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571-272-7822

Paper # 26  
Date: February 21, 2020

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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APPLE INC.,  
HTC CORPORATION, HTC AMERICA, INC.,  
AND ZTE (USA) INC.,  
Petitioner,

v.

INVT SPE LLC,  
Patent Owner.

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Case IPR2018-01472  
Patent 6,466,563 B1

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Before THU A. DANG, KEVIN F. TURNER, and  
BARBARA A. BENOIT, *Administrative Patent Judges*.

DANG, *Administrative Patent Judge*.

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

In response to a Petition (Paper 1, “Pet.”) filed by Apple Inc., HTC Corporation, HTC America, Inc., and ZTE (USA), Inc. (collectively, “Petitioner”), we instituted *inter partes* review of claims 1–21 of U.S. Patent No. 6,466,563 B1 (Ex. 1001, “the ’563 patent”). Paper 9 (“Dec. on Inst.”). During the trial, INVT SPE LLC (“Patent Owner”) filed a Response (Paper 11, “PO Resp.”), to which Petitioner filed a Reply (Paper 19, “Reply”). In turn, Patent Owner filed a Sur-Reply. Paper 24 (“Sur-Reply”). An oral hearing was held with the parties on November 21, 2019. A transcript of the hearing has been entered into the record. Paper 25 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6. This Decision is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of claims 1–3, 5, 6, 12, 13, 15, and 16 (the “challenged claims”) on which we instituted trial.<sup>1</sup> Based on the record before us, Petitioner has shown, by a preponderance of the evidence, that claims 1–3, 5, 6, 12, 13, 15, and 16 of the ’563 patent are unpatentable.

## I. BACKGROUND

### A. *The ’563 Patent (Ex. 1001)*

The ’563 patent, titled “CDMA Mobile Station and CDMA Transmission Method,” issued on October 15, 2002, from an application filed July 16, 1998. Ex. 1001, (54), (45), (22). According to the ’563 patent, a burst frame generation circuit “generates burst data solely made of pilot symbols and transmission power control symbols,” and a transmission

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<sup>1</sup> Patent Owner disclaimed claims 4, 7–11, 14, and 17–21 of the ’563 patent. PO Resp. 2, 14–15; Ex. 2001.

interval control circuit “controls the transmission interval of the burst data N times (N being a natural number) one slot at the end of transmission.” *Id.* at Abstract.

Figures 1A–1C, reproduced below, illustrate “data transmission timing in a conventional CDMA [(‘Code Division Multiple Access’)] mobile station apparatus.” *Id.* at 2:9–11.

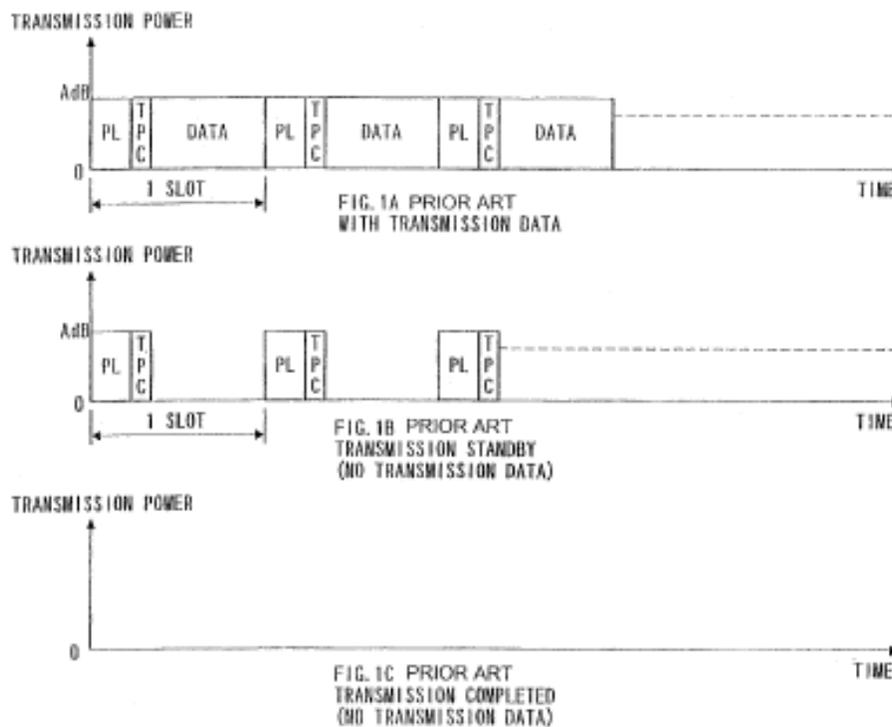


Figure 1A depicts “a timing chart showing data transmission timing during data transmission,” Figure 1B depicts “a timing chart showing data transmission timing during transmission on transmission standby,” and Figure 1C depicts “a timing chart showing data transmission timing at the end of transmission.” *Id.* at 1:21–63.

As shown in Figure 1A, “[p]ilot symbols (hereafter referred to as ‘PL’) and transmission power control symbols (hereafter referred to a ‘TPC’) are periodically inserted into data, forming a frame.” *Id.* at 1:21–25. “When a portion from the start of a PL to the start of the next PL is calculated as one slot, one frame generally consists of 16 slots.” *Id.* at 1:24–26.

As shown in Figure 1B, “[o]n transmission standby, the CDMA mobile station apparatus transmits burst data in which only a PL and TPC are written and other bits are left in blank for each slot.” *Id.* at 1:34–36. As shown in Figure 1C, “the conventional CDMA mobile station apparatus stops transmission of burst data in a certain time after the end of communication in order to reduce power consumption of batteries by a transmission amplifier.” *Id.* at 1:54–57.

Figures 3A–3C, reproduced below, illustrate “transmission timing of data in the CDMA mobile station apparatus” in an embodiment of the ’563 patent. *Id.* at 2:16–18.

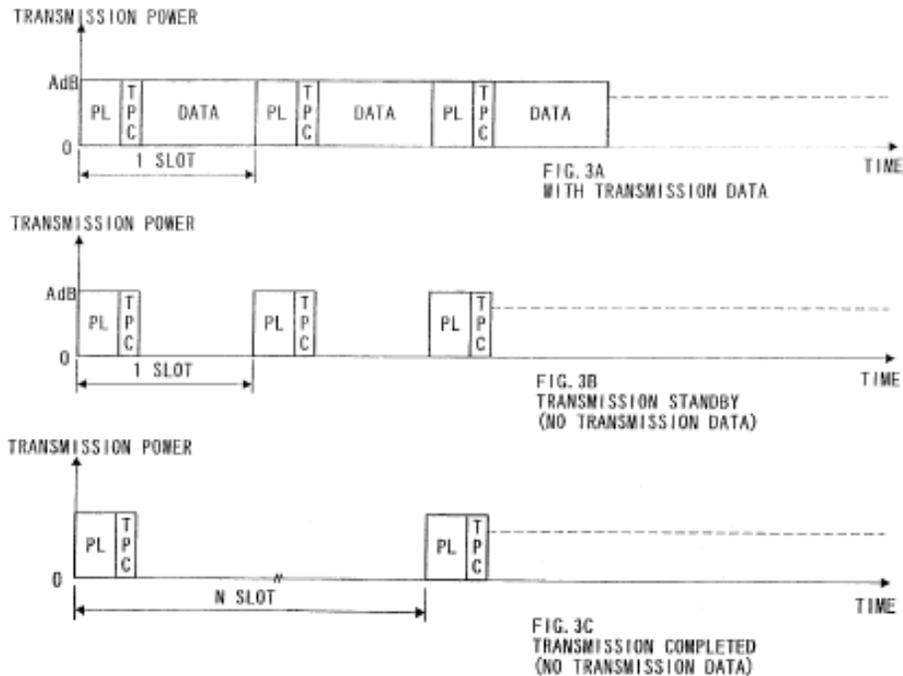


Figure 3A depicts “a timing chart showing the transmission timing of data during data transmission,” Figure 3B depicts “a timing chart showing the transmission timing of data on transmission standby,” and Figure 3C depicts “a timing chart showing transmission timing of data at the end of transmission.” *Id.* at 3:22–4:28.

As shown in Figure 3A, “PLs and TPCs are periodically inserted in the data . . . , combined into a frame.” *Id.* at 3:23–26. As shown in Figure 3B, a burst frame generation circuit “generates burst data in which only PLs and TPCs are written and other bits are left in blank when there are no data to be transmitted.” *Id.* at 3:42–44. A transmission interval control circuit “controls the burst data transmission interval to one slot on transmission standby.” *Id.* at 3:45–47. “Transmitting burst data when there are no data to be transmitted allows synchronization with the base station apparatus to be

maintained,” thus “making it possible to restart communication immediately.” *Id.* at 3:54–57.

However, “continuing transmission of burst data for a long time after the end of data transmission results in an increase of power consumption of batteries.” *Id.* at 3:58–62. Therefore, as shown in Figure 3C, the transmission interval control circuit “controls the transmission interval of burst data to N times one slot (N: a natural number) at the end of transmission.” *Id.* at 3:66–4:1.

*B. Illustrative Claim*

Of the challenged claims, claims 1, 5, 12, and 15 are independent. Claims 2 and 3 depend from claim 1, claim 6 depends from claim 5, claim 13 depends from claim 12, and claim 16 depends from claim 15.

Claim 5 is illustrative:

5. A transmission method comprising:
  - (a) generating transmission frames by inserting pilot symbols and transmission power control symbols into transmission data,
  - (b) transmitting transmission data by radio,
  - (c) generating burst frames comprising pilot symbols and transmission power control symbols and no transmission data when there are no transmission data to be transmitted, and
  - (d) transmitting said burst frames by radio by controlling transmission intervals to cyclically once every N slots.

*C. Evidence of Record*

Petitioner relies upon the references listed below (Pet. 13–82):

Reference		Exhibit
Nakamura et al.	US 6,026,279, issued February 15, 2000 (“Nakamura”)	1004
Okumura et al.	“A Transmission Experiment on Coherent Multicode DS-CDMA Mobile Radio Access, IEICE (1995) (“Okumura”)	1005
Bhagalia et al.	CA 2,222,705, issued June 3, 1996 (“Bhagalia”)	1006
Abe	US 5,987,020, issued November 16, 1999 (“Abe”)	1007

Petitioner also relies on the Declaration of Andrew C. Singer, Ph.D. (Ex. 1003). Patent Owner relies on the Declarations of Branimir Vojcic, Ph.D. Exs. 2002, 2004. Dr. Vojcic was cross-examined by Petitioner, and a transcript of his deposition was entered into the record. Ex. 1016.

*F. Asserted Grounds of Unpatentability*

We instituted *inter partes* review on all grounds in the Petition, on all claims, including the challenged claims. As to the challenged claims, Petitioner asserts the following grounds of unpatentability (Pet. 7):

Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1–3, 5, 6, 12, 13, 15, 16	§ 103	Nakamura and Okumura
1–3, 5, 6, 12, 13, 15, 16	§ 103	Bhagalia and Abe

## II. ANALYSIS

### A. *Claim Construction*

Petitioner contends that claim terms of an “unexpired” patent should be given their “broadest reasonable construction in light of the specification.” Pet. 8. According to Petitioner’s expert, Dr. Singer, “the ’563 patent has not expired.” Ex. 1003 ¶ 15. In the Decision to Institute, we gave claim terms their ordinary and customary meaning under the broadest reasonable interpretation (BRI) standard, as would be understood by one of ordinary skill in the art, at the time of the invention. Dec. on Inst. 8–9.

