UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC., and
TELEFONAKTIEBOLAGET LM ERICSSON

Petitioner,

v.

INTELLECTUAL VENTURES II LLC

Patent Owner.

Case IPR2014-00919
U.S. Patent 7,848,353 B2

INTELLECTUAL VENTURES II LLC'S NOTICE OF APPEAL TO THE U.S. COURT OF APPEALS FOR THE FEDERAL CIRCUIT

Via PRPS
Patent Trial and Appeal Board

Via Hand Carry
Director of the U.S. Patent & Trademark Office
c/o Office of the General Counsel, 10B20
Madison Building East
600 Dulany Street
Alexandria, VA 22314

Via CM/ECF
United State Court of Appeals for the Federal Circuit

Pursuant to 35 U.S.C. §§ 141, 142, and 319, 37 C.F.R. §§ 90.2, 90.3, and 104.2, and Rule 4(a) of the Federal Rules of Appellate Procedure, Patent Owner Intellectual Ventures II LLC hereby appeals to the United States Court of Appeals for the Federal Circuit from the Final Written Decision (Paper 37) entered by the Patent Trial and Appeal Board on December 7, 2015 (Attachment A). In particular, Patent Owner identifies the following issues on appeal:

- The Board's judgment that Claims 9–20 and 29–34 of U.S. Patent No. 7,848,353 B2 are unpatentable;
- The Board's claim construction;
- The Board's denial of Patent Owner's Motion to Exclude Evidence; and
- Any Board finding, determination, judgment or order supporting or related to the Final Written Decision and decided adversely to Patent Owner.

Patent Owner is concurrently filing true and correct copies of this Notice of Appeal, along with the required fees, with the United States Court of Appeals for the Federal Circuit, and with the USPTO Patent Trial and Appeal Board.

Respectfully submitted,

Dated: February 8, 2016

/Peter J. McAndrews/
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CERTIFICATE OF FILING

The undersigned hereby certifies that, in addition to being electronically filed through PRPS, a true and correct copy of the above-captioned **INTELLECTUAL VENTURES II LLC'S NOTICE OF APPEAL** is being filed by hand with the Director on February 8, 2016, at the following address:

Director of the U.S. Patent & Trademark Office
c/o Office of the General Counsel, 10B20
Madison Building East
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Alexandria, VA 22314

The undersigned also herby certifies that a true and correct copy of the above-captioned **INTELLECTUAL VENTURES II LLC'S NOTICE OF APPEAL** and the filing fee is being filed via CM/ECF with the Clerk's Office of the United States Court of Appeals for the Federal Circuit on February 8, 2016.

Dated: February 8, 2016

Respectfully submitted,

/Peter J. McAndrews/
Peter J. McAndrews
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Intellectual Ventures II LLC

CERTIFICATE OF SERVICE

The undersigned hereby certified that the foregoing **INTELLECTUAL VENTURES II LLC'S NOTICE OF APPEAL** was served electronically via e-mail on February 8, 2016 in its entirety on the following:

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Paper No. 37
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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ERICSSON INC. and
TELEFONAKTIEBOLAGET LM ERICSSON,
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v.

INTELLECTUAL VENTURES II LLC,
Patent Owner.

Case IPR2014-00919
Patent 7,848,353 B2

Before JOSIAH C. COCKS, WILLIAM A. CAPP, and
DAVID C. McKONE, *Administrative Patent Judges.*

CAPP, *Administrative Patent Judge.*

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

Ericsson Inc. and Telefonaktiebolaget LM Ericsson, (collectively "Ericsson") filed a Petition (Paper 1, "Pet.") requesting *inter partes* review of claims 9–20 and 29–34 of U.S. Patent No. 7,848,353 B2 (Ex. 1001, the "'353 patent"). We issued a Decision to Institute an *inter partes* review of claims 9–20 and 29–34 of the '353 patent. Paper 8 ("DI"). After institution of trial, Patent Owner Intellectual Ventures II LLC ("Intellectual Ventures") filed a Patent Owner's Response (Paper 17, "PO Resp.") and Ericsson filed a Petitioner's Reply (Paper 21, "Reply"). We have jurisdiction under 35 U.S.C. § 318(a).

The instant case came before the Board for a regularly scheduled oral hearing on the merits on August 25, 2015, the transcript of which is entered as Paper 36 ("Tr."). Also before the Board are the following matters:

Patent Owner's Objection to Evidence (Paper 24); and

Patent Owner's Motion to Exclude Evidence (Papers 27 and 31).

After considering the evidence and arguments of counsel and for the reasons set forth below, we determine that Ericsson has met its burden of showing, by a preponderance of the evidence, that claims 9–20 and 29–34 of the '353 patent are unpatentable.

Related Proceedings

The '353 patent issued from non-provisional application number 12/033,824 and is the subject of two IPR proceedings. The first such proceeding is the instant proceeding in which Petitioner Ericsson challenges claims 9–20 and 29–34 of the '353 Patent. The second such IPR Proceeding is *Google Inc. v. Intellectual Ventures II LLC*, Case IPR2014-01031 (PTAB) in which the Petitioner Google challenges claims 1–8 and 21–27 of the '353 Patent.

The ’353 patent is the parent of a continuation application, non-provisional application number 12/960,774, which lead to issuance of US Patent 8,396,079 B2 (the “’079 patent”). The ’079 Patent is the subject of an IPR proceeding captioned *Ericsson, Inc. v. Intellectual Ventures II LLC*, IPR2014-00915 (PTAB).

The ’353 patent and/or the ’079 patent are patents-in-suit in one or more of the following United States District Court patent infringement actions:

Intellectual Ventures I LLC v. AT&T Mobility LLC, 1-13-cv-01668 (D. Del. 2013).

Intellectual Ventures I LLC v. Leap Wireless Int’l, 1-13-cv-01669 (D. Del. 2013).

Intellectual Ventures I LLC v. Nextel Operations, 1-13-cv-01670 (D. Del. 2013).

Intellectual Ventures I LLC v. T-Mobile USA Inc., 1-13-cv-01671 (D. Del. 2013).

Intellectual Ventures I LLC v. United States Cellular, 1-13-cv-01672 (D. Del. 2013).

Intellectual Ventures I LLC v. Motorola Mobility LLC, 0-13-cv-61358 (S.D. Fla. 2013).

I. BACKGROUND

A. The ’353 Patent (Ex. 1001)

The ’353 patent, titled “Communication Units Operating With Various Bandwidths,” relates to digital communication systems such as wireless cellular communication systems. Ex. 1001, 1:13–18. The communication system disclosed in the ’353 patent is capable of operating at a plurality of bandwidths. *Id.*, Abstract. The system transmits a signal comprised of a first signal portion and a further signal portion. *Id.* The first

signal portion is transmitted over a first bandwidth. *Id*. The first signal portion contains an indication of an operating bandwidth selected from a plurality of bandwidths for use in transmitting and receiving the further signal portion. *Id.*

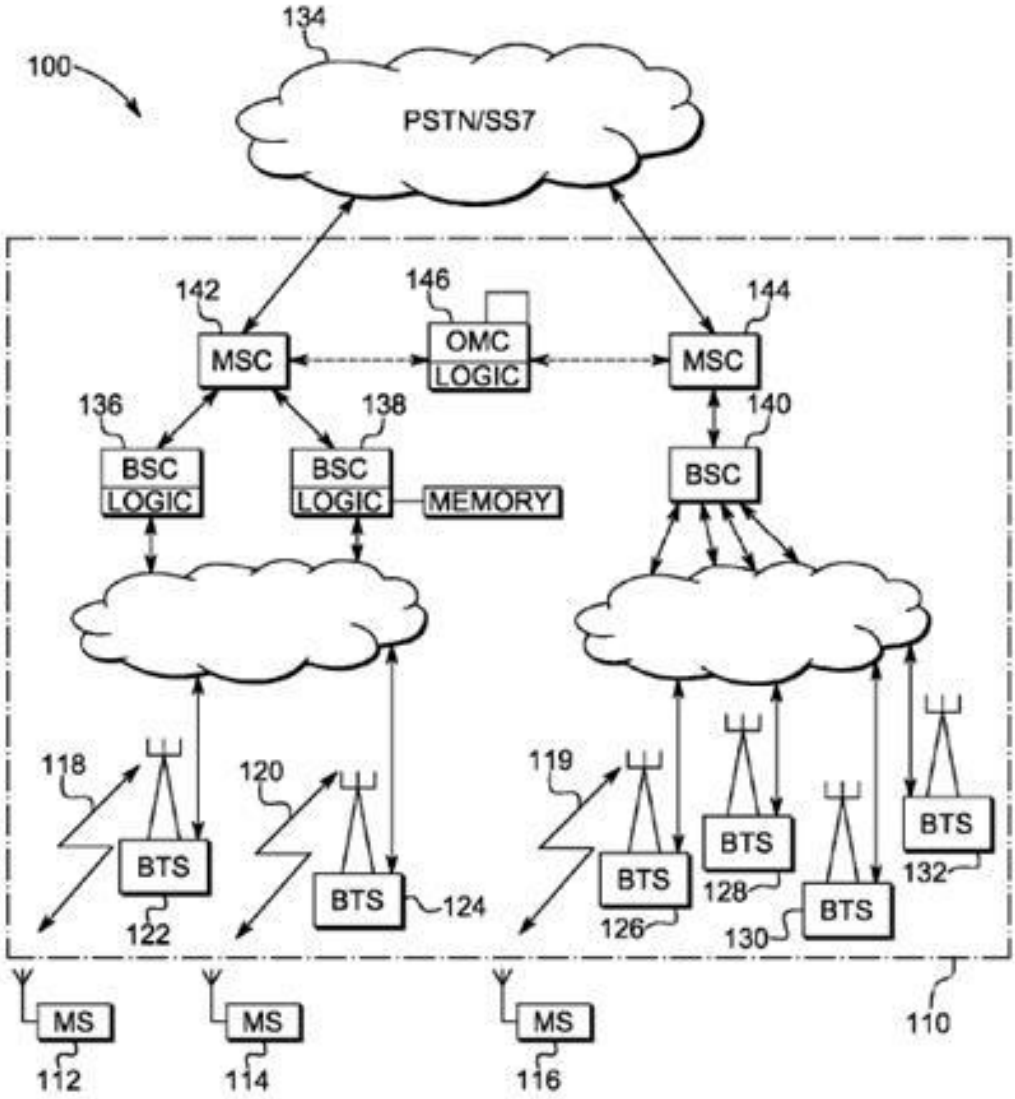

Figure 1 of the ’353 patent is shown above. Figure 1 is a block diagram of a wireless communication system. Ex. 1001, 3:8–10. A plurality of subscriber terminals (*e.g*., cell phones) 112, 114, 116 communicate wirelessly over radio links 118, 119, 120 with a plurality of base transceiver

stations 122, 124, 126, 128, 130, 132, also known as "Node-Bs." *Id.* at 3:34–38. The cell phones and Node-Bs transmit and receive multi-rate signals. *Id*. at 4:39–44.

A first portion of the multi-rate signal has a predetermined bandwidth and contains an indication of an operating bandwidth for a further portion of the signal. *Id*. at claim 9. Following transmission, both the indication from the first signal portion and the information in the further signal portion are recoverable. *Id*. The information in the further signal portion is recoverable at the operating bandwidth indicated in the first signal portion. *Id*.

B. The Challenged Claims

Ericsson challenges claims 9–20 and 29–34. Claims 9, 14, and 29 are independent claims. Claim 9 is a method claim and claims 14 and 29 are apparatus claims. Claim 14 is illustrative of the subject matter of the challenged claims and is reproduced below:

> 14. A multi-bandwidth communication system comprising:
>
> a transmitter having logic for transmitting a signal having a first signal portion at a first, predetermined bandwidth and containing an indication of an operating bandwidth selected from a plurality of bandwidths used for a further signal portion;
>
> a receiver having logic for receiving the transmitted signal;
>
> logic for recovering the indication from the first signal portion at the first, predetermined bandwidth; and
>
> logic for recovering information in the further signal portion at the operating bandwidth indicated by the indication.

C. The Asserted Grounds of Unpatentability

We instituted trial on Ericsson's challenge to claims 9–20 and 29–34 of the '353 patent as obvious under 35 U.S.C. § 103 over various combinations of references listed below. DI, 22, 23.

References	Claims challenged
McFarland (Ex. 1002)[1] and van Nee (Ex. 1003)[2]	9, 10, 12, 14–17, 19, 29, 30, and 32
McFarland, van Nee, and Shahar (Ex. 1004)[3]	11, 18, and 31
McFarland, van Nee, and Dahlman (Ex. 1006)[4]	13, 20, and 33
McFarland, van Nee, and Richardson (Ex. 1005)[5]	34
Trompower (Ex. 1007)[6] and Yamaura (Ex. 1008)[7]	9, 10, 12, 14–17, 19, 29, 30, and 32
Trompower, Yamaura, and Shahar	11, 18, and 31
Trompower, Yamaura, and Dahlman	13, 20, and 33
Trompower, Yamaura, and Richardson	34

II. MOTION TO EXCLUDE EVIDENCE

Intellectual Ventures moves to exclude Exhibits 1011, 1012, 1013, 1016, 1021, 1032, and 1033. Intellectual Ventures also moves to exclude selected paragraphs of testimony from the Supplemental Declaration of Zygmunt J. Haas, Ph.D., which appears in the record as Exhibit 1031.

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[1] U.S. Patent No. 7,397,859 B2 to McFarland, issued July 8, 2008.

[2] U.S. Patent No. 6,175,550 B1 to van Nee, issued Jan. 16, 2001.

[3] U.S. Patent No. 6,987,754 B2 to Shahar et al., issued Jan. 17, 2006.

