

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HEWLETT PACKARD ENTERPRISE COMPANY and CISCO SYSTEMS,
INC.,
Petitioners,

v.

COBBLESTONE WIRELESS, LLC,
Patent Owner.

U.S. Patent 7,924,802
Issue Date: April 12, 2011

Title: WIRELESS COMMUNICATIONS SYSTEMS AND METHODS

Inter Partes Review No.: IPR2024-00707

**PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT 7,924,802
UNDER 35 U.S.C. §§311-319 and 37 C.F.R. §§42.1-.80, 42.100-.107**

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PETITIONER’S EXHIBIT LIST

<i>Exhibit #</i>	<i>Description</i>
1001	U.S. Patent No. 7,924,802 (“’802 Patent”)
1002	File History for U.S. Patent No. 7,924,802
1003	Expert Declaration of Dr. Kevin Negus
1004	IEEE 802.11n Draft 2.0 (“IEEE 802.11n D2.0”)
1005	IEEE Std. 802.11-2007 (“IEEE 802.11-2007”)
1006	<i>Next Generation Wireless LANs</i> , by E. Perahia and R. Stacey, ISBN: 978-0-521-88584-3, Cambridge University Press (“Perahia”)
1007	U.S. Patent Pub. No. 2006/0018249 by D. Shearer and M. Webster, entitled “Packet generation systems and methods” (“Shearer”)
1008	IEEE 802.11n: Throughput, Robustness, and Reliability Enhancements to WLANs, by E. Perahia and R. Stacey, Presentation at Globecom 2006 (“Perahia Globecom Presentation”)
1009	IEEE Std. 802.11-1999 (“IEEE 802.11-1999”)
1010	Docket Control Order in No. 2:23-cv-00454 (E.D. Tex.)
1011	Cobblestone Preliminary Infringement Contentions to Cisco Systems, Inc. in No. 2:23-cv-00454 (E.D. Tex.)
1012	Cobblestone Preliminary Infringement Contentions to Hewlett Packard Enterprise Company in No. 2:23-cv-00454 (E.D. Tex.)
1013	Declaration of Eldad Perahia, Ph.D.
1014	Expert Declaration of Dr. Ingrid Hsieh-Yee

I. INTRODUCTION

Hewlett Packard Enterprise Company and Cisco Systems, Inc. (“Petitioners”) hereby petition for *Inter Partes* Review (“IPR”) of U.S. Patent No. 7,924,802 (“’802 Patent”) (EX-1001). Petitioners respectfully submit that Claims 1-9 (“Challenged Claims”) of the ’802 Patent are unpatentable under 35 U.S.C. § 103 in view of the prior art discussed herein. This Petition demonstrates by a preponderance of the evidence that there is a reasonable likelihood that Petitioners will prevail with respect to at least one of these claims. Accordingly, Petitioners request that the Board institute IPR of the ’802 Patent pursuant to 37 C.F.R. §42.108.

II. OVERVIEW

The ’802 Patent presents its innovation as using prior art wireless transmission components to transmit data over two separate channels, *i.e.*, frequency ranges, to increase the effective available bandwidth for transmissions. According to the ’802 Patent, prior art systems were limited to a single channel (using the same prior art transmission components), and thus pursued bandwidth increases by “maximizing the bandwidth around the center frequency” rather than simultaneously accessing multiple frequency ranges over which to send data.

But by January 2008, the critical date of the patent, transmitting data on multiple channels (called “carriers” or “sub-carriers”) was already well-known. Indeed, variants of that process date back to before one of the earliest wireless

standards created by the Institute of Electrical and Electronics Engineers (“IEEE”) as the 802.11 standard. Specifically, the draft of the 802.11n amendment, published and made widely available in March 2007 and relied upon in this Petition, taught “duplicate” modes of transmission. As their name suggests, these duplicate formats permitted the simultaneous transmission of wireless signals across multiple frequency ranges—precisely the innovation claimed by the ’802 Patent. Additionally, prior art patent publications already described the use of these techniques to increase data rates, such as by sending data packets through an upper and lower frequency channel “substantially simultaneously,” thereby “increasing the bandwidth by a factor of 2.” EX-1007 ¶ 57.

As explained in further detail below, by the time the ’802 Patent was filed, its claims were obvious based on existing wireless standards and forthcoming amendments made available to interested parties in draft form, and also in view of prior art work by others and disclosed in published patent applications. Accordingly, Petitioners respectfully request that the Board institute review and find the challenged claims of the ’802 Patent invalid as obvious.

III. GROUNDS FOR STANDING

Petitioners certify that the ’802 Patent is available for IPR and Petitioners are not barred or estopped from requesting this review. 37 C.F.R. §42.104(a). This Petition is being filed less than one year after the date on which Petitioners were

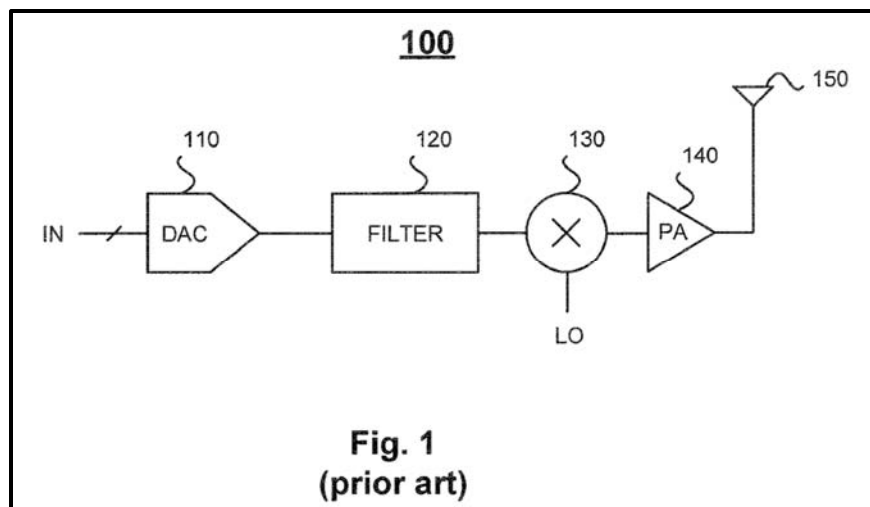
served with a Complaint alleging infringement of '802 Patent. This Petition is filed under 37 C.F.R. §42.106(a).

IV. REASONS FOR THE REQUESTED RELIEF

As explained in this Petition and the Declaration of Petitioners' Expert, Dr. Kevin Negus (EX-1003), the apparatus and methods claimed in the '802 Patent were obvious in view of the prior art to a person of ordinary skill in the art ("POSA") at the alleged time of the invention.

A. Summary of the '802 Patent

The '802 Patent relates to the field of wireless communication, and specifically to methods of transmitting information in wireless communication channels. As the '802 Patent explains in the background section, prior art communication systems "generally contain one or more transmission channels to transmit data from the transmitter to the receiver." Ex. 1001, 1:12-14; Ex. 1003 ¶ 40. Figure 1 of the '802 Patent illustrates an example of a transmitter (element 100) used in a prior art wireless communication system:

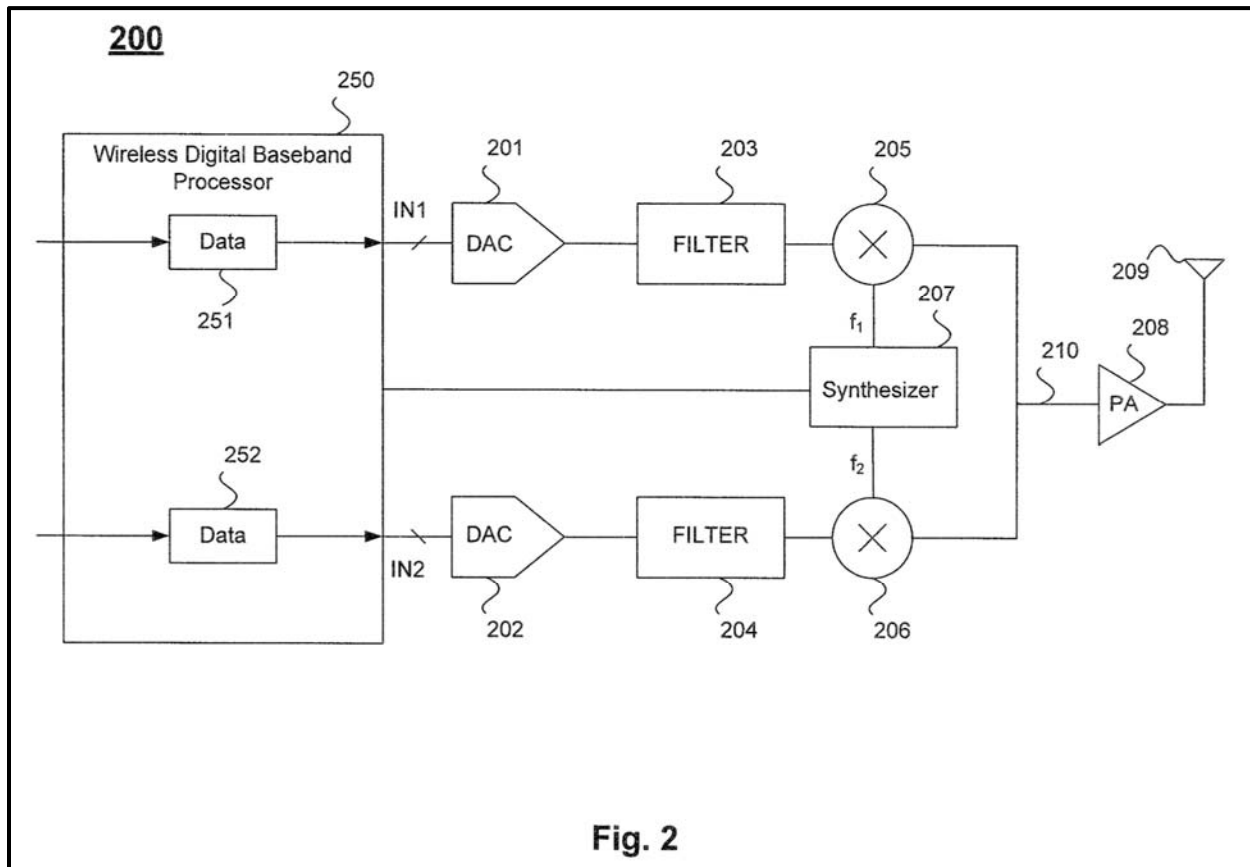


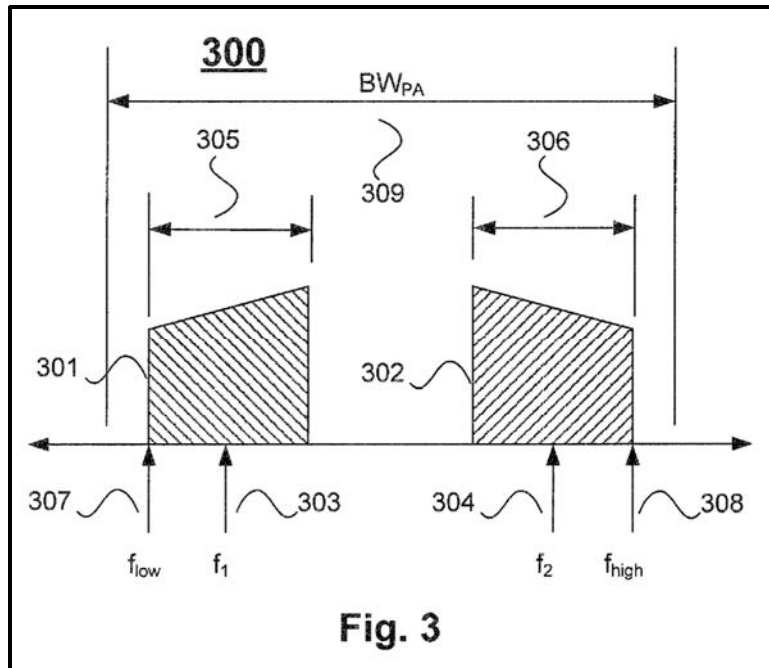
Ex. 1001, Fig. 1; Ex. 1003 ¶ 41. In the context of Figure 1, element 110 is a “digital-to-analog converter” that “receives a digital input signal (“IN”)” and converts it to an analog signal. Ex. 1001, 1:18-24. Meanwhile, the “filter” (element 120) “may be used to remove undesirable frequencies and signal images.” *Id.*; *see also* Ex. 1003 ¶ 42. The filter is coupled to a “mixer 130” that “may be used to up-convert the frequency of the signal by combining it with a local oscillator signal (“LO”).” Ex. 1001, 1:24-29; Ex. 1003 ¶ 43. Finally, the output of the mixer goes to the power amplifier (element 140) to “amplify the signal for transmission before it is sent through antenna 150.” *Id.*

The '802 Patent identifies a problem with this prior art approach, which is that the transmitter is “limited to up-converting a signal to one center frequency,” and the “amount of information transmitted around the center frequency is limited by the bandwidth of the transmitter around the center frequency.” Ex. 1001, 1:29-35; Ex. 1003 ¶ 44. The bandwidth thus “limits the amount of data that can be transmitted.”

Id. According to the '802 Patent, prior art approaches to improving transmission capacity focused on “maximizing the bandwidth around” this single center frequency. Ex. 1001, 1:35-40; Ex. 1003 ¶ 45.

The '802 Patent's specification describes a wireless transmitter with two transmitter channels designed to transmit multiple signals at different center frequencies, as shown in Figures 2 and 3 (“an example of the frequency content of the transmitted signal 300 which may result from system 200”):





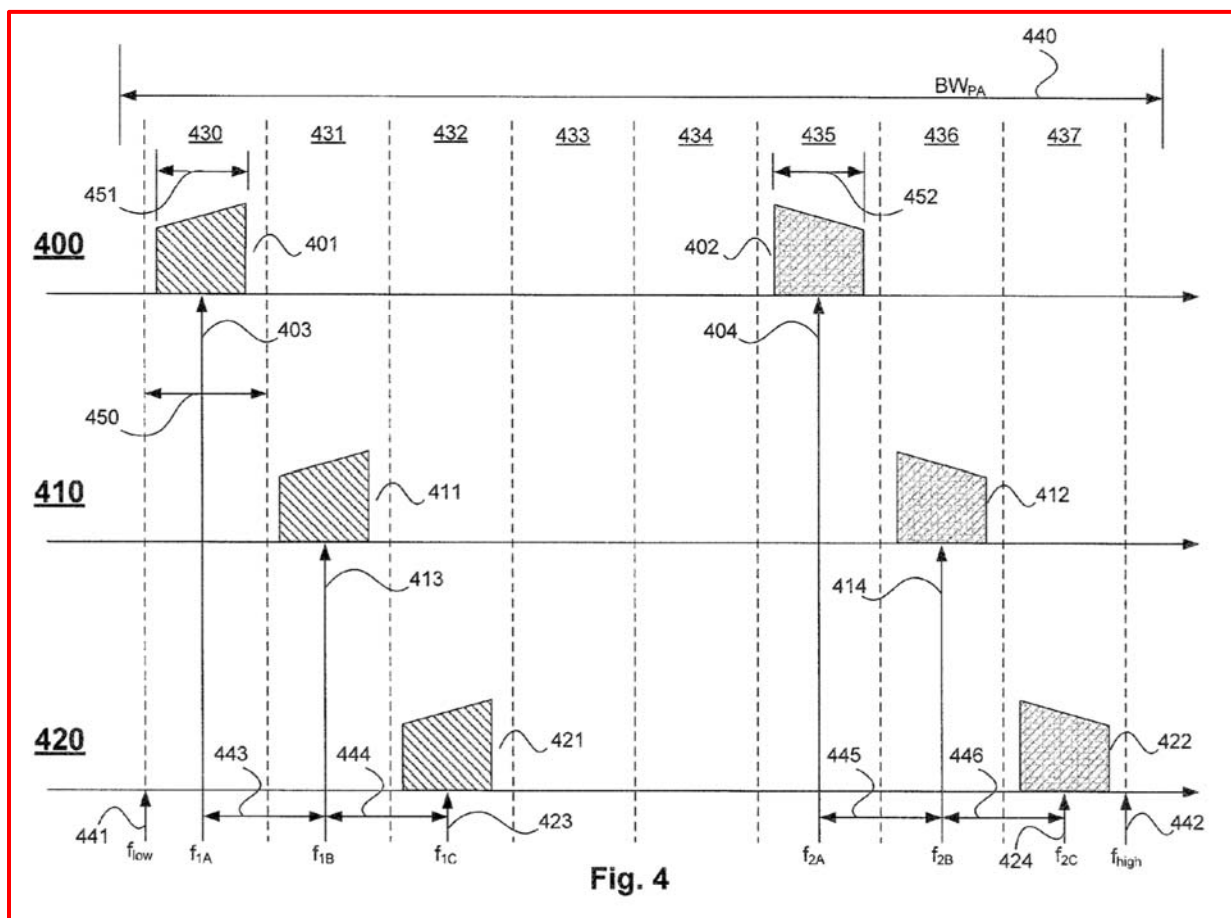
Ex. 1001, Figs. 2-3, 5:53-6:9, 6:60-63. The two paths of Figure 2, with two digital-to analog converters (201 and 202), two filters (203 and 204), and two up-converters/mixers (205 and 206), represent different channels that data (251 and 252) can travel through. Ex. 1003 ¶¶ 46-48. The patent further explains, by reference to Figure 2, that “data 25[1] and data 252 may be packets of data that conform to a specific wireless communication protocol.” Ex. 1001, at 5:60-6:1; Ex. 1003 ¶ 48. Additionally, “[t]he data of the first digital signal and the data of the second digital may be unrelated data streams or may be data from the same data stream.” Ex. 1001, at 6:7-9, 8:16-19 (“As mentioned above, the signals 511 and 512 carry different data from a common data stream or from different data streams, data corresponding to different protocols, or even the same data.”); Ex. 1003 ¶ 49.

The '802 Patent describes its DACs and filters as operating in the same manner as the prior art wireless transmission system in Figure 1. *See* Ex. 1001, at 1:12-20, 6:10-21. As shown in Figure 3, the signals traveling in the different transmission channels are up-converted to different RF center frequencies. Figure 3 also shows the resulting “frequency content of the transmitted signals,” and “illustrates that a frequency difference between the first RF center frequency and the second RF center frequency is greater than the sum of one-half the first frequency range and one-half the second frequency range so that the up-converted signals do not overlap and thereby cause distortion.” Ex. 1001, at 6:48-53; Ex. 1003 ¶¶ 50-53.