However, as Patent Owner points out, the ’563 patent expired on July 16, 2018, before the filing date of the Petition. PO Resp. 12–13. We accord claim terms in an “expired” patent their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention. *See Cisco Sys., Inc. v. AIP Acquisition, LLC*, Case IPR2014-00247, slip op. at 2 (PTAB July 10, 2014) (Paper 20) (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313–1317 (Fed. Cir. 2005) (en banc)). In doing so, “we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–1317). Nevertheless, as would have been understood by a person of ordinary skill in the art, the below claim constructions would have been the same under both the broadest reasonable construction and the standard under *Phillips*.

Petitioner applies “the plain and ordinary meaning of all claim terms,” which Petitioner contends is consistent with both the broadest reasonable

construction and the standard applied by Article III courts (“the *Phillips* standard”). Pet. 8; *see* Pet. 8–13. Petitioner contends that it “does not believe any additional claim terms” beyond those identified in the Petition “require express construction to resolve the proposed grounds of rejection” presented in the Petition. Pet. 8. Although Patent Owner contends that the Board should apply the plain and ordinary meaning of any claim terms for the ’563 patent, Patent Owner does not contest any of Petitioner’s claim constructions set forth in the Petition, and instead indicates that “no claim terms are in controversy.” PO Resp. 12–13.

With respect to claim 1, according to Petitioner, the claim includes “limitations in means-plus function format, which creates a rebuttable presumption that the [Applicant] intended to invoke § 112, ¶ 6.”<sup>2</sup> Pet. 8–9; *see also* *Altiris Inc. v. Symantec Corp.*, 318 F.3d 1363, 1375 (Fed. Cir. 2003). In the Decision on Institution, we addressed Petitioner’s proposed constructions of the means-plus-function (“MPF”) terms, and we determined that Petitioner had set forth proposed structures that support these limitations. Dec. on Inst. 9–12 (citing Pet. 9–11); *see* 37 C.F.R. § 42.104(b)(3).

As we noted in the Decision on Institution, Petitioner’s constructions presume that the meaning of specific functions, such as “generating” a frame, for example, are generally known. Dec. on Inst. 10. Patent Owner

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<sup>2</sup> Applicant is Matsushita Electric Industrial Co., Ltd.

has not rebutted this presumption. Petitioner’s proposed constructions of the means-plus-function terms in the claims (Pet. 9–11) are as follows:

Claim Term	Construction
<p>“transmission frame generation means for generating frames by inserting pilot symbols and transmission power control symbols into transmission data” (claim 1)</p>	<p>Corresponding structure: “a circuit programmed to insert pilot symbols and transmission power control symbols into data to form a frame.”            As set forth in the Specification: “Data transmission section 3 comprises transmission data conversion circuit 301 that inserts PLs and TPCs into data to be transmitted by radio forming a frame.” Pet. 9 (citing Ex. 1001, 2:66–3:1, 3:23–29, Figs. 2, 3A, 4, 6, 8).</p>
<p>“burst frame generation means for generating burst frames comprising pilot symbols and transmission power control symbols and no transmission data” (claim 1)</p>	<p>Corresponding structure: “a circuit programmed to generate burst data in which only pilot symbols and transmission power control symbols are written when there is no data to be transmitted.”            As set forth in the Specification: “Burst frame generation circuit 307 generates burst data in which only PLs and TPCs are written and other bits are left in blank when there are no data to be transmitted.” Pet. 10 (citing Ex. 1001, 3:11–13, 3:42–44, Figs. 2, 3, 4, 6, 8).</p>
<p>“transmission interval control means for controlling a transmission interval of said burst frames to cyclically once every N slots” (claim 1)</p>	<p>Corresponding structure: “a circuit programmed to control the burst data transmission interval.”            As set forth in the Specification, Ex. 1001, 3:45–60, 3:66–4:5, 4:60–62, Figs. 2, 3B, 3C, 4, 5B, 5C, 6, 8. Pet. 10.</p>

<p>“transmission means for transmitting said transmission data and said burst frames by radio” (claim 1)</p>	<p>Corresponding structure: “a transmission antenna that transmits by radio.”          As set forth in the Specification: “transmission antenna 305 . . . transmits by radio.” Pet. 11 (citing Ex. 1001, 3:7–8, 3:34–37, 4:11–15, 5:3–7, 6:4–11, Figs. 2, 4, 6, 8).</p>
<p>“repetition processing means for arranging pilot symbols and transmission power control symbols in series respectively” (claim 2)</p>	<p>Corresponding structure: “a circuit programmed to process arranging the same information in series for pilot symbols and transmission power control symbols.”          As set forth in the Specification, Ex. 1001, 4:53–59, 5:23–31, Figs. 4, 5, 8, 9. Pet. 11.</p>

Petitioner contends that each of these proposed constructions would be the same under the broadest reasonable interpretation standard and the *Phillips* standard. Pet. 9–11.

As Petitioner points out in its Reply, “Patent Owner does not dispute any aspect of Petitioner’s proposed means-plus function constructions.” Reply 16; *see generally* PO Resp. 12–13. Instead, according to Petitioner, Patent Owner’s expert confirmed that, under “the broadest reasonable interpretation applicable to this proceeding, the language of the means-plus-function limitations would have been understood by a [person of ordinary skill in the art (POSITA)] at the time of the ‘563 Patent.” *Id.* at 17 (citing Ex. 1016, 7:24–15:3). As set forth in our Decision on Institution, we found Petitioner’s analysis to be sufficient under the BRI standard. Dec. on Inst. 10. Since what would have been understood by a POSITA would have been

the same under the *Phillips* standard, we do not alter these initial constructions in this Final Written Decision.

As for the other claim limitations of independent claims 1, 5, 12, and 15, and claims 2, 3, 6, 13, and 16 depending respectively therefrom, for the reasons set forth below, the explicit requirements set forth in claims themselves sufficiently limit the claims without requiring further construction. Thus, we determine that we need not further construe expressly any other claim terms to resolve the arguments before us. *See Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (only claim terms that are in controversy need to be construed and only to the extent necessary to resolve the controversy); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an *inter partes* review).

*B. Principles of Law*

To prevail in challenging Patent Owner's claims, Petitioner must demonstrate by a preponderance of the evidence that the claims are unpatentable. 35 U.S.C. § 316(e) (2012); 37 C.F.R. § 42.1(d) (2017). "In an [inter partes review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable." *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify "with particularity . . . the evidence that supports the grounds for the challenge to each claim")); *see also* 37 C.F.R. § 42.104(b) (requiring a petition for *inter*

*partes* review to identify how the challenged claim is to be construed and where each element of the claim is found in the prior art patents or printed publications relied on). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review). Furthermore, Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *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 ordinary skill in the art; and (4) objective evidence of nonobviousness.<sup>3</sup> *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

*C. Level of Ordinary Skill in the Art*

In determining the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art;

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<sup>3</sup> Neither party presents arguments regarding objective evidence of nonobviousness in the instant proceeding.

prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (citation omitted). In that regard, Petitioner’s declarant, Dr. Singer, testifies that a person with ordinary skill in the art (POSITA) at the time of the invention

would have been a person having a Bachelor’s degree in electrical engineering or the equivalent plus three years of experience working with digital communication systems or in network engineering or a Master’s degree in electrical engineering with an emphasis on communication systems or the equivalent plus one year of experience working with digital communication systems or in network engineering.

Pet. 6; Ex. 1003 ¶ 36.

Patent Owner declarant, Dr. Vojcic, testifies that a person with ordinary skill in the art (POSITA) at the time of the invention

would have had at least a bachelor’s degree in Electrical Engineering, or equivalent, with three years of experience researching or working with cellular radio communication systems, or a master’s degree in Electrical Engineering, or equivalent, with one year of experience researching or working with cellular radio communication systems

PO Resp. 12; Ex. 2002 ¶ 17.

The parties propose similar levels of ordinary skill in the art and do not directly challenge the other’s proposal. We consider the level of ordinary skill in the art to be reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1354–55 (Fed. Cir. 2001) (holding

that absent evidence to the contrary, “the prior art itself [may] reflect[] an appropriate level” of ordinary skill in the art).

In general, we agree with the areas of agreement in the parties’ proposals. Patent Owner has not explained sufficiently why researching or working particularly with “cellular radio communication systems” is necessary (PO Resp. 12), and so we adopt Petitioner’s proposed general experience of working with “digital communication systems or in network engineering” (Pet. 6), which comports with the level of ordinary skill in the art reflected in the prior art of record. Accordingly, we determine that a person of ordinary skill would have a Bachelor’s degree in electrical engineering or the equivalent plus three years of experience working with digital communication systems or in network engineering or a Master’s degree in electrical engineering with an emphasis on communication systems or the equivalent plus one year of experience working with digital communication systems or in network engineering.

*D. Obviousness over Nakamura and Okumura*

Petitioner contends that claims 1–3, 5, 6, 12, 13, 15, and 16 are unpatentable under § 103 over Nakamura in view of Okumura. Pet. 13–50. Patent Owner disputes Petitioner’s contentions. PO Resp. 20–34. Petitioner then replies to Patent Owner’s contentions (Reply 1–11) and Patent Owner in turn addresses Petitioner’s reply (Sur-Reply 1–4).

For the reasons provided below, we determine that Petitioner has demonstrated that claims 1–3, 5, 6, 12, 13, 15, and 16 are obvious over Nakamura and Okumura. We provide a brief description of Nakamura and Okumura before turning to the parties’ contentions.

1. Nakamura

Nakamura, titled “Method and Apparatus for Signal Transmission in CDMA Mobile Communication System,” issued on February 15, 2000, from an application filed June 12, 1997. Ex. 1004, (54), (45), (22). Nakamura discloses controlling “radio channel transmission . . . so that only signal portions for the necessary signals are transmitted without transmitting any other signal portions when there is no transmission signal to be transmitted.” *Id.* at Abstract. Figure 3, showing “exemplary signal format and corresponding transmission pattern for the radio channel transmission signals” in an embodiment (*id.* at 2:41–44), is reproduced below:

FIG. 3

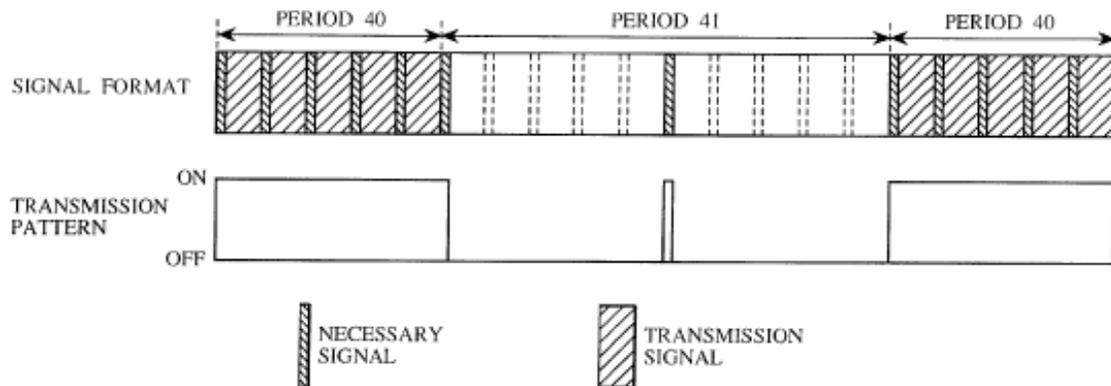


Figure 3 shows a “transmission pattern which indicates the transmission ON/OFF timings” at a transmission unit, and depicts a case of “thinning four necessary signals from every five necessary signals.” *Id.* at

5:29–52. As shown Figure 3, “when there is no transmission signal, the necessary signals are thinned in order to lower their transmission frequency, so that an unnecessary radio channel transmission is further eliminated.” *Id.* at 5:34–38. Therefore, “it is possible to prevent an unnecessary increase of an amount of interference power and thereby prevent an unnecessary decrease of a system capacity.” *Id.* at 5:38–41. In this embodiment, “the transmission of the necessary signals is continued so that it is possible to maintain the radio channel without causing an out-of-synchronization state at a receiving side.” *Id.* at 5:44–52.

