. 1001, 4:12–6:47; Ex. 1005, 11:42–49; Ex. 1065, 80:3–81:25). “[T]he ’943 patent’s limited disclosure of specific implementation details indicates,” Petitioner contends, that the ordinarily skilled artisan “would have had the requisite skill to implement Raleigh’s system as modified by Byrne.” *Id.* at 26 (citing Ex. 1048 ¶¶ 68–69).

Regarding Patent Owner’s asserted technical difficulties, Petitioner also replies that “abundant advantages and motivations,” undisputed by Patent Owner’s declarant, would have prompted the proposed combination. Pet. Reply 26 (citing Pet. 43–49; PO Resp. 53–55; Ex. 1003 ¶¶ 160–168; Ex. 1048 ¶ 70; Ex. 1049, 100:8–102:7). Petitioner argues that Patent Owner’s counting of processors “takes an impermissibly narrow view of the

law of obviousness.” *Id.* (citing PO Resp. 54; Ex. 1005, 6:21–23, 8:1–2, Figs. 1, 3, 11–16, 22–25; Ex. 1057, 47; Ex. 1058, 101; Ex. 1059, 77; Ex. 1060, 108). Petitioner reiterates that one of ordinary skill in the art “would have recognized and found it obvious to implement the teachings of Raleigh and Byrne in a handheld device or other wireless communication devices for numerous known benefits (e.g., reduced cost, size, weight, power, hardware complexity).” *Id.* at 26–27 (citing Ex. 1048 ¶ 71).

c) Patent Owner’s Sur-Reply

Patent Owner replies that the Petition “repeatedly refers to the purported benefits of implementing Raleigh’s system in Byrne’s handheld phone” and “Petitioner proffers no evidence contradicting” Patent Owner’s testimonial evidence and supporting exhibits that show no motivation “to implement Raleigh’s space-time coding system in Byrne’s handheld phone.” PO Sur-reply 20–21 (citing Pet. 43–49). Patent Owner also argues that it “identified multiple challenges faced by a [person of ordinary skill in the art] at the Critical Date that would have strongly discouraged. . . implementing Raleigh’s space-time coding system in Byrne’s handheld phone,” and Petitioner does not address those arguments in reply. *Id.* at 21. Patent Owner further argues that Petitioner adds a new motivation based on the popularity of and demand for mobile phones, but the new motivation also fails for the same reason, specifically “it fails to address the specific reasons why Raleigh’s MIMO and space-time coding would have been considered too challenging to implement in the form factor of Byrne’s handheld as of the Critical Date.” *Id.* at 22 (citing Pet. Reply 24).

Regarding reasonable expectation of success, Patent Owner replies “Raleigh’s space-time coding system is not a required element of the ’943 Patent’s claims,” so the ’943 patent does not indicate one of ordinary skill in

the art “would have had the requisite skill to implement Raleigh’s system as a handheld device.” PO Sur-reply 22–23 (citing Pet. Reply 25). Patent Owner also argues that the asserted “abundant advantages and motivations” are immaterial to whether the ordinarily skilled artisan would have had a reasonable expectation of success. *Id.* at 23. Patent Owner further argues that “Raleigh describes the processors in structural terms” and “Petitioner fails to rebut Patent Owner’s showing that the large number of processors contributes to the difficulty of implementing Petitioner’s combination.” *Id.* (citing Pet. Reply 26; Ex. 1001, 13:52–55). Patent Owner, thus, argues that “Petitioner fails to rebut Patent Owner’s showing that a [person of ordinary skill in the art] as defined by Dr. Jensen would not reasonably have expected success in making Petitioner’s combination of Raleigh and Byrne.” *Id.* at 24.

d) Petitioner Fails to Show a Reasonable Expectation of Success

Petitioner contends that one of ordinary skill in the art “would have recognized that the purposes of Raleigh and Byrne were compatible, and the Raleigh-Byrne combination would have accomplished those purposes in similar ways that each of Raleigh and Byrne achieve.” Pet. 48 (citing Ex. 1003 ¶ 67). According to Petitioner, the “combination would have still achieved Raleigh’s purposes of improving capacity, computational efficiency, spectral data efficiency, and communication quality (by reducing interference)” and “Byrne’s purposes of ‘automatically select[ing] and re-select[ing] which of the available radio systems to use,’ ‘automatically [handing over] to a system having a good service (e.g., cordless to cellular),’ and ‘automatically [handing over] the call to the low cost system.’” *Id.* at 48–49 (citing Ex. 1003 ¶ 167; Ex. 1005, 1:66–2:63; Ex. 1008, 3:43–4:21).

Petitioner concludes that one of ordinary skill in the art “would have understood that the intended operations would be achievable in parallel” and “[f]or these reasons, based on the teachings of Raleigh and Byrne, a [person of ordinary skill in the art] would have had a reasonable expectation of success in implementing a dual-mode telephone with Raleigh’s known communication design for long-range (e.g., cellular) communication and Byrne’s known communication design for short-range (e.g., cordless) communication.” Pet. 49 (citing Ex. 1003 ¶¶ 167, 168). The cited testimonial evidence is verbatim identical and does not cite any further support in the record. Ex. 1003 ¶¶ 167, 168.