[4] Erik Dahlman et al., *UMTS/IMT-2000 Based on Wideband CDMA*, IEEE COMMUNICATIONS MAGAZINE, 70–80 (Sept. 1998).

[5] K.W. Richardson, *UMTS Overview*, ELECTRONICS & COMMUNICATION ENGINEERING JOURNAL, 93–100 (June 2000).

[6] U.S. Patent No. 5,950,124 to Trompower et al., issued Sept. 7, 1999.

[7] U.S. Patent No. 5,321,721 to Yamaura et al., issued June 14, 1994.

A. Exhibit 1011 — European Prosecution History

Exhibit 1011 is taken from the prosecution history of a European counterpart application to the '353 Patent. Intellectual Ventures argues that Exhibit 1011 is irrelevant and should be excluded under Rule 402 of the Federal Rules of Evidence. Intellectual Ventures cites *Volkswagen Group of America, Inc. v. Emerachem Holdings, LLC*, Case IPR2014-01557, slip op. at 15 (PTAB Mar. 16, 2015) (Paper 13) for the proposition that proceedings before the European Patent Office ("EPO") are essentially irrelevant. Paper 27, 1.

Ericsson argues that, notwithstanding any differences in the law, the European Application is relevant because it illustrates the applicability of the Trompower reference (Ex. 1007) to a patent application having the same specification of the '353 Patent. Paper 31, 2.

We think Exhibit 1011 is probative of whether Trompower is analogous art to the '353 patent and will admit it for this limited purpose. Intellectual Ventures's motion to exclude Exhibit 1011 is DENIED.

B. Exhibit 1012 and 1013 — District Court Allegations

Exhibit 1012 is a copy of a complaint in one of the related District Court patent infringement lawsuits identified above. Exhibit 1013 is an opposition filed by Plaintiffs Intellectual Ventures I LLC and Intellectual Ventures II LLC to a motion to sever filed by the defendants in related District Court litigation. Intellectual Ventures argues that its allegations of infringement have no relevance to the validity of the '353 patent. Paper 27, 2. Intellectual Ventures relies on a Board decision in *Synopsys, Inc. v. Mentor Graphics Corp.*, Case IPR 2012-00042, slip op. at 15 (PTAB

Feb. 22, 2013) (Paper 16) for the proposition that potentially infringing products are irrelevant to the issues raised in the Petition. Paper 27, 3.

Ericsson responds that Exhibits 1012 and 1013 are submitted for the purpose of evidencing features known to be part of the products alleged to be infringing by Intellectual Ventures. Paper 31, 3. Ericsson argues that infringement-related evidence that tends to show the potential breadth of the claims is relevant. *Id.* at 3 (citing *Hewlett-Packard Co. v. MPHJ Tech. Invs., LLC*, Case IPR 2013-00309, slip op. at 20 (PTAB Nov. 19, 2014) (Paper 35)).

In the opposition to motion to sever (Exhibit 2017), plaintiffs in the related District Court litigation make the following factual allegation to the Delaware District Court.

> Plaintiffs assert that each Defendants' LTE wireless network infringes Plaintiffs' patents [*inter alia,* the '353 patent] . . . . LTE is the latest wireless standard published by the 3GPP organization. It is currently marketed as 4G LTE.

Exhibit 1013, 2. To the extent that there is a factual connection between the OFDM technology disclosed in the McFarland prior art reference in the instant IPR proceeding (Ex. 1002) and the LTE technology that is accused of infringing the '353 patent in the related District Court litigation, Intellectual Ventures's infringement allegations in the District Court litigation shed light on Intellectual Ventures's allegations regarding the scope of the claims in the instant IPR proceeding.

We DENY Intellectual Ventures's motion to exclude Exhibits 1012 and 1013.

C. Exhibits 1016 and 1021 – LTI Evolution of Mobile Broadband

Intellectual Ventures argues that the publication date of Exhibits 1016 and 1021 (duplicates of each other) is after the priority date of the '353 patent and, therefore, Exhibits 1016 and 1021 are irrelevant.

Ericsson argues that the purpose for which these articles are offered is not as prior art, but as evidence of features known to be part of the products alleged to be infringing by Patent Owner. Paper 31, 2. As such, Ericsson contends that these Exhibits are evidence of features that Intellectual Ventures alleges fall within the scope of the claims of the '353 patent, at least as construed by Intellectual Ventures in another forum. *Id*. at 2–3. Ericsson further contends that these Exhibits demonstrate that Intellectual Ventures is taking inconsistent positions on claim construction in this proceeding *vis-à-vis* related District Court litigation. *Id.* at 3.

It is well settled that, because the claims of a patent measure the invention at issue, the claims must be interpreted and given the same meaning for purposes of both a validity and infringement analysis. *Amazon.com, Inc. v. BarnesAndNoble.com, Inc*., 239 F.3d 1343, 1351 (Fed. Cir. 2001). Otherwise, an improper claim construction may distort an infringement and invalidity analysis. *Id.*(citing *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc*., 796 F.2d 443, 450 (Fed. Cir. 1986)). The courts have long decried that patent owners may not, like a "nose of wax," twist the meaning of patent claims one way to avoid a finding of unpatentability and in another way so as to find infringement. *See Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc*., 381 F.3d 1111, 1117 (Fed. Cir. 2004) (quoting *White v. Dunbar*, 119 U.S. 47, 51–52 (1886)).

All of the challenged claims of the '353 patent contain limitations directed to a "signal" with a "first signal portion" and a "further signal portion." Ex. 1001, claims 9, 14, and 29. The claims also contain limitations directed to an "operating bandwidth." *Id.* The parties engage in a vigorous dispute over the proper construction of "signal" and "indication of an operating bandwidth." Intellectual Ventures takes the position in the instant IPR proceeding that the OFDM system disclosed in McFarland (Ex. 1002), does not satisfy the signal and bandwidth limitations of the challenged claims. *See, e.g.*, PO Resp. 22–26. We agree with Ericsson that Exhibits 1016 and 1021 are probative of whether Intellectual Ventures may be taking inconsistent positions on whether OFDM communication systems satisfy the signal and bandwidth limitations of the challenged claims.

We DENY Intellectual Ventures's motion to exclude Exhibits 1016 and 1021.

D. Exhibit 1032 — Newton's Telecom Dictionary

Intellectual Ventures argues that Exhibit 1032 is irrelevant, outside the scope of Patent Owner's Response and will cause undue prejudice to Patent Owner. Paper 27, 6–7. Ericsson states that Exhibit 1032 is offered to rebut Intellectual Ventures's position on the proper construction of "data burst." Paper 31, 7–8.

Exhibit 1032 is a technical dictionary that offers definitions of the term "packet" as it is used in the telecommunications industry. The term "packet" appears in the '353 patent (Ex. 1001, 3:59); McFarland (Ex. 1002, *e.g.*, Fig. 10); van Nee (Ex. 1003, *e.g.*, 4:25); Shahar (Ex. 1004, *e.g.*, Abstract); Richardson (Ex. 1005, *e.g.*, 93); Dahlman (Ex. 1006, *e.g.*, 70); and Trompower (Ex. 1007, *e.g.*, 13:34). Given the issues raised by

Intellectual Ventures in the Patent Owner's Response in connection with above cited prior art references, we think the introduction of a technical dictionary definition of "packet" is within the proper scope of rebuttal evidence.

We DENY Intellectual Ventures's motion to exclude Exhibit 1032.

E. Exhibit 1033 — Digital Communications Fundamentals

Intellectual Ventures argues that Exhibit 1033 is neither referred to nor discussed in Ericsson's Reply and, therefore, should be excluded as irrelevant under Federal Rule of Evidence 402. Paper 27, 7.

Ericsson responds that its Reply specifically cites to paragraph 10 of Dr. Haas's supplemental declaration (Ex. 1031 ¶ 10). Paper 31, 8–9. Paragraph 10 of Dr. Haas's declaration testimony, in turn, quotes directly from Exhibit 1033. *See* Ex. 1031 ¶ 10.

We DENY Intellectual Ventures's motion to exclude Exhibit 1033.

F. Exhibit 1031 — Supplemental Haas Declaration

Intellectual Ventures moves to exclude paragraphs 5–9, 11–17, 19–23, and 25 of the Supplemental Haas Declaration submitted in connection with Ericsson's Reply. Ex. 1031.

1. Paragraphs 5–9, 11, 14, 15, 17, and 21–23

Intellectual Ventures argues that these paragraphs should be excluded from evidence because they are not cited or otherwise relied on in Petitioner's Reply. Paper 27, 3.

Ericsson responds that the paragraphs support the analysis and conclusions of Dr. Haas contained in the paragraphs that were cited in the Reply and that there is no requirement that every paragraph must be expressly cited in a corresponding brief. We agree and DENY Intellectual

Ventures's motion to exclude paragraphs 5–9, 11, 14, 15, 17, and 21–23 of the supplemental Haas declaration.

2. Paragraphs 12–17, 21–23, and 25

Intellectual Ventures moves to exclude these paragraphs as offering testimony raising new issues. Paper 27, 3–6. In support of its position, Intellectual Ventures cites the Board's decision in *Intri-Plex Tech., Inc. v. Saint-Gobain Performance Plastics Rencol Ltd*., Case IPR2014-00309, slip op. at 13 (PTAB March 23, 2014) (Paper 83). Paper 27, 3–6.

Ericsson responds that these paragraphs are proper rebuttal to Intellectual Ventures's Patent Owner's Response. Paper 31, 4–6.

The *Intri-Plex* decision relied on by Intellectual Ventures does not apply to the instant situation. In *Intri-Plex*, the Petitioner did not support its original Petition with any expert declaration testimony and then later submitted an expert declaration, for the first time contemporaneous with its Reply, that offered claim construction opinion testimony, a claim-by-claim, element-by-element obviousness analysis of each challenged claim, and an opinion that each challenged claim was obvious over the prior art. *See Intri-Plex*, Case IPR2014-00309, slip op at 12 (Paper 83).

In the instant case, we have reviewed the paragraphs at issue and agree with Ericsson that they contain rebuttal testimony that is appropriate for submission in a Reply. Accordingly, we DENY Intellectual Ventures's motion to exclude paragraphs 12–17, 21–23, and 25 of the supplemental Haas declaration.

3. Paragraphs 19 and 20

Intellectual Ventures argues that paragraphs 19 and 20 provide "conclusory and unsupported" testimony that is not based on any facts or

data. Paper 27, 6. Ericsson responds that Dr. Haas testimony is based on facts and data that he is personally familiar with based on his 35 years of experience with wireless communications. Paper 31, 7.

We have reviewed paragraphs 19 and 20 where Dr. Haas offers opinion testimony concerning his interpretation and analysis of the Shahar (Ex. 1004) reference. We will admit Dr. Haas' testimony regarding his understanding and interpretation of Shahar based on his knowledge and experience with wireless communications.

We DENY Intellectual Ventures's motion to exclude paragraphs 19 and 20 of the supplemental Haas declaration.

III. CLAIM INTERPRETATION

In an *inter partes* review, claims are given their broadest reasonable interpretation consistent with the specification. *See* 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1278 (Fed. Cir. 2015). Within this framework, terms generally are given their ordinary and customary meaning. *See In re Translogic Tech., Inc*., 504 F.3d 1249, 1257 (Fed. Cir. 2007).

1. "bandwidth"

Ericsson's proposed construction: a frequency range.

Pet. 16–17, Reply 9.

Intellectual Ventures's proposed construction: a width of a frequency band.

PO Resp. 6–8.

In its initial Petition, Ericsson proposed to construe "bandwidth" as "a frequency range that a component, circuit, or system passes or uses." Pet. 16–17. In the Decision to Institute, we construed bandwidth as "a

frequency range." DI, 5. In its Reply, Ericsson agrees with the Board's preliminary construction and recognizes that the additional features in its originally proposed construction are unnecessary. Reply 9.

Intellectual Ventures argues that a "width of a frequency band" is the correct construction. PO Resp. 8. Intellectual Ventures argues that the Board's preliminary construction of "frequency range" does not convey the concept of accuracy that "width of a frequency band" conveys. *Id.* Intellectual Ventures does not explain how its proposed construction conveys a different concept of accuracy than the Board's preliminary construction. *Id.*

It is well settled that claims should be read in light of the specification and teachings in the underlying patent. *See Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015). The PTO should also consult the patent's prosecution history in proceedings in which the patent has been brought back to the agency for a second review. *Id.*[8]

The specification uses the terms "chip rate" and "bandwidth" each about eleven times. For example,

> This invention, at least in a preferred form, implements a scheme where the SCH channel in the UTRA air-interface is transmitted at the lowest *chip-rate* supported by the system design. Note that only the SCH channel is always transmitted at the lower *chip rate*.
>
> As the SCH is transmitted at the lower *chip rate*, the receiving UE will by default, select the receiver *bandwidth* appropriate to this lower *chip-rate*. In this configuration, the UE will be able to recover the SCH, irrespective of the *chip rate* used at the transmitting Node B.

Ex. 1001, 5:63–6:5 (emphases added).

[8] The *Proxyconn* case involved an IPR Proceeding.

The specification further explains that the inventive concepts of the invention can be applied outside of the context of wireless communication systems.

> Although the preferred embodiment of the invention is described with reference to a wireless communication system employing a UMTS air-interface, it is within the contemplation of the invention that the inventive concepts described herein can be applied to any multi-bandwidth/multi-data rate communication system—fixed or wireless.