According to the '802 Patent's Figure 2, the up-converted signals are “combined at the input of [power] amplifier 208 before amplification to produce a combined up-converted signal” and that “antenna 209 is coupled to the output of amplifier 208 to transmit the amplified up converted signal as an electromagnetic signal.” Ex. 1001, at 6:57-7:11; Ex. 1003 ¶¶ 54-55. As shown in Figure 3, to use a single power amplifier, the “bandwidth 309 (BWPA) of the PA 208 is greater than the difference between a lowest frequency 307 (f_{low}) in the first up-converted frequency range 305 and highest frequency 308 (f_{high}) in the second up-converted frequency range 306.” Ex. 1001, at 6:65-7:18; Ex. 1003 ¶¶ 56-57. However, the '802 Patent states that multiple power amplifiers are optional, but not required; rather, “[e]mbodiments of the present invention transmit multiple signals simultaneously

over a communication channel at different center frequencies, and may use a single power amplifier and antenna” while “[i]n another embodiment, two or more power amplifiers may be used as part of the power amplifier implementation.” Ex. 1001, at 6:60-65; Ex. 1003 ¶¶ 57-58.

The '802 Patent also describes the ability to “change” the “frequency content” of transmitted signals “within a bandwidth” of a power amplifier either “at irregular intervals or at regular intervals (periodically).” Ex. 1001, at 7:19-57; Ex. 1003 ¶¶ 59-62. Figure 4 of the '802 Patent purports to illustrate these frequency changes:



Ex. 1001, at Fig. 4. By reference to Figure 3, the specification explains that the “change in frequency” may “result in a new frequency content 410 in which the signal 401 has moved in frequency as illustrated by signal 411 having an RF center frequency 413 (f1B), and the signal 402 has moved in frequency as illustrated by signal 412 having an RF center frequency 414 (f2B).” Ex. 1001, at 7:29-33; Ex. 1003 ¶¶ 60-63. As a result, the “changes may move the RF signals to adjacent or non-adjacent locations,” and the “spacing between the two RF center frequencies may remain the same or may vary.” Ex. 1001, at 7:44-57; Ex. 1003 ¶ 62.

B. Prosecution History

Application No. 12/018,370, which later became the '802 Patent, was filed on January 23, 2008, without a priority claim. As originally filed, claim 1 recited:

1. A method of transmitting information in a wireless communication channel comprising:

transmitting first information across a first frequency range using a wireless transmitter, the first frequency range having a first center frequency, a first highest frequency, and a first lowest frequency; and

simultaneously transmitting second information across a second frequency range using the same wireless transmitter, the second frequency range having a second center frequency greater than the first center frequency, a second highest frequency, and a second lowest frequency.

EX-1002, at 30. The claims of the '802 Patent were allowed without rejection, and the '802 Patent issued on April 12, 2011. EX-1002, at 62-65; Ex. 1003 ¶¶ 69-72.

C. Claim Construction

For the purposes of this IPR, Petitioners propose that each claim term of the Challenged Claims be given “their ordinary and customary meaning” as understood by a POSA at the time of the claimed invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312, 1327 (Fed. Cir. 2005). Petitioners contend that no specific construction of any claim term is required because the prior art relied on in this Petition meets each of the claim terms under any reasonable construction. EX-1003 ¶¶ 76-79.

D. Priority of the Challenged Claims

The '802 Patent was filed on January 23, 2008. EX-1001. In related District Court litigation, Patent Owner has asserted that the '802 Patent is entitled to a priority date of “at least as early as January 23, 2008.” EX-1011, at 4; EX-1012, at 4. For purposes of this Petition, Petitioners rely on prior art as of the January 23, 2008 priority date alleged by the Patent Owner. EX-1003 ¶ 23.

E. Person of Ordinary Skill in the Art

A POSA for the purposes of this Petition would have had at least a Bachelor’s degree in Electrical Engineering or a related field and at least two years of professional experience in wireless communications. EX-1003 ¶¶ 24-25. Alternatively, a POSA would have had a more advanced degree, such as a Master’s degree in Electrical Engineering or an equivalent field, combined with at least one year of work experience in wireless communication. *Id.*

A POSA would also have been familiar with wireless communications networks, equipment, and integrated circuit chips, and would have had a working knowledge of the design of physical layer signal processing and RF systems for wireless communication based at least upon IEEE 802 standards. *Id.* The level of skill in the art is further demonstrated by the references cited herein, including the asserted art and the background references discussed in §IV.F below. Though this Petition, and supporting declaration, may occasionally use the present tense, the analysis is from the perspective of a POSA as of the time of the purported invention. *Id.*

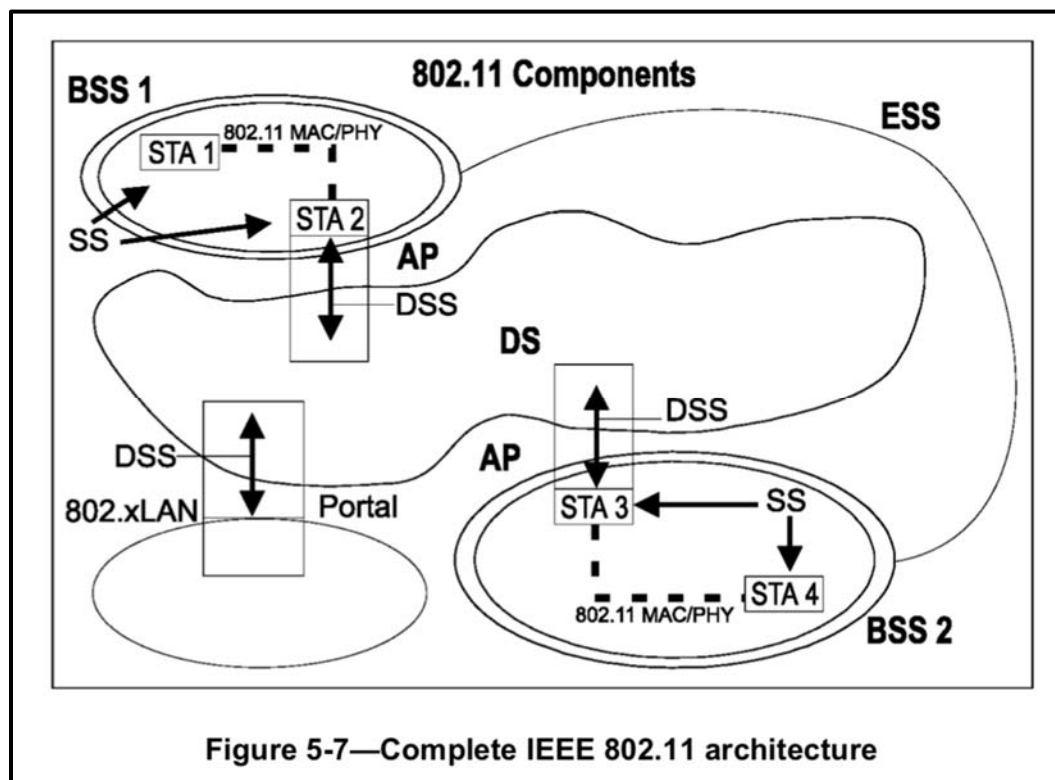
F. State of the Art

This section describes the state of the art, including general knowledge, skill, common sense, and creativity possessed by a POSA as of January 2008. It explains the conventional purposes, methods, and components in the art, informing the motivations and reasonable expectations of success.

1. IEEE 802.11-2007 (EX-1005)

The IEEE 802.11 standard for wireless local area networks (“WLANs”) was published in June 2007. EX-1014 ¶¶ 46-47; EX-1003 ¶ 120-121. It is a comprehensive standard that encompasses all previous amendments in a single document. *Id.* Specifically, IEEE 802.11-2007 was approved by the IEEE-SA Standards Board on March 8, 2007 and bears a publication date of June 12, 2007.

Id. By June 21, 2007, the IEEE had published a digital book of the standard. EX-1014 ¶¶ 49-51. The standard defines the “complete IEEE 802.11 architecture” and governs how the various components interact with one another:



EX-1005 §5.3.2; EX-1003 ¶ 130. More specifically, the standard defines “one medium access control (MAC) and several physical layer (PHY) specifications for wireless connectivity for fixed, portable, and moving stations (STAs) within a local area.” EX-1005 §1.1; EX-1003 ¶ 126. One of the defining features of wireless connectivity, and thus one of the requirements of the 802.11 standard, is the ability to handle “mobile stations,” meaning stations that “actually access the LAN while in motion.” EX-1005 §5.1.1.3; EX-1003 ¶¶ 128-129.

Among other aspects of wireless data transmission, clause 17 of the 802.11 standard “specifies the PHY entity for an orthogonal frequency division multiplexing (OFDM) system” which “uses 52 subcarriers that are modulated using binary or quadrature phase shift keying (BPSK or QPSK) or using 16- or 64-quadrature amplitude modulation (16-QAM or 64-QAM)” including for the “5 GHz band.” EX-1005 §17.1; EX-1003 ¶ 137. Put more simply, the standard defines how data can be transmitted over the 52 subcarriers, each with different center frequencies, while some subcarriers are “skipped” or “omitted” to guard against interference and improve performance. EX-1005 §17.3.2.1; EX-1003 ¶¶ 138-141. The 802.11 standard also defines how to “append the OFDM symbols one after another” to “up-convert the resulting “complex baseband” waveform to an RF according to the center frequency of the desired channel and transmit.” EX-1005 §17.3.2.1; EX-1003 ¶ 141.

2. IEEE 802.11n D2.0 (EX-1004)

IEEE 802.11n D2.0 is a published draft of the IEEE 802.11n amendment that “specifies enhancements” to the then-current 802.11 standard “to obtain higher throughput.” EX-1004, at v; EX-1003¶¶ 82-85. In addition to amending portions of what became IEEE 802.11-2007, the draft added Clause 20, which “specifies the PHY Entity for a high throughput (HT) orthogonal frequency division multiplexing (OFDM) system.” EX-1004 § 20.1; EX-1003 ¶ 86. IEEE 802.11n D2.0 ties directly

to the 802.11 standard by stating that the “HT OFDM PHY is based on the OFDM PHY defined in Clause 17” and requiring that the “HT STA shall be compliant with PHY specifications as defined in Clause 17 for operation in the 5 GHz bands, and Clauses 18 and 19 for operation in the 2.4 GHz bands.” EX-1004 §20.1; EX-1003 ¶¶ 87-88. As particularly relevant here, IEEE 802.11n D2.0 introduced 40 MHz channels to the PHY layer along with two transmission formats that take advantage of this channel—“HT duplicate format” and “non-HT duplicate format.” EX-1004 §§ 21.1.3, 20.3.2; EX-1003 ¶¶ 91-93. As the draft explains, “in the case of the HT duplicate and non-HT duplicate formats, the same data are transmitted over two adjacent 20 MHz channels” such that “the 40 MHz channel is divided into 128 sub-carriers and the data are transmitted on carriers -58 to -6 and 6 to 58.” EX-1004 §20.3.7; EX-1003 ¶ 95.

IEEE 802.11n D2.0 further describes “non-HT duplicate” as “a mode of operation of the PHY that duplicates a 20 MHz non-HT transmission in two adjacent 20 MHz channels, allowing a non-HT BSS on either channel to receive the transmission.” EX-1003 ¶ 113. In non-HT duplicate mode, the client device (the “STA”) “operates in a 40 MHz channel composed of two adjacent 20 MHz channels.” EX-1004 § 20.1.3; EX-1003 ¶ 92. The packets to be sent (in the 802.11 clause 17 format) are the same in both the upper (higher frequency) and lower (lower frequency) channels, except that the packets in the upper channel are “rotated by

+90° relative to the lower channel.” EX-1004 § 20.1.3; EX-1003 ¶ 92. HT duplicate format in IEEE 802.11n D2.0 likewise requires that the “signals in two halves of the occupied channel width contain the same information.” EX-1004 §3n.19; EX-1003 ¶ 112.

3. Perahia (EX-1006)

Next Generation Wireless LANs, a book by Eldad Perahia (then of Intel Corporation) and Robert Stacey (then of Apple, Inc.) was published around the fall of 2008, but was based upon work that Mr. Perahia and Mr. Stacey performed in 2006 and 2007. Ex-1013, ¶¶ 4-8. For example, Mr. Perahia and Mr. Stacey gave a day-long presentation at the Globecom 2006 Expo in San Francisco on November 27, 2006 titled IEEE 802.11n: Throughput, Robustness, and Reliability. *Id.* That presentation, the slides for which are attached as Exhibit EX-1008 to this Petition, included much of the material that ended up in the book. Thus, Perahia and its discussion of the 802.11n amendment reflect the state of the art as of about March 2007, the date of public availability for IEEE 802.11n D2.0. *Id.*; *see also* EX-1003 ¶¶ 164-170 (describing indicia that book reflects state of the art in 2007).

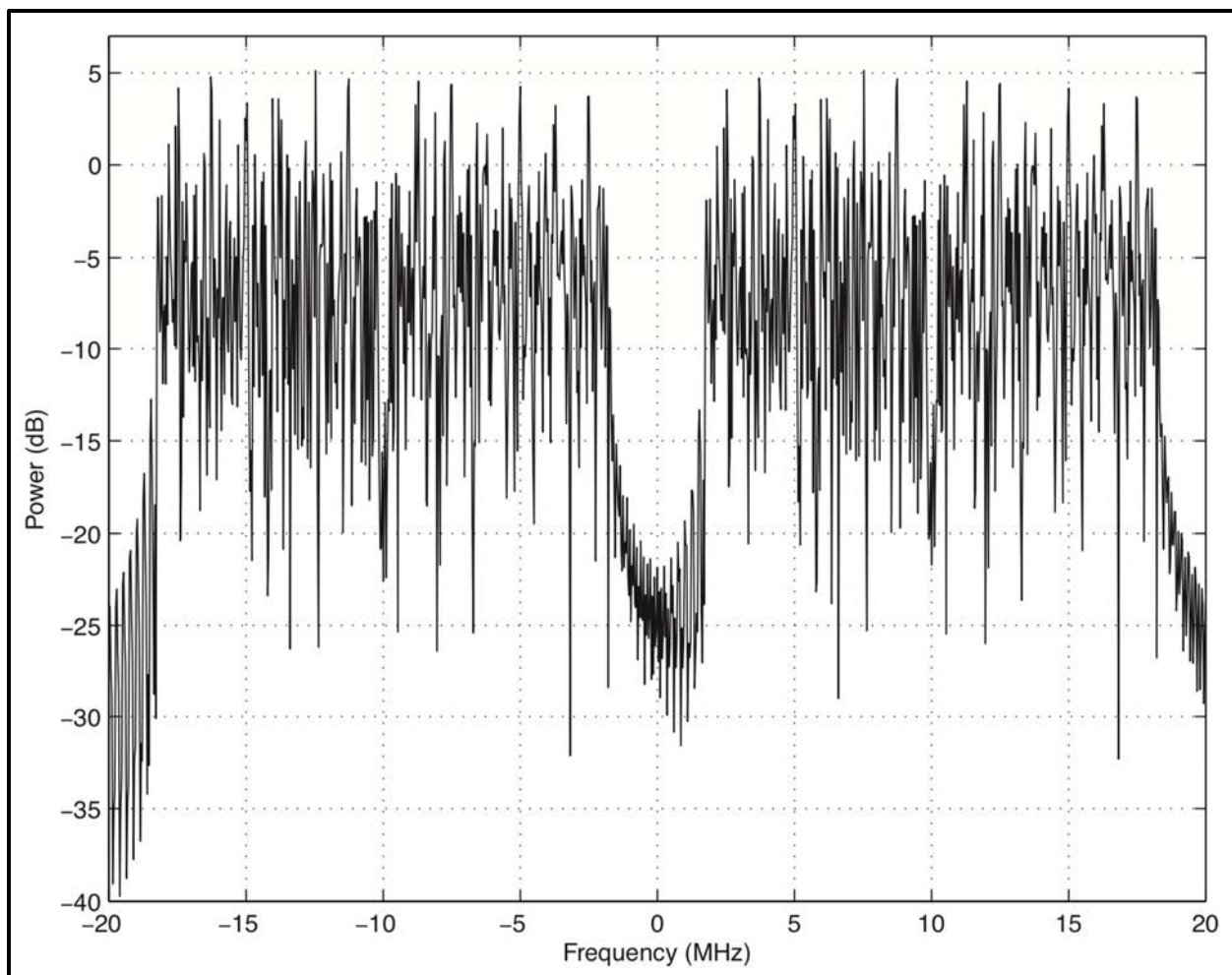
In fact, the Foreword to Perahia explains that as of December 6, 2007, the draft 802.11n amendment (*i.e.*, D2.0) was “remarkably successful” with more than 150 products certified in less than five months.” EX-1006, at xix-xxi; EX-1003 ¶ 171. Perahia observes that in “2004, Atheros demonstrated that 40 MHz devices

could be produced at almost the same cost as 20 MHz devices” and there were “new regulations in the 5 GHz band that added an additional 400 MHz of unlicensed spectrum for use by commercial WLANs,” which “paved the way for the broad acceptance of 40 MHz operating modes in 802.11n.” EX-1006, at 2; EX-1003 ¶ 174. Thus, Perahia explains that to “continue the market momentum and forestall interoperability issues, the IEEE took the unusual step of releasing 802.11n D2.0 to the public while work continued toward the final standard,” which allowed the Wi-Fi Alliance “to begin interoperability testing and certification of devices based on a subset of the 802.11n D2.0 features in May 2007.” EX-1006, at 3; EX-1003 ¶ 175.

As relevant here, Perahia observes that “802.11n is the high throughput amendment to the 802.11 standard,” wherein the “significant increase in data rate is derived from the new 40MHz channel width.” EX-1006, at 101; EX-1003 ¶ 195. “[F]undamental to the design of the 40 MHz channel is that only adjacent 20 MHz channels are combined to form a 40 MHz channel,” which “makes coexistence and interoperability between 20 MHz and 40 MHz devices much simpler.” EX-1006, at 104; EX-1003 ¶ 196. “In order to interoperate and coexist with legacy 802.11a/g OFDM devices” certain fields are “replicated over the other 20 MHz portion of the 40 MHz band,” wherein the original “20 MHz waveform is shifted lower by 32 subcarriers” while “a copy of the waveform is shifted higher by 32 subcarriers and phase rotated by 90 degrees (the j term preceding the second summation in Eq.