Figure 5, reproduced below, shows “exemplary signal format and corresponding transmission pattern for the radio channel transmission signals” according to another embodiment (*id.* at 2:50–53):

FIG. 5

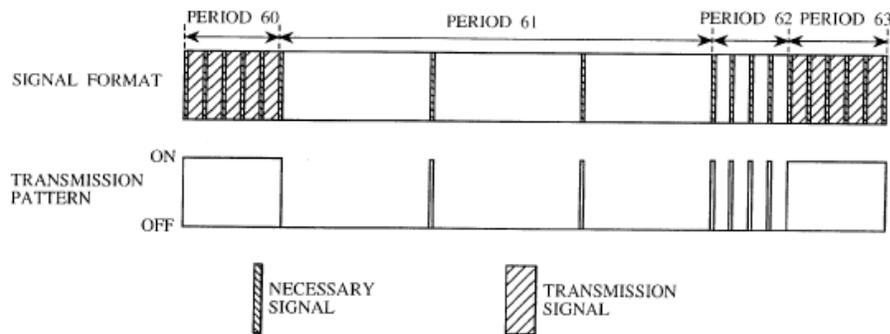


Figure 5 also shows a “transmission pattern which indicates the transmission ON/OFF timings at the transmission unit.” *Id.* at 7:13–60. As shown in Figure 5, on one hand, “when the transmission signals are supplied,” the signal format formation unit “forms the signal format by

combining the necessary signals in the maximum frequency . . . with the transmission signals.” *Id.* at 7:16–26. On the other hand, “when there is no transmission signal to be transmitted through the radio channel,” the signal format formation unit “forms the signal format by thinning a prescribed number of necessary signals from the necessary signals in the maximum frequency,” and “using only the remaining necessary signals after the thinning, while leaving portions for placing transmission signals and thinned necessary signal portions empty (the period 61).” *Id.* at 7:27–37.

In an embodiment, the necessary signal generation unit “includes pilot signals to be used in carrying out the coherent detection with interpolation at a receiving side.” *Id.* at 11:48–50. In such embodiment, “known pilot signals are inserted into the radio channel at prescribed frequency so that a receiving side can estimate a propagation function of the radio section.” *Id.* at 11:54–61. In this embodiment, “when there is no transmission signal to be transmitted, an amount of interference power is reduced by lowering the transmission frequency of the pilot signals.” *Id.* at 11:66–12:3.

In another embodiment, the necessary signal generation unit “includes a transmission power control information which is necessary in carrying out a transmission power control.” *Id.* at 13:11–15. In this embodiment, “it is possible to control the transmission power so that the receiving quality follows the prescribed quality, and therefore it is possible to suppress an amount of interference power while satisfying the prescribed quality.” *Id.* at 13:49–53. Thus, “the transmission frequency of the transmission power control information is lowered when there is no transmission to be

transmitted so that it becomes possible to prevent an unnecessary increase of an amount of interference power.” *Id.* at 13:65–14:3.

Claim 12 recites a “transmitting step” that forms the radio channel transmission Signals by using the necessary signals which contain any one or more of pilot Signals which are necessary in carrying out a coherent detection with interpolation, a Synchronization information which is necessary in maintaining a Synchronization for Signal reception at a receiving Side, an order number which is necessary in carrying out an order control at a time of Signal transmission or Signal reception, and a transmission power control information which is necessary in carrying out a transmission power control.

*Id.* at 15:51–61.

## 2. Okumura

Okumura is an article titled “A Transmission Experiment of Coherent Multicode DS-CDMA Mobile Radio Access.” Ex. 1005. Okumura discloses “mobile radio access using coherent multicode DS-CDMA having a number of technical features including, . . . pilot-signal synchronous detection, traffic-adaptive transmit power control, . . . .” *Id.* at Abstract. Figure 2, showing a “[c]ode channel,” is reproduced below:

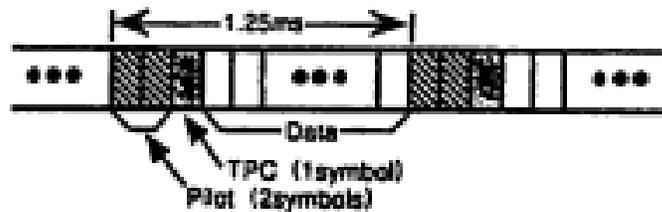


Fig. 2 Code channel

Figure 2 shows a “code channel” wherein “a two-symbol pilot symbol is inserted per every period” in addition to a one-symbol transmit power control (“TPC”) symbol. *Id.* at 14.

3. Independent Claims 1, 5, 12, and 15

*a. Preamble (claims 1, 5, 10, 12, and 15)*

Petitioner contends that Nakamura discloses “a mobile station apparatus and base station apparatus for signal transmission in a CDMA (Code Division Multiple Access) communication system.” Pet. 17–19, 31–32, 34–37 (citing Ex. 1004, 1:8–15, 1:61–2:9, 3:14–21, Fig. 1). Patent Owner does not dispute Petitioner’s analysis of the preamble of claims 1, 5, 10, 12, and 15. Based at least on the disclosure of Nakamura noted above, Petitioner has demonstrated persuasively that the Nakamura teaches the preamble.

*b. “generating transmission frames by inserting pilot symbols and transmission power control symbols into transmission data,” “transmitting transmission data by radio,” and “generating burst frames comprising pilot symbols and transmission power control symbols and no transmission data when there are no transmission data to be transmitted” (claim 5, similarly recited in claims 1, 10, 12, and 15)*

Petitioner contends, as illustrated in Figure 5 of Nakamura, “necessary signals (e.g., pilot and TPC symbols) are combined with transmission signals (transmission data) to create frames.” Pet. 20 (citing Ex. 1004, Fig. 5). In particular, Petitioner contends, “[t]hese frames are illustrated in Periods 60 and 63 [of Nakamura].” *Id.* at 20–21. According to Petitioner, “[l]ike the ’563 Patent, *Nakamura* teaches multiple pairs of control data

(necessary data) and transmission data (transmission signal) comprising a transmission frame.” *Id.* at 22. Petitioner contends, Nakamura’s antenna “would be responsible for transmitting transmission frames.” *Id.* at 30–31 (citing Ex. 1004, 3:14–21, 3:45–46, Fig. 1; Ex. 1003 ¶ 58). Furthermore, according to Petitioner, Nakamura’s signal format formation unit “forms the transmission frames of control data and transmission data when such data is present” and “forms burst frames of only control data (necessary signals) when transmission data is absent. *Id.* at 26–27 (citing Ex. 1004, 3:22–38).

Petitioner then contends, “*Nakamura* further teaches that the ‘necessary signals’ can include pilot signals and transmission power control signals.” Pet. 20–21. In particular, Petitioner contends Nakamura discloses that, in the eighth embodiment, “the necessary signal generation unit 10 includes pilot signals to be used in carrying out the coherent detection with interpolation at a receiving side” (*id.* at 21 (emphasis omitted) (citing Ex. 1004, 11:48–50)), and that, in the eleventh embodiment, “the necessary signal generation unit 10 includes a transmission power control information which is necessary in carrying out a transmission power control.” *Id.* (emphasis omitted) (citing Ex. 1004, 13:11–14).

Accordingly, Petitioner asserts that it would have been obvious “to modify *Nakamura* such that its necessary signal includes both pilot symbols and TPC symbols in accordance with the teachings of *Okumura*.” Pet. 22–23. In particular, Petitioner contends that *Okumura* teaches a DS-CDMA system wherein “pilot symbols and TPC symbols are sent together in a code channel over a 1.25ms interval (slot),” and wherein “the pilot symbols and

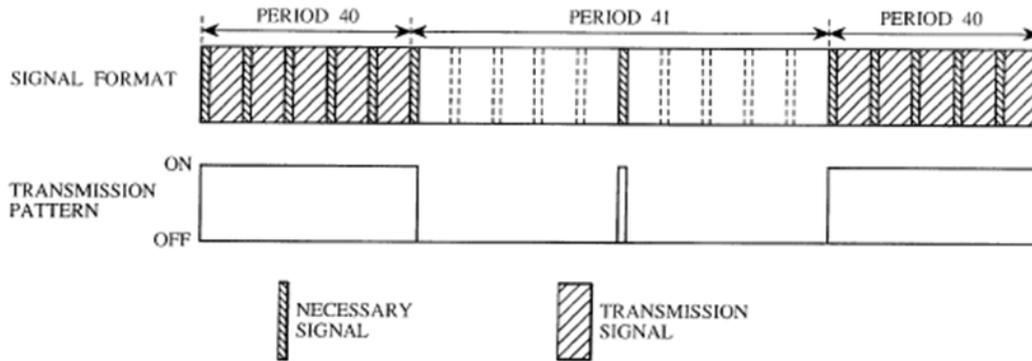
TPC symbols are inserted with transmission data into frames.” *Id.* at 23–24 (citing Ex. 1005, 14, Fig. 2).

Patent Owner does not dispute Petitioner’s analysis of these limitations. Based on at least the disclosures of Nakamura and Okumura discussed above, Petitioner has demonstrated persuasively that Nakamura, in combination with Okumura, teaches “generating transmission frames by inserting pilot symbols and transmission power control symbols into transmission data,” “transmitting transmission data by radio” and “generating burst frames comprising pilot symbols and transmission power control symbols and no transmission data when there are no transmission data to be transmitted,” as recited in the claims.

*c. “transmitting said burst frames by radio by controlling transmission intervals to cyclically once every N slots” (claim 5, similarly recited in claims 1, 10, 12, and 15)*

Petitioner contends that Nakamura discloses forming “the transmission frames of control data and transmission data when such data is present” and forming “burst frames of only control data (necessary signals) when transmission data is absent.” Pet. 26–27 (citing Ex. 1004, 3:22–38). Further, Petitioner contends that Nakamura’s signal format formation unit controls “a transmission interval of necessary signals (burst frames) to cyclically, e.g., once every five slots (once every N slots), by ‘thinning four necessary signals from every five necessary signals.’” Pet. 28. In particular, Petitioner references Period 41 in Figure 3 of Nakamura, reproduced below:

FIG. 3



Pet. 28–29 (citing Ex. 1004, Fig. 3). Nakamura’s Figure 3 shows an exemplary signal format and corresponding transmission pattern for radio channel transmission signals. Ex. 1004, 2:37–39.

According to Petitioner, in Nakamura,

when there is no transmission signal to be transmitted through the radio channel so that no transmission signal is supplied from the transmission signal generation unit 11, the signal format formation unit 12 forms the signal format by thinning a prescribed number of necessary signals from the necessary signals in the maximum frequency as supplied from the necessary signal generation unit 10 and using only the remaining necessary signals after the thinning, while leaving portions for placing transmission signals and thinned necessary signal portions empty (the period 41).

FIG. 3 depicts an exemplary case of thinning four necessary signals from every five necessary signals, and shows the transmission pattern which indicates the transmission ON/OFF

timings at the transmission unit 15 in correspondence to the signal format.

Pet. 28–29 (citing Ex. 1004, 5:18–33) (emphasis omitted).