Id. at 4:39–44. The '353 patent issued on a continuation application (non-provisional application number 12/033,824) that claimed priority to non-provisional application number 10/293,635 (the '635 application), which led to issuance of US Patent 7,356,098 B2 (the '098 patent). Ex. 1001; Ex. 2001. During prosecution of the '635 application, all of the originally filed claims used the term "chip rate" and none of the originally filed claims used the term "bandwidth." Ex. 1010, 468–473. Originally filed claim 1 is illustrative:

> 1. A method for synchronisation[9] in a multi-rate communication system, the method comprising:
>
> receiving a signal having a synchronization portion at a first, predetermined *chip rate* and containing an indication of *chip rate* used for a further portion; and
>
> recovering the indication from the synchronization portion at the first, predetermined *chip rate*; and
>
> recovering information in the further portion at the *chip rate* indicated by the indication.

[9] Two alternative spellings for this word (1) synchronisation; and (2) synchronization are used at various places in the specification and various prior art references. For the sake of simplicity and consistency, we will hereinafter render this word with the spelling synchronization, regardless of how the term may be spelled elsewhere in the record.

Ex. 1010, 468 (emphases added). All of the original pending claims in the '635 application were rejected over Boer.[10] *Id.* at 361. Boer discloses a multi-rate wireless data communication system. Boer transmits the initial portion of a message at a predetermined data rate and includes in such initial portion an identification segment identifying a selected data rate at which the data portion of the message is to be transmitted. Boer, 1:33–47. Boer discloses that it achieves a plurality of data rates by using a plurality of different modulation techniques. *Id.* at 2:16–53.

> the preamble **216** and header **218** are always transmitted at the 1 Mbps rate using DBPSK modulation. The subsequent DATA field **214**, however, may be transmitted at a selected one of the four possible rates 1, 2, 5, or 8 Mbps, using the modulation and coding discussed hereinabove.

Boer, 3:57–62.

In traversing the rejection over Boer, the applicant argued that Boer discloses transmitting multi-rate signals where the plurality of data rates all use the same symbol rate. Ex. 1010, 354 (citing Boer, 1:33–47; 2:27–53). Applicant further argued that a symbol rate is also referred to as the chip rate for DSSS codes and that the chip rate determines a signal bandwidth. Ex. 1010, 354. In order to distinguish over Boer, Intellectual Ventures's amended its claims to include limitations with the term "bandwidth determined by . . . chip rate." Ex. 1010, 267. All of the independent claims that eventually issued in the '098 patent contain the term "bandwidth determined by . . . chip rate." Pet. 8–9; Ex. 1010, 273, 354.[11] Similarly, all

[10] US 5,706,428, iss. Jan. 6, 1998. We take Official Notice of Boer. Ex. 3001.

[11] *See also* US Patent 7,356,098 B2, claims 1, 9, 13, 20, and 27. Ex. 2001.

of the claims of the '353 patent use the term "bandwidth" and none of the claims use the term "chip rate" or "data rate."

In the Notice of Allowance for the '098 patent, the Examiner explained that Boer teaches the claimed method except that it fails to teach recovering from a received first signal portion at a predetermined bandwidth and then recovering information in a further signal portion at a bandwidth indicated by the first signal portion. Ex. 1010, 44.

As modern telecommunications technology has developed over time, the term "bandwidth" has acquired more than one meaning. For example, one on-line dictionary provides the following two definitions:

> 1: a range within a band of wavelengths, frequencies, or energies; *especially*: a range of radio frequencies which is occupied by a modulated carrier wave, which is assigned to a service, or over which a device can operate[.]
>
> 2: the capacity for data transfer of an electronic communications system <graphics consume more *bandwidth* than text does>; *especially*: the maximum data transfer rate of such a system <a *bandwidth* of 56 kilobits per second>[.]

Merriam-Webster.com.[12] The parties' proposed constructions appear to agree that the term "bandwidth," as used in the claims of the '353 patent, more closely conforms to definition number 1 above. Such a construction is supported by the prosecution history of the '098 patent and the '353 patent where the claims were amended essentially to substitute "*bandwidth*" or "*bandwidth determined by . . . chip rate*" for "*chip rate*" to distinguish over the Boer reference.

[12] *http://www.merriam-webster.com/dictionary/ bandwidth* (last visited Oct. 16, 2015).

In view of the foregoing, we retain the same construction for "bandwidth" that we adopted for purposes of the Decision to Institute. Thus, we construe "bandwidth" to mean "a frequency range." For purposes of clarification, we will provide the following example: a band of frequencies with a lower cut-off frequency of 10 MHz and an upper cut-off frequency of 40 MHz has a "bandwidth" of 30 MHz.

2. indication of operating bandwidth

> Ericsson's proposed construction: Ericsson contends that the plain and ordinary meaning of this term should apply and that no construction is necessary.

Reply 7–8.

> Intellectual Ventures's proposed construction: identification of a particular operating bandwidth.

PO Resp. 8–10.

This term was not construed in the Decision to Institute as neither party proposed a construction in their respective Petition or Preliminary Response. Intellectual Ventures first placed the meaning of this phrase in controversy in its Patent Owner's Response after receiving our Decision to Institute.

In support of its proposed construction, Intellectual Ventures argues that claim 15, which depends from independent claim 14, recites that "'the logic for recovering information in the further signal portion comprises a filter having a bandpass ***appropriate*** for the indicated operating bandwidth.'" PO Resp. 8–9. Intellectual Ventures argues that a selected bandpass range could only be "appropriate" if the indicated operating bandwidth is identified with particularity. *Id.* at 9. This argument is not persuasive. If the word "appropriate" is necessary to indicate that the

operating bandwidth is "particular," Intellectual Ventures does not explain why the modifier "appropriate" appears only in a dependent claim. We have considered Intellectual Ventures's other arguments and find them to be equally unpersuasive.

The term "operating bandwidth" appears in multiple claims in the '353 patent. Ex. 1001, claims 1, 2, 4, 9, 10, 14, 15, 16, 17, 21, 22, 23, 24, 29, and 30. However, the term "operating bandwidth" does not appear, in so many words, throughout the specification. In addition, we note that none of the originally filed claims in the '635 application contained the term "bandwidth," much less "operating bandwidth." Ex. 1010, 468–73.

A claim construction analysis begins with, and is centered on, the claim language itself. *See Interactive Gift Express, Inc. v. Compuserve, Inc.*, 256 F.3d 1323, 1331 (Fed. Cir. 2001). In the instant case, claim 14 requires that the claimed communication system has logic for transmitting a signal. The signal has a "first" portion and a "further" portion. The first signal portion is transmitted at a first "*predetermined*" bandwidth. The first signal portion contains an "*indication of an operating bandwidth*." Such "*indication*" is recoverable from the first signal portion. Information contained in the further signal portion is recoverable at the "*operating bandwidth*" that is "*indicated by the indication*." The context of the claim suggests that the "*indication*" is transmitted so that the transmitter and receiver can coordinate with each other to send and receive the further signal portion at compatible frequencies corresponding to the "*operating bandwidth*."

The "ordinary and customary meaning of a claim term" is that meaning that a person of ordinary skill in the art in question, at the time of

the invention, would have understood the claim to mean. *See Translogic Tech.*, 504 F.3d at 1257; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc). The Federal Circuit admonishes us that even under the broadest reasonable interpretation, the Board's construction cannot be divorced from the specification and the record evidence. *See Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d at 1298. Rather, "claims should always be read in light of the specification and teachings in the underlying patent." *Id.* (internal citation and quotations omitted). Thus, a construction that is unreasonably broad and does not reasonably reflect the plain language and disclosure will not pass muster. *See id.*

In the instant case, the specification is directed to solving a need for a synchronization scheme for multi-rate communication systems that overcomes the problems in the prior art attributable to initial rate negotiations schemes and other inefficiencies. Ex. 1001, 2:3–8. The specification discloses a receiving communication unit that can receive and process high-speed signals of varying bandwidths. *Id.* at 5:5–10.

As explained by Intellectual Ventures's expert, Dr. Zeger, the specification discloses that synchronization information is transmitted at a specified narrow bandwidth. Ex. 2006 ¶ 30. This initial part of a transmitted signal (referred to as the "synchronization channel" or "SCH") can be sent at a particular specified bandwidth corresponding to the lowest chip rate supported by the system. *Id.* The receiver receives the SCH at the specified bandwidth and identifies the bandwidth for the subsequent part of the signal (referred to as the "transport channel"). *Id.* This "system" bandwidth may be different from the initially specified bandwidth of the SCH. *Id.* Once the receiver identifies the bandwidth for the subsequent part

of the signal, the receiver adapts its filtering to receive the transport channel portion of the signal at the system bandwidth. *Id.* ¶ 31. Transport channel information is then received at the wider system bandwidth. *Id.*

A person of ordinary skill in the art reading the specification of the '353 patent, as a whole, would understand that the "*operating bandwidth*" of claims 9, 14, and 29 is the frequency range or bandwidth that is used for the transport channel. The person of ordinary skill in the art would also understand that that the operating bandwidth is coordinated between the transmitter and the receiver so that the frequency range that the transmitter uses to transmit the data portion of the signal is compatible with the frequency range that the receiver uses to receive the signal. In other words, the system operates at a range of frequencies, i.e., the "*operating bandwidth*" that enables the receiver to receive the signal that is transmitted by the transmitter.

Intellectual Ventures's proposed construction merely substitutes the word "identification" in lieu of "indication" and then inserts the word "particular" as a modifier to "operating bandwidth." Substituting "identification" for "indication" does nothing to clarify the meaning of this phrase. Furthermore, we do not agree with Intellectual Ventures that interjection of the word "particular" into the construction contributes anything meaningful to an understanding of the term.

Thus, for purposes of this Decision, it is sufficient to construe "*indication of an operating bandwidth*" to mean that the first signal portion contains sufficient information so that when it is received, the receiver is able to configure itself to receive the data portion of the signal (or "further

signal portion" or "transport channel") at approximately the same frequency range or bandwidth at which it has been transmitted by the transmitter.[13]

3. "signal," "first signal portion," "further signal portion"

Ericsson's proposed construction:

"signal" — a modulated waveform used to convey information.

"first signal portion" — the portion of the signal that identifies the bandwidth for receiving the further signal portion.

"further signal portion" — a different portion of the signal from the first signal portion and is received on the bandwidth identified by the first signal portion.

Pet. 17–18.

Intellectual Ventures's proposed construction:

"signal" — a modulated waveform used to convey information.

"first signal portion" — first portion of the modulated waveform.

"further signal portion" — a portion of the modulated waveform different from the first portion.

PO Resp. 10, 15, 16.

In its Petitioner's Reply, Ericsson modified its proposed construction from "a physical representation of data" to "a modulated waveform used to convey information." Petition 17; Reply 5. Thus, the two parties now agree as to the meaning of "signal."

[13] In further regard to Intellectual Ventures's contention that the bandwidth indication be "particular," we express no opinion as to whether the receiver must be set to the exact same lower cut-off frequency and upper cut-off frequency as the transmitter as a slightly narrower or broader transmitter or receiver bandwidth may still be adequate to transmit and receive the information contained in the signal and thus function as an "*operating bandwidth*" The key consideration is that the receiver is able to receive the data that the transmitter transmits.

We are not persuaded that construction of this term is material to this Decision, as it appears to us that all of Ericsson's cited references contemplate wireless transmissions that use modulated carrier waves. Consequently, for purposes of this Decision, we construe "signal" as broad enough to encompass the wireless transmissions disclosed in Ericsson's cited references.[14]

With respect to "first signal portion" and "further signal portion," we do not discern any disagreement between the parties as to the ordinary and customary meaning of "portion" as being a part of a whole, or that the "first portion" is distinct from the "further portion." Thus, we do not find it necessary to further construe these terms for purposes of this decision.

4. "data burst"

> Ericsson's proposed construction: a method of transmission that combines a high data signaling rate with short transmission of time. A "packet" is an example of a "burst of data."

Pet. 18, Reply 5–7.

[14] We note that claim 9 is not limited to wireless networks and that the specification does not limit the invention to wireless systems. "[I]t is within the contemplation of the invention that the inventive concepts described herein can be applied to any multi-bandwidth/multi-data rate communication system—fixed or wireless." Ex. 1001, 4:41–44. However, in light of the scope of prior art asserted by Ericsson in this IPR, all of which entail wireless communications, we need not further construe this term for purposes of this IPR proceeding. *See Vivid Tech. Inc., v. Am. Sci. & Eng., Inc*., 200 F.3d 795, 803 (Fed. Cir. 1999) (only terms in controversy need be construed and only to the extent necessary to resolve the controversy). We note that the construction that we adopt herein may not be appropriate in the context of wired communications. *See* Ex. 1030, 13:6–14:3 (Dr. Zeger testifies that there are ways to transmit digital information over wired systems that do not use modulated carrier waves).

> Intellectual Ventures's proposed construction: does not offer a proposed construction and argues that the Board should construe "data burst" in accordance with its plain and ordinary meaning, which Intellectual Ventures defines as "a burst of data."

PO Resp. 17–18.

Ericsson supports its proposed construction with a definition from NEWTON'S TELECOM DICTIONARY. Pet. 18 (*citing* Ex. 1018); Reply 6 (*citing* Ex. 1032). Ericsson's construction is corroborated by the testimony of its expert, Dr. Haas. Ex. 1015 ¶ 34. Intellectual Ventures criticizes Ericsson's proposed construction as needlessly complicated. PO Resp. 17. Intellectual Ventures faults Ericsson for not identifying supporting intrinsic evidence; however, Intellectual Ventures fails to cite any intrinsic evidence of its own to controvert Ericsson's construction. *Id.*

Intellectual Venture's proposed construction merely reorders the words "data burst" to a "burst of data." PO Resp. 18. Grammatically converting "data" from an adjective to the object of a preposition does nothing to clarify the meaning of this term. Intellectual Ventures characterizes Ericsson's construction as unduly narrow. *Id.* at 17. This argument is conclusory in nature and fails to articulate how or why it does not comport with our broadest reasonable construction standard.