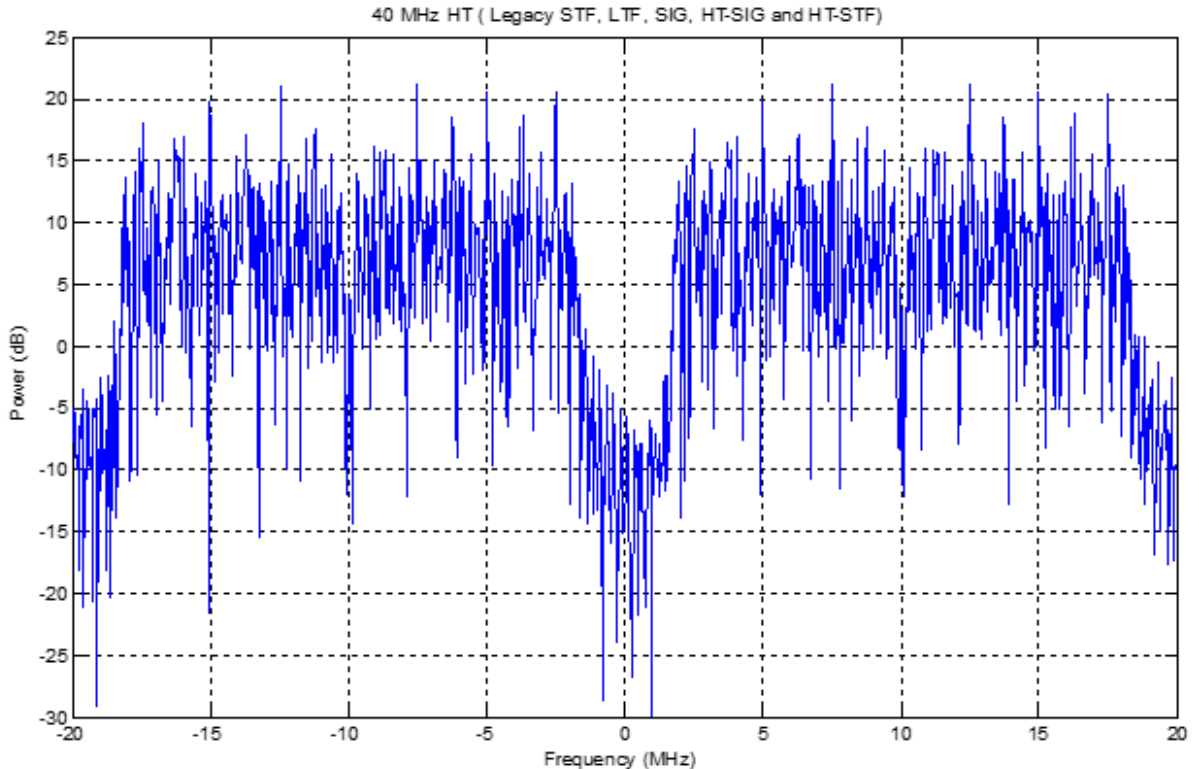
(5.1)).” EX-1006, at 104-05; EX-1003 ¶¶ 197-198. In regards to the non-HT duplicate format discussed above, Perahia explains that “in essence a packet is transmitted in legacy OFDM format in the upper and lower halves of the 40MHz channel simultaneously.” EX-1006, at 114; EX-1003 ¶ 199. Thus, the “non-HT duplicate format is designed to be receivable by legacy (and HT) devices in both the primary and secondary channels simultaneously.” EX-1006, at 114; EX-1003 ¶¶ 199-200.

Perahia also contains a figure that shows a pattern similar r a non-HT duplicate transmission in accordance with IEEE 802.11n D2.0:



EX-1006, Fig. 5.5; EX-1003 ¶ 198 (the figure shows a “spectrum associated with such duplicated fields).

The figure from Perahia shown above reflects what a POSA understood about how HT duplicate and non-HT duplicate RF waveforms would look like as of the date of the IEEE 802.11n D2.0 amendment. The authors, Mr. Perahia and Mr. Stacey, included a very similar figure in their 2006 presentation on the IEEE 802.11n proposal:



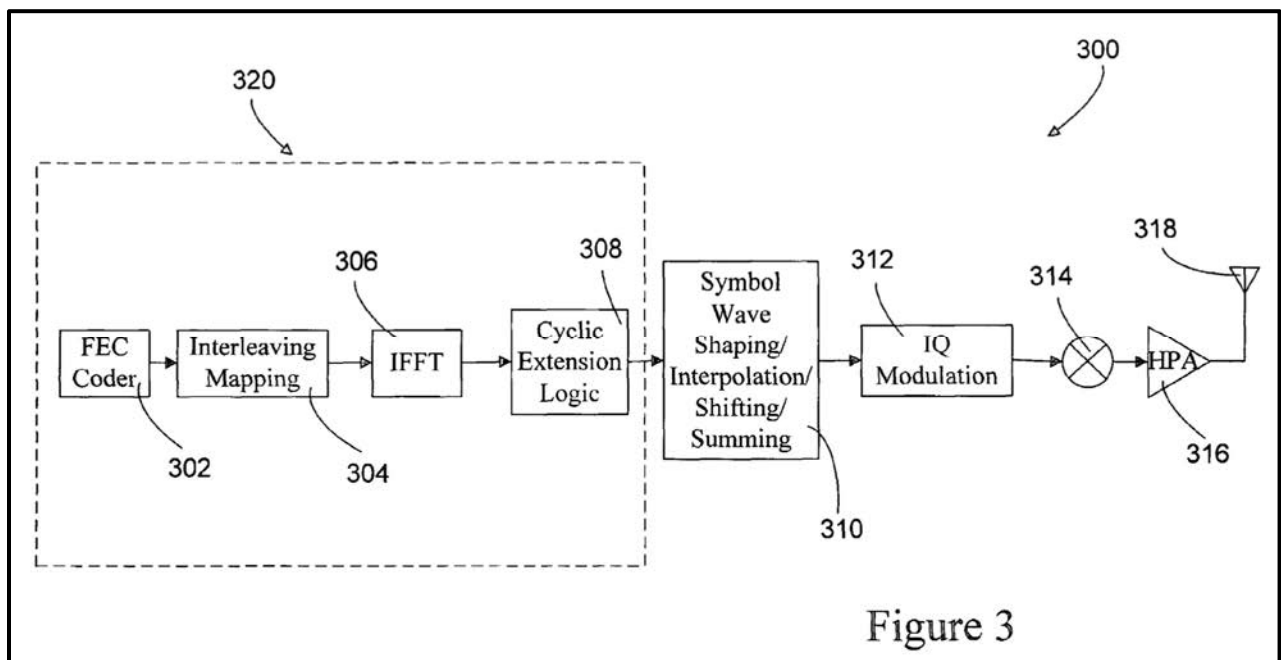
EX-1013, ¶¶ 4-11 ; EX-1008, at 35; EX-1003 ¶ 198 (“Note also that this material in Perahia described above and shown by Figure 5.5 previously appears in the 2006 tutorial from which Perahia originates.”).

4. Shearer

U.S. Patent Publication 2006/0018249 by D. Shearer and M. Webster, entitled “Packet generation systems and methods” (“Shearer”) was filed on Jul. 20, 2005 and published on January 26, 2006. EX-1007. It is therefore prior art under pre-AIA 35 U.S.C. § 102(b).

Shearer is directed to methods for increasing packet generation in a wireless communication system and, in particular, to a method in which “subcarriers are added to a packet in a wireless local area network transmission to increase the data

rate.” EX-1007, at Abstract. Shearer is specifically directed to systems “implemented according to at least one of several embodiments compliant with the 802.11n proposal.” EX-1007 ¶¶ 38-39 & Fig. 2; EX-1003 ¶ 219. According to Shearer, “One embodiment of a transmitter for an 802.11 device is provided in FIG. 3” showing “a PHY unit 300 [that] includes an orthogonal frequency division multiplex (OFDM) transmit kernel 320 and other components:



EX-1007, at Fig. 3; EX-1003 ¶ 222.

Shearer focuses “on a scenario with two inputs, increasing the bandwidth by a factor of 2” such that “in one embodiment of an 802.11n system, two 20 MHz 802.11a input signals are received at the PHY unit 300 from FIG. 3 substantially simultaneously,” and “two signals are processed separately, one in a lower 20 MHz path and one in an upper 20 MHz path.” EX-1003 ¶ 233. As Shearer explains, the

outputs of the two paths are “aggregated” after processing. EX-1007 ¶ 62 & Fig. 13; EX-1003 ¶ 237. The combined signals can then be processed through the single high-power amplifier, indicated as HPA 316 in Shearer’s Figure 3. EX-1007, at Fig. 3; EX-1003 ¶ 225.

Accordingly, based on the prior art and contemporaneous references cited above, it was well-known by January 2008 that multi-carrier transmission techniques were feasible and could increase data rates, reduce interference, and generally improve performance of wireless LANs. As Shearer (and similarly, the Perahia book) explains, the commercial motivation for creating those systems pre-dated the ’802 Patent. For example, Shearer observes that its multi-carrier techniques could meet demands for devices with “higher data rates” than existed under 802.11a, while allowing them to “co-exist in the same WLAN environment or other area without significant interference or interruption from each other.” EX-1007 ¶ 7. And Perahia disclosed that, after the release of IEEE 802.11n D2.0, “more than 150 products [were] certified” as compliant with IEEE 802.11n D2.0 in the five months leading up to December 2007. EX-1003 ¶ 171.

V. IDENTIFICATION OF CHALLENGES

A. Challenged Claims

Claims 1-9 of the ’802 Patent are challenged in this Petition.

B. Statutory Grounds for Challenges

The Challenges are set forth in detail below and summarized as follows:

Ground	Claim(s)	Basis	Reference
1	1-9	§103	IEEE 802.11n D2.0 in view of 802.11-2007
2	1-4, 7-9	§ 103	Shearer

C. Prior Art Basis

IEEE 802.11n D2.0 (EX-1004) is a draft amendment to the IEEE 802.11 standard that was completed in February 2007 and published in March 2007. EX-1014 ¶ 25. Specifically, IEEE 802.11n D2.0 was reported as “now available” at a closing plenary meeting of the IEEE 802.11 working group on March 16, 2007. EX-1014 ¶ 34. Moreover, numerous corroborating sources demonstrate that 802.11n D2.0 was accessible to interested persons in the field as of other dates in 2007. EX-1014 ¶¶ 26, 29, 33. Accordingly, IEEE 802.11n D2.0 is prior art under at least pre-AIA 35 U.S.C. § 102(a).

IEEE 802.11-2007 (EX-1005) was completed in March 2007 and published in June 2007. EX-1014 ¶¶ 49-68; EX-1003 ¶ 120. It is therefore prior art under at least pre-AIA 35 U.S.C. § 102(a).

Shearer (EX-1007) is U.S. Patent Application Publication No. 2006/0018249, and published on January 26, 2006. It is therefore prior art under at least pre-AIA 35 U.S.C. § 102(b).

VI. IDENTIFICATION OF HOW THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Claims 1-9 are Obvious Over 802.11n Draft 2.0 in View of IEEE 802.11-2007

1. IEEE 802.11n D2.0 (EX-1004)

a. Analogous Art

IEEE 802.11n D2.0 is analogous art to the '802 Patent. Specifically, it is in the same field of endeavor and “relates to wireless communications systems and methods,” including in particular the transmission of signals over a communication channel. EX-1001, at Abstract. More specifically, IEEE 802.11n D2.0 is reasonably pertinent to the problem faced by the inventors of the '802 Patent, since it addresses transmitting data simultaneously over two different communication channels. EX-1003 ¶¶ 82-119. This conclusion is consistent with statements in the '802 Patent, which explain that embodiments of the purported invention are intended to work with “wireless local area network (WLAN) protocol[s] such as 802.11g.” EX-1001, at 8:1-2.

b. Overview of IEEE 802.11n D2.0

IEEE 802.11n D2.0 is a published version of a draft standard that emerged from an IEEE Task Group called “TGn.” EX-1003¶¶ 82-83. The draft was intended as an amendment that “specifies enhancements” to the 802.11 standard that ultimately became 802.11-2007. EX-1003 ¶ 85. IEEE 802.11n D2.0 focuses on improving data rates, and discloses “transmission using 1 to 4 spatial streams in

40MHz bandwidth” and “data rates up to 600Mb/s.” EX-1004 §20.1; EX-1003 ¶¶ 86-87. Among other features, IEEE 802.11n D2.0 “specifies the PHY Entity for a high throughput (HT) orthogonal frequency division multiplexing (OFDM) system” that are “applicable to operation in either the 2.4 GHz band or the 5 GHz bands, or both.” EX-1004 §20.1; EX-1003 ¶¶ 86-88.

As particularly relevant here, IEEE 802.11n D2.0 addressed the very same problem recognized by the ’802 Patent—increasing data rates and reliability by using two transmission channels. Indeed, the draft amendment is titled “Enhancements for Higher Throughput.” EX-1004, Cover Page. As explained by Dr. Negus, 802.11n utilized a 40 MHz channel width to provide a “significant increase in data rate,” and a POSA would understand that the HT and non-HT duplicate formats would be desirable at least for their “comparable maximum range for the lowest data rates of 20 MHz” and their interoperability with legacy devices. EX-1003 ¶¶ 85, 267. In particular, IEEE 802.11n D2.0 defines both “HT duplicate and non-HT duplicate formats,” in which “the same data are transmitted over two adjacent 20 MHz channels.” EX-1004 § 20.3.7; EX-1003 ¶¶ 95. As explained below, the duplicate formats in IEEE 802.11n D2.0, in connection with prior art 802.11 standards, renders obvious the Challenged Claims of the ’802 Patent.

As to non-HT duplicate format, it is a “mode of operation of the PHY that duplicates a 20 MHz non-HT transmission in two adjacent 20 MHz channels,

allowing a non-HT [basic service set] on either channel to receive the transmission.” EX-1003 ¶ 113. This non-HT duplicate format is explicitly linked to the existing standard, and specifically Clause 17, which Dr. Negus explains was “originally specified as IEEE 802.11a.” EX-1003 ¶ 135. Thus, non-HT duplicate mode is “used to transmit to Clause 17 STAs,” EX-1003 ¶ 104, and the packets are in “Clause 17 format,” i.e., the format specified in 802.11a, EX-1003 ¶ 92. Likewise, the non-HT duplicate format “follow[s] the transmit procedure as in Clause 17 duplicated on both channels.” EX-1003 ¶ 119.

2. Motivation to Combine IEEE 802.11n D2.0 and IEEE 802.11-2007.

IEEE 802.11n D2.0, and specifically its disclosure of HT and non-HT duplicate formats, render obvious the Challenged Claims. First, the draft leveraged a new 40 MHz channel that was highly desirable to a POSA because it would increase wireless transmission throughput for commercial devices. EX-1003 ¶¶ 85-89-119, 261-273. And the duplicate formats facilitate the precise functionality recited in the Challenged Claims: simultaneous transmission of information over separate carriers or channels. *See, e.g.*, EX-1003 ¶¶ 261-300. Importantly, the HT and non-HT duplicate formats are defined entirely within 802.11n D2.0.

A POSA would have also been motivated to consider IEEE 802.11-2007 to perform the claimed methods, and would have had a reasonable likelihood of success in doing so. Specifically, a POSA would have selected the IEEE 802.11n HT

duplicate or Non-HT duplicate formats for OFDM in two adjacent 20 MHz channels for a 40 MHz channel bandwidth device at 2.4 GHz or 5 GHz and combined it with an existing or forthcoming wireless standard. EX-1003 ¶¶ 261-274. The primary reference used in this Petition contemplates that exact combination, since a POSA would understand that IEEE 802.11n D2.0 is an amendment to the 802.11 standard. EX-1003 ¶¶ 85-89, 121-125, 195, 261-300. And not surprisingly, IEEE 802.11n D2.0 contains numerous specific references to sections of what became IEEE 802.11-2007. EX-1003 ¶ 82-89. Furthermore, because IEEE 802.11n D2.0 is an amendment to the existing standard, a POSA would understand that at least certain aspects of its HT duplicate and non-HT duplicate formats can only be implemented using appropriate sections of IEEE 802.11-2007. EX-1003 ¶ 82-89.

Second, the strong commercial interest in designing products with 40 MHz channel bandwidth using at least the IEEE 802.11n HT duplicate or Non-HT duplicate formats would have motivated a POSA to combine IEEE 802.11n D2.0 with IEEE 802.11-2007. EX-1003 ¶¶ 261-300. A POSA would also understand that transmitting IEEE 802.11n HT duplicate or Non-HT duplicate formats of IEEE 802.11n D2.0 would be highly predictable in view of a combination of IEEE 802.11n D2.0 and IEEE 802.11-2007; after all, IEEE 802.11n D2.0 was intended to be an amendment to existing standards and thus designed to work in conjunction with them. EX-1003 ¶¶ 261-300.

3. Detailed Application to the Challenged Claims

a. Claim 1

[1pre] A method of transmitting information in a wireless communication channel comprising:

To the extent the preamble is limiting, IEEE 802.11n D2.0 discloses a method of transmitting information in a wireless communication channel. Specifically, it teaches “a high throughput (HT) orthogonal frequency division multiplexing (OFDM) system” that is “applicable to operation in either the 2.4 GHz band or the 5 GHz bands, or both.” The HT duplicate and non-HT duplicate formats disclosed by IEEE 802.11n D2.0 are a method of transmitting information in a wireless communication channel, and would be understood by a POSA as such. As the reference explains, in “HT duplicate and Non-HT duplicate formats, the same data are transmitted over two adjacent 20 MHz channels” in which “the 40 MHz channel is divided into 128 sub-carriers and the data are transmitted on carriers -58 to -6 and 6 to 58.” A POSA would understand the disclosures in IEEE 802.11n D2.0 of “data” that is “transmitted” as “an RF signal” using “orthogonal frequency division multiplexing (OFDM)” (i.e. a “method of transmitting information”) over “two adjacent 20 MHz channels” according to the “center frequency of the desired channel” for “operation in either the 2.4 GHz band or the 5 GHz bands, or both” (i.e. “in a wireless communication channel”), as constituting a “method of transmitting information in a wireless communication channel.” EX-1003 ¶¶ 248-274.