In its Response, Patent Owner contends, although “Petitioner cites to Nakamura’s Figure 3 and its corresponding description” in support of this claim limitation, “Nakamura’s Figure 3 . . . fails to demonstrate the required plurality (‘burst frames’ and ‘intervals’) and cyclicity (‘every N slots’) because Figure 3 is limited to one time period.” PO Resp. 23 (citing Pet. 28–29; Ex. 1004, Fig. 3). In particular, Patent Owner contends that “the shown ‘period 41’ only contains one necessary signal.” *Id.* According to Patent Owner, “nothing in Figure 3, or anything cited in support . . . suggests that the one necessary signal is repeated (much less cyclically).” *Id.* (citing Pet. 28–29).

Although Patent Owner concedes that “Nakamura’s Figure 5 may suggest the cyclicity missing in Figure 3,” Patent Owner contends that “such cyclicity differs significantly from the one disclosed by the ’563 patent” because Nakamura’s Figure 5 “clearly illustrates an embodiment in which necessary signals are transmitted in unequal periods (*i.e.* not in identical N slot intervals where N is a natural number, as required by the ’563 Patent).” PO Resp. 23. According to Patent Owner, as shown in Figure 5 of Nakamura, “duration of Period 61 is many times larger in length than its counterpart Period 62, both representing when data is not being transmitted, meaning the N for Period 61 is not the same as for Period 62.” *Id.* at 24. Further, “the necessary signals are transmitted twice over Period 61, and at least 4 times in Period 62 (not once every N periods (slots),” and

“duration of Period 61 is about 4.3 (non-integer) times longer than the duration of Period 60.” *Id.* (citing Ex. 2004 ¶ 8).

In weighing the evidence before us, we find more persuasive the position of Petitioner.

Nakamura’s Figure 3 is reproduced below:

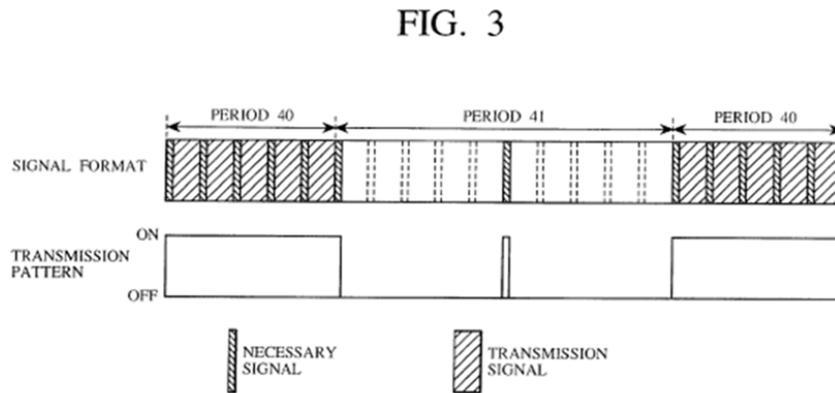


Figure 3 depicts a case of “thinning four necessary signals from every five necessary signals.” Ex. 1004, 5:29–52.

Here, we are persuaded by Petitioner’s contention that Nakamura’s Figure 3 teaches thinning necessary signals by controlling the transmission interval of the necessary signals (burst frames) “to cyclically, e.g., once every five slots (once every N slots), by ‘thinning four necessary signals from every five necessary signals.’” Pet. 28.

Further, Nakamura’s Figure 5 is reproduced below:

FIG. 5

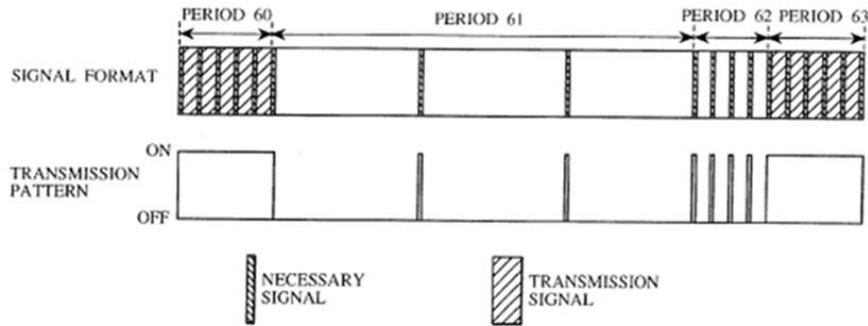


Figure 5 shows the necessary signal repeated over a plurality of burst frames/intervals, wherein, “when there is no transmission signal to be transmitted through the radio channel,” the signal format formation unit “forms the signal format by thinning a prescribed number of necessary signals from the necessary signals in the maximum frequency.” Ex. 1004, 7:27–37.

Here, we agree with Petitioner’s contention that, as shown in Figure 5, “Nakamura teaches multiple pairs of control data (necessary data) and transmission data (transmission signal) comprising a transmission frame [in periods 60 and 63].” Pet. 20–22. As Petitioner contends, Nakamura discloses forming “the transmission frames of control data and transmission data when such data is present [in periods 60, and 63]” and forming “burst frames of only control data (necessary signals) when transmission data is absent [in period 61].” Pet. 26–27 (citing Ex. 1004, 3:22–38).

Although Patent Owner contends that, in Figure 3, “the shown ‘period 41’ only contains one necessary signal” (PO Resp. 23), Petitioner relies on

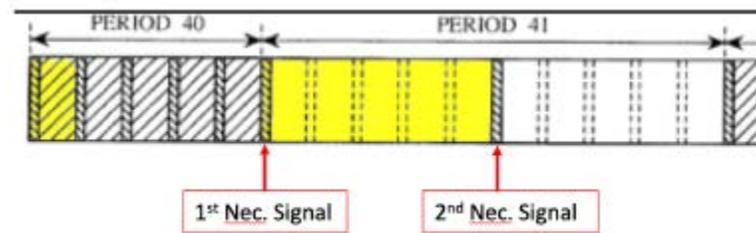
Nakamura's Figure 3 to show thinning of four necessary signals "from every five" necessary signals in multiple burst frames, but relies on Figure 5 for showing such multiple burst frames. Pet. 28–29.

As noted above, Patent Owner concedes that "Nakamura's Figure 5 may suggest the cyclicity." PO Resp. 23. Further, as Petitioner points out in its Reply, "Patent Owner does not dispute that the burst frame frequency in Fig. 3 (one every five slots) satisfies the cyclicity requirement." Reply 3 (citing PO Resp. 23–24). As Petitioner points out, Patent Owner's expert, Dr. Vojcic, confirmed that Nakamura's Figure 3 discloses "the identical arrangements of burst frames transmitted cyclically every N slots." Reply 6 (citing Ex. 1016, 29:6–13). Furthermore, as Petitioner points out, Patent Owner also does not dispute "that Fig. 5's multiple cycles satisfies the plurality requirement." Reply 3 (citing PO Resp. at 23).

Accordingly, we are persuaded by Petitioner's argument that "Patent Owner is thus incorrect in concluding that Petitioners have failed to carry their burden, because Patent Owner ignores the 'plurality' and 'cyclicity' are taught by *Nakamura*." Reply 3.

We are also persuaded by Petitioner's argument that, alternatively, "*Nakamura*'s Fig. 3 alone does in fact teach both 'plurality' and 'cyclicity.'" Reply 3–4. As Petitioner points out in its Reply, "Patent Owner's own expert, Dr. Vojcic, contradicts Patent Owner's argument, confirming in his deposition (1) that Fig. 3 depicts multiple necessary signals; and (2) like the '563 Patent, necessary signals are sent cyclically 1/Nth (specifically 1/5<sup>th</sup>) as frequently when transmission signals are not present." *Id.* at 4.

Petitioner points to “Patent Owner’s own briefing” which shows an annotation of Nakamura’s Fig. 3:

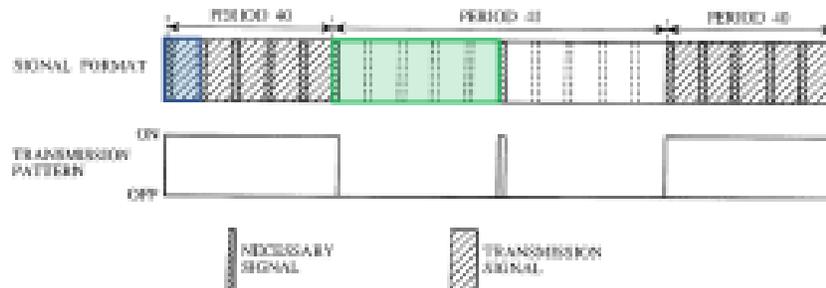


Reply 4 (citing PO Resp. 16 (highlighting in PO Resp. and annotation in Reply)). Petitioner’s annotated version of Nakamura’s Figure 3 shows a signal format and corresponding transmission pattern with the necessary signals discussed below indicated in red. According to Petitioner, the Patent Owner Response “demonstrates that Period 41 begins with a necessary signal,” and that “there is no dispute that a second necessary signal is sent in the middle of Period 41. Namely, the POR highlights in yellow the first half of Period 41, which includes one full cycle of a necessary signal followed by a duration of no transmission data.” *Id.*

As Petitioner points out, “[a]t his deposition, Dr. Vojcic expressly contradicted Patent Owner’s interpretation and admitted that Fig. 3 does indeed illustrate two necessary signals within Period 41.” Reply 4 (citing Ex, 1016, 22:9–23:8).

Further, as Petitioner contends, Nakamura’s “Fig. 3 similarly satisfies the ‘cyclicity’ requirement of the Challenged Claims.” Reply 5. Petitioner provides an annotation of Nakamura’s Fig. 3:

FIG. 3



Reply 6–7 (citing Ex. 1004, Fig. 3). Petitioner’s annotated version of Nakamura’s Figure 3 shows a signal format and corresponding transmission pattern with the data transmission rates discussed below indicated in blue and green.

According to Petitioner, “Period 40 illustrates a first rate (highlighted blue) when there is transmission data present and Period 41 illustrates a second rate (highlighted green) when no transmission data is present (where  $N=5$  such that necessary signals are transmitted  $1/5$  as frequently).” Reply 6. Petitioner points out that Patent Owner’s expert, “Dr. Vojcic, confirmed that Fig. 3 depicts the identical arrangements of burst frames transmitted cyclically every  $N$  slots.” *Id.* (citing Ex. 1016, 29:6–13).

We note Patent Owner does not address Petitioner’s arguments set forth in the Reply in its Sur-Reply. *See generally* Sur-Reply.

On this record, Petitioner has demonstrated persuasively that Nakamura, in combination with Okumura, teaches “transmitting said burst frames by radio by controlling transmission intervals to cyclically once every  $N$  slots,” as recited in the claims.

*d. Motivation to Combine Nakamura and Okumura*

Petitioner contends that “[a]lthough *Nakamura* discloses necessary signals comprised of pilot symbols and TPC symbols” but in separate embodiments, “[i]t would have been obvious, however, to modify *Nakamura* such that its necessary signal includes both pilot symbols and TPC symbols in accordance with the teachings of *Okumura*.” Pet. 22–23. In particular, “*Nakamura* . . . does teach that **‘the necessary signals . . . contain any one or more of pilot signals** which are necessary in carrying out a coherent detection with interpolation, . . . **and a transmission power control information** which is necessary in carrying out a transmission power control.” Pet. 24–25 (citing Ex. 1004, 15:53–61) (emphasis in original).

Thus, Petitioner contends that “[a] POSITA would understand that [Nakamura’s] teaching directs a skilled artisan to implement the necessary signals with multiple distinct control data, including pilot and TPC symbols,” and “would further recognize that transmitting both pilot and TPC symbols together as control data was well known as evidenced by *Okumura*.” Pet. 24–25 (citing Ex. 1004, 15:53–61; Ex. 1003 ¶ 53).