Although the parties dispute what Petitioner’s proposed combination is, Petitioner’s only argument and evidence regarding a reasonable expectation of success pertains to “implementing a dual-mode telephone with Raleigh’s known communication design for long-range (e.g., cellular) communication and Byrne’s known communication design for short-range (e.g., cordless) communication.” Pet. 49; Ex. 1003 ¶ 168. As discussed above, Byrne’s CCT 200 includes cordless and cellular transceivers 220, 230, and Byrne does not describe that those transceivers are in some other component such as cordless base station 114 or cellular base station 130. Ex. 1005, Figs. 1, 2. Leading up to the assertion of reasonable expectation of success, Petitioner and its declarant cite a portion of Raleigh that describes its “space-time signal processing system,” its components, and the associated advantages. Pet. 48; Ex. 1003 ¶ 167; Ex. 1005, 1:66–2:63. Petitioner and its declarant also cite a portion of Byrne that describes the advantages of its radio telephone. Pet. 48–49; Ex. 1003 ¶ 167; Ex. 1008, 3:43–4:21.

The cited portions of Raleigh and Byrne do not describe adding Raleigh's signal processing system to a radio telephone such as Byrne's CCT 200 or a radio telephone having a signal processing system like Raleigh's. Ex. 1005, 1:66–2:63; Ex. 1005, 1:66–2:63. We, thus, find that the cited portions of the record do not support Petitioner's argument that “a [person of ordinary skill in the art] would have had a reasonable expectation of success in implementing a dual-mode telephone with Raleigh's known communication design for long-range (e.g., cellular) communication and Byrne's known communication design for short-range (e.g., cordless) communication.” Pet. 49; Ex. 1003 ¶ 168.

Petitioner does not provide any further argument or evidence elsewhere in the record to explain why one of ordinary skill in the art would have had a reasonable expectation of success in implementing a dual-mode telephone with Raleigh's cellular communication and Byrne's cordless communication. *See* Pet. 43–49; Pet. Reply 25–27; Ex. 1003 ¶¶ 160–168; Ex. 1048 ¶¶ 68–71.

Patent Owner, on the other hand, provides evidence that one of ordinary skill in the art would not have had a reasonable expectation of success in implementing a dual-telephone with Raleigh's and Byrne's communication systems. *See, e.g.*, Ex. 2008, 68 (stating that “[t]he introduction of MIMO techniques into wireless communication systems introduces a number of implementation challenges” “[t]he greatest challenges, however, lie within the terminal where the size, power and cost constraints must be overcome,” and “[r]esearch initiatives must address the viability of terminals employing MIMO or diversity techniques, with particular emphasis being placed on maximizing the performance of the terminal antenna system in realistic macrocellular deployment scenarios and

within the restricted form factors of future terminals such as laptops, PDAs and handsets”).

In view of the full record that shows insufficient support for Petitioner’s only reasonable expectation of success argument for the Raleigh-Byrne combination, Petitioner does not show by a preponderance of the evidence that “a [person of ordinary skill in the art] would have had a reasonable expectation of success in implementing a dual-mode telephone with Raleigh’s known communication design for long-range (e.g., cellular) communication and Byrne’s known communication design for short-range (e.g., cordless) communication.” Pet. 43–49; Pet. Reply 25–27; Ex. 1003 ¶¶ 160–168; Ex. 1048 ¶¶ 68–71; Ex. 2004 ¶¶ 93–97; Ex. 2008, 11; Ex. 2011, 297–298; Ex. 2015, 9; Ex. 2016, 276; Ex. 2018, 46:20–22, 47:18–20, 53:4–10, 54:19–27, 55:19–57:22, 59:12–24.

Furthermore, Petitioner’s proposed combination ultimately includes Byrne’s CCT, whether or not the proposed combination starts with Raleigh. *See* Pet. 44 (arguing that the ordinarily skilled artisan “would have found it obvious to implement Raleigh’s transmitter/receiver systems and multiple antennas as the cellular system described by Byrne such that the telephone’s cellular system uses multiple transmitters/receivers and antennas for performing space-time processing as taught in Raleigh”), 47 (arguing that the proposed modification “would only apply Raleigh’s techniques to part of Byrne’s existing circuitry without substantially changing the other structures/configurations (e.g., cordless system) of Byrne’s telephone”), 55 (arguing that the ordinarily skilled artisan “would have understood or found obvious that the combination of Raleigh and Byrne (Section III.D.2) would apply Raleigh’s techniques utilizing multiple transceivers and antennas as the cellular system of Byrne’s telephone”); Ex. 1003 ¶ 160 (stating that “it

would have been obvious to implement Raleigh's transmitter/receiver systems and multiple antennas in at least the cellular system described by Byrne such that the telephone's cellular system uses multiple transmitters/receivers and antennas for performing space-time processing as taught in Raleigh").