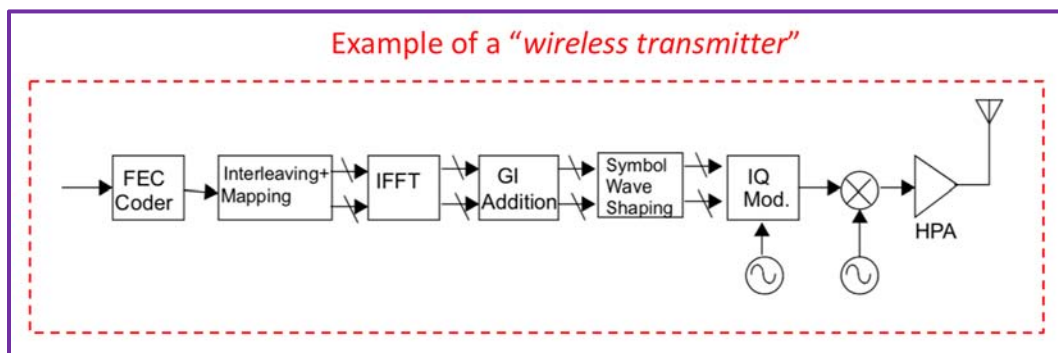
Likewise, a POSA would understand that the IEEE 802.11-2007 standard discloses a method of transmitting information in a wireless communication channel. As the standard explains, it “define[s] one medium access control (MAC) and several physical layer (PHY) specifications for *wireless connectivity* for fixed, portable, and moving stations (STAs) within a local area.” IEEE 802.11-2007 “specifies the PHY entity for an orthogonal frequency division multiplexing (OFDM) system” which “uses 52 subcarriers that are modulated” with “data, pilots, or training symbols” specifically for the “5 GHz band.” A POSA would understand that these disclosures (among others) of transmitting data using OFDM teach a method of transmitting information in a wireless communication channel. EX-1003 ¶¶ 248-274.

[1a] transmitting first information across a first frequency range using a wireless transmitter, the first frequency range having a first center frequency, a first highest frequency, and a first lowest frequency;

IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently.

As to “transmitting first information” “using a wireless transmitter,” a POSA would necessarily understand that transmitting information wirelessly requires a “wireless transmitter.” EX-1003 ¶¶ 294-299. Indeed, the ’802 Patent expressly acknowledges that such transmitters were known in the art. *See, e.g.*, EX-1001, at Fig. 1 (labeled “prior art”). With specific regard to the HT duplicate and non-HT

duplicate formats disclosed in IEEE 802.11n D2.0, a POSA would understand that there would be no practical way to up-convert the signals to “an RF according to the center frequency of the desirer channel and transmit” without a wireless transmitter. EX-1003 ¶¶ 294-299. Moreover, IEEE 802.11-2007 expressly discloses examples of wireless transmitters, as shown below:



EX-1003 ¶¶ 294-299. Other prior art, such as Shearer, also discloses wireless transmitters. See EX-1003 ¶ 222.

As to transmitting first information across a “first frequency range having a first center frequency, a first highest frequency, and a first lowest frequency, a POSA would understand that a combination of IEEE 802.11n D2.0 with the 802.11 standard renders obvious these limitations as well. Specifically, 802.11n D2.0 defines two formats of wireless transmission: HT duplicate format and non-HT duplicate format. In HT duplicate format, “signals in two halves of the occupied channel width contain the same information.” EX-1003 ¶¶ 275-294. Non-HT duplicate format is defined as a “mode of operation of the PHY that duplicates a 20

MHz non-HT transmission in two adjacent 20 MHz channels, allowing a non-HT BSS on either channel to receive the transmission.” EX-1003 ¶¶ 275-294.

IEEE 802.11n D2.0 further sets out the equations (in “complex base-band signal notation”) that define the transmissions in HT duplicate and non-HT duplicate format. EX-1003 ¶¶ 275-281. As detailed in Dr. Negus’s accompanying declaration, such equations describe the transmission of “first information” across a “first frequency range” that is defined by a “first highest frequency,” and “first center frequency,” and a “first lowest frequency”:

IEEE 802.11n D2.0 Eq. (20-60) describing HT Duplicate Format

$$r_{HT-DATA}^{iTX}(t) = \frac{1}{\sqrt{N_{Duplicate}^{Tone}}} \sum_{n=0}^{N_{SYM}-1} w_{T_{SYM}}(t - nT_{SYM})$$

$$\cdot \sum_{k=-N_{SR}}^{N_{SR}} (D_{k,n} + p_{n+z} P_k) ([Q_{k-32}]_{i_{TX},1} \exp(j2\pi(k-32)\Delta_F(t - nT_{SYM} - T_{GI}))$$

$$+ j[Q_{k+32}]_{i_{TX},1} \exp(j2\pi(k+32)\Delta_F(t - nT_{SYM} - T_{GI})))$$

Example disclosure of both a “first highest frequency” and a “second highest frequency”

Example disclosure of a “first center frequency”

Example disclosure of both a “first lowest frequency” and a “second lowest frequency”

Example disclosure of both “first information” and “second information”

Example disclosure of a “second center frequency” that is “greater than the first center frequency”

EX-1003 ¶ 279.

IEEE 802.11n D2.0 Eq. (20-61) describing Non-HT Duplicate Format

$$r_{LEG-DUP}^{i_{TX}}(t - nT_{SYM}) = \frac{1}{\sqrt{N_{Duplicate}^{Tone}}} \sum_{n=0}^{N_{SYM}-1} w_{T_{SYM}}(t - nT_{SYM})$$

Example disclosure of both a "first highest frequency" and a "second highest frequency"

$$\cdot \sum_{k=-26}^{26} (jD_{k,n} + p_n P_k) (\exp(j2\pi(k-32)\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}})))$$

Example disclosure of a "first center frequency"

$$+ j \exp(j2\pi(k+32)\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}})))$$

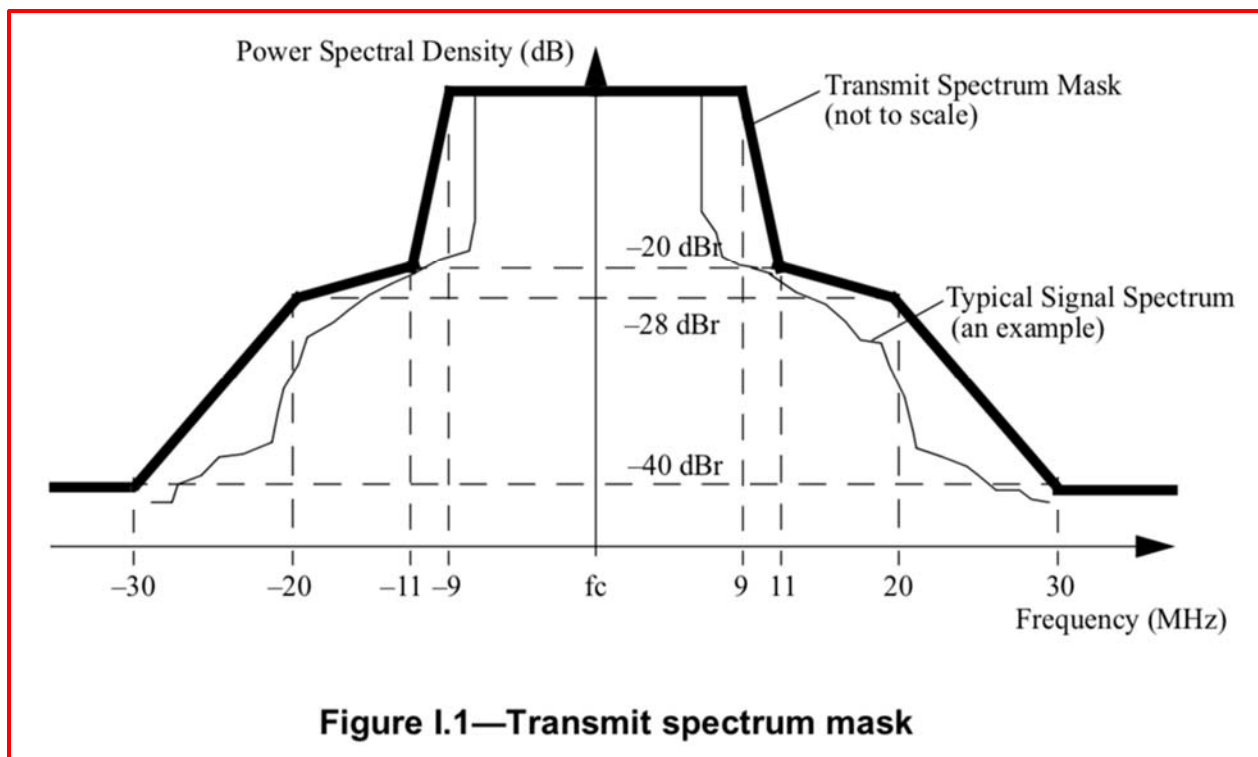
Example disclosure of both a "first lowest frequency" and a "second lowest frequency"

Example disclosure of both "first information" and "second information"

Example disclosure of a "second center frequency" that is "greater than the first center frequency"

EX-1003 ¶ 280.

These equations and their disclosure of frequency ranges are reinforced by IEEE 802.11-2007, which includes disclosures of the "transmit spectrum mask" that corresponds to the "transmitted spectral density of the transmitted signal." EX-1003 ¶¶ 275-294. The transmit spectrum mask visually illustrates the first highest frequency, the first lowest frequency, and the first center frequency, and thus defines the "first frequency range" across which the first information is transmitted, as illustrated in Annex I of IEEE 802.11-2007:



EX-1005, Figure I.1.

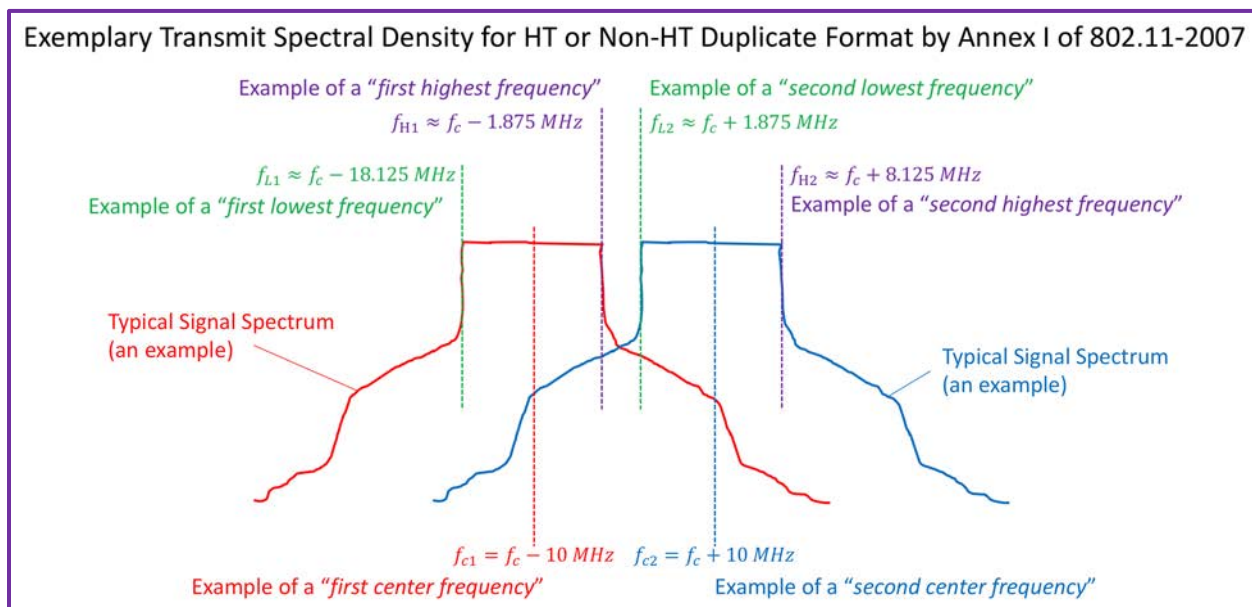
IEEE 802.11n D2.0 expressly teaches that the “maximum allowable transmit power by regulatory domain” is discussed in Annex I of the 802.11 standard. EX-1003 ¶¶ 275-294; EX-1005 § 20.3.20.3. Thus, a POSA would understand that Figure I.1 from IEEE 802.11-2007, when duplicated, shows what transmissions in HT or non-HT duplicate format would look like, as demonstrated in the below annotated

figure

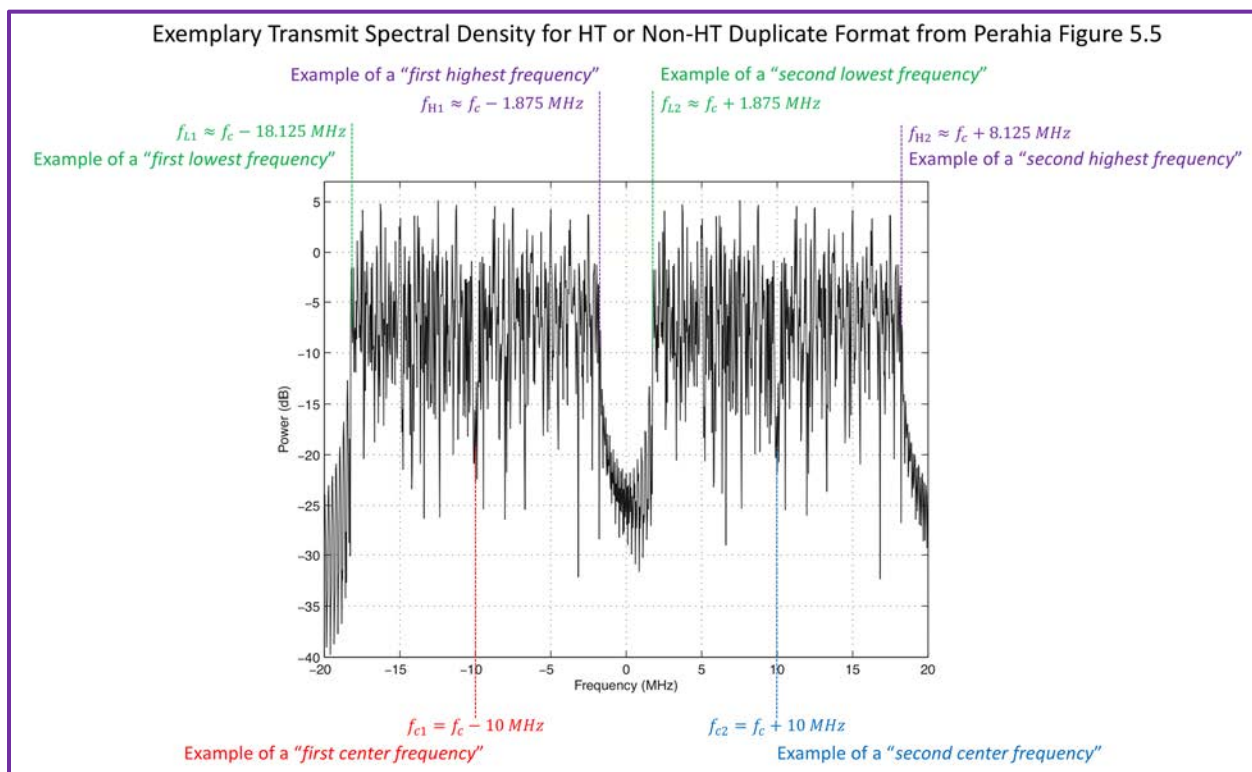
from

Dr.

Negus:



EX-1003 ¶ 290-291. Another visual representation of what the first frequency range would look like in HT duplicate and non-HT duplicate format appears in Perahia:



EX-1003 ¶ 292-293.

Therefore, IEEE 802.11n D2.0 in view of IEEE 802.11-2007 disclose explicitly or render obvious “transmitting first information across a first frequency range using a wireless transmitter, the first frequency range having a first center frequency, a first highest frequency, and a first lowest frequency.”

[1b] simultaneously transmitting second information across a second frequency range using the same wireless transmitter, the second frequency range having a second center frequency greater than the first center frequency, a second highest frequency, and a second lowest frequency.

IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently.

As an initial matter, the claim limitations in this element mirror those in element 1a above, replacing “second” with “first.” Thus, a POSA would understand that the same disclosures relating to the transmission of “first information” using a “wireless transmitter” across a “first frequency range” apply equally here. EX-1003 ¶¶ 301-302.

The examples and references discussed above in connection with element 1a disclose the “second frequency range having a second center frequency greater than the first center frequency.” The annotated equations in Dr. Negus’s declaration include references to the first and second center frequencies that show the second center frequency is greater than the first center frequency:

IEEE 802.11n D2.0 Eq. (20-60) describing HT Duplicate Format

$$r_{HT-DATA}^{i_{TX}}(t) = \frac{1}{\sqrt{N_{Duplicate}^{Tone}}} \sum_{n=0}^{N_{SYM}-1} w_{T_{SYM}}(t - nT_{SYM})$$

$$\cdot \sum_{k=-N_{SR}}^{N_{SR}} (D_{k,n} + p_{n+z}P_k) ([Q_{k-32}]_{i_{TX},1} \exp(j2\pi(k-32)\Delta_F(t - nT_{SYM} - T_{GI}))$$

$$+ j[Q_{k+32}]_{i_{TX},1} \exp(j2\pi(k+32)\Delta_F(t - nT_{SYM} - T_{GI})))$$

Example disclosure of both a "first highest frequency" and a "second highest frequency"

Example disclosure of a "first center frequency"

Example disclosure of both a "first lowest frequency" and a "second lowest frequency"

Example disclosure of both "first information" and "second information"

Example disclosure of a "second center frequency" that is "greater than the first center frequency"

EX-1003 ¶ 279.