According to Petitioner, “*Okumura* illustrates the technical benefits that can be realized by including both pilot and TPC symbols together with transmission data in a CDMA system,” and “[a] POSITA would recognize that those same benefits would be realized in the *Nakamura* system.” *Id.* at 25 (citing Ex. 1005, 14, 18, Fig. 2; Ex. 1003 ¶ 54). According to Petitioner, “[t]he proposed modification to *Nakamura* would be straightforward, not requiring undue experimentation, and would produce predictable results.” *Id.* That is, “it would have been natural and an application of nothing more

than ordinary skill and common sense to modify *Nakamura* with the control data arrangement taught by *Okumura*.” *Id.* at 25–26.

However, Patent Owner contends, “the Petition relies on unsupported expert testimony, including verbatim recitations by the technical expert of arguments in the Petition,” and “proposes a combination that would not teach the claimed invention.” PO. Resp. 28–32 (*comparing* Pet. 25 with Ex. 1003 ¶¶ 53–54). According to Patent Owner, “[t]he Petition’s proposed combination of *Nakamura* and *Okumura* is guided by the ’563 patent and driven by hindsight.” *Id.* at 32.

Patent Owner contends that, “Petitioners do not cite to any benefits articulated in *Okumura* specifically with respect to the use of both pilot (‘PL’) symbols and transmission power controls (‘TPC’) symbols.” PO Resp. 33. Instead, according to Patent Owner, “there is evidence that *Nakamura* teaches away from combining pilot and TPC symbols together.” *Id.* at 33–34. In particular, “no embodiments in *Nakamura* . . . show such a combination,” and “combining the signals would seemingly go against the objective of *Nakamura*, which is to minimize transmission of signals, to a minimum (only that which is absolutely necessary), in order to minimize interference.” *Id.* at 34 (citing Ex. 1004, 1:36–4; Ex. 2004 ¶ 9).

In its Sur-Reply, Patent Owner contends “*Nakamura* addresses either pilot signals *or* TPC signal, but never both.” Sur-Reply 3 (citing Ex. 1004, 11:48–50, 13:11–14). Although Patent Owner concedes that Claim 12 of *Nakamura* discloses that “necessary signals could include ‘one or more’ of pilot signals, synchronization information, order number, and TPC information,” Patent Owner contends “Claim 12 of *Nakamura* does not

expressly state that pilot and TPC signals *must* be combined.” Sur-Reply 4 (citing 1004, 15:51–61).<sup>4</sup>

In weighing the evidence before us, we find more persuasive the position of Petitioner.

Here, we agree with Petitioner that Nakamura teaches “necessary signals comprised of pilot symbols and TPC symbols,” wherein “burst data” comprising “pilot symbols and transmission power control symbols are written when there is no data to be transmitted.” Pet. 22–23, 26. In particular, Nakamura discloses necessary signals comprising pilot signals (Ex. 1004, 11:48–50), *and* comprising transmission power control (TPC) information (*id.* at 13:11–15), wherein Nakamura also discloses the advantages in including pilot symbol when no transmission data is transmitted (*id.* at 11:66–12:3), and including TPC symbol when no transmission data is transmitted (*id.* at 13:65–14:3).

As Petitioner contends, “[a] POSITA would understand that [Nakamura’s] teaching directs a skilled artisan to implement the necessary signals with *multiple* distinct control data,” wherein the POSITA “would further recognize that transmitting both pilot and TPC symbols together as control data was well known as evidenced by *Okumura*.” Pet. 25 (emphasis

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<sup>4</sup> Patent Owner contends that Petitioner argues “for the first time” on Reply regarding Claim 12, wherein “Petitioners have not established that Claim 12 of Nakamura was an original claim as the priority date of the Assert Patent.” Sur-Reply 3. However, we note Petitioner did present such argument in its Petition. *See* Pet. 24–25 (citing Ex. 1004, 15:53–61). Furthermore, the prosecution records of Nakamura (US Application No. 08/873,738) show that Claim 12 was an original claim at the time of filing of June 12, 1997.

added). Although Patent Owner contends that “the Petition relies on unsupported expert testimony” (PO. Resp. 28–32), here, Petitioner points out, “Okumura demonstrates that it was known in the art to transmit both types of control data together such that both benefits could be obtained within the same communication session.” Reply 10 (citing Pet. 23–24 (citing Ex. 1005, 14)).

In his Deposition, Patent Owner’s expert, Dr. Vojcic, concedes that “there could be” prior art in which pilot symbols and transmission power control symbols “exist together.” Ex. 1016, 9:14–24. In particular, Dr. Vojcic concedes, “a person of ordinary skill in the art would understand . . . it was known that control signals of different kinds could be inserted or mixed together in various ways with – with data.” *Id.* at 10:7–12.

We are unpersuaded by Patent Owner’s contention that “Nakamura teaches away from combining pilot and TPC symbols together” since there are “no embodiments in Nakamura [that] show such a combination.” PO Resp. 33–34 (citing Ex. 1004, 1:36–4; Ex. 2004 ¶ 9). As Petitioner responds in its Reply, Patent Owner’s “argument ignores that Nakamura expressly contemplates and claims combining pilot and TPC symbols.” Reply 10 (citing PO Resp. 33–34 (citing Ex. 2004 ¶ 9)) (emphasis added). In particular, Petitioner points out that Nakamura expressly teaches that

**the necessary signals . . . contain any one or more of pilot signals** which are necessary in carrying out a coherent detection with interpolation, . . . **and a transmission power control information** which is necessary in carrying out a transmission power control

Reply 10–11 (citing Ex. 1004, 15:53–61 (Claim 12) (emphasis in original); also Pet. 24–25). Even Patent Owner concedes that Claim 12 of Nakamura discloses that “necessary signals could include ‘one or more’ of pilot signals, synchronization information, order number, and TPC information.” Sur-Reply 4 (citing 1004, 15:51–61). The Supreme Court has stated that the “combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” *KSR*, 550 U.S. at 416; *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1161 (Fed. Cir. 2007) (quoting *KSR*, 550 U.S. at 416). According to Petitioner, “[t]he proposed modification to *Nakamura* would be straightforward, not requiring undue experimentation, and would produce predictable results.” Pet. 25. That is, “it would have been natural and an application of nothing more than ordinary skill and common sense.” *Id.* at 25–26.

Here, the question is whether combining Okumura’s teaching of using both pilot and TPC symbols in the same necessary signal with Nakamura’s necessary signals comprising control data, such as pilot symbols and TPC symbols, was “uniquely challenging or difficult for one of ordinary skill in the art” or “represented an unobvious step over the prior art.” *Leapfrog Enters.*, 485 F.3d at 1162 (citing *KSR*, 550 U.S. at 421). As Petitioner points out, Patent Owner’s Expert, “Dr. Vojcic admitted that no technical barriers would have prevented a POSITA from modifying the expressly disclosed embodiments of *Nakamura* to combine pilot and TPC symbols.” Reply 11 (citing Ex. 1016, 34:14–35:20). We view Petitioner’s combination as being akin to a simple substitution of Okumura’s use of both pilot and TPC

symbols in Nakamura's necessary signals. *Cf. KSR*, 550 U.S. at 417 (indicating determining obviousness is easier when the claimed subject matter involves "a simple substitution for one known element for another or the mere application of a known technique to a piece of prior art ready for improvement.").

We are unpersuaded by Patent Owner's contention that "[t]he Petitioner's proposed combination of Nakamura and Okumura is guided by the '563 patent and driven by hindsight." PO Resp. 32. Rather, we agree with Petitioner that Nakamura and Okumura provide sufficient motivation for combining the references in the manner required by the claims. Pet. 24–25 (citing Ex. 1004, 15:53–61; Ex. 1005, 14, 18, Fig. 2; Ex. 1003 ¶¶ 53–54). First, although Patent Owner contends that "there is no discussion of the benefits gained by sending both pilot and power control symbols" (PO Resp. 32 (citing Pet. 21)), we agree with Petitioner that Nakamura explains that pilot symbols permit 'coherent detection with interpolation at a receiving side' and that power control symbols permit 'carrying out a transmission power control'" and this provides a reason one of ordinary skill in the art would make Petitioner's proposed combination. Ex. 1004, 11:48–50 ("In this eighth embodiment, the necessary signal generation unit 10 includes pilot signals to be used in carrying out the coherent detection with interpolation at a receiving side"), 13:11–14 ("In this eleventh embodiment, the necessary signal generation unit 10 includes a transmission power control information which is necessary in carrying out a transmission power control."); Pet. 21 (quoting Ex. 1004, 11:48–50, 13:11–14)).

Thus, although Patent Owner contends that Nakamura "does not

expressly state that pilot and TPC signals *must* be combined” (Sur-Reply 4), Petitioner has provided sufficient support that “a skilled artisan would have had reason to combine the teaching of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success from doing so.” *PAR Pharm., Inc. v. TWI Pharm., Inc.*, 773 F.3d 1186, 1193 (Fed. Cir. 2014).

Accordingly, on this record, Petitioner’s rationale that a person of ordinary skill in the art would have found it obvious “to modify *Nakamura* with the control data arrangement taught by *Okumura*” (Pet. 25–26) is sufficiently supported. *KSR*, 550 U.S. at 418 (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness” (alteration in original) (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006))). Based on the foregoing discussion, Petitioner shows persuasively that the combination of *Nakamura* and *Okumura* renders obvious claims 1, 5, 12, and 15.

4. Dependent claims 2, 3, 6, 13, and 16

Petitioner provides explanations and supporting evidence regarding the limitations of dependent claims 2, 3, 6, 13, and 16. Pet. 31–38. In particular, Petitioner contends that *Okumura* discloses sending “pilot symbols and TPC symbols . . . together in a code channel,” wherein “the pilot symbols and TPC symbols are inserted with transmission data into frames. *Id.* at 23 (citing Fig. 2).

Patent Owner contends that Petitioner fails to show in the prior art a finding or suggestion of the claim requirement that “the burst frames be

subject to processing and that they include pilot symbols and transmission power control symbols, **in that particular order.**” PO Resp. 26 (citing Ex. 1001, 6:55–60 (claim 2); 7:23–28 (claim 6); 9:5–9 (claim 16)).

In its Reply, Petitioner points out that “Patent Owner has not proposed that [‘in that particular order’] should be construed,” nor has Patent Owner “supported any construction of the limitation with intrinsic or extrinsic support.” Reply 11–12. In particular, “[t]he claims themselves simply state that the recited control data is arranged **in series.**” *Id.* at 12. Petitioner also points out that “[t]here is no apparent benefit of Patent Owner’s proposed ordering, and Patent Owner does not suggest there would be.” *Id.* Nevertheless, pointing to Okumura’s Figure 2, Petitioner contends that “*Okumura* expressly orders its pilot symbol and power control (TPC) symbol as Patent Owner contends is required.” *Id.* (citing Ex. 1005, Fig. 2; Pet. 24).

In turn, in its Sur-Reply, Patent Owner responds that the ’563 Patent’s arrangement of “the same information  $n$  times ( $n$ : a natural number) in series for PLs and TPCs” is advantageous because such arrangement “can maintain synchronization even if the transmission power is reduced.” Sur-Reply 5 (citing Ex. 1001, 4:57–59, 5:8–12). Furthermore, although Petitioner relies on Okumura for teaching the ordering of its pilot symbol and TPC symbol, Patent Owner contends that “*Okumura* is not compatible with *Nakamura*’s thinning scheme and would introduce more interference against the objectives of *Nakamura*.” *Id.* (citing 1005, 14; Ex. 1004, 1:36–42, 2:6–9, 2:22–26, 7:3–8, 7:28/7–37, 9:51–58, 10:47–60, 11:62–12:3, 12:27–32, 13:2–8, 13:49–60, 13:61–14:3).

In weighing the evidence before us, we find more persuasive the position of Petitioner.