The term "data burst" appears in the specification of the '353 patent in twelve different places. The specification does not define "data burst" expressly. In column 6, the SCH (synchronization channel) is referred as to being treated identically to "the rest of the data burst." Ex. 1001, 6:21–22. Figure 3A depicts a "data burst construct 330" that is combined with SCH information 320 by combiner 310. Ex. 1001, 6:26–31. The output of combiner 310 is referred to as the "resultant data burst containing the SCH

information." *Id.* at 6:29. This "data burst" is then passed to the antenna for transmission. *Id.* at 6:33-34. After being transmitted, the data burst is received at the antenna. *Id.* at 6:38–39. Throughout the specification, the term "data burst" is used generically for a construct or entity that contains digital information that is processed for transmission at the transmitter, then transmitted via an antenna, then received via an antenna, and finally processed at the receiver.

Intellectual Ventures points to nothing in the specification that tends to differentiate a "data burst" from any other digital data construct or entity that is transmitted or received in a digital communications system. Neither are we able to discern that "data burst," as used in the specification, is anything other than a generic term used to describe a digital data communication of some finite duration.[15]

The broad and generic nature of the term "data burst" was confirmed by counsel during oral argument. When asked how to define "data burst" in a way that discriminated between a transmission that is a data burst and a transmission that is not a data burst, counsel for Intellectual Ventures responded that a "continuous transmission" is not a data burst. Tr. 73:8–23. Counsel did not dispute that packetized wireless transmissions constitute data bursts. Tr. 73:20–74:11. Counsel conceded that data bursts are

[15] We discern the limitation of finite duration from language in the specification and claims indicating that the transmission signals are divided into "portions" and that the first signal portion contains an indication of the bandwidth for the further signal portion which bandwidth is one of a plurality of bandwidths used for a further signal portion. *See e.g.*, Ex. 1001, claim 14.

"probably" inherent in McFarland (Ex. 1002) and Trompower (Ex. 1007). *Id.* 74:22–24.

On the present record, we modify our construction of "data burst" from our Decision to Institute. *See Jack Guttman, Inc. v. Kopykake Enters., Inc*., 302 F.3d 1352, 1361 (Fed. Cir. 2002) (courts may engage in a rolling claim construction, in which the court revisits and alters its interpretation of the terms as its understanding of the technology evolves). For purposes of this Decision, we construe "data burst" broadly to encompass any data transmission of limited or finite duration.[16] Thus, any communication system that segments a stream of information into packets or portions for transmission may be considered as employing "data bursts."

5. "synchronization," "synchronization signal" (claim 8, 30)

Neither party requested construction of these terms. Ericsson contends, nevertheless, that it is well known that synchronization is essential to digital communications systems. Reply 18 (citing Ex. 1001, Background section). Intellectual Ventures, in turn, argues that Shahar's timing and synchronization information is used to support multiple downstream modulation formats that are not supported by the disclosure of McFarland. PO Resp. 39.

The specification of the '353 patent discloses that prior art UMTS, Time Division Duplex, and Frequency Division Duplex systems provide a synchronization channel (SCH) that is used by user equipment to search for valid signals and perform a synchronization procedure. Ex. 1001, 1:30–34. Figure 3 of the '353 patent depicts a synchronization channel (SCH) 320 that

[16] In contrast to a lengthy and continuous transmission.

is processed by the same transmit and receive filters as the physical channels used to transport information having the same chip rate. *Id.* at 6:25–34.

Figure 4 shows the receiver/transmitter implementation of a multi-rate scheme. *Id.* at 7:24–25. In this example, the information in the synchronization channel (SCH) is transmitted at the low chip rate f_b so as to ensure that the SCH information can be recovered in the receiver by filtering at the same chip rate. *Id.* at 7:26–40. The SCH information is then encoded with the desired higher system chip rate f_c, after which the data portion is transmitted at such higher chip rate f_c. *Id.* The receiver is then configured in a corresponding manner to recover first the SCH channel information at the low chip rate f_b and the data portion is recovered at the higher chip rate f_c. *Id.* at 7:41–8:11.

The common English language definition of "synchronize" is "to cause (things) to agree in time or to make (things) happen at the same time and speed" and for "synchronization" is merely the "act or result of synchronizing." [17] The description of synchronization and synchronization channel in the specification of the '353 patent comports with the common English language meaning of the term. The specification does not define synchronization in any other manner, either expressly or by implication. *See Phillips*, 415 F.3d at 1321 (the specification may expressly define terms or define terms by implication). "In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily

[17] *Synchronize Definition*, LearnersDictionary.com, http://www.learnersdictionary.com/definition/synchronize (last visited Oct. 21, 2015). *Synchronization definition*, Merriam-Webster.com, http://www.merriam-webster.com/dictionary/synchronization (last visited Oct. 21, 2015).

apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips*, 415 F.3d at 1314. We think this is the case with how "synchronization" is used in the '353 patent. Thus, for purposes of this decision, we will construe the term synchronization in accordance with its plain and ordinary, common English language dictionary meaning, namely, "the result of making things happen at the same time and speed." Similarly, the "synchronization signal" is that portion of the first signal portion that provides information that allows the transmitter to transmit and the receiver to receive at the same rate.

6. "filter," "filter having a bandpass" (claims 15, 16)

In their respective Petition and Patent Owner's Response, neither party proposed a construction for the term "filter," which appears in claims 15 and 16. Claims 15 and 16 depend from claim 14. The filters of claims 15 and 16 are constituent elements of the "logic for receiving . . ." and "logic for recovering . . ." limitations of claim 14. Ericsson and Intellectual Ventures dispute whether McFarland satisfies the filter limitations of claims 15 and 16. *See, e.g.*, PO Resp. 31–33.

Ericsson's expert, Dr. Haas, testifies that, in his opinion, a person of ordinary skill in the art would have understood "filter" to mean "*a circuit that eliminates certain portions of a signal, by frequency, voltage, or some other parameter*." Ex. 1015 ¶ 35. Dr. Haas provides no accompanying exposition of the intrinsic record to support his construction. Intellectual Ventures's expert, Dr. Zeger, states that he takes no opinion as to whether Dr. Haas's construction is correct. Ex. 2006 ¶ 65. Dr. Zeger testifies that McFarland's Figure 8 embodiment does not eliminate portions of a signal

and, instead, zeroes out signal portions that input into the iFFT and FFT circuitry. *Id.* Dr. Zeger testifies that this is not a "filter" as defined by Dr. Haas.

The specification does not define "filter" expressly. It is abundantly clear, however, that the context in which "filter" is used in both the specification and the claims is in connection with the frequency bandwidth of a communication signal. *See IGT v. Bally Gaming Int'l, Inc*., 659 F.3d 1109, 1117 (Fed. Cir. 2011) (claim language must be construed in the context of the claim in which it appears).

The principle of claim construction that applies here was annunciated by the Federal Circuit in the case of *Renishaw PLC v. Marposs Societa' Per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998), namely, "if an apparatus claim recites a general structure (*e.g*., a noun) without limiting that structure to a specific subset of structures (*e.g*., with an adjective), we will generally construe the claim to cover all known types of that structure that are supported by the patent disclosure." In the instant case, the term "filter" is modified by the phrase "having a bandpass." *See* Ex. 1001, claim 15 ("filter having a bandpass"). In turn, the term "bandpass" is used in the context of a bandwidth. *Id.* ("*bandpass appropriate for the . . . bandwidth*"). We have previously construed bandwidth as "a frequency range." *See* above.

Taking the foregoing into account, we construe the term "*filter having a bandpass*" as a "*circuit that limits the frequency range that is transmitted or received*."

IV. OBVIOUSNESS OVER COMBINATIONS BASED ON MCFARLAND

Ericsson asserts that claims 9–20 and 29–34 would have been obvious over McFarland in combination with one or more secondary references. A patent is invalid for obviousness:

> if the differences between the subject matter sought to be patented 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.

35 U.S.C. § 103. Obviousness is a question of law based on underlying factual findings: (1) the scope and content of the prior art; (2) the differences between the claims and the prior art; (3) the level of ordinary skill in the art; and (4) objective indicia of nonobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Courts must consider all four *Graham* factors prior to reaching a conclusion regarding obviousness. *See Eurand, Inc. v. Mylan Pharms., Inc*. (*In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*), 676 F.3d 1063, 1076–77 (Fed. Cir. 2012). As the party challenging the patentability of the claims at issue, Ericsson bears the burden of proving obviousness by a preponderance of the evidence. *See* 35 U.S.C. § 316(e).

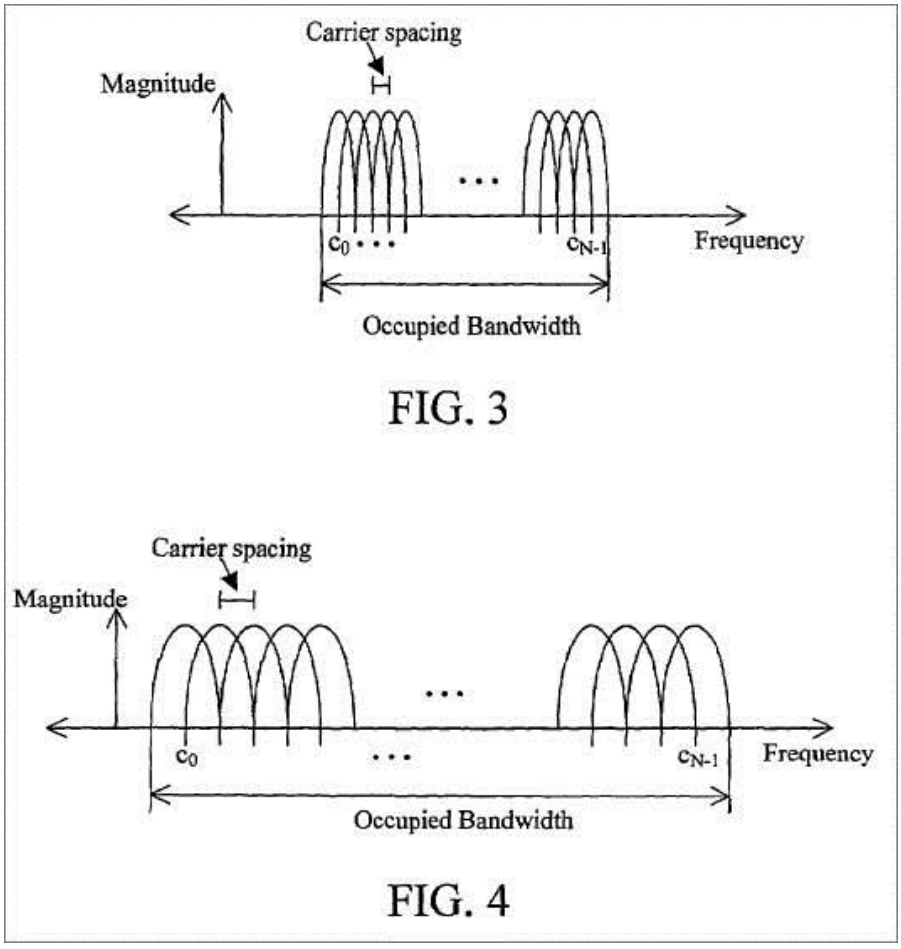
A. Scope and Content of the Prior Art

1. McFarland (Ex. 1002)

McFarland discloses a multi-carrier communication system that employs Orthogonal Frequency-Division Multiplexing ("OFDM"). Ex. 1002, Abstract. OFDM uses a relatively wide bandwidth communication channel and breaks it into many smaller frequency sub-

channels. *Id*. at 1:22–24. The narrower sub-channels are then used to transmit data simultaneously at a high rate. *Id*. at 1:24–25.

Figures 3 and 4 of McFarland are shown below.



Figures 3 and 4 depict a plurality of sub-channels identified as c_o to c_{N-1}. The figures further identify the spacing between the carrier frequencies of each channel. *See* label "Carrier spacing" The figures further show an "Occupied Bandwidth" as a function of frequency. As graphically illustrated in Figures 3 and 4, McFarland's specification explains that the Occupied Bandwidth of the system depicted in Figure 4 has twice the Occupied Bandwidth of the system depicted in Figure 3. Ex. 1002, 3:63–4:1.

McFarland's system is designed to vary and regulate the operational mode of a multi-carrier system. *Id.* at 3:9–19. In McFarland, an operational "mode" refers to the number of carriers, symbol rate, and occupied bandwidth for a particular transmission. *Id.* McFarland's system is designed to vary and regulate the operational mode on a packet-by-packet basis. *Id.*

McFarland packetizes its data transmission with a header that is sent and received at a base mode that all nodes expect at the beginning of each packet. *Id.* at 6:64–67. The header contains a field indicating the mode for the remainder of the packet. *Id.* at 6:67–7:1. When transmitting, the mode is adjusted on a packet-by-packet basis in order to take into account that different destinations may be through different channels with different bandwidths. *Id.* at 7:4–7.

2. van Nee (Ex. 1003)

Van Nee discloses a scalable OFDM system that is used in mobile, wireless communication devices. Ex. 1003, 1:38–61. Van Nee uses control circuitry to scale the transmission rate of an OFDM system by scaling signal duration, number of carriers, and the number of bits per symbol per carrier. *Id.* at 1:38–44.

Van Nee's system allows asymmetric data rates between mobile units and base stations. *Id.* at 2:11–18; 7:40–45. For example, the mobile units can have lower data rates than the base stations by allocating only a fraction of the total number of carriers to each mobile unit, while the base stations transmit at all carriers simultaneously. *Id.*

3. Shahar (Ex. 1004)

Shahar discloses an adaptive modulation scheme that allows switching the type of modulation used on wireless transmissions on a packet-by-packet basis. Ex. 1004, 2:14–18. Shahar provides for a carrier signal modulated with an information signal to be transmitted between two wireless devices. *Id.* at 2:30–32. Shahar's information signal comprises a header portion and a data portion. *Id.* at 2:32–34. The header portion includes information identifying a modulation type that is used to modulate the data portion of the signal. *Id.* at 2:35–38.