IEEE 802.11n D2.0 Eq. (20-61) describing Non-HT Duplicate Format

$$r_{LEG-DUP}^{i_{TX}}(t - nT_{SYM}) = \frac{1}{\sqrt{N_{Duplicate}^{Tone}}} \sum_{n=0}^{N_{SYM}-1} w_{T_{SYM}}(t - nT_{SYM})$$

$$\cdot \sum_{k=-26}^{26} (jD_{k,n} + p_nP_k) (\exp(j2\pi(k-32)\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}})))$$

$$+ j \exp(j2\pi(k+32)\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}})))$$

Example disclosure of both a "first highest frequency" and a "second highest frequency"

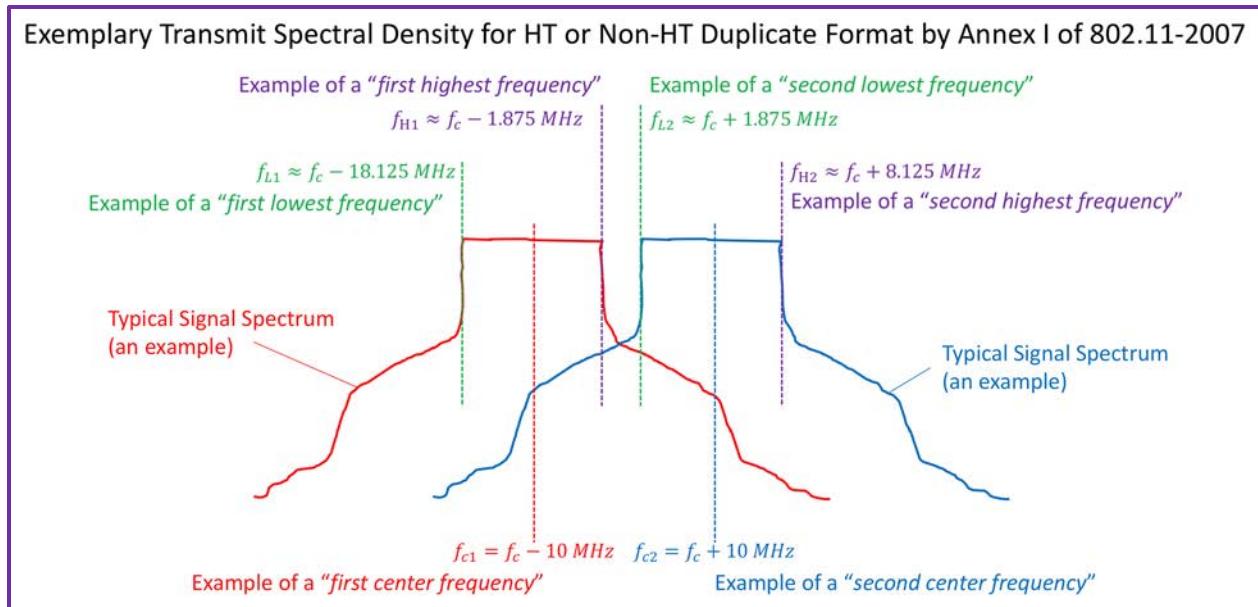
Example disclosure of a "first center frequency"

Example disclosure of both a "first lowest frequency" and a "second lowest frequency"

Example disclosure of both "first information" and "second information"

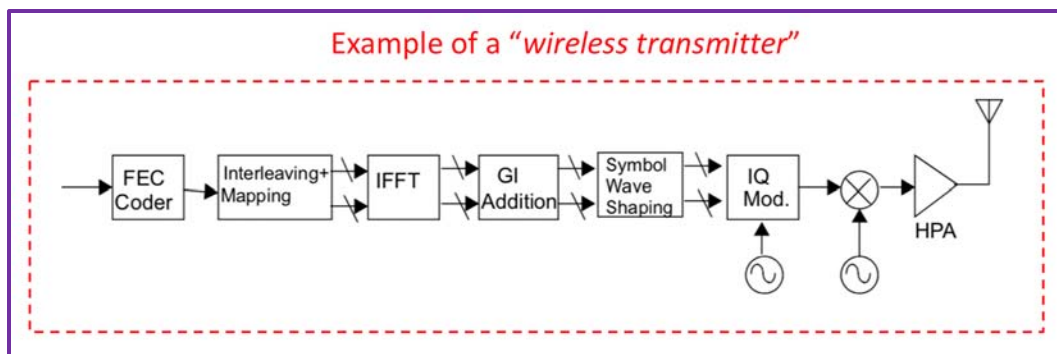
Example disclosure of a "second center frequency" that is "greater than the first center frequency"

EX-1003 ¶ 280. Likewise, the spectral mask diagram in IEEE 802.11-2007, as shown doubled and annotated by Dr. Negus, demonstrates the second center frequency being greater than the first central frequency:



EX-1003 ¶¶ 290-291. Accordingly, a POSA would understand that IEEE 802.11n D2.0 in view of IEEE 802.11-2007 and the knowledge of a POSA renders obvious the limitations of this claim element.

As to the "second information" transmission occurring "simultaneously" to the "first information" and using the "same wireless transmitter," a POSA reading IEEE 802.11n D2.0 would understand that the HT duplicate and non-HT duplicate formats disclosed therein require "first" and "second" information being transmitted "simultaneously" on different carrier frequencies (i.e., on first and second frequencies). EX-1003 ¶¶ 303-322. Moreover, a POSA would understand that the HT duplicate and non-HT duplicate formats disclose both "first information" and "second information" within a single composite complex baseband signal generated by a structure similar to the one shown in IEEE 802.11-2007:



EX-1003 ¶¶ 296, 303-322. This block diagram shows a transmitter, and thus, based on a POSA’s knowledge, discloses that the “same wireless transmitter” transmits the first and second information “simultaneously.” EX-1003 ¶¶ 303-322. Moreover, other prior art demonstrates that a POSA would understand that 802.11n D2.0 describes simultaneous transmission. Shearer, for example, states that “[i]n one embodiment of an 802.11n system, two 20 MHz 802.11a input signals are received at the PHY unit 300 from Fig. 3 *substantially simultaneously*.” EX-1007, at 8:22-25; EX-1003 ¶ 233.

Therefore, IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses explicitly or renders obvious “simultaneously transmitting second information across a second frequency range using the same wireless transmitter, the second frequency range having a second center frequency greater than the first center frequency, a second highest frequency, and a second lowest frequency.” EX-1003 ¶¶ 303-323.

b. Claim 2

[2] The method of claim 1 wherein frequency difference between the first center frequency and the second center frequency is greater than the sum of one-half the first frequency range and one-half the second frequency range.

IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently. The analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.”

As an initial matter, the language of claim 2 effectively requires the “first frequency range” and the “second frequency range” to be non-overlapping and non-contiguous. That is, the “distance” from the first center frequency to the lowest (or highest) frequency is always going to be “one-half the first frequency range.” Accordingly, if the difference between the first center frequency and the second center frequency is *exactly* the sum of half the first frequency range and the second frequency range, the ranges abut each other. Anything *greater* than that difference will result in non-overlapping channels.

As explained in the accompanying declaration of Dr. Negus, both the HT duplicate and non-HT duplicate formats of IEEE 802.11n D2.0 disclose a “first frequency range” and “second frequency range” of 16.5 MHz each. EX-1003 ¶¶ 324-325 (citing EX-1003 ¶¶ 287-289 and 309-311). Further, these two frequency ranges are within the 40 Mhz channel, non-overlapping and separated by an intermediary 3.5 Mhz range. EX-1003 ¶¶ 198-199, 324-330, 367-368. And a POSA would

likewise understand that both the HT duplicate and non-HT duplicate formats of IEEE 802.11n D2.0 disclose a difference between the first center frequency and second center frequency of 20 MHz. Thus, IEEE 802.11n D2.0, in view of IEEE 802.11-2007 renders obvious claim 2 at least by showing a 40 MHz HT duplicate or non-HT duplicate format transmission that has its second center frequency higher than its first center frequency by 20 MHz, which is greater than the 16.5 MHz of frequency expanse for the sum of each of its first and second frequency ranges. EX-1003 ¶¶ 198-199, 324-330, 367-368.

c. Claim 3

[3] The method of claim 1 wherein the first and second information are transmitted using the same power amplifier in said wireless transmitter.

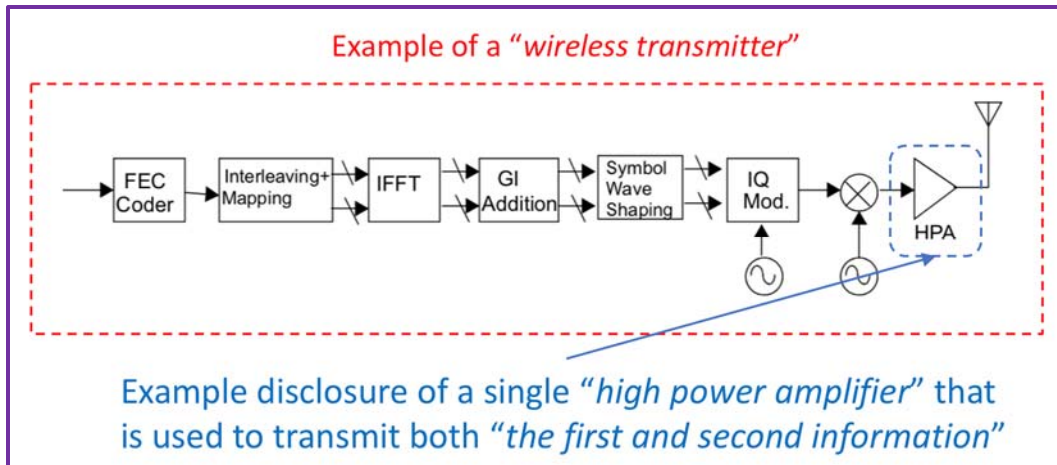
IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently. The analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.”

As explained above in relation to claim element 1a, IEEE 802.11n D2.0 in view of IEEE 802.11-2007 disclose a “wireless transmitter” as used in the claims.

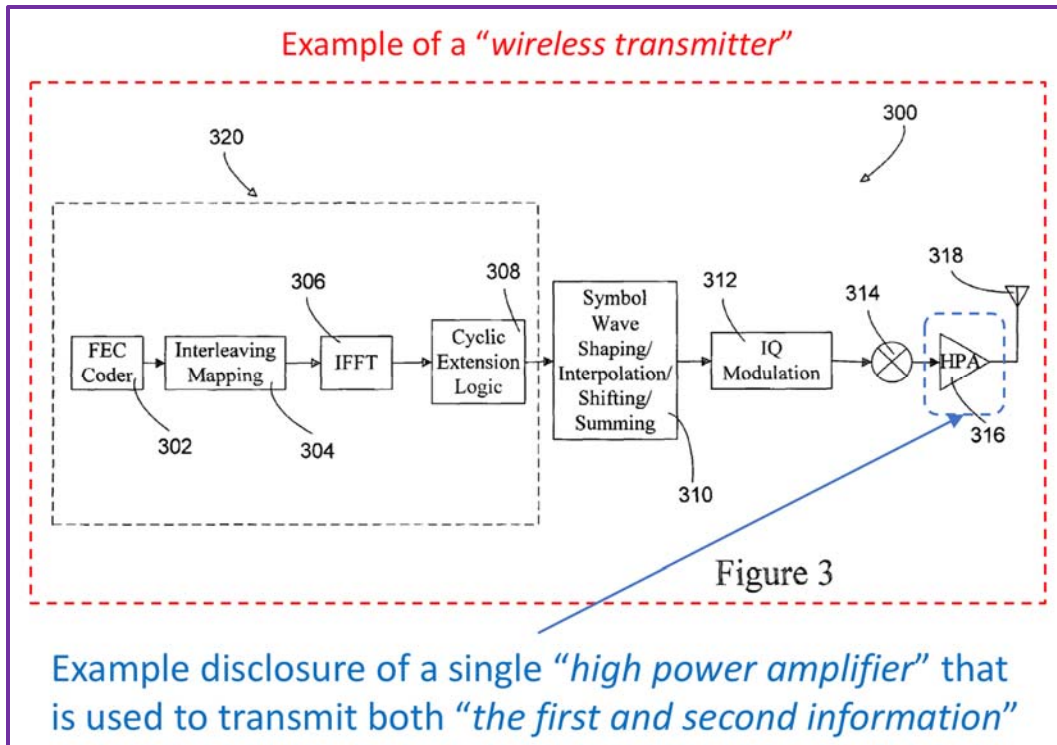
As to the transmission of the first and second information “using the same power amplifier,” a POSA would understand that the combination of references likewise renders that limitation obvious. The ’802 Patent itself acknowledges that using a power amplifier to amplify signals for transmission was known in the art, and includes a depiction of a power amplifier in its “prior art” Figure 1. EX-1001, at

Figure 1 and 1:27-29. Nothing in the specification suggests that the disclosed power amplifier is novel or unconventional. Indeed, if the '802 Patent were claiming a novel power amplifier or used new techniques to build its transmitter, the applicant would have been required to disclose those aspects in the specification. *See Trustees of Columbia Univ. in the City of N.Y. v. Illumina, Inc.*, 620 Fed. Appx. 916, 933 (Fed. Cir. 2015) (rejecting argument that POSA would not have had skill to build claimed nucleotide because “if novel and non-obvious chemistry was needed to practice the claimed inventions, [inventor] would have been obligated to disclose this chemistry in his patent”). The use of the “same power amplifier” is obvious for this reason alone.

Additionally, as explained by Dr. Negus, a POSA would have understood that the HT duplicate and non-HT duplicate formats disclosed in IEEE 802.11n D2.0 in view of IEEE 802.11-2007 include the transmission of first and second information “based upon a single composite complex baseband signal that is generated using a complex IFFT structure analogous to that shown” in IEEE 802.11-2007 as a “transmitter.” EX-1003 ¶¶ 331-340. A block diagram from IEEE 802.11-2007, reproduced below, illustrates a “high power amplifier” used to transmit both “first information” and “second information”:



EX-1003 ¶¶ 335. Given the ubiquity of power amplifiers and their well-known use in wireless transmission, it is unsurprising that other prior art likewise would have given a POSA the required knowledge to render the use of the “same power amplifier” obvious. Shearer, as an example of the state of the art known to a POSA, discloses a block diagram of a wireless transmitter that could be used in connection with either the HT duplicate or non-HT duplicate modes of IEEE 802.11n D2.0:



EX-1003 ¶ 336.

Accordingly, IEEE 802.11n D2.0, in view of IEEE 802.11-2007 renders obvious the “method of claim 1 wherein the first and second information are transmitted using the same power amplifier in said wireless transmitter.” EX-1003 ¶¶ 331-340.

d. Claim 4

[4] The method of claim 3 wherein the bandwidth of said power amplifier is greater than the difference between the first lowest frequency and the second highest frequency.

IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently. The analysis set forth above with reference to claims 1 and 3 renders obvious the “method of claim 3.”

The '802 Patent acknowledges that using a power amplifier to amplify signals for transmission was known in the art at the time of the alleged invention, and includes a depiction of a power amplifier in its “prior art” Figure 1. EX-1001, at Figure 1 and 1:27-29. Nothing in the remaining portions of the specification suggest that the '802 Patent discloses a novel power amplifier or that a POSA would not have the background knowledge necessary to select a prior art power amplifier to cover a given bandwidth, namely the bandwidth “between the first lowest frequency and the second highest frequency.”

Second, as explained above in reference to claim 3, a POSA would find it obvious to use the “same power amplifier” to transmit both the “first information” and the “second information” with respect to the HT duplicate and non-HT duplicate formats. And, because the POSA would know that he or she would be using the same power amplifier to transmit signals in both a first and second frequency range, the POSA would necessarily know that the bandwidth of the power amplifier in the wireless transmitter would need to be sufficiently wide to cover the frequency expanse of the first and second frequency ranges. EX-1003 ¶¶ 341-351.

Third, the disclosures of IEEE 802.11n D2.0 in view of IEEE 802.11-2007 render this limitation obvious because the combination discloses specific requirements for a wireless transmitter for carrying out HT duplicate and non-HT duplicate formats. Specifically, IEEE 802.11-2007 includes Figure 17-12 in Clause

17 showing a “wireless transmitter . . . for the OFDM PHY.” EX-1005 § 17.3.8.1. As noted above, IEEE 802.11n D2.0 refers specifically to Clause 17 for its non-HT duplicate transmission, providing that it “follow[s] the transmit procedure as in Clause 17 duplicated on both channels.” As Dr. Negus explains in connection with claim 3, a POSA would understand this disclosure to mean that the duplicate transmissions disclosed by IEEE 802.11n D2.0 are transmitted using the “same power amplifier.” EX-1003 ¶¶ 341-351. In light of that, a POSA would understand that the power amplifier would necessarily have to span at least the frequency range “between the first lowest frequency and the second highest frequency,” because otherwise the same power amplifier could not handle both transmissions. Thus, a POSA would know that IEEE 802.11n D2.0 requires a power amplifier with a bandwidth “greater than the difference between the first lowest frequency and the second highest frequency” for performing in HT duplicate and non-HT duplicate mode. EX-1003 ¶¶ 341-351.

Accordingly, IEEE 802.11n D2.0 in view of IEEE 802.11-2007 renders obvious the “method of claim 3 wherein the bandwidth of said power amplifier is greater than the difference between the first lowest frequency and the second highest frequency.” EX-1003 ¶¶ 341-351.

e. Claim 5

[5] The method of claim 1 further comprising concurrently changing the first center frequency to a third center frequency and the second center frequency

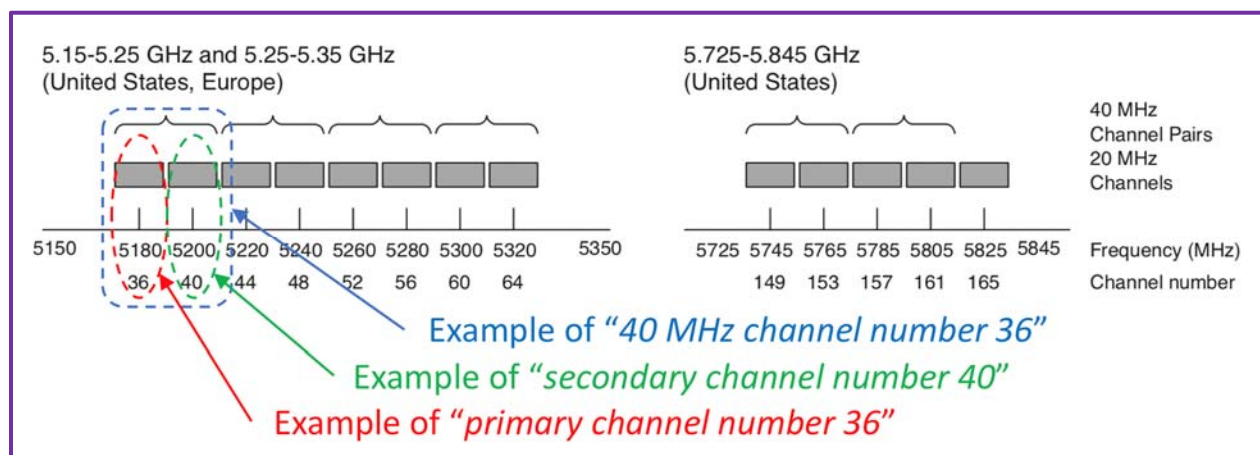
to a fourth center frequency, wherein the fourth center frequency is greater than the third center frequency, and wherein the first center frequency changes by at least the first frequency range and the second center frequency changes by at least the second frequency range, and wherein the bandwidth of said power amplifier is greater than the difference between the first lowest frequency and the second highest frequency for the changed first and second center frequencies.

IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently. As an initial matter, the analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.”