Here, although Patent Owner contends that the prior art fail to disclose “pilot symbols and transmission power control symbols, **in that particular order**” (PO Resp. 26), as Petitioner points out, “[t]he claims themselves simply state that the recited control data is arranged ‘**in series.**’” Reply 12. As set forth in Patent Owner’s Sur-Reply, the advantage of “maintain[ing] synchronization even if the transmission power is reduced” is for an arrangement of information “**in series** for PLs and TPCs,” but Patent Owner does not provide any evidence to support its contention that an arrangement “in that particular order” would be advantageous. Sur-Reply 5 (citing Ex. 1001, 4:57–59, 5:8–12) (emphasis added). In fact, other than using mere attorney arguments, Patent Owner does not cite any expert testimony as to the benefits of an arrangement “in that particular order.” *See* generally Sur-Reply 5. As Petitioner points out in its Reply, “[t]elling, Patent Owner’s expert does not address this ordering issue.” Reply 12.

Nevertheless, Figure 2 of Okumura is reproduced below:

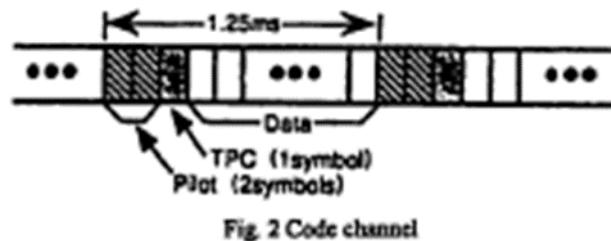


Figure 2 shows a “code channel” wherein “a two-symbol pilot symbol is inserted per every period” in addition to a one-symbol transmit power control (“TPC”) symbol. Ex. 1005, 14. Here, we are persuaded by

Petitioner's contention that "*Okumura* expressly orders its pilot symbol and power control (TPC) symbol as Patent Owner contends is required." Reply 12 (citing Ex. 1005, Fig. 2; Pet. 24).

We are similarly unpersuaded by Patent Owner's mere contention that "*Okumura* is not compatible with *Nakamura*'s thinning scheme and would introduce more interference against the objectives of *Nakamura*." Sur-Reply 5. We find mere attorney arguments without substantial evidentiary support unpersuasive.

On this record, Petitioner has provided sufficient support that *Nakamura*, in combination with *Okumura*, teaches "arranging pilot symbols and transmission power control symbols in series respectively," as recited in the claims 2, 6, and 16. Based on the foregoing discussion, Petitioner shows persuasively that the combination of *Nakamura* and *Okumura* renders obvious claims 2, 6, and 16.

Patent Owner does not separately address Petitioner's showing as to dependent claims 3 and 13. *See generally* PO Resp., Sur-Reply. Based on the foregoing discussion, Petitioner shows persuasively that the combination of *Nakamura* and *Okumura* also renders obvious claims 3 and 13.

*E. Obviousness over Bhagalia and Abe*

Petitioner contends that claims 1–3, 5, 6, 12, 13, 15, and 16 are unpatentable under § 103 over *Bhagalia* in view of *Abe*. Pet. 50–82. Patent Owner disputes Petitioner's contentions. PO Resp. 37–50. Petitioner then replies to Patent Owner's contentions (Reply 13–17) and Patent Owner in turn addresses Petitioner's reply (Sur-Reply. 5–12).

For the reasons provided below, we determine that Petitioner has demonstrated that claims 1–3, 5, 6, 12, 13, 15, and 16 are obvious over Bhagalia and Abe. We provide a brief description of Bhagalia and Abe before turning to the parties’ contentions.

1. Bhagalia

Bhagalia, titled “Apparatus and Method of Controlling Transmitting Power and Transmit Rate of a Wireless Telecommunication System,” published on December 5, 1996, from an application filed June 3, 1996. Ex. 1006, (54), (43), (22). Bhagalia discloses a “wireless telecommunication system” that “operates in one of three operating modes”: 1) “an acquisition mode;” 2) “a standby mode;” and 3) “a traffic mode.” *Id.* at Abstract.

During the “acquisition mode,” the transmitting power of the downlink and uplink transmitters are “maximized.” *Id.* at 33:12–14. In the “standby mode,” the transmitting power of the transmitters are “reduced by 12 decibels,” which “minimizes the interference to other subscriber terminals while still maintaining synchronization.” *Id.* at 33:8–30. In the “standby mode,” the transmit rate “remains at the low rate level to allow exchange of control information” between the central terminal and the subscriber terminal over the overhead channel. *Id.* at 33:27–30. During the “traffic mode,” the transmitting power of both the downlink and uplink communication path is “increased to the high power level and the transmit rate is increased to the high rate level of 160 kilobits per second” to “facilitate information transfer between originating and destination terminals.” *Id.* at 34:4–9.

“Upon detection of call termination, a message is sent from the terminating terminal to the other terminal indicating that the downlink and uplink communication paths are no longer required,” and the system “reenters the standby mode,” wherein “[c]ode synchronization and frame alignment tracking is performed in both the standby mode and the traffic mode.” *Id.* at 34:9–15.

Figure 13, showing the general contents of a frame information signal, is reproduced below:

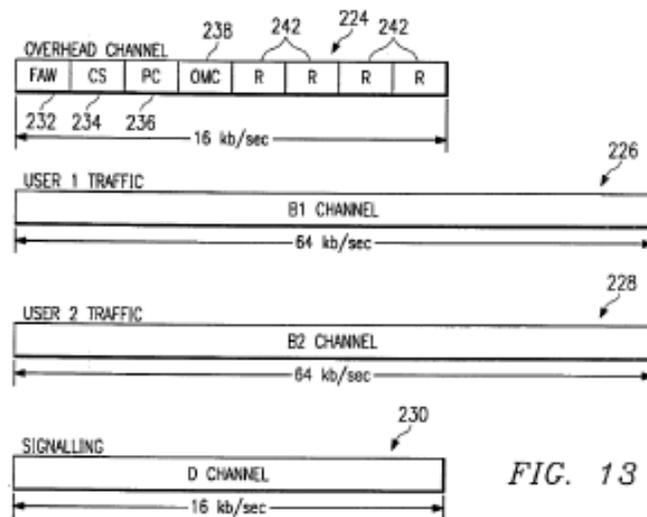
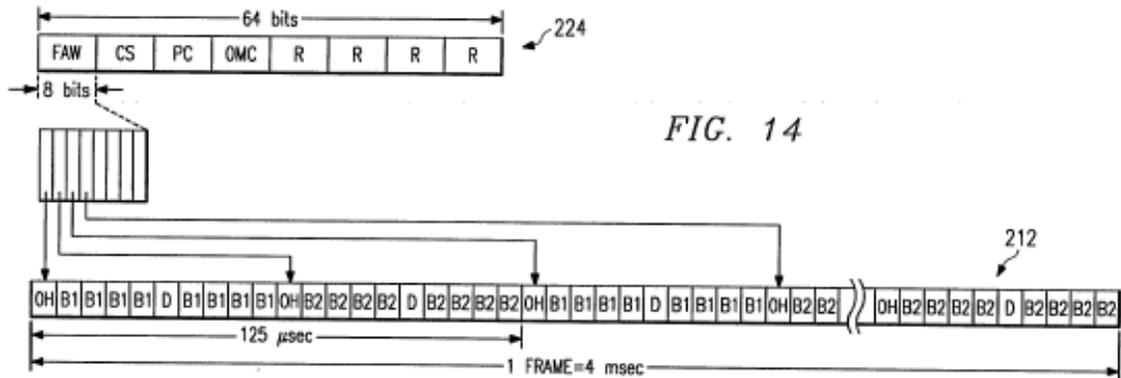


Figure 13 shows a frame information signal, which includes “an overhead channel 224, a first user channel 226, a second user channel 228, and a signaling channel 230 for each frame of information transported over [a] downlink signal.” *Id.* 24:19–24. “Overhead channel 224 carries control information used to establish and maintain the downlink and uplink communication paths.” *Id.* at 24:24–26. “Overhead channel 224 includes eight byte fields – a frame alignment word 232, a code synchronization

signal 234, a power control signal 236, an operations and maintenance channel signal 238, and four reserved byte fields 242.” *Id.* at 25:15–19.

Figure 14, showing a data stream of a downlink signal, is reproduced below:



“Figure 14 shows how overhead channel 224 is inserted into the data stream of downlink signal 212.” *Id.* at 25:3–4. As shown in Figure 14, “[t]he data stream of downlink signal 212 is partitioned into twenty bit subframes,” and each subframe “has two ten bit sections,” with the first section including “an overhead bit, a signaling bit, and eight first user bits,” while a second bit section includes “an overhead bit, a signaling bit, and eight second user bits.” *Id.* at 25:4–14. “This twenty bit subframe format is repeated throughout an entire four millisecond frame of information,” and thus, “an overhead bit occupies every tenth bit position of frame information in the data stream of downlink signal 212.” *Id.*

## 2. Abe

Abe, titled “Intermittent Transmission Control System,” issued November 16, 1999, from an application filed March 17, 1997. Ex. 1007,

(54), (45), (22). Abe discloses “[a]n intermittent transmission control system based on a TDMA system which involves a burst transmission” with “a sound presence detector.” *Id.* at Abstract. A “normal burst transmission containing the sound information” is performed “if presence of the sound information is detected,” whereas a “reduced burst transmission containing time interval information of the burst transmission” is performed “if no burst transmission is performed for a predetermined time.” *Id.*

Abe recognizes that, “there is a need for a burst control at a given timing upon initiation of a transmission and for a power saving during the non-transmission interval (standby time).” *Id.* at 1:41–48. During the non-transmission interval (or standby time), “the gate voltage of a transmission power amplifier is controlled so as to suppress the drain current of a transistor in the amplifier, thus achieving a power saving.” *Id.* at 1:53–57.

Figure 2, illustrating the operation of the intermittent transmission control system, is reproduced below:

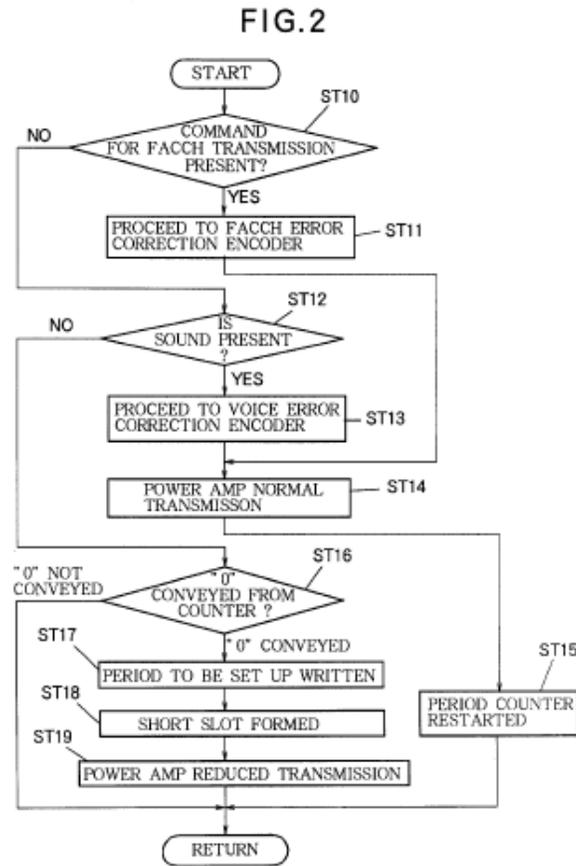


Figure 2 is a “flow chart illustrating the operation of the switch unit” of the transmitter. *Id.* at 6:1–2. As shown in Figure 2, “[a]t step ST14, a power amplifier normal transmission is established in which a normal transmission time is set up during which the power amplifier 200 is turned on.” *Id.* at 6:21–23. “At step ST15, the period counter 140 is restarted, thus completing one pass through the program.” *Id.* at 6:23–25. At step ST16, “it is determined whether ‘0’ is conveyed from the period counter 140.” *Id.* at 6:26–30.