4. Richardson (Ex. 1005)

Richardson is an article published in the Electronics & Communication Engineering Journal that presents a general overview of UMTS technology. Ex. 1005. Section 7 describes the system architecture of UMTS Terrestrial Radio Access Network (UTRAN). Ex. 1005, 96. It explains that a UTRAN consists of one or more radio network subsystems that, in turn, consist of radio network controllers and Node-Bs. *Id*. at 96–97.

5. Dahlman (Ex. 1006)

Dahlman provides an introductory overview to UMTS technology. Ex. 1006. Among other things, Dahlman discloses improvements to second generation mobile communications that are achieved by third generation mobile communications technology. *Id.* at 70.

B. Differences Between the Prior Art and the Claimed Invention

1. Claim 9

Ericsson asserts that independent claim 9 is obvious over the combination of McFarland and van Nee. Pet. 18. Ericsson relies on van

Nee as disclosing a base station in a wireless communications system. Pet. 21. Intellectual Ventures focuses its case on alleged deficiencies in the McFarland reference. PO Resp. 18–27, 28–31, 35–36.

Intellectual Ventures argues that McFarland's "packet" is not a "signal" within the meaning of claim 9. PO 22–23. This argument is not persuasive. McFarland discloses transmitting packets of data. Ex. 1002, 3:16–19. The packets have headers that contain a field indicating the mode for the remainder of the packet. *Id.* at 6:64–7:3. The packets are transmitted in a multi-carrier communication system that uses frequency division multiplexing. *Id.*, Abstract. McFarland's specification is replete with references to its packet transmissions as signals. *Id.* at 6:31; 7:34–37 (referring to "bandwidth of the transmitted signal").

Intellectual Ventures relies on a technical argument that a packet is fundamentally different from a signal, but this argument is unavailing. PO Resp. 24–26. As we understand McFarland's OFDM system, at some point, packets of information containing a header and a data portion are multiplexed and then modulated onto carrier waves that are then transmitted between a transmitter and a receiver. The physical entity that exists in the wireless space between the transmitter and the receiver that conveys the information exists in the form of a modulated carrier wave that constitutes a "signal" as we have construed the term. At oral argument in a related proceeding, counsel for Intellectual Ventures conceded as much.[18]

[18] JUDGE CAPP: But you'll agree that once the packet is transmitted, that's part of the signal?

MR. HAMPTON: That's the signal, yes.

IPR2014-01031, Paper 39 (Oral Hearing Transcript), 58:21–23.

Intellectual Ventures next argues that McFarland's indication of an operating "mode" is distinguishable from an "indication of an operating bandwidth" recited in claim 9. PO Resp. 19. This argument is also unpersuasive. Intellectual Ventures's argument relies, in part, on a construction of "indication of an operating bandwidth" that we reject above.

In McFarland, an operational "mode" refers to the number of carriers, symbol rate, and occupied bandwidth for a particular transmission within the context of a frequency division multiplexing communication system. Ex. 1002, 3:9–19, Abstract. As illustrated by Figures 3–5, a mode that uses three carriers/sub-channels uses more occupied bandwidth than a mode that uses only two carriers/sub-channels. McFarland further provides that:

> A preferred approach might be to have a short header on the packet that would be in a base mode that all nodes could receive and would always expect at the beginning of the packet. Within that header would be an indication of which mode the remainder of the packet will be in. The receiver would then quickly switch modes to receive the remainder of the packet.

Id. at 6:64 –7:3. An "indication" of how many carriers/sub-channels will be used for the remainder of the packet is included in McFarland's packet header. *Id.* This follows from McFarland's disclosure that an "operating 'mode'" is a combination of symbol rate and numbers of carriers. *Id.* at 5:53–55.[19] A person of ordinary skill in the art would understand, from at least Figures 3–5 of McFarland, that specifying the number of carriers in a

[19] The fact that a McFarland mode includes both symbol rate and occupied bandwidth (number of carriers) is inconsequential to our analysis. Claims 6 and 28 each use open-ended "comprising" transitions. *See CIAS, Inc. v. Alliance Gaming Corp.*, 504 F.3d 1356, 1360 (Fed. Cir. 2007) ("In the patent claim context the term 'comprising' is well understood to mean 'including but not limited to.'").

mode of McFarland determines the occupied bandwidth of the signal, which is patentably indistinguishable from Intellectual Ventures's concept of an "operating bandwidth." Thus, McFarland's disclosure that a packet heading contains an "indication of which mode the remainder of the packet will be in" satisfies the limitations in claim 1 directed to an "indication of an operating bandwidth."

Intellectual Ventures argues that McFarland does not satisfy the limitations of claim 9 directed to identification of an operating bandwidth because McFarland's mode indication fails to specify carrier spacing. PO Resp. 20–21. Intellectual Ventures's counsel essentially repudiated this position at the oral hearing.

JUDGE CAPP: Mr. Hampton, in order for McFarland to work, when it transmits on subchannel 1, doesn't its receiver need to be tuned to the carrier frequency for subchannel 1?

MR. HAMPTON: Yes, as I understand it, it certainly needs to receive that carrier.

JUDGE CAPP: And you're not questioning whether McFarland actually works?

MR. HAMPTON: No.

JUDGE CAPP: So, then it has subchannel 2, which has a carrier frequency, and it receives at that carrier frequency and the same for subchannel 3 and so on. So, if the receiver knows what it's transmitting at for each of the carrier frequencies, how can you say that the receiver doesn't understand what the spacing is between the carriers?

MR. HAMPTON: Oh, I think it does. I don't know how else it would receive the signals.

Tr. 50:22–51:13.

Next, Intellectual Ventures argues that McFarland fails to account for "guard-band." PO Resp. 20–21. We are not persuaded that claim 9 contemplates either the inclusion or exclusion of a guard band. As admitted by Intellectual Ventures's expert, Dr. Zeger, a guard band is merely a band of frequency spectrum that serves as a buffer zone so that modulation will not leak into neighboring bands. Ex. 1030, 46:4–6. Thus, a guard band serves as a buffer to prevent interference between two neighboring communication channels. Inasmuch as a guard band exists as a buffer "between" two channels, there is no reason to include it "within" the frequency spectrum or "operating bandwidth" of either of the neighboring channels.

The term "guard band," *per se*, does not appear in either the specification or claims of the '353 patent. Intellectual Ventures has not identified any language in the specification that indicates or suggests that the concept of allocating a portion of the frequency spectrum for a "guard band" or analogous buffer zone is contemplated by the '353 patent's disclosure of "bandwidth" and, as we have previously observed, the specification nowhere uses the term "operating bandwidth." Neither does Intellectual Ventures identify any language in the specification or claims that is concerned with neighboring communication channels and/or providing a buffer between communication channels. Consequently, we reject Intellectual Ventures's "guard band" argument.

2. Claims 14 and 29

Claims 14 and 29 are independent claims that are substantially similar in scope, with the principal exception that claim 14 is an apparatus claim directed to a communication system and claim 29 is an apparatus claim

directed to a communication unit. Claims 14 and 29 differ in scope from independent claim 9 in that they also contain limitations directed to "logic for . . ." transmitting and/or receiving at claimed bandwidths. Ex. 1001, claims 9, 14, and 29.

Intellectual Ventures argues that McFarland lacks the "logic for" limitations in claims 14 and 29 of the '353 patent. PO Resp. 29–31, 35–36.[20] In particular, Intellectual Ventures argues that Ericsson fails to identify any circuitry for a receiver in McFarland that meets the limitation of "logic for recovering the indication" in claim 14. *Id.* at 29.

In Reply, Ericsson points to the following disclosure in McFarland:

> As can be seen from the similarity of the transmitting circuit and receiving circuits in FIGS. 1 and 2, almost any approach for changing the symbol rate at the transmitter can be used in a similar fashion at the receiver.

Ex. 1002, 4:21–25; Reply 15. Ericsson argues that a person of ordinary skill in the art, having read and understood McFarland's disclosure of a transmitter, would have been able to construct a corresponding receiver, due to the similarity between transmitters and receivers. Reply 16, Pet. 27–29. Ericsson's position is supported by declaration testimony from Dr. Haas. Ex. 1015 ¶¶ 44, 46.

McFarland discloses a number of ways to change the number of carriers in active use, thereby changing the occupied bandwidth of the system. Ex. 1002, 4:55–58. For example, Figure 8 of McFarland depicts an iFFT (inverse Fast Fourier Transform) processor. Ex. 1002, Fig. 8. McFarland explains that, in the Figure 8 embodiment, a subset of available

[20] Intellectual Ventures also repeats the same arguments advanced against Ericsson's challenge to independent claim 9. *Id.* Such arguments are equally unpersuasive when applied to claims 14 and 29.

carriers can be used by simply inputting zero magnitude signals on the carriers that are not used. *Id.* at 4:61–67. Similarly, Figure 9 depicts a circuit in which the iFFT processor itself has been designed to disable portions of its internal circuitry depending on how many carriers are active. *Id.* at 5:13–15, Fig. 9. In the embodiment of Figure 9, the serial-to-parallel and parallel-to-serial converters alter their operation so that they act only on carriers that will actually be used at a given time. *Id.* at 5:15–18. While Figures 8 and 9 depict transmitter circuitry, McFarland explains that almost any approach for changing the number of carriers at the transmitter can be used in a similar fashion in the receiver. *Id.* at 4:58–60. Dr. Haas provided an annotated version of Figure 2 to illustrate how the Figure 8 embodiment would be implemented on the receiver side. Ex. 1015 ¶ 44.

In view of the foregoing evidentiary presentation from Ericsson, we find unpersuasive Intellectual Ventures's arguments that McFarland fails to disclose receiver logic as claimed. An artisan must be presumed to know something about the art apart from what the references disclose. *See In re Jacoby*, 309 F.2d 513, 516 (CCPA 1962). Here, McFarland suggests that transmitters and receivers are sufficiently similar that a person of ordinary skill in the art who knows how to construct a transmitter in accordance with the Figure 8 and 9 embodiments would also be able to construct a corresponding receiver. Ex. 1002, 4:21–25. Intellectual Ventures presents neither evidence nor persuasive technical reasoning that casts doubt on McFarland's statement. Thus, we discern no material difference between the prior art and the claimed invention with respect to the "logic for . . ." limitations in claims 14 and 29.

3. Claims 10, 17, and 30

Claim 10 depends from claim 9, claim 17 depends from claim 14, and claim 30 depends from claim 29. Claims 10, 17, and 30 each add a limitation that the first predetermined bandwidth is lower than the indicated operating bandwidth. Ericsson asserts that these claims are obvious over the combination of McFarland and van Nee. Pet. 20. Intellectual Ventures alleges that Ericsson has not satisfied its burden to show that this limitation is disclosed in the prior art. PO Resp. 27–28, 35, and 36. We disagree.

Ericsson relies on McFarland as using a base mode of operation that all nodes support. Pet. 22, Ex. 1002, 7:45–51; *see also* 6:37–38. Such mode of operation is signaled in the header of the packet. Ex. 1002, 7:46. McFarland further discloses that, after initial communication is successful, the nodes can move to higher data rate modes. Pet. 25, Ex. 1002, 6:38–40.

Intellectual Ventures argues that Ericsson's Petition conflates the concepts of "data rate" and "bandwidth." PO Resp. 27. Intellectual Ventures argues that McFarland does not disclose that the higher data rate must correspond to a higher operating bandwidth and that it is possible for McFarland to achieve higher data rates at the same or lower operating bandwidths. *Id.* at 27 (citing Ex. 2006 ¶ 59 (Dr. Zeger)).

Intellectual Ventures's argument is not persuasive as it fails to contemplate the teachings of McFarland as a whole. McFarland discloses that nodes can transmit at a base mode, which all nodes can understand. Ex. 1002, 6:35–38. If communication at the base mode is successful, the nodes can move to more and more complex, and higher data rate, modes. *Id.* at 6:38–40. McFarland discloses that data rate can be increased by: (1) increasing the symbol rate, (2) increasing the number of carriers used, or

(3) a combination of increasing both the symbol rate and the number of carriers. *Id.* at 3:63–4:16. "For a given channel, there is an optimal occupied bandwidth, symbol rate, and thereby number of separate carriers. It is therefore beneficial to be able to vary both the symbol rate and the size of the iFFT processor according to the quality of the current channel." *Id.* at 4:12–16; *see also* 5:30–31 (it is possible to change the symbol rate and number of carriers simultaneously); *see also* 4:18–5:55 (discussing varying the symbol rate, varying the number of carriers, and controlling symbol rate and number of carriers). Intellectual Ventures may be correct that, in certain instances, McFarland may increase its data rate solely by increasing its symbol rate. However, McFarland also teaches that it may increase its data rate by using a greater number of channels and thus using a greater occupied bandwidth. *Id.* at 5:30–38 (doubling the symbol rate and doubling the number of carriers quadruples the data rate of the channel.) Thus, McFarland discloses the limitation of claims 10, 17, and 30 that the first predetermined bandwidth is lower than the indicated operating bandwidth.

4. Claims 12, 19, and 32

Claims 12, 19, and 32 depend from claims 9, 14, and 29 respectively and each adds a limitation directed to a wireless communication system. Ericsson contends that McFarland satisfies this limitation. Pet. 25, 32, 35. Intellectual Ventures does not dispute Ericsson's position that McFarland satisfies this dependent limitation. PO Resp. 28, 35, 37.