Moreover, apart from the “concurrently changing” limitation, dependent claim 5 contains limitations that mirror those in claims 1, 3, and 4. The analysis set forth above with respect to those claims thus renders obvious those limitations as well. Specifically, after the “concurrently changing” step, claim 5’s “third center frequency” and “fourth center frequency” as well as the “changed first and second center frequencies” correspond to the same configuration of frequency ranges as set forth in claim 1, except shifted. For that reason, the analysis of the “first center frequency” and “second center frequency” above (along with the corresponding terms like “first highest frequency” and “first lowest frequency”) is the same as for the “third center frequency” and “fourth center frequency” post-shift.

As for “concurrently changing the first center frequency to a third center frequency and the second center frequency to a fourth center frequency,” IEEE 802.11n D2.0 in view of IEEE 802.11-2007 renders this limitation obvious as well.

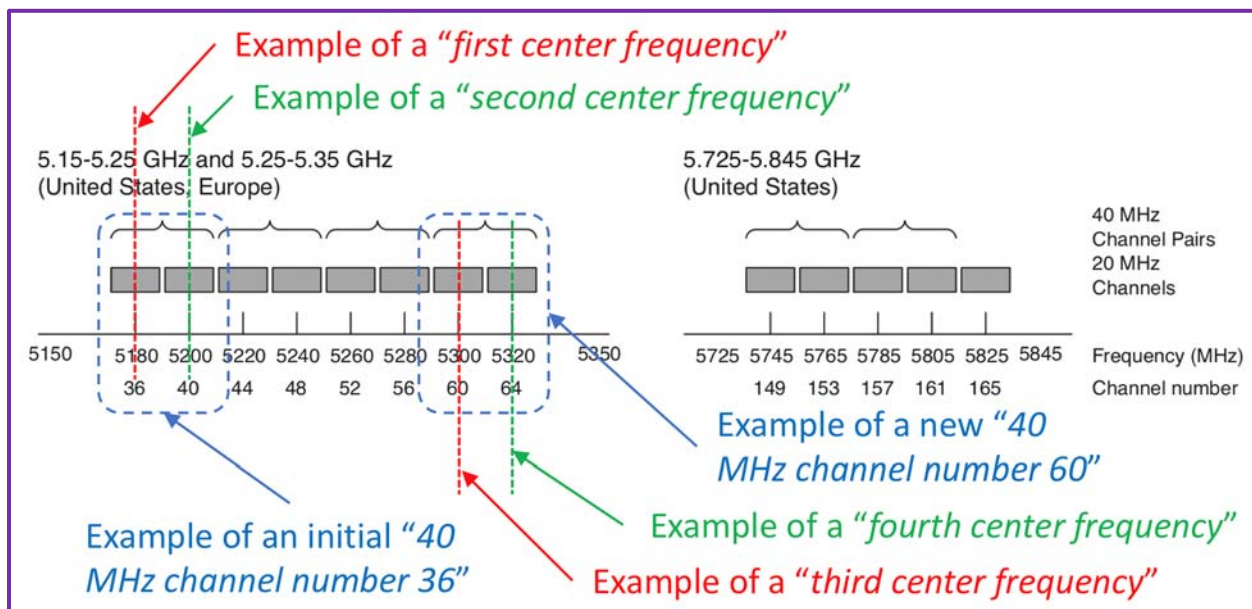
Specifically, IEEE 802.11-2007 discloses a “channel switch announcement” that can be used by a WLAN access point to “advertise when it is changing to a new channel and the channel number of the new channel.” When used in conjunction with HT duplicate and non-HT duplicate formats disclosed by IEEE 802.11n D2.0, then, the result of this channel switching is to concurrently change the first and second center frequencies to a third and fourth center frequency, respectively, while maintaining the orientation of the fourth center frequency being “greater than the third center frequency.” To illustrate this shift, as explained in detail by Dr. Negus, IEEE 802.11n D2.0 includes an annotated figure showing an example of HT duplicate or non-HT duplicate transmission in adjacent 20 MHz channels:



EX-1003 ¶¶ 363, 352-376.

The “channel switch” procedure of IEEE 802.11-2007 is applicable to 40 MHz channels within the frequency band of 5150-5350 MHz, and thus a POSA would understand that it is applicable to the HT duplicate and non-HT duplicate

formats disclosed in IEEE 802.11n D2.0, and in particular to the figure shown above. A POSA would have also known that it was desirable to executing a channel switch may be desirable because it allows an AP to shift transmissions to a channel with less traffic to avoid interference. EX-1003 ¶¶ 352-376. The channel switch procedure from IEEE 802.11-2007, when applied to the HT duplicate or non-HT duplicate formats of IEEE 802.11n D2.0, thus results in “concurrently changing” both the “first center frequency” and the “second center frequency” to a respective “third center frequency” and “fourth center frequency,” as demonstrated by the annotated figure in Dr. Negus’s declaration:



EX-1003 ¶ 363.

The resulting switch, as shown in the annotated figure, results in the “fourth center frequency” being greater than the “third center frequency,” as demonstrated by the higher channel number (which corresponds to a higher frequency range). As

Dr. Negus explains, this is more than just a quirk of this particular graph, because a POSA would understand that this orientation holds for “any valid 40 MHz channel number within the frequency band of 5150-5350 MHz” as applied to HT duplicate and non-HT duplicate formats. EX-1003 ¶¶ 352-376.

Further, as to the limitation that the “first center frequency changed by at least the first frequency range and the second center frequency changes by at least the second frequency range,” the example provided by Dr. Negus shows that IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses these limitations as well. In particular, in the figure from paragraph 344 of Dr. Negus’s declaration, the “third center frequency” (at 5310 MHz) has changed by 120 MHz compared to the first center frequency (at 5190 MHz). Likewise, the fourth center frequency (at 5330 MHz) has changed by 120 MHz compared to the second center frequency (at 5210 MHz). Both of these changes are greater than the 40 MHz first and second frequency ranges. This will always be the case when a change from a first or second frequency range is made to a non-adjacent channel. EX-1003 ¶¶ 352-376.

As to the limitation that the “bandwidth of said power amplifier is greater than the difference between the first lowest frequency and the second highest frequency for the changed first and second center frequencies,” the analysis with respect to claim 3 (which contains an identical limitation) renders obvious this limitation as well. EX-1003 ¶¶ 352-376.

Accordingly, IEEE 802.11n D2.0 in view of IEEE 802.11-2007 renders obvious the “method of claim 1 further comprising concurrently changing the first center frequency to a third center frequency and the second center frequency to a fourth center frequency, wherein the fourth center frequency is greater than the third center frequency, and wherein the first center frequency changes by at least the first frequency range and the second center frequency changes by at least the second frequency range, and wherein the bandwidth of said power amplifier is greater than the difference between the first lowest frequency and the second highest frequency for the changed first and second center frequencies.” EX-1003 ¶¶ 352-376.

f. Claim 6

[6] The method of claim 1 wherein the first information corresponds to a first wireless protocol and the second information corresponds to a second wireless protocol.

IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently. As an initial matter, the analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.”

A POSA would understand that IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses in at least two separate ways that a first information of claim 1 corresponds to a first wireless protocol and a second information of claim 1 corresponds to a second wireless protocol. First, the analysis with respect to claim 1 demonstrates that the proposed combination of references, and in particular the

disclosure of HT duplicate and non-HT duplicate formats, disclose a first information and second information as part of an ensemble OFDM symbol, along with the equations for producing those transmissions. *See* EX-1003 ¶¶ 377-387. As a POSA would understand, IEEE 802.11n D2.0 recites that, for the second information as compared to the first information, the transmission at a “second center frequency” includes an “additional 90° rotation of each subcarrier as indicated by the additional “*j*” in the amplitude value for each respective complex baseband rotator term.” EX-1003 ¶¶ 377-387. A POSA would understand that the 90° rotation constitutes a “second wireless protocol” as compared to the “first wireless protocol.” *Id.*

Second, and independently, a POSA would understand that the first and second information can correspond to first and second wireless protocols, respectively, because they are in the form of symbols that comply with (or “correspond to”) different protocols defined by IEEE 802.11. EX-1003 ¶¶ 377-387. By way of example, the first information can be in the form of an “ensemble OFDM modulation” that is identical to the format disclosed in clause 17 of IEEE 802.11-2007 or IEEE 802.11a-1999. *Id.* As explained above, IEEE 802.11n D2.0 non-HT duplicate formats use packets that are in “Clause 17 format,” i.e., the format specified in 802.11a, EX-1003 ¶ 92. Thus, an ensemble OFDM symbol corresponding to 802.11a or 802.11g, for example, constitutes a “first information

corresponding to a first wireless protocol. EX-1003 ¶¶ 377-387. Notably, the '802 Patent specifically cites IEEE 802.11g-2003 as an example of a “first wireless protocol.” EX-1001, at 8:1-2; EX-1003 ¶ 383. Likewise, an ensemble OFDM symbol corresponding to the HT duplicate or non-HT duplicate format would be compliant with 802.11n, which is a “second information corresponding to a second wireless protocol.” EX-1003 ¶¶ 377-387.

Accordingly, IEEE 802.11n D2.0 in view of IEEE 802.11-2007 renders obvious the “method of claim 1 wherein the first information corresponds to a first wireless protocol and the second information corresponds to a second wireless protocol.” EX-1003 ¶¶ 377-387.

g. Claim 7

[7] The method of claim 1 wherein the first information and the second information are the same data transmitted across two different frequencies.

IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently. As an initial matter, the analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.”

As to the “first information” and the “second information” being the “same data transmitted across two different frequencies,” that is the heart of the HT and non-HT *duplicate* format, with duplicate meaning the same information across two different frequencies. Specifically, as Dr. Negus explains, the OFDM symbols corresponding to the “first information” and “second information” are complex

rotated by the terms $\exp(j2\pi(k - 32)\Delta_F(t - nT_{SYM} - T_{GI}))$ or $\exp(j2\pi(k - 32)\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}}))$ and $j \exp(j2\pi(k + 32)\Delta_F(t - nT_{SYM} - T_{GI}))$ or $j \exp(j2\pi(k + 32)\Delta_F(t - nT_{SYM} - T_{GI} - T_{CS}^{i_{TX}}))$ (i.e. “are the *same data transmitted across two different frequencies*”). EX-1003 ¶¶ 388-392; *see also* EX-1003 ¶¶ 196-201, 279-281, and 302-305.

Accordingly, IEEE 802.11n D2.0 in view of IEEE 802.11-2007 renders obvious the “method of claim 1 wherein the first information and the second information are the same data transmitted across two different frequencies.”

h. Claim 8

[8] The method of claim 1 wherein the first information and the second information are from the same data stream.

IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently. As an initial matter, the analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.”

Likewise, the analysis set forth above with reference to claim 7 renders obvious “first information and the second information being from the same data stream.” The limitation of claim 7 that the first and second information are the same data is narrower than, but encompasses the limitation that the first and second information are from the same data stream because “the same data” necessarily

includes data “from the same data stream.” EX-1003 ¶¶ 393-397. For that reason, the obviousness analysis there, applies equally here.

Accordingly, IEEE 802.11n D2.0 in view of IEEE 802.11-2007 renders obvious the “method of claim 1 wherein the first information and the second information are from the same data stream.”

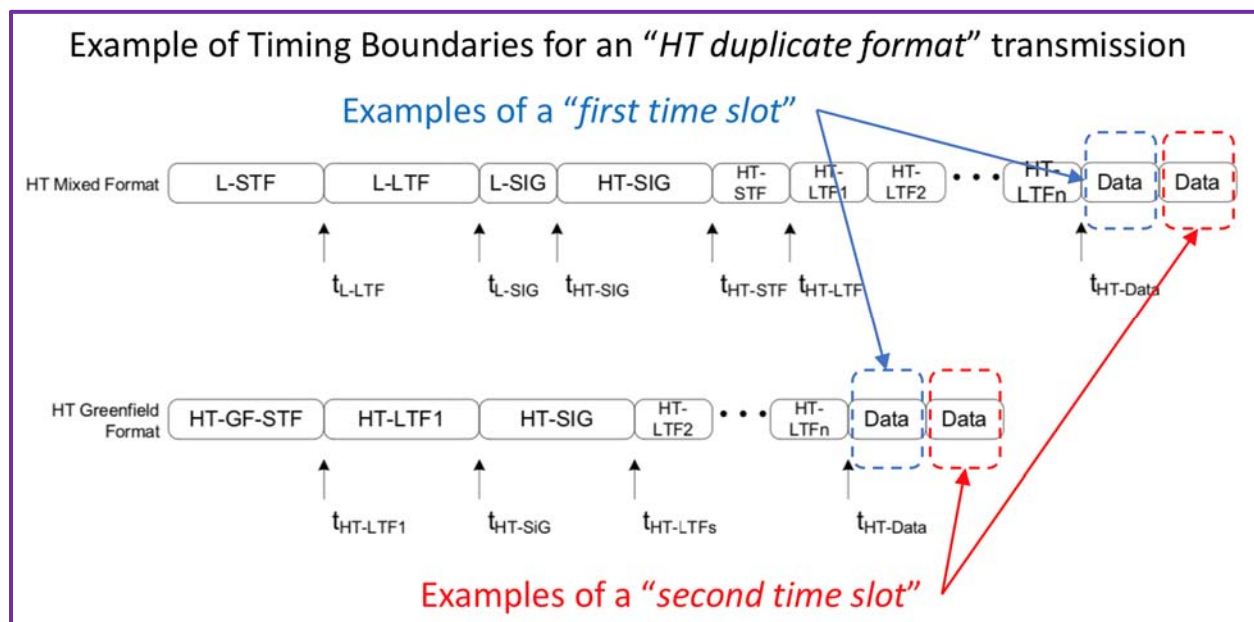
i. Claim 9

[9] The method of claim 1 wherein first information and second information comprise a plurality of OFDM symbols, wherein a first symbol is transmitted during a first time slot across the first frequency range and a second symbol is transmitted during the first time slot across the second frequency range, and wherein a third symbol is transmitted during a second time slot across the first frequency range and a fourth symbol is transmitted during the second time slot across a second frequency range.

IEEE 802.11n D2.0 in view of IEEE 802.11-2007 discloses this limitation explicitly or inherently. As an initial matter, the analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.”

The analysis above with respect to claim 1 shows that the “first information” and “second information” can “comprise a plurality of OFDM symbols” in the context of the HT duplicate or non-HT duplicate formats disclosed in IEEE 802.11n D2.0. EX-1003 ¶¶ 398-407. Moreover, the transmission of the “first information” and “second information” in the “first time slot” is rendered obvious by claim 1’s requirement of “simultaneously transmitting” first and second information. In any event, IEEE 802.11n D2.0 discloses the transmission of multiple ensemble OFDM

symbols in a “time domain,” as shown in the annotated figure from Dr. Negus’s declaration:



EX-1003 ¶¶ 398-401. Likewise, Dr. Negus’s declaration demonstrates that a POSA would understand IEEE 802.11n D2.0 in view of 802.11-2007 to disclose (as demonstrated by the same annotated figure) transmission of third and fourth information in a “during the second time slot”—that is, by the third and fourth information being transmitted simultaneously. EX-1003 ¶¶ 398-407.

Accordingly, IEEE 802.11n D2.0 in view of IEEE 802.11-2007 renders obvious the “method of claim 1 wherein first information and second information comprise a plurality of OFDM symbols, wherein a first symbol is transmitted during a first time slot across the first frequency range and a second symbol is transmitted during the first time slot across the second frequency range, and wherein a third

symbol is transmitted during a second time slot across the first frequency range and a fourth symbol is transmitted during the second time slot across a second frequency range.” EX-1003 ¶¶ 398-407.

B. Ground 2: Claims 1-4 and 9 are Obvious in View of Shearer

1. Shearer (EX-1007)

a. Analogous Art

Shearer is analogous art to the ’802 Patent. Specifically, it is in the same field of endeavor and “relates to wireless communications systems and methods,” including in particular the transmission of signals over communication channels. EX-1001, at Abstract. More specifically, Shearer is reasonably pertinent to the problem faced by the inventors of the ’802 Patent, since it addresses transmitting data simultaneously over two different communication channels. EX-1007 ¶ 62.

b. Overview of Shearer

Shearer is titled “packet generation systems and methods,” and is specifically directed to a “system and method for increased bandwidth digital communications.” EX-1007 ¶ 2. Shearer teaches its methods with specific relation to the IEEE 802.11 standard, and expressly references the then-proposed IEEE 802.11n standard which ultimately published as IEEE 802.11n D2.0 as discussed above. EX-1007 ¶ 35. Among the methods Shearer teaches are a system that “receives a number of digital signals, multiplies the signal sample rate by the number of received signals (e.g., an interpolation), shifts the signals with respect to a center frequency, and accumulates

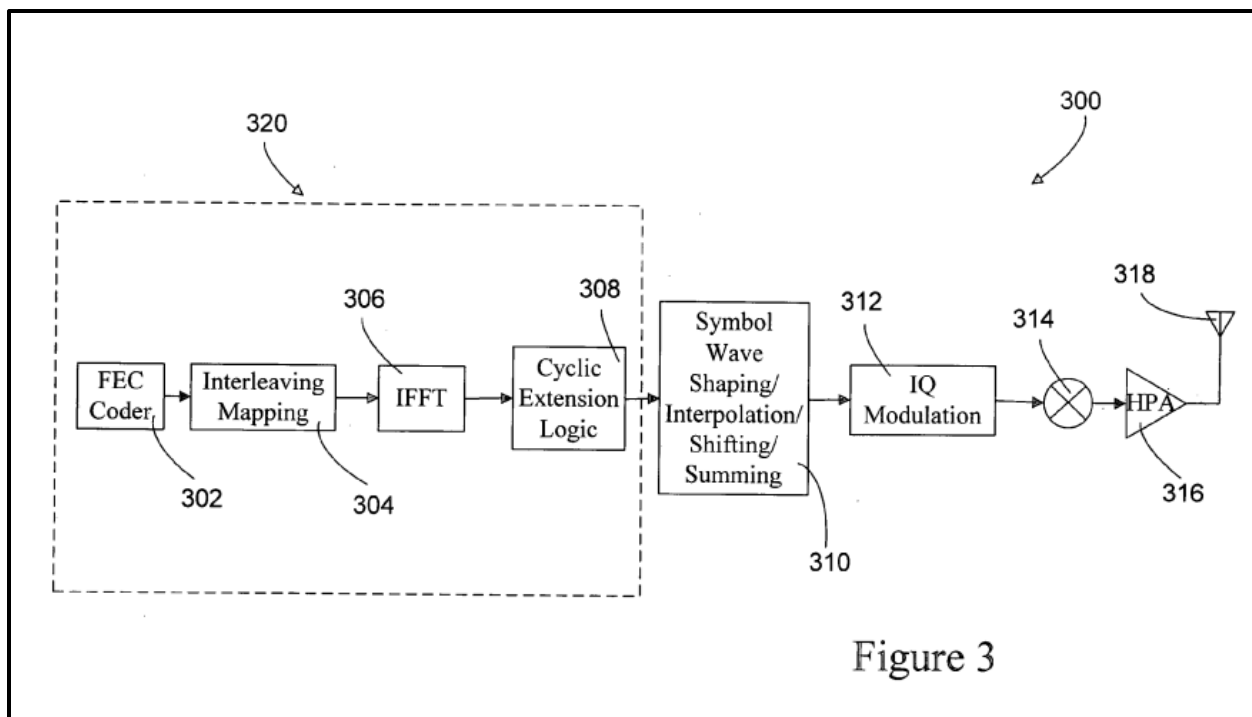
the shifted signals into one signal.” *Id.* This system uses “two inputs” and therefore has the capability of “increasing the bandwidth by a factor of 2” by transmitting two signals “substantially simultaneously.” EX-1007 ¶ 233. As explained below, Shearer’s teachings concerning simultaneous transmission of multiple signals renders obvious at least claims 1-4 and 9 of the ’802 Patent. Ex-1003 ¶¶ 217, 211-240.