Elsewhere in the Petition, the proposed combination can be read to add only Byrne's cordless circuitry to Raleigh's remote unit. *See, e.g.*, Pet. 43 (arguing motivation "to combine Raleigh's teachings with Byrne such that the telephone or remote unit in the combination is implemented using Raleigh's space-time signal processing schemes for long-range wireless (e.g., cellular) communication with Byrne's protocols for short-range, cordless communication"), 47 (arguing that it would have been "obvious to modify Raleigh's remote unit to include Byrne's circuitry and operational design for cordless communication because such modification would only require an additional set of components necessary to implement Byrne's cordless system in the remote unit").

Petitioner, however, goes on to argue that one of ordinary skill in the art "would have been motivated to consider other references to improve or further implement Raleigh's remote unit into various types of products such as telephones or other wireless devices." Pet. 44–45 (citing Ex. 1003 ¶ 161). Petitioner also argues that the proposed combination "yields predictable results (e.g., a telephone operable to perform Raleigh's space-time signal processing techniques for cellular connections with the capability of making cordless connections as taught in Byrne)." *Id.* at 47 (citing Ex. 1003 ¶ 166). For the reasons above, even if the proposed combination started with Raleigh, when viewing Petitioner's arguments in their entirety, the proposed combination would still result in a phone. *See id.* at 44–45, 47; Ex. 1003

¶¶ 161, 166. For such a phone, Petitioner does not show by a preponderance of the evidence that one of ordinary skill in the art would have had a reasonable expectation of success for the above-stated reasons.

I. Remaining Challenges Starting with Raleigh

Petitioner's arguments that dependent claim 2 is unpatentable over Raleigh and Byrne and dependent claims 3 and 4 are unpatentable over Raleigh, Byrne, and WO748 do not address the deficiencies discussed above for claim 1, from which these claims depend. *See* Pet. 59–63. Petitioner's arguments for claims 3 and 4 are additionally deficient for the reasons discussed above for the challenge based on Byrne and WO748.

Petitioner's arguments for independent claims 5 and 8 and their dependent claims 6, 7, and 9 have the same deficiency identified for claim 1. *See* Pet. 62 (referring to arguments for claim 1), 63 (arguing that “in the combination, the telephone's cellular system would be implemented by Raleigh's transmitter and receiver systems”), 67–68 (referring to arguments for claims 1 and 5). Petitioner's arguments for independent claim 12 and its dependent claims 13–20 also have the same deficiency. *See id.* at 72 (arguing that “Raleigh-Byrne-Pillekamp's wireless device includes a cellular system that uses Raleigh's techniques and a cordless system that uses Byrne-Pillekamp's techniques”).

III. CONCLUSION⁵

In summary:

Claims	35 U.S.C. §	References/Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1, 5–9	103(a)	Byrne	1, 5–9	
3, 4	103(a)	Byrne, WO748		3, 4
12	103(a)	Byrne, Johnston, Pillekamp	12	
13, 14	103(a)	Byrne, Johnston, Pillekamp, Billström	13, 14	
1, 2, 5–9	103(a)	Raleigh, Byrne		1, 2, 5–9
3, 4	103(a)	Raleigh, Byrne, WO748		3, 4
12, 15, 18–20	103(a)	Raleigh, Byrne, Pillekamp		12, 15, 18–20
13, 14	103(a)	Raleigh, Byrne, Pillekamp, Billström		13, 14
16, 17	103(a)	Raleigh, Byrne, Pillekamp, WO748		16, 17
Overall Outcome			1, 5–9, 12–14	2–4, 15–20

⁵ Should Patent Owner wish to pursue amendment of the challenged claim in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 5–9, and 12–14 of U.S. Patent No. 9,614,943 B1 have been shown, by a preponderance of the evidence, to be unpatentable;

FURTHER ORDERED that claims 2–4 and 15–20 of U.S. Patent No. 9,614,943 B1 have not been shown, by a preponderance of the evidence, to be unpatentable; and

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

IPR2022-01004
Patent 9,614,943 B1

For PETITIONER:

W. Karl Renner
Jeremy J. Monaldo
Hyun Jin In
Sangki Park
FISH & RICHARDSON P.C.
IPR39483-0124IP1@fr.com
PTABInbound@fr.com

Andrew S. Ehmke
Clint S. Wilkins
HAYNES AND BOONE, LLP
andy.ehmke.ipr@haynesboone.com
clint.wilkins.ipr@haynesboone.com

For PATENT OWNER:

Rex Hwang
Todd Martin
Steve Udick
SKIERMONT DERBY LLP
rhwang@skiermontderby.com
tmartin@skiermontderby.com
sudick@skiermontderby.com

Philip Graves
Greer Shaw
GRAVES & SHAW LLP
pgraves@gravesshaw.com
gshaw@gravesshaw.com