5. Claim 15

Claim 15 depends from claim 14 and contains a limitation that the logic for recovering the indication comprises a filter with a bandpass appropriate for the first predetermined bandwidth and the logic for

recovering information in the further signal portion comprises a filter with a bandpass that is appropriate for the indicated operating bandwidth. Ericsson presents testimony from Dr. Haas supported by an annotated version of McFarland's Figure 2 as evidence that McFarland discloses a filter that is appropriate for the first predetermined bandwidth. Pet. 30, Ex. 1015 ¶ 45. Ericsson presents testimony from Dr. Haas as evidence that McFarland's Figure 8 and 9 embodiments disclose a filter that is appropriate for the indicated operating bandwidth. Pet. 30–31, Ex. 1015 ¶ 46; *see also* Ex. 1031 ¶¶ 14–17.

Intellectual Ventures argues that McFarland's Figure 2 embodiment fails to satisfy the first dependent limitation in claim 15 directed to a filter with a bandpass appropriate for the first predetermined bandwidth. PO Resp. 32. Intellectual Ventures argues that the Figure 2 embodiment is not a multi-bandwidth receiver because it operates in fixed bandwidth systems. PO Resp. 32 (citing Ex. 2006 ¶ 64 (Dr. Zeger)).

Intellectual Ventures next argues that McFarland's Figure 8 embodiment fails to satisfy the second dependent limitation in claim 15 directed to a filter with a bandpass appropriate for the indicated operating mode. PO Resp. 32 (citing Ex. 2006 ¶ 65 (Dr. Zeger)). According to Intellectual Ventures, the iFFT and FFT circuitry of the Figure 8 embodiment of McFarland does not eliminate portions of the signal and, instead, merely "zero out" certain carriers prior to being input into the iFFT and FFT circuitry. *Id.*

We think that Ericsson's position is the correct one. McFarland discloses varying the "occupied bandwidth" of a multi-carrier system. Ex. 1002, 3:3–20 ("dynamically changing the number of carriers . . . and

occupied bandwidth"). McFarland discloses that, for a given channel, there is an optimum occupied bandwidth, symbol rate, and thereby number of separate carriers. *Id.* at 4:12–13. McFarland repeatedly characterizes changing the number of carriers with changing the occupied bandwidth:

> It is also possible to change the symbol rate and the number of carriers simultaneously. For example, if the channel could allow both a doubling of the symbol rate (due to low time delay in the multi-path echoes), and a quadrupling of the occupied bandwidth (due to an exceptionally broad channel or few other users to share with), it would make sense to simultaneously double the number of carriers and the symbol rate. These changes taken together would allow a quadrupling of the data rate in the channel.

Id. at 5:30–38. McFarland discloses that there are a number of ways to change the number of carriers in "active use." *Id.* at 4:55–56. The embodiments disclosed in Figures 8 and 9 are two such ways to change the number of carriers in active use. *Id.* at 4:61–5:29.

We find that McFarland's Figure 8 and Figure 9 embodiments satisfy the "filter having a bandpass" limitations in claim 15. Although Figures 8 and 9 depict transmitter circuitry, we further find that McFarland's disclosure that "any approach for changing the number of carriers at the transmitter can be used in a similar fashion at the receiver" (*id*. at 4:58–60) is sufficient to satisfy the "for receiving" limitation in claim 14 and the "for recovering" limitations of claims 14 and 15.

6. Claim 16

Claim 16 depends from claim 15 and adds a limitation that the respective filter(s) "are reconfigurable." Ericsson relies on the filter(s) of the corresponding receiver to McFarland's Figure 8 transmitter as satisfying

this limitation. Pet. 31. According to Ericsson, the requisite reconfiguration is accomplished by adjusting the number of carriers set to zero. *Id*. at 31–32.

Intellectual Ventures argues that McFarland does not satisfy the claim 16 limitation. PO Resp. 34. According to Intellectual Ventures, claim 16 requires two distinct filters, each of which is reconfigurable. *Id.*

Claim 16 states that the filter(s) "*are*" reconfigurable. Use of the verb "are" ordinarily connotes a plurality of items whereas the verb "is" ordinarily connotes a single item. However, when the claim is read as a whole, and in the context of the Specification, it is broad enough to cover both Intellectual Ventures's two filters interpretation and an interpretation that the filter for the first bandwidth and the filter for the operating bandwidth are one and the same filter. An embodiment where a single filter is reconfigured between a first configuration for the first bandwidth and a second configuration for the operating bandwidth is disclosed expressly in the specification. Ex. 1001, 5:26–31.[21]

> [I]n the case where a different chip-rate is available for the physical channel that is used to transport data, it is necessary to provide different filters (or to differently configure the filter(s)) for the SCH channel and the physical channels used to transport the data. Such different filters, or *re-configuration of the same filter(s)*, may be implemented . . . .

Id. at 6:54–60 (emphasis added).

Ericsson argues that, if Intellectual Ventures had genuinely intended claim 16 to require two distinct filters, it would have used the phraseology "a first filter" and "a second filter." Reply 16. Ericsson argues that Intellectual Ventures's chosen form of expression is intended to simultaneously cover two, alternative embodiments, one embodiment where

[21] The specification also discloses embodiments that use two filters. *Id.*

there is one reconfigurable filter, and another embodiment that has two reconfigurable filters. *Id.* at 17.

> We agree with Ericsson. In our Decision to Institute, we stated that:
>
> we are persuaded that the claim language does not preclude the use of a single, common filter that can be used in the logic for recovering the first signal portion, as well as the logic for recovering the further signal portion.

DI, 14. We maintain this construction on the full record.

We find that McFarland discloses a reconfigurable filter within the meaning of claim 16.

7. Differences between Claims 11, 18, and 31 and the combination of McFarland, van Nee, and Shahar

Claims 11, 18, and 31 depend from claims 9, 14, and 29 respectively and add limitations directed to a signal comprising a data burst and the first signal portion comprising a synchronization signal. Ex. 1001. Ericsson relies on Shahar as disclosing these limitations. Pet. 35 (citing Ex. 1004, 13:21–51, Fig. 4A).

Intellectual Ventures argues that Shahar fails to disclose a "data burst." PO Resp. 37. We disagree.

Shahar discloses transmitting a data packet 220 comprised of a header 240 and a data field 250. Ex. 1004, Fig. 3. The header 240 contains information relating to modulation type 300, length 310, fixed pattern 330, and forward error correction (FEC) 340. *Id.* at Fig. 4, 13:21–35. The fixed pattern field 330 provides timing and synchronization information for the wireless modem. *Id.* at 13:29–31. Shahar varies all parameters involved in the modulation and transmission of a communication including the symbol rate. *Id.* at 13:42–51. This disclosure is sufficient to establish that Shahar

transmits "data bursts" as we have construed the term above. Other than pointing out that Shahar fails to use the term "data burst," in so many words, Intellectual Ventures provides no persuasive technical reasoning as to why a person of ordinary skill in the art would not understand Shahar's transmission of packets as data bursts. *See In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009) (a reference need not satisfy an *ipsissimis verbis* test).[22]

8. Differences between Claim 13, 20, and 33 and the combination of McFarland, van Nee, and Dahlman (Ex. 1006)

Claims 13, 20, and 33 depend from claims 12, 19, and 32 respectively and each claim contains a limitation that the wireless communication system is a UMTS system. Ex. 1001, claims 12, 13, 19, 20, 32, and 33. Ericsson relies on Dahlman as disclosing the dependent limitation. Pet. 37. Intellectual Ventures does not dispute Ericsson's contention that Dahlman discloses a UMTS wireless network.

9. Differences between Claims 34 and the combination of McFarland, van Nee, and Richardson (Ex. 1005)

Claim 34 depends directly from claim 29 and contains a limitation the communication unit is a node B. Ex. 1001, claim 34. Ericsson relies on Richardson as disclosing this limitation. Pet. 38–39. Intellectual Ventures does not dispute Ericsson's contention that Richardson discloses a Node-B unit.

[22] We also find that McFarland's disclosure of wireless transmission using data packets with a header and data portion satisfies our construction of a "data burst." Ex. 1002, Abstract; *see also* Tr. 73:20–74:11, where Counsel for Intellectual Ventures concedes that data bursts are "probably" inherent in McFarland.

C. Person of Ordinary Skill in the Art

Ericsson's Petition does not provide an evidentiary based description of a person of ordinary skill in the art. Nevertheless, Ericsson asserts that the combination of elements recited in the claims of the '353 patent would have been obvious to a person of ordinary skill. Pet. 9–10. Ericsson's expert, Dr. Haas, testifies that a person of ordinary skill would have had a B.S. degree in Electrical Engineering, Computer Engineering, Computer Science, or equivalent training, as well as 3–5 years of experience in the field of digital communications systems, such as wireless cellular communication systems and networks. Ex. 1015 ¶¶ 4, 36. According to Dr. Haas, such a person would have been familiar with well-known communication techniques such as OFDM. *Id.* Such a person would also know how to apply such different techniques to communication systems and networks, including UMTS networks. *Id.*

Intellectual Ventures does not provide an evidentiary based description of a person of ordinary skill in the art. Intellectual Ventures nevertheless contends that a person of ordinary skill in the art would understand and construe all of the disputed claims in accordance with Intellectual Ventures's proposed constructions. *See e.g.*, PO Resp. 6. Intellectual Ventures's expert, Dr. Zeger, testifies that he was asked to consider the patent claims through the eyes of a person of ordinary skill in the art and that he was told by counsel to consider factors such as the educational level and years of experience of those working in the pertinent art; the types of problems encountered in the art; the teachings of the prior art; patents and publications of other persons or companies; and the sophistication of the technology. Ex. 2006 ¶ 24. Dr. Zeger testifies that

counsel told him that Intellectual Ventures has taken the position in related district court litigation that a person of ordinary skill in the art would have earned a Bachelor's Degree in Electrical Engineering or a related field and would also have 2–3 years of experience in the wireless communications field. *Id.* ¶ 25. Dr. Zeger testifies that he has an understanding of the capability of a person of ordinary skill in the art and that he has trained, supervised, directed, and worked alongside such persons. *Id.* ¶ 26.

Neither party presents a detailed evidentiary showing under the factors recited in *Environmental Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 696–97 (Fed. Cir. 1983).[23] Notwithstanding the scant evidence on skill level presented by the parties, the level of skill in the art often can be determined from a review of the prior art. *See Litton Indus. Products, Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163–64 (Fed. Cir. 1985).

Based on our review of the prior art, the applicable field of endeavor is wireless telecommunications. The person of ordinary skill in this field would have been generally familiar with transmitting information using packets that included a header portion and a data portion. Ex. 1002, 6:64–7:3. The person of ordinary skill in the art would have been familiar with techniques for varying the signal rate and the occupied bandwidth of a signal

[23] Factors pertinent to a determination of the level of ordinary skill in the art include: (1) educational level of the inventor; (2) type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) educational level of workers active in the field. Not all such factors may be present in every case, and one or more of these or other factors may predominate in a particular case. *See id.* These factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art. *See Daiichi Sankyo Co., Ltd. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

on a packet-by-packet basis. *Id.* at 7:4–15. The ordinarily skilled artisan also would have been familiar with the fundamentals of OFDM communications technology. *Id.* 1:18–2:61. Such fundamentals of OFDM communications would have included synchronizing the timing and frequency of OFDM signals. Ex. 1003, 7:1–8, 9:1–23. The skilled artisan also would have been familiar with the basic principles underlying spread spectrum communication technology. Ex. 1007, Abstract. Such an artisan would have been familiar with modulating carrier waves, varying the modulation scheme used in different packet/signals, and synchronizing the modulation scheme between a transmitter and a receiver. Ex. 1004, 2:14–18; 10:48–11:3. The person of ordinary skill in the art would also have familiarity with using Node-Bs in a UMTS environment. Ex. 1005; Ex. 1006.

D. Secondary Considerations of Non-Obviousness

Evidence of secondary considerations of non-obviousness, when present, must always be considered en route to a determination of obviousness. *See Cyclobenzaprine*, 676 F.3d at 1075–76. However, the absence of secondary considerations is a neutral factor. *See Custom Acc., Inc., Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 960 (Fed. Cir. 1986). Neither party introduced evidence on secondary considerations of non-obviousness. Consequently, we will focus our attention on the first three *Graham* factors.

E. Whether the Prior Art Could Have Been Combined and/or Modified to Achieve the Claimed Invention

The Supreme Court instructs courts to take an expansive and flexible approach in determining whether a patented invention was obvious at the time it was made. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 415

(2007). The existence of a reason for a person of ordinary skill in the art to modify a prior art reference is a question of fact. *See In re Constr. Equip. Co.*, 665 F.3d 1254, 1255 (Fed. Cir. 2011). In an obviousness analysis, some kind of reason must be shown as to why a person of ordinary skill would have thought of combining or modifying the prior art to achieve the patented invention. *See Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1374 (Fed. Cir. 2008). A reason to combine or modify the prior art may be found explicitly or implicitly in market forces; design incentives; the "'interrelated teachings of multiple patents'"; "'any need or problem known in the field of endeavor at the time of invention and addressed by the patent'"; and the background knowledge, creativity, and common sense of the person of ordinary skill. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328–29 (Fed. Cir. 2009) (quoting *KSR*, 550 U.S. at 418–21).

1. Claims 9, 10, 12, 14–17, 19, 29, 30, and 32 over the Combination of McFarland and van Nee

Ericsson asserts that a person of ordinary skill in the art would have recognized that van Nee's base station may be used as the transmitter in McFarland's communication system for the similar function of wirelessly transmitting signals. Pet. 21, 26. Ericsson further contends that it would have been obvious to one of ordinary skill in the art to apply the known technique of using a base station, as taught by van Nee, to the communication system of McFarland as such would have yielded a predictable result. *Id*. Ericsson supports its position with testimony from Dr. Haas. *Id.* (citing Ex. 1015 ¶¶ 48, 49).