2. Detailed Application to the Challenged Claims

a. Claim 1

[1pre] A method of transmitting information in a wireless communication channel comprising:

To the extent the preamble is limiting, Shearer discloses a method of transmitting information in a wireless communication channel. Specifically, Shearer discloses “a transmitter for an 802.11 device” to “operate in the 5 GHz band”:



EX-1003 ¶¶ 415-416; EX-1007, Fig. 3 & ¶¶ 38-40. Shearer further teaches using transmitters of the type disclosed to transmit information in a wireless communication channel. As relevant to this Petition, Shearer teaches multi-carrier transmission in which “two 20 MHz 802.11a input signals are received at the PHY unit 300 from FIG. 3 substantially simultaneously.” EX-1003 ¶ 416.

Accordingly, Shearer renders obvious a “method of transmitting information in a wireless communication channel.” EX-1003 ¶¶ 417-419.

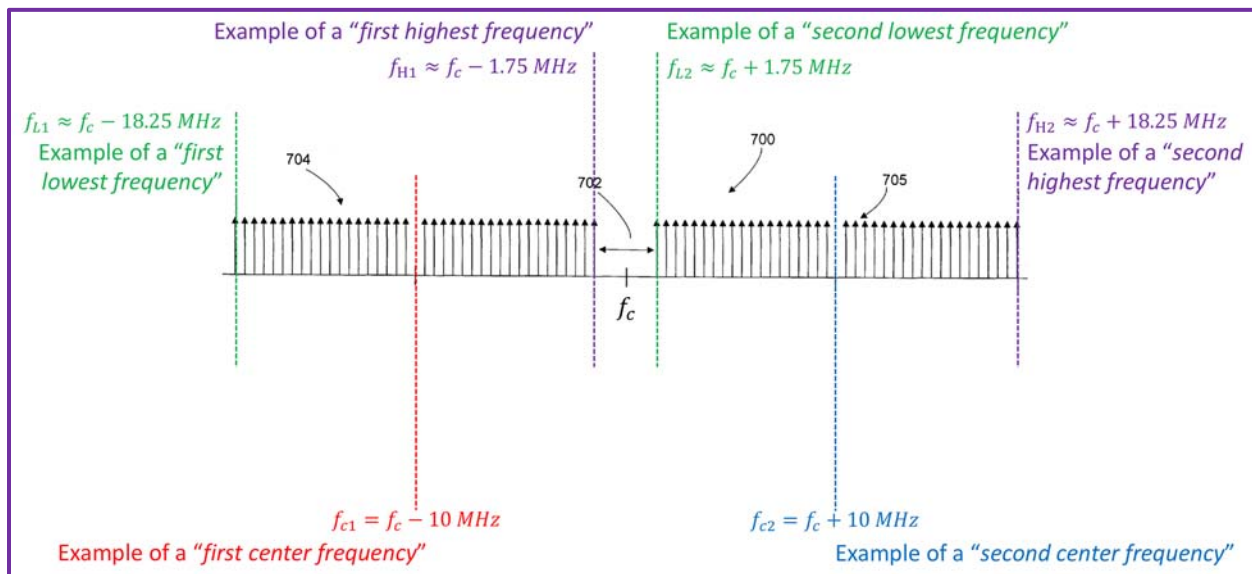
[1a] transmitting first information across a first frequency range using a wireless transmitter, the first frequency range having a first center frequency, a first highest frequency, and a first lowest frequency

Shearer discloses this limitation explicitly or inherently.

As to “transmitting first information” “using a wireless transmitter,” as explained in ground 1, a POSA would necessarily understand that transmitting information wirelessly requires a “wireless transmitter,” and the ’802 Patent acknowledges that such transmitters were known in the art. EX-1003 ¶¶ 294-299; EX-1001, at Fig. 1 (labeled “prior art”). As noted above, Shearer discloses a wireless transmitter for multi-carrier transmission. *See* EX-1003 ¶¶ 420-430.

As to transmitting first information across a “first frequency range having a first center frequency, a first highest frequency, and a first lowest frequency, Shearer renders this limitation obvious. Shearer teaches transmission in a 40 MHz channel comprised of two 20 MHz channels. EX-1003 ¶¶ 420-22. As Shearer explains, for “an IEEE 802.11a or IEEE 802.11g OFDM signal, a packet 400 within each 20 MHz channel has fifty-two (52) subcarriers” but “the packet is 20 MHz wide because that is the span of the 64 points in the IFFT” even though “the active (populated) subcarriers span a spectrum somewhat less than 20 MHz wide, about 16.5 MHz.” EX-1003 ¶ 420. Shearer illustrates these frequency ranges in, among other places, Figure 7, by diagramming the “subcarrier structure of two 20 MHz 802.11a/g OFDM packets” wherein the respective “center frequencies are spaced by 10 MHz” and there is an 11 subcarrier gap 702 between the packets.” EX-1007, Fig 7; EX-1003 ¶ 421. Dr. Negus’s annotations to a portion of Figure 7 show how these subcarriers teach the transmission of first information across a first frequency range, and define

the bounds of the frequency range (i.e., the “first lowest frequency,” the “first center frequency,” and the “first highest frequency”):



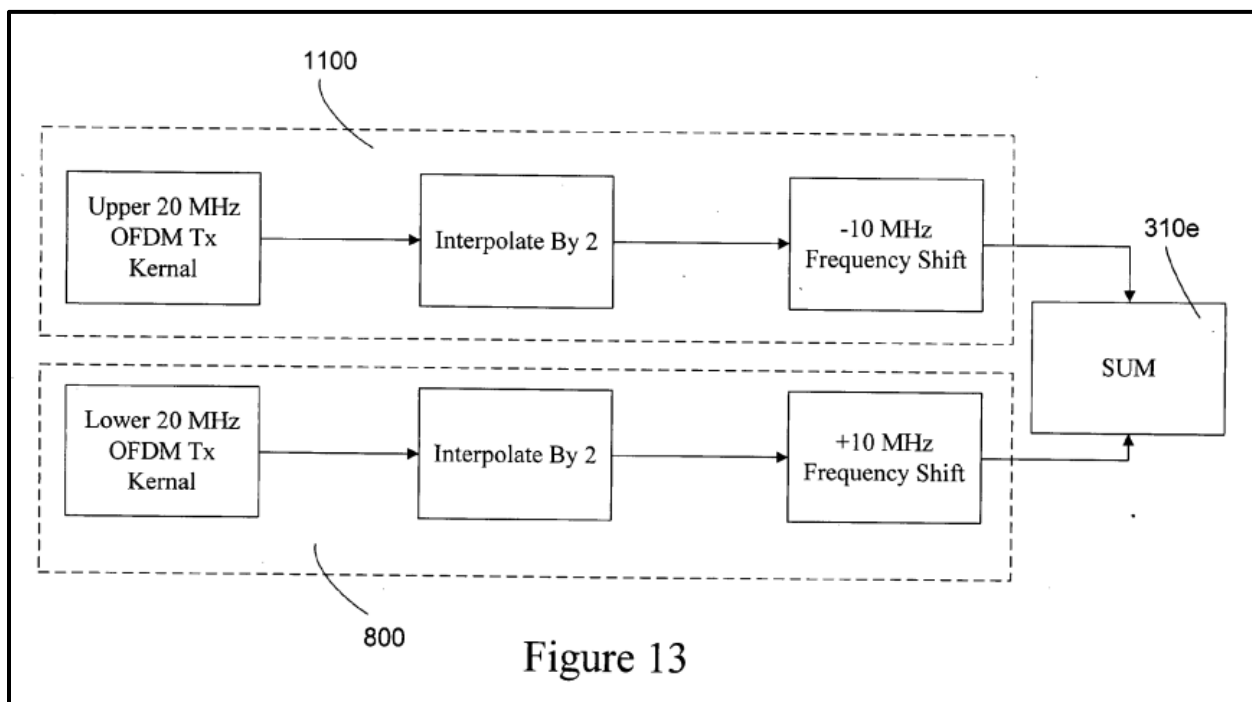
EX-1003 ¶ 421.

Additionally, Shearer explains that the transmitter it teaches permits the signal, through “mixer 314” to be “unconverted to the desired transmit frequency” and “amplified in the high powered amplifier” and sent to an “antenna 318 for transmission.” EX-1003 ¶ 427. Thus, Shearer teaches multiple transmission frequencies and multiple techniques for transmitting “first information” across a “first frequency range,” and accordingly explicitly discloses or renders obvious “transmitting first information across a first frequency range using a wireless transmitter, the first frequency range having a first center frequency, a first highest frequency, and a first lowest frequency.” EX-1003 ¶¶ 420-430.

[1b] simultaneously transmitting second information across a second frequency range using the same wireless transmitter, the second frequency range having a second center frequency greater than the first center frequency, a second highest frequency, and a second lowest frequency.

Shearer discloses this limitation explicitly or inherently.

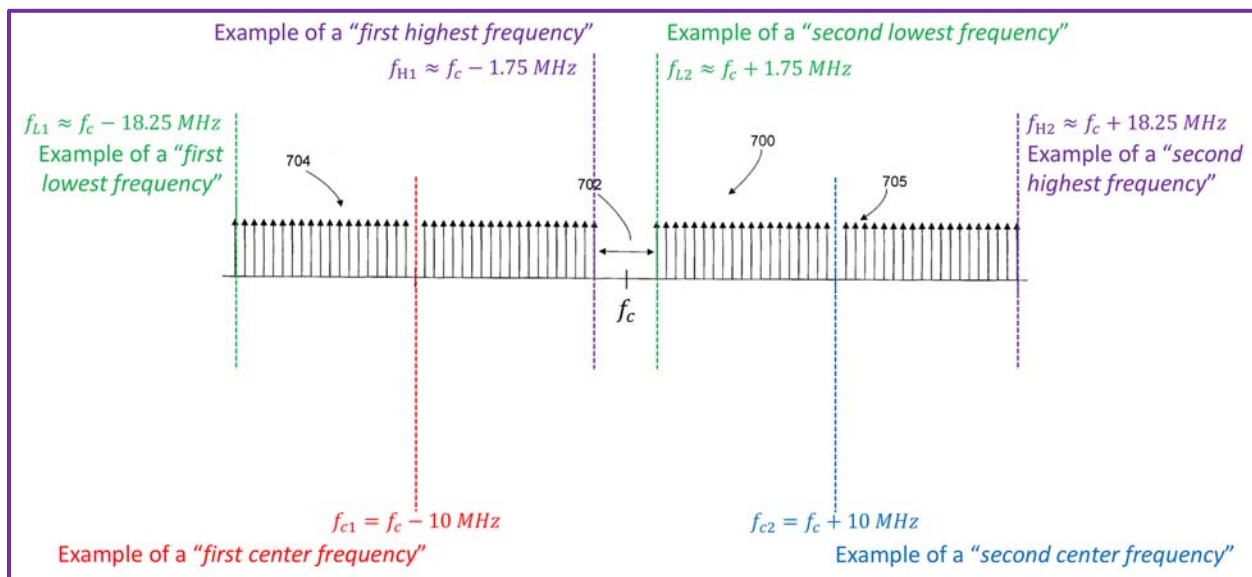
Shearer teaches simultaneous transmission of second information across a second frequency range in its disclosure of an upper and lower transmission “path.” Specifically, Shearer discloses Figure 13, which is an “exemplary embodiment with 2 signal paths, upper path 1100 and lower path 800, each processing a 20 MHz 802.11a input signal *substantially simultaneously*”:



EX-1007, Fig. 13; EX-1003 ¶¶ 420-428, 431-438. A POSA would understand that these signals (the upper path or the lower path) are “processed separately” (albeit

substantially simultaneously) and that either can consist of “transmitting second information across a second frequency range. EX-1003 ¶ 433.

As for the “second center frequency greater than the first center frequency,” Shearer describes shifting the signal of the lower path down by 10 MHz (to a “first center frequency”) and the signal of the upper path up by 10 MHz (to a “second center frequency”). EX-1003 ¶ 435.¹ And as Dr. Negus’s annotated Figure 7 shows, and as a POSA would understand, a signal shifted up (the upper path) as Shearer requires would necessarily have a center frequency greater than the signal that has been shifted down (the lower path):



¹ As Dr. Negus explains, Figure 13 has a “clear typographical error” in mistakenly designating the upper path as having a -10 MHz frequency shift and the lower path as having a +10 MHz frequency shift. EX-1003 ¶ 236. As is readily apparent from the specification and the other figures, those numbers are meant to be swapped with one another.

EX-1003 ¶¶ 421, 435.

Accordingly, Shearer renders obvious “simultaneously transmitting second information across a second frequency range using the same wireless transmitter, the second frequency range having a second center frequency greater than the first center frequency, a second highest frequency, and a second lowest frequency.” EX-1003 ¶¶ 431-438.

b. Claim 2

[2] The method of claim 1 wherein frequency difference between the first center frequency and the second center frequency is greater than the sum of one-half the first frequency range and one-half the second frequency range.

Shearer discloses this limitation explicitly or inherently. The analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.”

As explained above, the language of claim 2 effectively requires the “first frequency range” and the “second frequency range” to be non-overlapping and non-contiguous. *See supra*, Ground 1, Claim 2.

Shearer teaches a “40 MHz packet's subcarrier structure matching the subcarrier structure of two 20 MHz 802.11a/g OFDM packets.” EX-1003 ¶ 440. However, as Shearer explains, the disclosed OFDM packets are not actually transmitted across a full 20 MHz; rather the “active (populated) subcarriers span a spectrum” of “***about 16.5 MHz.***” EX-1003 ¶ 424. A POSA would understand that the 16.5 MHz constitutes either the “first frequency range” or the “second frequency

range,” depending on whether the reference is to the upper or lower path taught by Shearer. EX-1003 ¶ 440. Thus, the “sum of one-half the first frequency range and one-half the second frequency range” is 16.5MHz as taught by Shearer. EX-1003 ¶ 441.

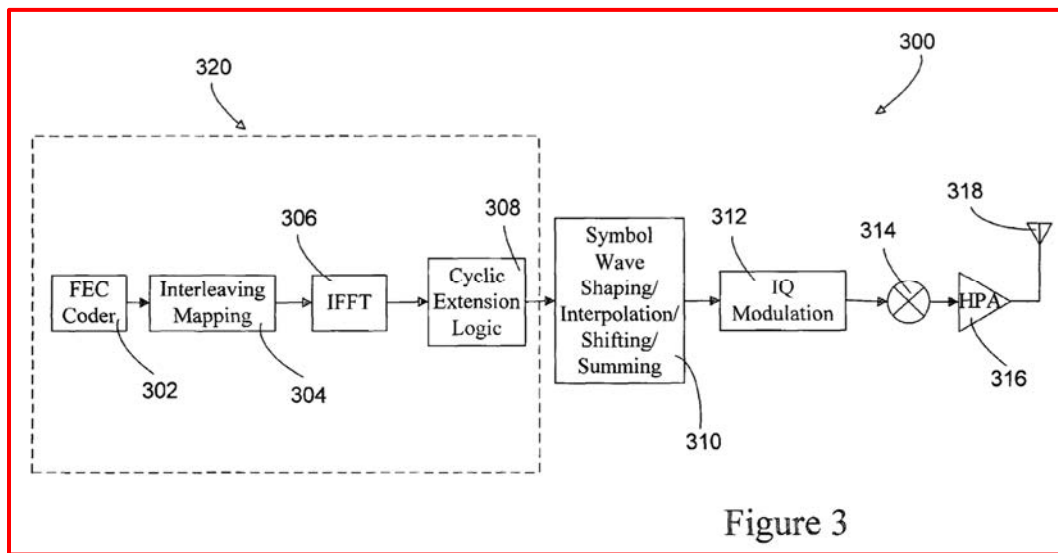
In contrast, as Shearer explains, the frequency of the transmission for one transmission path of the “40 MHz packet's subcarrier structure matching the subcarrier structure of two 20 MHz 802.11a/g OFDM packets” is shifted up by 10 MHz while the frequency for the other path is shifted down by 10 MHz. EX-1003 ¶ 434. Since the difference between -10 and +10 is 20 MHz, the “difference between the first center frequency and the second center frequency” is 20 MHz. EX-1003 ¶ 442. Because a POSA would understand that 20 MHz is greater than 16.5 MHz, a POSA would understand that Shearer teaches that the “method of claim 1 wherein frequency difference between the first center frequency and the second center frequency is greater than the sum of one-half the first frequency range and one-half the second frequency range.” EX-1003 ¶¶ 439-445.

c. Claim 3

[3] The method of claim 1 wherein the first and second information are transmitted using the same power amplifier in said wireless transmitter.