“In the event there is ‘0’ conveyed from the period counter 140, the operation proceeds to step ST17 where a preset period is written into the period counter 140, and at step ST18, a short slot is formed in accordance

with a preset period.” *Id.* at 6:31–35. Then, “[a]t step ST19, a reduced transmission time during which the power amplifier 200 is turned on is set up for the power amplifier reduced transmission, whereupon the program is completed.” *Id.* at 6:35–38.

On the other hand, “when it is found at step ST16 that there is no ‘0’ conveyed from the period counter 140, the program is then completed.” *Id.* at 6:39–41.

3. Independent Claims 1–3, 5, 6, 12, 13, 15, and 16

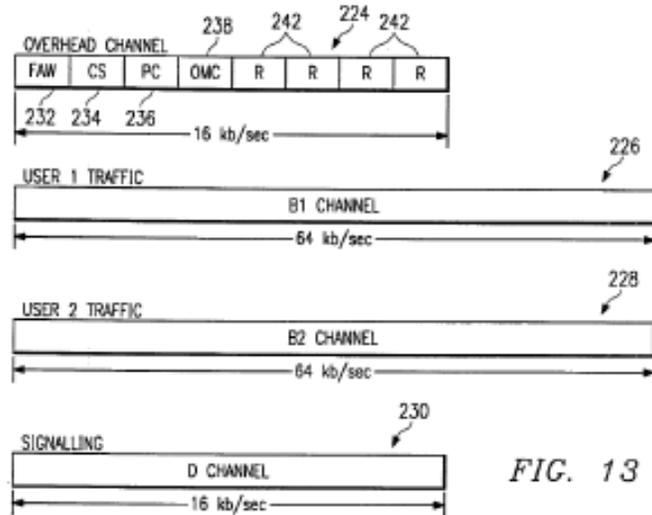
*a. Preamble (claims 1, 5, 12, and 15)*

Petitioner contends that Bhagalia discloses “a mobile station apparatus and base station apparatus for signal transmission in a CDMA (Code Division Multiple Access) communication system.” Pet. 52, 64–65, 68–71 (citing Ex. 1006, Abstract, 17:20–24, 6:11–28, 20:19–21:2, Figs. 4, 6–9). Patent Owner does not dispute Petitioner’s analysis of the preamble of claims 1, 5, 12, and 15. *See generally* PO Resp. Based on the disclosure of Bhagalia discussed above, Petitioner has demonstrated persuasively that Bhagalia teaches the preamble.

*b. “generating transmission frames by inserting pilot symbols and transmission power control symbols into transmission data,” and “transmitting transmission data by radio” (claim 5, similarly recited in claims 1, 12, and 15)*

Petitioner contends, “*Bhagalia* teaches that pilot symbols and TPC symbols are inserted into transmission data to create transmission frames,” because “under both the BRI and *Phillips*, ‘pilot symbol’ includes synchronization signals (symbols, bits, bytes, etc.) or synchronization

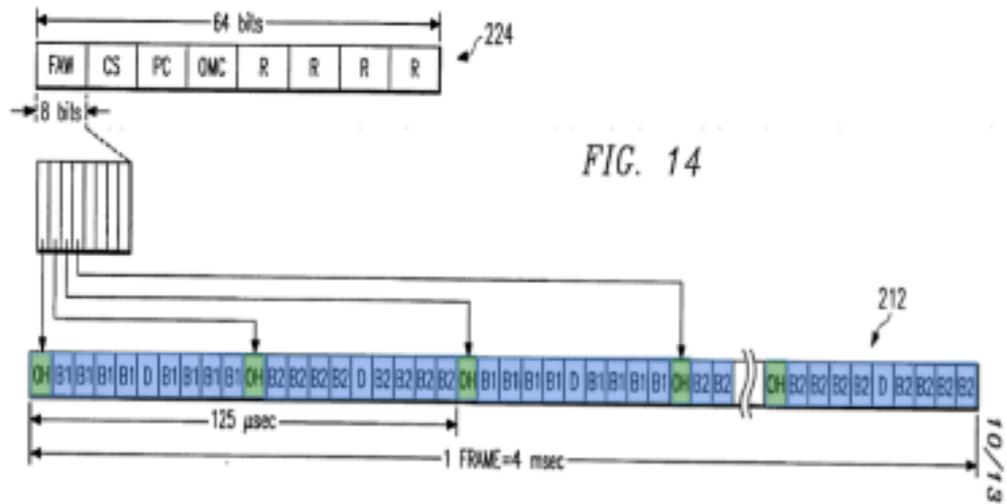
control information.” Pet. 53. Petitioner references Figure 13 of Bhagalia, reproduced below:



Pet. 53. (citing Ex. 1006, Fig. 13). Figure 13 shows a frame information signal. Ex. 1006, 24:19–24.

According to Petitioner, as shown in Figure 13 of Bhagalia, “a code synchronization signal 234 (CS 234) (pilot symbols) and power control signal 236 (PC 236) (transmission power control symbols) are contained in frame information signal 218” and “user traffic information (transmission data) is contained in traffic channels 226 and 228.” Pet. 53.

Further, Petitioner contends that, in Bhagalia, “[w]hen there is transmission data available, both the control data and transmission data are inserted into transmission frames at a ‘high rate level.’” Pet. 54 (citing Ex. 1006, 32:5–34:15). According to Petitioner, as shown in the annotated Figure 14 of Bhagalia, “**OH** illustrates the control data (including pilot and TPC symbols) and **BI** and **B2** illustrate the user transmission data”:



Pet. 54–56. Bhagalia’s Figure 14 shows a tabular depiction illustrating overhead insertion into a data stream of a downlink signal. Ex. 1006, 15.

Petitioner contends that the annotated Figure 14 illustrates “a frame, comprising pairs of necessary data and transmission data,” wherein, “[l]ike the ’563 Patent, *Bhagalia* teaches multiple pairs of control data (CS and PC) and transmission data (user traffic) comprising a transmission frame.”

Pet. 55.

Petitioner then contends that, in Bhagalia, “the transmission means is a transmission antenna that transmits by radio.” Pet. 63 (citing Ex. 1006, Fig. 18).

Patent Owner does not dispute Petitioner’s analysis of these limitations. Based on the disclosure of Bhagalia discussed above, Petitioner has demonstrated persuasively that Bhagalia, in combination with Abe, teaches “generating transmission frames by inserting pilot symbols and transmission power control symbols into transmission data” and “transmitting transmission data by radio,” as recited in the claims.

*c. “generating burst frames comprising pilot symbols and transmission power control symbols and no transmission data when there are no transmission data to be transmitted” and “transmitting said burst frames by radio by controlling transmission intervals to cyclically once every N slots” (claim 5, similarly recited in claims 1, 12, and 15)*

Petitioner contends Bhagalia teaches that, during periods in which data transmissions cease, “the system enters ‘standby mode’ in which ‘[t]he transmit rate remains at the low rate level to allow exchange of control information between central terminal 10 and subscriber terminal 20 over overhead channel 224’ to ‘maintain[] synchronization.’” Pet. 58 (citing Ex. 1006, 32:5–34:15). In particular, according to Petitioner, “when there is no transmission data, the system of *Bhagalia* continues to transmit control data (including pilot and TPC symbols) at a lower rate than normal transmissions over Overhead Channel 224.” *Id.* Citing Dr. Singer, Petitioner contends, “[a] POSITA would have understood that these control data transmission without transmission data are ‘burst frames comprising pilot symbols and transmission power control symbols and no transmission data.’” *Id.* at 59 (citing Ex. 1003 ¶ 68).

Further, Petitioner contends that “[a]lthough *Bhagalia* teaches that its standby mode control burst frames are transmitted at a low rate, it does not expressly teach that this low rate is ‘cyclically once every N slots.’” Pet. 60. However, according to Petitioner, “*Abe* discloses cyclical transmission during periods of no transmission data (sound data),” wherein “a period counter 140 has a predetermined period established by switch unit 130 set such that during a time when no sound information is to be transmitted, the

period counter 140 will count down until its counter reaches zero,” at which point “a ‘reduced transmission’ is transmitted between a base station and mobile station.” *Id.* at 59–60 (citing Ex. 1007, 3:56–62, 4:1–9, 4:29–30). Thus, Petitioner contends that it would have been obvious “to modify *Bhagalia* such that its control burst frames are transmitted once every N frames in accordance with the teachings of *Abe*.” *Id.*

Patent Owner contends “the Petition cites no evidence from *Bhagalia* that expressly states pilot symbols or TPC symbols are transmitted in ‘burst frames’ when there is no transmission data.” PO Resp. 38. According to Patent Owner, “*Bhagalia* teaches that when there is no transmission data, . . . communication system 1 enters the acquisition mode,” wherein “[d]uring ‘acquisition mode,’ ‘only overhead information is needed,’ but “[t]his overhead information, however, is likely to be transmitted continuously, not in ‘burst frames.’” *Id.* (citing Ex. 1006, 33:9–12, 18; Ex. 2002 ¶ 23 (citing Ex. 1001, 7:13–21)). Patent Owner contends that “the pilot symbols and transmission power control symbols should only be transmitted in a portion of a frame (leaving rest of the frame empty),” but “such symbols are not ‘burst data’ since the overhead bits are transmitted over the whole frame.” *Id.* at 44 (citing Ex. 2004 ¶ 7).

Citing its own expert, Dr. Vojcic, Patent Owner contends that “Dr. Singer’s assertions in paragraph 68 of his Declaration are incorrect.”<sup>5</sup> PO

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<sup>5</sup> Patent Owner also contend that Dr. Singer’s Declaration should be excluded “due to improper incorporation by reference.” PO Resp. 38 (citing Pet. 59; Ex. 1003 ¶ 68; Ex. 2002 ¶¶ 22–23). We are not persuaded. Although Patent Owner contends that “[t]he cited Paragraph 68 of the Singer

Resp. 40 (citing Pet. 59; Ex. 1003 ¶ 68; Ex. 2002 ¶¶ 22–28). In particular, Patent Owner contends that, in Bhagalia, “when data is not transmitted, . . . data rate is reduced from 160kbps to 10kps to transmit overhead information only,” but “overhead bits are transmitted over the whole frame continually.” *Id.* According to Patent Owner, “Bhagalia’s continuous low rate overhead transmission is different from how ‘burst frames’ are defined in the ’563 patent, which claims control signals that are transmitted intermittently (with some periodicity) while nothing is transmitted during the rest of the intervals/slots in the frame.” *Id.* at 40–41 (citing Ex. 2002 ¶ 28 (citing Ex. 1001, Fig. 3, 7:13–21); Ex. 1001, 22–23).

Patent Owner then contends that although “the Petition makes the conclusory statement that ‘[a] POSITA would understand. . . . Abe’s transmission feedback loop to be ‘cyclically every N slots,’” Petitioner’s expert, Dr. Singer’s declaration “does not explain why the preset period from Abe would be a natural number” as required by the ’563 patent. PO Resp. 42 (citing Pet. 61; Ex. 1003 ¶ 59).

In weighing the evidence before us, we find more persuasive the position of Petitioner.

As discussed above in Section II(A), Patent Owner does not provide any special definition for “burst frames comprising pilot symbols and transmission power control symbols,” as claimed. Contrary to Patent

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Declaration in this petition is itself over two pages long,” and is “conclusory” (*id.* at 32), the issue is whether Dr. Singer’s opinions, on which the arguments in the Petition rely, are well-reasoned and sufficiently supported by analysis and evidence.