Intellectual Ventures offers a conclusory statement that the Petition does not provide sufficient rationale as to why or how the references should

be combined. PO Resp. 18. Otherwise, Intellectual Ventures does not present evidence or argument in an attempt to controvert Ericsson's position on the combinability of McFarland and van Nee.

2. Claims 11, 18, and 31 over the Combination of McFarland, van Nee, and Shahar

Ericsson asserts that a person of ordinary skill in the art would have recognized that Shahar's header field may be used in McFarland to provide time and synchronization information in McFarland's OFDM system. Pet. 35. Ericsson further contends that it would have been obvious to one of ordinary skill in the art to apply the known technique of using synchronization information in a header of an OFDM data burst, as taught by Shahar, to the header of McFarland to yield a predictable result. *Id.* at 36. Ericsson supports its position with testimony from Dr. Haas. *Id.* at 35 (citing Ex. 1015 ¶ 50).

Intellectual Ventures contends that Ericsson's evidence of combinability is insufficient. PO Resp. 38. Intellectual Ventures contends that Ericsson fails to explain how or why one of ordinary skill in the art would have combined McFarland and Shahar. *Id*. Intellectual Ventures further contends that a person of ordinary skill in the art would not have combined Shahar and McFarland, because Shahar teaches that the purpose of its timing and synchronization information is to facilitate multiple downstream modulation types. *Id*. at 39. Intellectual Ventures argues that McFarland does not have multiple downstream modulation types. *Id.*

Intellectual Ventures presents neither evidence nor persuasive technical reasoning to controvert Ericsson's position that incorporating Shahar's modulation and synchronization techniques into McFarland would

have yielded a predictable result. Intellectual Ventures presents testimony from Dr. Zeger to the effect that there would have been no need to use Shahar's synchronization in McFarland because McFarland does not use multiple downstream modulation formats. Ex. 2006 ¶ 68. This testimony is not persuasive because it ignores Ericsson's evidence that Shahar and McFarland, when combined, would use multiple modulation formats and, therefore, would also use synchronization techniques associated therewith. Moreover, Intellectual Ventures presents no evidence that incorporating the multiple modulation formats and associated synchronization techniques of Shahar into McFarland would require anything more than the exercise of ordinary skill.

Moreover, in addition to teaching synchronization among modulation schemes, Shahar can also be read as teaching synchronization in a more general sense. "A reference may be read for all that it teaches, including uses beyond its primary purpose." *In re Mouttet*, 686 F.3d 1322, 1331 (Fed. Cir. 2012) (citing *KSR*, 550 U.S. at 418–21). Here, the prior art already recognized the need for synchronization in wireless communications. *See* Ex. 1001, 1:22–23 ("It is known that synchronization is an essential procedure in a modern digital communication system"); Ex. 1003, 7:1–8; Ex. 1002, 4:18–26. We are persuaded that a person of ordinary skill in the art would have been able to adapt Shahar's teaching of synchronization to the wireless system of McFarland and would have had good reason to do so. *See KSR*, 550 U.S. at 420 (any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed).

Furthermore, there is nothing in claims 11, 18, or 31 that requires that the claimed synchronization necessarily is used to synchronize between or among various modulation schemes. The '353 patent acknowledges that it is known that synchronization is an essential procedure in a modern digital communication system. Ex. 1001, 1:22–23. It further acknowledges that synchronization is the procedure used by a remote unit to align the remote frequency reference and timing to that used by the system infrastructure. *Id.* at 1:23–29.

In McFarland, an operating mode contemplates a combination of symbol rate and number of carriers. Ex. 1002, 5:53–55. McFarland discloses that a packet has a short header that is transmitted in the base mode that all nodes can receive and would always expect at the beginning of the packet. *Id.* at 6:64–67. Within the header is an indication of which mode the remainder of the packet will be in. *Id.* at 6:67–7:1. The receiver then switches modes to receive the remainder of the packet. *Id.* at 7:1–3. Thus, according to McFarland, the indication of operating mode not only includes information as to the number of carriers that will be used, which corresponds to the occupied bandwidth, but it also includes information as to the "symbol rate" that will be used for the data portion of the packet.

Column 4 of McFarland contains a sub-section entitled "Variable Symbol Rate" which explains that many methods are known in the art to change the symbol rate of a multi-carrier system. *Id.* at 4:18–20. It further explains that almost any approach for changing the symbol rate at the transmitter can be used in a similar fashion at the receiver. *Id.* at 4:24–26. Among other things, it teaches that the symbol rates can be changed between packets or even within packets. *Id.* at 4:48–50. Thus, it appears that one of

the functions of the header in McFarland is to coordinate the symbol rate for the data portion of the packet between the transmitter and the receiver. This meets the definition of synchronization as we have construed the term.

In view of the fact that the prior art recognized a need for synchronization and further in view of McFarland's disclosure that its operating mode includes symbol rate information, we agree with Ericsson that Shahar can be combined with McFarland so that McFarland's OFDM system can support multiple modulation formats that are synchronized in accordance with the teaching of Shahar.

3. Claims 13, 20, and 33 over the Combination of McFarland, van Nee, and Dahlman

Ericsson asserts that a person of ordinary skill in the art would have found it obvious to combine the UMTS system of Dahlman with McFarland and van Nee. Pet. 37–38. According to Ericsson's expert, Dr. Haas, such would have merely entailed applying the known technique of using UMTS technology, as taught by Dahlman, in the wireless system of McFarland thereby yielding a predictable result. *Id.* (citing Ex. 1015 ¶ 52).

Intellectual Ventures argues that Ericsson fails to provide a rational underpinning for combining Dahlman with McFarland. PO Resp. 40. Intellectual Ventures contends that Ericsson fails to explain how or why someone with ordinary skill would have combined McFarland and Dahlman. *Id*.

Intellectual Ventures argues that Dahlman's UMTS system does not operate to vary a number of carriers and symbol rates. PO Resp. 40. Intellectual Ventures essentially argues that McFarland discloses the use of OFDM technology and Dahlman discloses the use of spread spectrum

technology that uses a single carrier and suggests that the two technologies are incompatible. *Id.*

In Reply, Ericsson argues that evolving cellular standards, such as UMTS, to accommodate improved techniques is commonplace in the wireless communication industry. As an example, Ericsson points to the predecessor to UMTS, known as GSM, which was improved to incorporate UMTS technology. Reply 19 (citing Ex. 1006, 71).

Intellectual Ventures's arguments are not persuasive. They amount to an attack on the applied references individually. However, it is well settled that non-obviousness cannot be established by attacking references individually where the basis for obviousness is the combined teachings of the references. *See In re Merck & Co., Inc.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986); *In re Keller*, 642 F.2d 413, 425 (CCPA 1981).

Furthermore, we think that adoption of UMTS technology in the marketplace provides a sufficient design incentive to adapt the teachings of McFarland to the particular product application (UMTS) disclosed by Dahlman. "When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability." *KSR*, 550 U.S. at 417. Here, Ericsson presents testimony from Dr. Haas that combining Dahlman with McFarland and van Nee entails nothing more than applying a known technique to yield a predictable result. Ex. 1015 ¶ 52. In other words, the combination of McFarland and Dahlman is nothing more than a predictable variation of McFarland. Intellectual Ventures presents no persuasive evidence or technical reasoning that adapting UMTS technology

from a single carrier, spread spectrum system to a multi-carrier OFDM system requires anything more than ordinary skill. We think that Ericsson has demonstrated sufficiently that a person of ordinary skill in the art would have been able to combine Dahlman with McFarland and would have had ample reason to do so.

4. Claim 34 over the Combination of McFarland, van Nee, and Richardson

Ericsson asserts that it would have been obvious to use Richardson's UMTS Node B base station in McFarland's wireless network. Pet. 39. According to Ericsson, using a Richardson Node B base station in McFarland amounts to merely applying a known technique to yield a predictable result. *Id.* Ericsson relies on opinion testimony from Dr. Haas to supports its assertion. *Id.* (citing Ex. 1015 ¶¶ 47, 51).

In opposing Ericsson's challenge, Intellectual Ventures makes substantially the same arguments with respect to Richardson and UMTS technology that we have previously considered above with respect to Dahlman and UMTS technology. PO Resp. 41–42. We find them equally unpersuasive here for essentially the same reasons.

F. Ultimate Conclusion of Obviousness

After considering all of the underlying factual considerations, the ultimate conclusion of obviousness is a question of law. *See Pfizer, Inc. v. Apotex, Inc*., 480 F.3d 1348, 1359 (Fed. Cir. 2007). "[T]he great challenge of the obviousness judgment is proceeding without any hint of hindsight." *Star Scientific, Inc., v. R.J. Reynolds Tobacco Co*., 655 F.3d 1364, 1375 (Fed. Cir. 2011). After considering Ericsson's obviousness presentation under the *Graham* factors and Ericsson's evidence on how or why a person

of ordinary skill in the art would have modified or combined the prior art to achieve the claimed invention, we conclude that Ericsson has established, by a preponderance of the evidence, that claims 9–20 and 29–34 of the '353 Patent are unpatentable as obvious over the proposed combinations of references based on McFarland.

V. OBVIOUSNESS OVER COMBINATIONS BASED ON TROMPOWER

A. Scope and Content of the Prior Art

1. Trompower (Ex. 1007)

Trompower discloses a wireless, cellular communication system. Ex. 1007, 5:34–52. Trompower's system contemplates a plurality of mobile terminals and a plurality of base stations. *Id.* The base stations may be connected to a hardwired network backbone. *Id.* Each base station can transmit and receive data. *Id.* The mobile terminal and the base station can adjust the PN code length and the chipping rate used between them depending on the surrounding conditions to increase the transmission rate. *Id.* Trompower's system also can adjust to other cellular communication system parameters such as different modulation schemes. *Id.*

Trompower explains that when a mobile terminal and a base station are in need of a fast data transmission rate and conditions otherwise permit, the mobile unit and base station may select a PN code having a relatively rapid chipping rate value (*e.g.*, 22 MHz). *Id.* at 6:27–31. If the spectral bandwidth needs to be decreased due to, among other reasons, excessive noise on closely situated frequency bands, the mobile units and base stations may decrease the chipping rate (*e.g.*, to 11 MHz) to decrease the required transmission bandwidth. *Id.* at 6:32–36.

Trompower discloses that transmitted packets begin with a header that is transmitted at a mid or slow data rate. *Id.* at 16:30–32, Fig. 3A. Trompower's packets include overhead bits in the form of a header 302 and a plurality of data bits 304. *Id.* at 16:36–38. The header may be transmitted at a mid or slow rate, while the data portion is transferred at a fast, mid or slow rate. *Id.* at 16:38–42. The header 302 includes receiver system setup data signifying the data rate at which the data bits 304 will be transmitted. *Id.* at 16:44–46. The packet also contains synchronization bits between the header and data portion to provide the receiver time to reconfigure itself to the data transmission rate of the data bits. *Id.* at 16:46–49. Trompower's system is designed to operate using PN codes of two different lengths. One PN code has an 11 chip PN code length and the other PN code has a 22 chip PN code length. *Id.* at 16:65–17:11.

Trompower discloses that its transmitter system 610 and receiver system 620 of the base station 210, wireless base station 215, and mobile terminal 230 will adjust their parameters in order to optimize the system. *Id.* at 30:22–25. Trompower discloses a variety of embodiments that the transmitter and receiver system may use in adjusting the system's data rates. *Id.* at 30:26–28.

In one such embodiment, Trompower discloses a controllable receiver 810*b* that includes demodulator 814, filter 816, adjustable PN code sequencer 818 and correlator 819. *Id.* at 33:28–37. In operation, the demodulator 814 receives the modulated PN coded signal from the transmitter system 610. *Id.* at 33:37–39. The demodulator demodulates the PN coded signal from the carrier frequency and forwards the PN coded signal to the filter 816. *Id.* at 33:39–41. Prior to receiving the PN coded

signal, the filter 816 receives the PN code chipping rate value signal from the microprocessor 730 and adjusts its spectral bandwidth based on the PN code chipping rate value received. *Id.* at 33:42–45. Upon receipt of the PN coded signal, the filter 816 then filters the PN coded signal and forwards the filtered PN coded signal to the correlator 819. *Id.* at 33:45–48.

2. Yamaura (Ex. 1008)

Yamaura discloses a spread spectrum communication system and transmitter-receiver. Ex. 1008, Abstract. Yamaura's base station monitors the amount of its traffic to and from each terminal and its base station and instructs its terminals when to change bandwidth, according to what timing, and by how much. *Id.* at 8:49–51; 9:20–23.

B. Differences Between the Prior Art and the Claimed Invention

1. Claim 9

Intellectual Ventures argues that Trompower's "packet" is not a "signal" within the meaning of claims 6 and 28. PO Resp. 48–49. We find this argument unpersuasive for the same reasons we discussed above with respect to the McFarland reference. Trompower wirelessly transmits data packets using modulation techniques. Ex. 1007, Abstract. Intellectual Ventures admits that Trompower's chips are transmitted by modulating a carrier signal. PO Resp. 45. This is sufficient to establish that Trompower discloses a "signal."

Intellectual Ventures next argues that Trompower fails to satisfy the limitation in claim 9 directed to "an indication of an operating bandwidth." PO Resp. 43–47. Intellectual Ventures argues that Trompower merely discloses that its header 302 includes data rate information. *Id.* at 44. Intellectual Ventures argues that data rate and bandwidth are distinct

concepts and that indication of a data rate does not also indicate a bandwidth. *Id.* at 44–45. Intellectual Ventures cites, by way of example, to Table 1 of Trompower where the fast, mid, and slow rates are all indicated as being transmitted at a chip rate of 11 MHz. PO Resp. 46 (citing Ex. 15:47–55). Based on this disclosure in Trompower, Intellectual Ventures argues that "because bandwidth will not change if there is no change in chip rate," Trompower's Fast, Mid, and Slow data rates all have the same bandwidth. PO Resp. 46.