Owner's contention (PO Resp. 40), the claims do not preclude the "continually" transmitting "overhead bits" (comprising "pilot symbols" and "transmission power control symbols") "over the whole frame," and do not require "intervals during the frame/s without data where overhead bits are not transmitted." *See generally* claim 5. Here, we agree with Petitioner that "generating burst frames comprising pilot symbols and transmission power control symbols and no transmission data when there are no transmission data to be transmitted" encompasses "generat[ing] burst data in which only pilot symbols and transmission power control symbols are written when there is no data to be transmitted," to which Patent Owner does not contest. Pet. 9–11; PO Resp.13.

Furthermore, as Petitioner points out in its Reply, by contending that, in *Bhagalia*, the overhead information is "likely to be transmitted continuously, not in 'burst frames'" (PO Resp. 38), Patent Owner "concedes that *Bhagalia* does not expressly describe continuous control data transmission." Reply 13 (citing PO Resp. 38 (noting "[t]his overhead information . . . is *likely* to be transmitted continuously.")) (emphasis in original)). That is, Patent Owner concedes that this overhead information is not necessarily transmitted continuously, but merely "likely." *Id.*

Additionally, although Patent Owner relies on Dr. Vojcic to support its contention that "*Bhagalia*'s 16 kbps overhead channel [is] continuously transmitted" (PO Resp. 40), as Petitioner contends, "Dr. Vojcic's analysis ignored that half of *Bhagalia*'s overhead channel is reserved for future applications and would have contained no data." Reply 13. According to Petitioner, "[c]onfronted with this teaching, Dr. Vojcic conceded that only 8

kbps of overhead data would have been sent in standby mode.” Reply 14 (citing Ex. 1016, 38:5–13, 39–41:3). In particular, in his deposition, Dr. Vojcic concedes that four specifically defined control signals populate half of the overhead signal, wherein he is not aware of any other specific information that is relayed during standby mode in the Bhagalia system. *See* Ex. 1016, 40:6–23. Dr. Vojcic concedes that, within Bhagali’s overhead channel, half of the bytes are reserved, wherein zeros would populate the reserve bytes and Bhagalia does not transmit specific data in those reserve bytes. *Id.* at 38:2–39:24.

Thus, we are unpersuaded by Patent Owner’s contention that, “because *Bhagalia*’s standby mode still transmits bytes continuously, *Bhagalia* fails to teach the claimed ‘generating burst frames comprising’ ‘no transmission data when there are no transmission data to be transmitted.’” Sur-Reply 7–8. That is, we are persuaded by Petitioner’s contention “[a] POSITA would have understood that these control data transmission without transmission data are ‘burst frames comprising pilot symbols and transmission power control symbols and no transmission data.’” Pet. 59 (citing Ex. 1003 ¶ 68).

We are also persuaded by Petitioner’s contention that “*Abe* could produce nothing but burst transmission whose periods are a natural number.” Reply 14 (citing Ex. 1007, Fig. 7). We are unpersuaded by Patent Owner’s contention that Dr. Singer’s declaration “does not explain why the preset period from *Abe* would be a natural number” as required by the ’563 patent. PO Resp. 42 (citing Pet. 61; Ex. 1003 ¶ 59). That is, although Patent Owner’s contends that “nothing in *Abe* teaches that the counter necessarily

operates through whole or integer numbers” (Sur-Reply 10 (citing Ex. 1007, Fig. 2)), as Petitioner points out, in Abe, “the period counter decrements each pass through the flowchart, resulting in a whole/natural number of loops through the flowchart preceding each burst transmission.” Reply 14 (citing Pet. 51, 60–61; Ex. 1007, Fig. 7).

We are persuaded by Petitioner’s contention that Bhagalia discloses controlling the transmission of “burst frames,” and that Abe teaches controlling transmission intervals to “cyclically once every N slots.” Pet. 60. Although Patent Owner contends that “Bhagalia’s continuous low rate overhead transmission is different from how ‘burst frames’ are defined in the ’563 patent, which claims control signals that are transmitted intermittently (with some periodicity) while nothing is transmitted during the rest of the intervals/slots in the frame” (PO Resp. 40–41), here, Petitioner relies on Abe to disclose “cyclical transmission during periods of no transmission data,” and contends that it would have been obvious “to modify *Bhagalia* such that its control burst frames are transmitted once every N frames in accordance with the teachings of *Abe*.” Pet. 60. On this basis, Petitioner contends its combination of Bhagalia and Abe would teach the transmission interval control means required by the claims.

Accordingly, Petitioner has provided sufficient support that the combination of Bhagalia and Abe teaches “transmitting said burst frames by radio by controlling transmission intervals to cyclically once every N slots,” as recited.

*e. Motivation to Combine Bhagalia and Abe*

Petitioner contends that motivation to modify Bhagalia in light of Abe “can be found in the references themselves.” Pet. 62. Petitioner contends that, “[a]lthough *Bhagalia* does not expressly describe transmitting its control burst frames cyclically every N frames, it does teach that the control burst frames are transmitted ‘at the low rate level’ while in standby mode,” and “[a] POSITA would understand that this teaching directs a skilled artisan to implement the standby mode control burst transmission at a specific rate that is lower than the standard communication mode rate.” Pet. 62 (citing Ex. 1006, 33:21–34:15; Ex. 1003 ¶ 60). Thus, Petitioner contends, “[u]pon reading the disclosure of *Bhagalia*, a POSITA would have recognized that the disclosed reduced rate control burst transmission would need to be conducted at some specific rate,” wherein “[a] POSITA would further have known that benefits can be realized by implementing a counter approach as taught by *Abe* to set the rate at which the bursts are transmitted.” *Id.*

Patent Owner contends, “[t]he Petition’s proposed combination of Bhagalia and Abe contains numerous unsupported conclusions.” PO Resp. 45 (citing Pet. 62). According to Patent Owner, Dr. Singer’s assertion “is nothing more than a regurgitation of argument in the Petition.” *Id.* at 46 (citing Ex. 1003 ¶ 60).

Patent Owner also contends that “there are significant radio protocol differences between Bhagalia’s CDMA system and Abe’s TDMA system” because “TDMA and CDMA systems use different control information, which may result in incompatibility” (PO Resp. 47), wherein “[c]ombining

Abe's time interval burst frames with Bhagalia's overhead information would cause multiple problems and ultimately cause improper operation." *Id.* at 48. Further, Patent Owner contends that "the continual low rate overhead transmission in Bhagalia is different from how burst transmission is performed in Abe," and as such, "a POSITA would not recognize that Bhagalia and Abe are compatible with each other." *Id.* at 49–50 (citing Ex. 2002 ¶ 30).

In weighing the evidence before us, we find more persuasive the position of Petitioner.

Although Patent Owner argues that "TDMA and CDMA systems use different control information" (PO Resp. 47–49), as Petitioner points out, "the Petition does not propose importing any control data from *Abe* into *Bhagalia*." Reply 15. Thus, although in its Sur-Reply, Patent Owner contends that "Petitioners' attempt to import *Abe*'s purport 'burst frames' into *Bhagalia* would frustrate *Bhagalia*'s goal of 'synchronizing a transmitter in a subscriber terminal of a wireless telecommunications system'" (Sur-Reply 11–12 (citing Ex. 1006, 5–8, 23, 24)), and that "a POSITA would recognize that any attempt to incorporate *Abe*'s time interval burst frames into *Bhagalia*'s overhead information would cause multiple problems and ultimately cause improper" information (*id.* at 12 (citing PO Resp. 48–49)), Patent Owner appears to view the combination in a different perspective than that of Petitioner. Here, the question is not whether one having ordinary skill in the art would have bodily incorporated Abe's TDMA system into Bhagalia's CDMA system, but, as Petitioner contends, "[u]pon reading the disclosure of *Bhagalia*, a POSITA would have

recognized that the disclosed reduced rate control burst transmission would need to be conducted at some specific rate.” Pet. 62. As Petitioner points out, “*Abe* is relied upon exclusively for its transmission timing teachings.” Reply 15.

In this case, Petitioner contends that a POSITA would have found it obvious to combine Bhagalia’s teaching of transmitting its standby control burst frames at a particular rate, with *Abe*’s teaching of “cyclical transmission” during periods of no transmission data. Pet. 60. According to Petitioner, “[t]he proposed modification to *Bhagalia* would be straightforward, not requiring undue experimentation, and would produce predictable results,” wherein, “[u]pon reading the disclosure of *Bhagalia*, a POSITA would have recognized that the disclosed reduced rate control burst transmission would need to be conducted at some specific rate,” and “it would have been natural and an application of nothing more than ordinary skill and common sense to modify *Bhagalia* with counter-based burst transmission rate taught by *Abe*.” *Id.* at 62; *see also KSR*, 550 U.S. at 416.

Furthermore, as discussed above, Petitioner identifies motivations in Bhagalia for combining the references in the manner required by the claims, including beneficially transmitting control burst transmissions at a lower rate than the standard communication mode rate. *See, e.g.*, Pet. 62 (citing Ex. 1006, 33:21–34:15; Ex. 1003 ¶¶ 60–61). Thus, Petitioner has provided support that “a skilled artisan would have had reason to combine the teaching of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success from doing so.” *PAR Pharm.*, 773 F.3d at 1193.

On this record, Petitioner's rationale that a POSITA would have found it obvious modify Bhagalia's burst frame transmission with the cyclical transmission rate of Abe (Pet. 60–62) is sufficiently supported.

For the reasons discussed above, we find that Petitioner the information presented in the Petition, Patent Owner's Response, Petitioner's Reply, and Patent Owner's Sur-Reply shows that claims 1, 5, 12, and 15 would have been obvious over Bhagalia and Abe.

4. Dependent claims 2, 3, 6, 13, and 16

Petitioner provides explanations and supporting evidence regarding the limitations of dependent claims 2, 3, 6, 13, and 16. *See generally* Pet. 64–65, 70–71. In particular, Petitioner provides explanation and evidence that the combination of Bhagalia and Abe, teaches all limitations of the claims. *Id.*

Patent Owner does not separately address Petitioner's showing as to these claims. *See generally* PO Resp.; Sur-Reply. Based on the disclosures of Bhagalia and Abe discussed above, Petitioner shows persuasively that the combination of Bhagalia and Abe renders obvious claims 2, 3, 6, 13, and 16.

## II. CONCLUSION<sup>6</sup>

For the foregoing reasons, we are persuaded on the record at hand that Petitioner has demonstrated by a preponderance of the evidence that claims 1–3, 5, 6, 12, 13, 15, and 16 are unpatentable under 35 U.S.C. § 103 as obvious over Nakamura and Okumura; and over Bhagalia and Abe.

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<sup>6</sup> Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner's attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

III. ORDER

For the foregoing reasons, it is

ORDERED that, based on a preponderance of the evidence, claims 1–3, 5, 6, 12, 13, 15, and 16 of U.S. Patent 6,466,563 B1 have been shown to be unpatentable; and

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

In summary:

<b>Reference(s)/Basis</b>	<b>35 U.S.C. §</b>	<b>Claims</b>	<b>Claims Shown Unpatentable</b>	<b>Claims Not Shown Unpatentable</b>
Nakamura, Okumura	§ 103(a)	1–3, 5, 6, 12, 13, 15, 16	1–3, 5, 6, 12, 13, 15, 16	
Bhagalia, Abe	§ 103(a)	1–3, 5, 6, 12, 13, 15, 16	1–3, 5, 6, 12, 13, 15, 16	
<b>Overall Outcome</b>			1–3, 5, 6, 12, 13, 15, 16	

IPR2018-01472  
Patent 6,466,563 B1

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