Intellectual Ventures argues that Trompower fails to disclose an embodiment that adjusts the chipping rate based on setup data in the header of a packet. *Id.* at 46–47. Intellectual Ventures supports this argument with declaration testimony from Dr. Zeger. *Id.* (citing Ex. 2006 ¶ 74). This testimony, in light of the teachings of Trompower as a whole, lacks credibility.

Ericsson's expert, Dr. Haas, testifies that, in Trompower, transmitting a given chipping rate corresponds to transmitting at a given bandwidth, because Trompower's bandwidth directly corresponds to chipping rate. Ex. 1015 ¶ 57 (citing Ex. 1007 at 6:28–39). Dr. Haas observes that Trompower discloses a mobile terminal and base station that can adjust the chipping rate to increase the transmission rate. Ex. 1015 ¶ 55 (citing Ex. 1007, 5:41–46). Dr. Haas interprets Trompower as disclosing a header that is transmitted at a predetermined data rate and a data portion that is selected from the plurality of available fast, mid, or slow data rates. *Id.* ¶ 56. Dr. Haas further testifies that Trompower discloses that a receiver, in response to signifying data contained in a header, reconfigures the receiver circuitry to receive data bits at an indicated data rate. *Id.* ¶ 60.

Thus, the parties do not dispute that Trompower transmits a header (or first signal portion) at a predetermined data rate that contains an indication of the data rate that will be used to transmit data portion of a packet. The parties also agree that Trompower's receiver is able to receive the indication of data rate in the header and then reconfigure the receiver to receive the data portion (further signal portion) at the data rate indicated in the header. The point of disagreement between the parties is whether the data rate indication in Trompower's header also contemplates an indication of the spectral bandwidth at which the data portion will be received. Ericsson contends that, because data rate indication in the header also contemplates an indication of chipping rate, it necessarily also encompasses an indication of spectral bandwidth. Pet. 43–45. Ericsson supports its position with testimony from Dr. Haas. *Id.* (citing Ex. 1015 ¶¶ 58–60). Intellectual Ventures contends that, while Trompower's header contains an indication of data rate, such variation in data rate all occurs at the same spectral bandwidth. PO Resp. 46.

We think that Ericsson's position is correct. Trompower discloses that: "[f]or a given communication . . . the mobile terminal and the base station can adjust the PN code length *and the chipping rate*." Ex. 1007, 5:42–44 (emphasis added); Ex. 1015 ¶ 49. Dr. Haas's testimony at paragraphs 58–60 of his declaration is corroborated by statements in Trompower that the system can increase or decrease its spectral bandwidth depending on conditions. Ex. 1007, 6:27–39.

> The demodulator **814** demodulates the PN coded signal from the carrier frequency and forwards the PN coded signal to the filter **816**. Prior to receiving the PN coded signal, the filter **816** *receives the PN code chipping rate value signal* from the

> microprocessor **730** and *adjusts its spectral bandwidth* based on the PN code chipping rate value received.

Ex. 1007, 33:39–45 (emphasis added). We infer, from reading the entire disclosure of Trompower, that the PN code chipping rate value discussed in the preceding passage is delivered in the packet header. Thus, we agree with Ericsson that there is no material difference between the prior art and claimed invention with respect to the "indication of an operating bandwidth" limitation in claim 9.

Intellectual Ventures next argues that the prior art does not disclose the "at infrastructure equipment" limitation in claim 9. PO Resp. 49–50. Ericsson's Petition alleges that Trompower's base station can select a data rate and act as the transmitter. Pet. 41 (citing Ex. 1015 ¶¶ 53–55 (Dr. Haas)). Ericsson also alleges that Yamaura's base station is capable of transmitting instructions for varying the chip rate to a mobile terminal. Pet. 41 (citing Ex. 1015 ¶ 65 (Dr. Haas)).

Intellectual Ventures argues that, in Trompower, the data rate is determined by the mobile terminals and that the base station merely responds to the data rate indication that it receives from a mobile terminal. PO Resp. 50. Consequently, according to Intellectual Ventures, Trompower's base station does not "transmit" a signal with first signal portion at a first bandwidth and a further signal portion at an operating bandwidth as claimed. *Id.*

In reply, Ericsson argues that, in Trompower, either the base station or the mobile terminal may be the transmitting component. Reply 22 (citing Ex. 1015 ¶ 64 (Dr. Haas)). Furthermore, Ericsson points out that Yamaura discloses that the base station instructs its terminals when to change

bandwidth. *Id.* (citing Ex. 1008, 9:20–23). The cited portion of Yamaura states that, in certain circumstances: "the base station instructs its terminals when to change bandwidth." Ex. 1008, 9:21–22. Based on the foregoing evidence, we find that the prior art satisfies the "at infrastructure equipment" limitation of claim 9.

2. Claims 14 and 29

Claims 14 and 29 are independent claims that differ in scope from claim 9 in that they do not have "at infrastructure equipment" limitations, but add limitations directed to logic for transmitting and receiving at various bandwidths. Ex. 1001. For claims 14 and 29, Intellectual Ventures repeats that same arguments for the "signal" and "indicated bandwidth" limitations that we found unpersuasive with respect to claim 9 and find equally unpersuasive with respect to claims 14 and 29.

3. Claims 10, 17, and 30

Intellectual Ventures contends that Trompower fails to disclose the "lower . . . bandwidth" limitation of claims 10, 17, or 30. PO Resp. 51, 54, 56. As discussed in more detail with respect to claims 9, 14, and 29 above, we are persuaded that the evidence presented by Ericsson establishes that Trompower can transmit and receive a header at 11 MHz and a data portion at 22 MHz. Accordingly, we do not find a material difference between the prior art and the claimed invention regarding the "lower" bandwidth limitation of claims 10, 17, and 30.

4. Claims 12, 19, and 32

Ericsson alleges and Intellectual Ventures does not dispute, that the prior art satisfies the "wireless communications system" limitations of claims 12, 19, and 32. Pet. 45–46, 52, 55; PO Resp. 52, 54, 56.

5. Claims 15 and 16

Intellectual Ventures argues that Trompower fails to disclose the filter and reconfigurable filter limitations of claims 15 and 16 respectively, because, according to Intellectual Ventures, these claims require two distinct filters. PO Resp. 53–54. This argument is unpersuasive for the same reasons that we discussed previously in connection with the grounds over McFarland.

6. Claims 11, 18, and 31

Ericsson relies on Shahar as disclosing the dependent limitations of claims 11, 18, and 31. Pet. 56–57. Intellectual Ventures argues that Shahar fails to disclose a "data burst." PO Resp. 56. We reject this argument for the same reasons discussed above under the McFarland grounds.

7. Claims 13, 20, and 33

Ericsson relies on Dahlman as disclosing the dependent limitation of claims 13, 20, and 33. Pet. 57–59. Intellectual Ventures does not dispute that Dahlman discloses such limitations. PO Resp. 58.

8. Claim 34

Ericsson relies on Richardson as disclosing the dependent limitation of claim 34. Pet. 59. Intellectual Ventures does not dispute that Richardson discloses such limitations. PO Resp. 58–59.

C. Whether the Prior Art Could Have Been Combined and/or Modified to Achieve the Claimed Invention

1. Claims 9, 10, 12, 14–17, 19, 29, 30, and 32 over Trompower and Yamaura

Ericsson contends that it would have been obvious to use Yamaura's base station in Trompower's communication system. Pet. 41, 47, 54.

Ericsson contends that such would have entailed merely applying a known technique to yield a predicable result. *Id.* Ericsson supports its position with testimony from Dr. Haas. *Id.* (citing Ex. 1015 ¶¶ 61–66).

Apart from a single conclusory sentence on page 36 of its Patent Owner's Response, Intellectual Ventures does not present evidence or argument in an attempt to controvert Ericsson's position on the combinability of Trompower and Yamaura. PO Resp. 43. Intellectual Ventures limits its opposition to Ericsson's case by focusing on alleged deficiencies in the Trompower reference as previously discussed hereinabove.

2. Claims 11, 18, and 31 over the Combination of Trompower, Yamaura, and Shahar

Ericsson contends that a person of ordinary skill in the art would have recognized that Shahar's header field may be used in Trompower and Yamaura's wireless packet transmission headers to provide timing and synchronization information. Pet. 56. Ericsson concludes that it would have been obvious to one of ordinary skill in the art to apply the known technique of using synchronization information in a header, as taught by Shahar, to the header of Trompower. *Id.* According to Ericsson, such would have entailed no more than applying a known technique to yield a predictable result. *Id.* Ericsson supports its position with testimony from Dr. Haas. *Id.* (citing Ex. 1015 ¶ 67).

Intellectual Ventures contends that Ericsson's evidence of combinability is insufficient. PO Resp. 56. Intellectual Ventures argues that Shahar's synchronization is directed to modulation schemes in a particular OFDM system while Trompower discloses a CDMA system using spread

spectrum technology. *Id.* at 57. Therefore, Intellectual Ventures argues that a person of ordinary skill in the art would not have combined Shahar and Trompower. *Id.*

As discussed above with respect to the McFarland grounds, Shahar can also be read as teaching synchronization in a more general sense. "A reference may be read for all that it teaches, including uses beyond its primary purpose." *Mouttet*, 686 F.3d at 1331. Here, the prior art already recognized the need for synchronization in wireless communications. *See* Ex. 1001, 1:22–23 ("It is known that synchronization is an essential procedure in a modern digital communication system"). According to Trompower:

> The header **302** may include receiver system setup data signifying the data rate at which the data bits **304** will be transmitted. The packet **300** may contain synchronization bits (not shown) between the header and data portion to provide the receiver time to reconfigure itself to the data transmission rate for the data bits **304**.

Ex. 1007, 16:44–49. We are persuaded that a person of ordinary skill in the art would have been able to adopt Shahar's teaching of synchronization to the wireless system of Trompower and would have had good reason to do so. *See KSR*, 550 U.S. at 420 (any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed).

3. Claims 13, 20, and 33 over the Combination of Trompower, Yamaura, and Dahlman

Ericsson asserts that a person of ordinary skill in the art would have found it obvious to combine the UMTS system of Dahlman with Trompower. Pet. 57–58. According to Ericsson, such would have merely

entailed applying the known technique of including UMTS technology, as taught by Dahlman, in the wireless system of Trompower thereby yielding predictable results. *Id.* Ericsson relies on testimony from Dr. Haas to support its assertion. *Id.* (citing Ex. 1015 ¶ 69).

Intellectual Ventures argues that Ericsson fails to provide a rational underpinning for combining Dahlman with Trompower. PO Resp. 58. Intellectual Ventures contends that Ericsson fails to explain how or why someone with ordinary skill would have combined Trompower and Richardson. *Id.* Intellectual Ventures's argument is unpersuasive, among other things, because it is unsupported by evidence and is conclusory in nature.

As with the grounds over McFarland discussed above, we think that adoption of the UMTS system in the marketplace is sufficient to provide a design incentive to adapt the teachings of Trompower to the product application (UMTS) disclosed by Dahlman. Here, Ericsson presents testimony from Dr. Haas that combining Dahlman with Trompower entails nothing more than applying a known technique to yield a predictable result. Ex. 1015 ¶ 69. Intellectual Ventures fails to explain persuasively how its adoption of known UMTS technology (Ex. 1001, 1:22–23) differs in any patentably distinct manner from the adoption of Dahlman's UMTS technology in Ericsson's ground of unpatentability. We think that Ericsson has sufficiently demonstrated that a person of ordinary skill in the art would have been able to combine Dahlman with Trompower and would have had ample reason to do so.

4. Claim 34 over the combination of Trompower, Yamaura, and Richardson

Ericsson asserts that it would have been obvious to use Richardson's UMTS Node B base station in Trompower's base station. Pet. 59–60. According to Ericsson, using a Richardson Node B base station in Trompower amounts merely to applying a known technique to yield a predicable result. *Id*. Ericsson relies on opinion testimony from Dr. Haas to supports its assertion. *Id.* (citing Ex. 1015 ¶¶ 64, 68).

In opposing Ericsson's challenge, Intellectual Ventures makes substantially the same arguments with respect to Richardson's disclosure of UMTS technology that we considered above with respect to Dahlman's disclosure of UMTS technology. PO Resp. 58–59. We find them equally unpersuasive here for essentially the same reasons.

D. Ultimate Conclusion of Obviousness

After considering Ericsson's obviousness presentation under the *Graham* factors and Ericsson's evidence on how and why a person of ordinary skill in the art would have modified or combined the prior art to achieve the claimed invention and Intellectual Ventures's counterarguments, we conclude that Ericsson has established, by a preponderance of the evidence, that claims 9–20 and 29–34 of the '353 patent are unpatentable as obvious over the proposed combinations of references based on Trompower.

VI. ORDER

In view of the foregoing, it is ORDERED as follows:

1. Claims 9, 10, 12, 14–17, 19, 29, 30, and 32 have been shown to be unpatentable as obvious over:
    a. McFarland and van Nee; *and also over*
    b. Trompower and Yamaura;
2. Claims 11, 18, and 31 have been shown to be unpatentable as obvious over:
    a. McFarland, van Nee, and Shahar; *and also over*
    b. Trompower, Yamaura, and Shahar;
3. Claims 13, 20, and 33 have been shown to be unpatentable as obvious over:
    a. McFarland, van Nee, and Dahlman; *and also over*
    b. Trompower, Yamaura, and Dahlman;
4. Claim 34 has been shown to be unpatentable as obvious over:
    a. McFarland, van Nee, and Richardson; *and also over*
    b. Trompower, Yamaura, and Richardson.

This is a Final Written Decision under 35 U.S.C. § 318(a). 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.

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