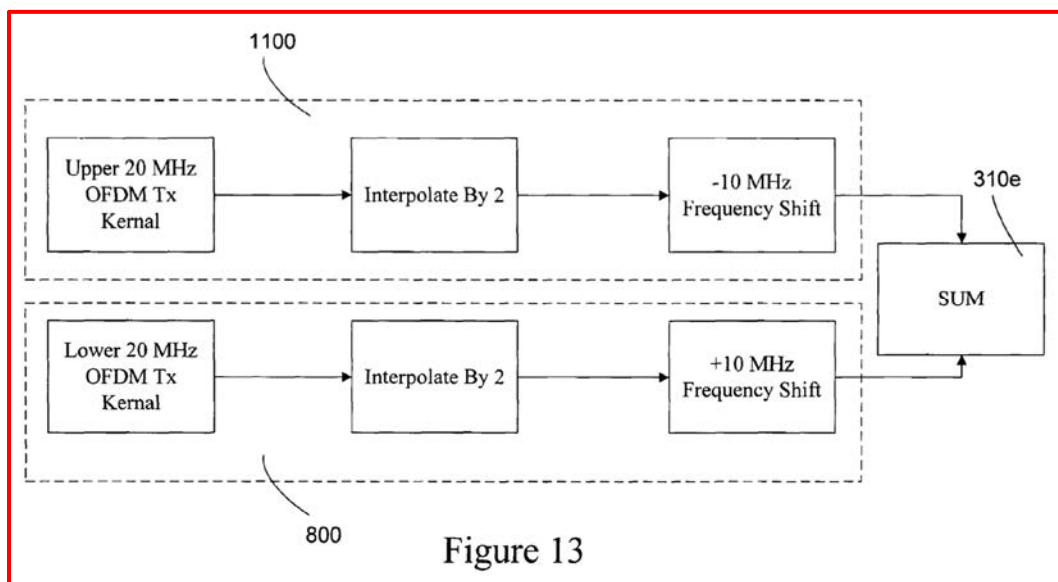
Shearer discloses this limitation explicitly or inherently. The analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.”

Shearer's Figure 3 shows a power amplifier, "high powered amplifier (HPA) 316." EX-1007, Fig. 3. In reference to Figure 3, Shearer explains that the "output of symbol wave shaper/interpolator/shifter/summer 310 is sent to modulator 312" which "modulates the encoded data onto carriers in OFDM symbols in accordance with conventional OFDM modulation techniques" and then "The output of the modulator 312 is sent to mixer 314 where it is upconverted to the desired transmit frequency" so that "the upconverted signal is amplified in high powered amplifier (HPA) 316 and sent to antenna 318 for transmission":



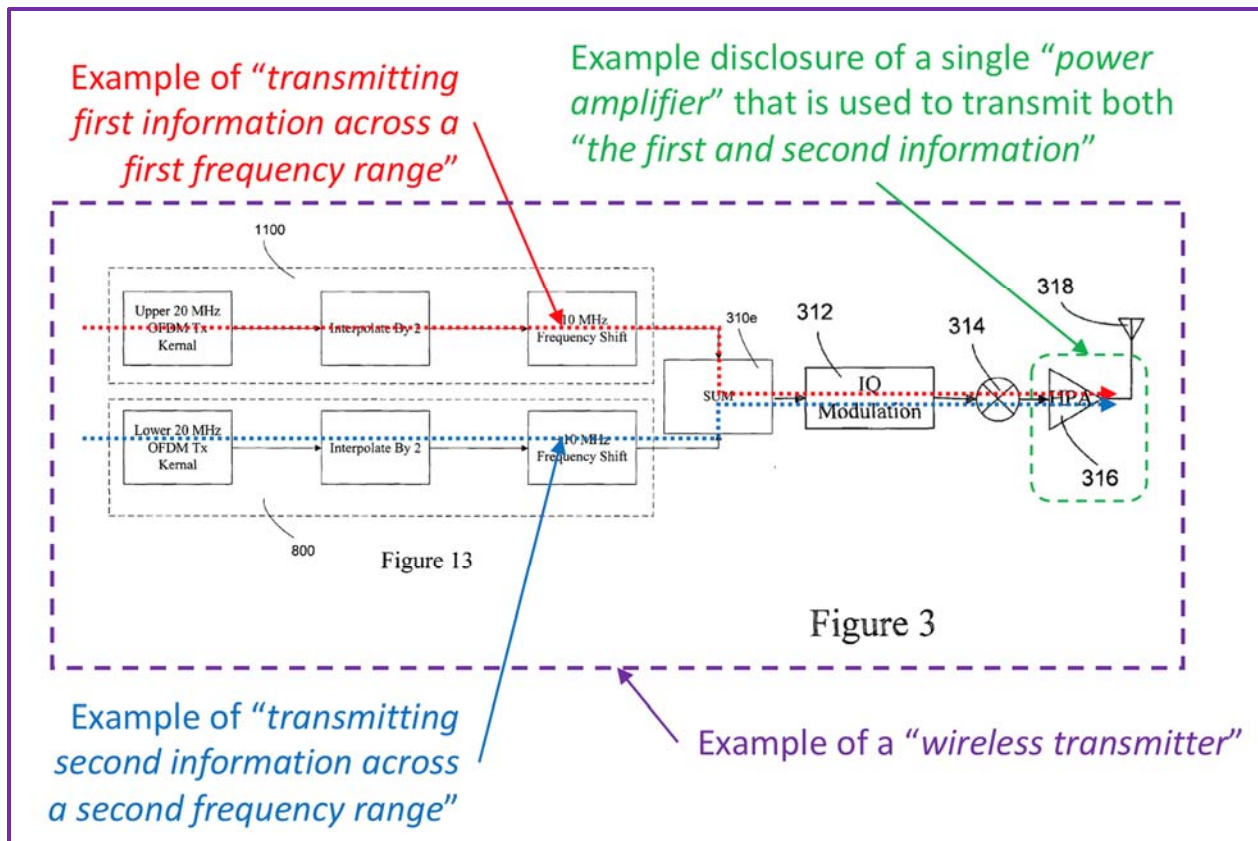
EX-10067, Fig. 3; EX-1003 ¶ 222. Although Figure 3 only shows a single transmission path, Shearer teaches the use of multiple paths, namely "simultaneously" transmitting "two 20 MHz 802.11a input signals" as a "40 MHz packet's subcarrier structure matching the subcarrier structure of two 20 MHz 802.11a/g OFDM packets." EX-1003 ¶ 449. These two paths come together in

element 310 of Figure 3, as shown in Figure 13, where the paths are shown separately and then combined in an “adder”:



EX-1007, Fig. 13; EX-1003 ¶¶ 235-37; *see also* EX-1007 ¶ 62 (the “output of each path is aggregated in an adder 310e”).

Thus, a POSA would understand that Figure 13 illustrates a multi-path system supplementing Figure 3, up to the “adder.” After the adder, Figure 3 shows the signal proceeding through IQ Modulation, the mixer, and then HPA 316, the high powered amplifier. Thus, as Dr. Negus explains, a POSA would understand that Shearer teaches the following combination of Figure 13 and Figure 3, in which the same power amplifier is used to transmit both the first and second information:



EX-1003 ¶ 449.

Accordingly, Shearer renders obvious the “method of claim 1 wherein the first and second information are transmitted using the same power amplifier in said wireless transmitter.” EX-1003 ¶¶ 446-451.

d. Claim 4

[4] The method of claim 3 wherein the bandwidth of said power amplifier is greater than the difference between the first lowest frequency and the second highest frequency.

Shearer discloses this limitation explicitly or inherently. The analysis set forth above with reference to claims 1 and 3 renders obvious the “method of claim 3.”

Although Shearer does not explicitly discuss the bandwidth of the disclosed power amplifiers, it would have been obvious to a POSA reading Shearer that HPA 316 should have a bandwidth “greater than the difference between the first lowest frequency and the second highest frequency.” EX-1003 ¶¶ 452-462.

First, as explained above, Shearer discloses “simultaneously” transmitting “two 20 MHz 802.11a input signals” as a “40 MHz packet’s subcarrier structure matching the subcarrier structure of two 20 MHz 802.11a/g OFDM packets.” EX-1003 ¶ 454. Transmitting those “simultaneous” signals using the same power amplifier necessarily means that the power amplifier’s bandwidth must span at least the full frequency range of the transmitted signals to avoid unacceptable distortion. EX-1003 ¶ 455.

Second, the specific requirements taught by Shearer for a wireless transmitter would inform a POSA of the need to use a power amplifier with at least the claimed bandwidth. Shearer teaches, for example, that its system is capable of “spoofing a legacy radio”—that is, sending simultaneous signals that “reuse the 20 MHz IEEE 802.11a/g preamble subcarrier definition.” EX-1003 ¶ 457. The end result, after up-conversion, amplification, and transmission, are that the “legacy radio receives what looks like a legacy packet” (e.g., an IEEE 802.11a or g compliant packet). *Id.* A POSA would understand that the result Shearer teaches could not be achieved without a power amplifier of sufficient bandwidth to span the first and second

frequency ranges, because using a power transmitter with lesser bandwidth would not result in the transmission of packets that “look like a legacy packet,” as Shearer teaches. EX-1003 ¶ 458.

Third, a POSA would understand that, in building Shearer’s system, there were effectively only two options: a power amplifier with bandwidth “greater than the difference between the first lowest frequency and the second highest frequency” or one with lesser bandwidth. EX-1003 ¶ 459. The ’802 Patent does not claim to have invented a new or improved power amplifier, and instead admits that its power amplifier is a conventional prior art component. *See* EX-1001, at Fig. 1 (showing a power amplifier in a figure labeled “prior art”). Thus, a POSA would understand that a power amplifier of the claimed bandwidth would be consistent with Shearer’s goals (including “spoofing a legacy radio”). EX-1003 ¶ 460. Accordingly, a power amplifier meeting the claimed bandwidth limitation would have been obvious to a POSA as one of a “finite number of identified, predictable solutions” to the problem that Shearer teaches the POSA to solve. *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398, 421 (2007).

Accordingly, Shearer renders obvious “the method of claim 3 wherein the bandwidth of said power amplifier is greater than the difference between the first lowest frequency and the second highest frequency.” EX-1003 ¶¶ 452-462.

e. **Claim 9**

[9] The method of claim 1 wherein first information and second information comprise a plurality of OFDM symbols, wherein a first symbol is transmitted during a first time slot across the first frequency range and a second symbol is transmitted during the first time slot across the second frequency range, and wherein a third symbol is transmitted during a second time slot across the first frequency range and a fourth symbol is transmitted during the second time slot across a second frequency range.

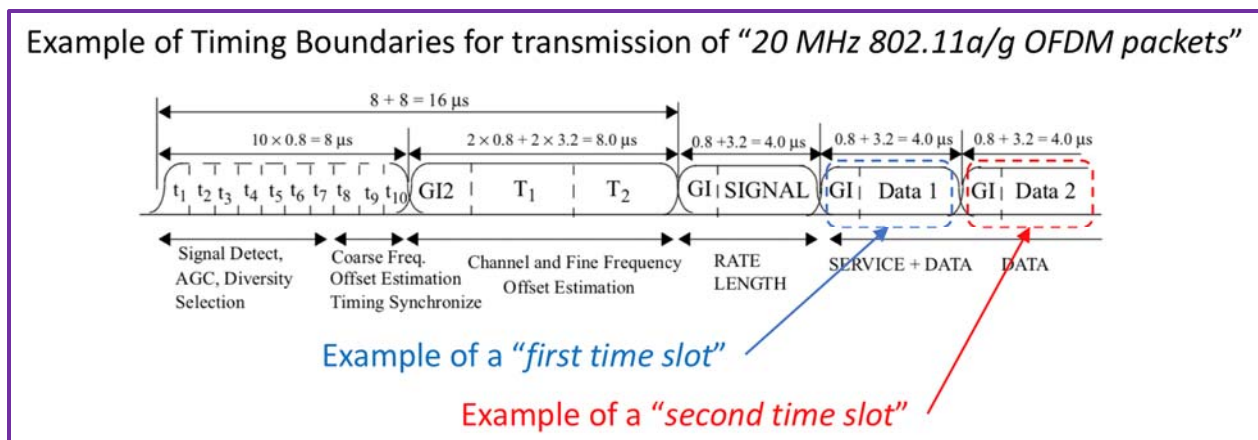
Shearer discloses this limitation explicitly or inherently. As an initial matter, the analysis set forth above with reference to claim 1 renders obvious the “method of claim 1.” EX-1003 ¶¶ 463-472.

Moreover, as explained above in connection with claim 1 of this ground, Shearer renders obvious the limitation that the “first information and second information comprise a plurality of OFDM symbols” transmitted across a “first frequency range” and “second frequency range,” respectively. *See supra*, Ground 2, Claim 1. Specifically, Shearer teaches that “first information” and “second information” are “two 20 MHz 802.11a input signals” within the “40 MHz packet’s subcarrier structure matching the subcarrier structure of two 20 MHz 802.11a/g OFDM packets.” EX-1003 ¶ 464. Shearer further teaches that those symbols are “simultaneously” transmitted across a first frequency range and second frequency range. *Id.*; *see also, e.g.*, EX-1007, Fig. 13.

As for the use of multiple “OFDM symbols,” Shearer teaches as an example of a packet “matching the subcarrier structure of two 20 MHz 802.11a/g OFDM

packets” a “mixed-mode packet” with a “spectrally aligned legacy preamble/header 2102, 2104, 2106, the extended header 2108, 2110, and data symbols 2112.” EX-1003 ¶ 465. A POSA would understand that even for the shortest data payload control frames, the number of “data symbols” would necessarily be more than one. EX-1003 ¶ 466. Therefore, even before considering the “upper path” and “lower” path teachings, Shearer necessarily discloses the transmission of a “first symbol” and a “second symbol” in a “first time slot” as part of the same packet. *Id.* For the same reason, Shearer necessarily discloses the transmission of a third and fourth symbol during a second time slot, again as part of the same packet. *Id.*

In any event, Shearer teaches the transmission of packets in the upper and lower paths “substantially simultaneously,” and therefore teaches the transmission of multiple OFDM symbols in the “first time slot” (i.e., simultaneously), as well as the transmission of multiple OFDM symbols in the “second time slot.” EX-1007 ¶ 57. And a POSA would understand that the “20 MHz 802.11a/g OFDM packets,” in compliance with IEEE 802.11a-1999, necessarily comprise multiple OFDM symbols transmitted in a time domain (i.e., a “time slot”), as illustrated in the annotated figure from Dr. Negus’s declaration and that appears in IEEE 802.11a-1999:



EX-1003 ¶ 467.

Accordingly, Shearer renders obvious the “method of claim 1 wherein first information and second information comprise a plurality of OFDM symbols, wherein a first symbol is transmitted during a first time slot across the first frequency range and a second symbol is transmitted during the first time slot across the second frequency range, and wherein a third symbol is transmitted during a second time slot across the first frequency range and a fourth symbol is transmitted during the second time slot across a second frequency range.” EX-1003 ¶¶ 463-472.

VII. THE BOARD SHOULD NOT EXERCISE ITS DISCRETION TO DENY INSTITUTION UNDER *FINTIV*

In *Apple Inc. v. Fintiv, Inc.*, the Board set forth six non-dispositive factors to guide whether efficiency, fairness, and the merits support the exercise of authority to deny institution in view of an earlier trial date in the parallel proceeding. On June 21, 2022, the Director issued interim procedure regarding application of the *Fintiv* factors (Interim Guidance) stating that “the PTAB will not deny institution of an IPR

or PGR under *Fintiv* [] when a petition presents compelling evidence of unpatentability.” USPTO Memorandum, Interim Procedure for Discretionary Denials in AIA Post Grant Proceedings with Parallel District Court Litigation (June 21, 2022), at 9. The instant Petition presents such evidence and, therefore, is not the proper subject of discretionary denial. Specifically, the Petition explains how the primary reference, IEEE 802.11n D2.0, alone and in combination with the other references, discloses the claimed limitations. The evidence presented, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence. Thus, under the Interim Guidance, the Board should not deny institution.

Likewise, the Board’s decision in *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (Dec. 1, 2020) (precedential as to § II.A) instructs that a holistic view of the remaining *Fintiv* factors also weighs in favor of institution.

Factor 1 is neutral because no request for stay has been filed in the District Court Litigation (§VIII.B). *Sand Revolution II LLC v. Continental Intermodal Group – Trucking LLC*, IPR2019-01393, Paper 24 at 7 (June 16, 2020) (informative).

Under factor 2, the trial date has been set for June 23, 2025. Further, a Final Written Decision in this matter is expected in or around November 2025. Considering the inherent uncertainties of litigation scheduling, particularly where

multiple trials are scheduled for the same date, this factor weighs against discretionary denial.

Factor 3 favors institution. The co-pending litigation is in its early stages, and the investment in it has been minimal. The parties have not exchanged proposed claim terms or constructions, and will not begin claim construction briefing until September 26, 2024, after the expected institution decision in this matter. EX-1010, at 4. The *Markman* hearing is not until November 26, 2024. EX-1010, at 4. Fact discovery closes in October 2024, and expert discovery closes in March 2025. EX-1010, at 3-4; *see PEAG LLC v. Varta Microbattery GMBH*, IPR2020-01214, Paper 8 at 17 (Jan. 6, 2021) (little investment in the parallel proceeding where claim construction hearing had not yet been held and discovery was not complete).

Under factor 4, Petitioners stipulate that if the IPR is instituted, it will not pursue, in District Court, the same invalidity grounds for the claims challenged here. *Sand Revolution II* at 7. Thus, the grounds presented here will not be asserted in District Court against the challenged claims and this factor weighs in favor of institution. In addition to the stipulation that Petitioners issued to Patent Owner, Patent Owner has only asserted a subset of the claims that are being challenged in the present Petition. Thus, it is unlikely the district courts will be addressing the validity of all of the claims challenged by this Petition. Thus, this factor favors institution. *Sand Revolution II* at 12.

Under factor 5, while Petitioners are defendants in District Court, nothing within *Fintiv* suggests that the same parties between the proceedings weighs in favor of discretionary denial. *See HP Inc. v. Slingshot Printing LLC*, IPR2020-01084, Paper 13 at 9 (Jan. 14, 2021) (having the “same parties as parallel proceeding” makes factor 5 “neutral”).

Under factor 6, other circumstances weigh in favor of institution. Here, the merits of the Petition are particularly strong. In the associated district court case against Petitioners, Patent Owner’s preliminary infringement contentions rely in several places on alleged use by Petitioners’ products of non-HT duplicate formats. *See, e.g.*, EX-1011, Claim Chart at 10 (contentions include “non-high-throughput (non-HT) duplicate PPDU”), 11-12, 40 (non-HT duplicate alleged to infringe claim 7), 61 (same for claim 8); EX-1012, Claim Chart at 4-6, 22, 40 (same allegations). Patent Owner appears not to have realized that the very same functionality it accuses of infringement was publicly available as prior art in draft 2.0 of the 802.11n standard. The one-to-one nature of Patent Owner’s reliance on non-HT duplicates for infringement and non-HT duplicates being invalidating prior art make this Petition uniquely strong and especially inappropriate for discretionary denial. asserted in the co-pending district court case that IEEE 802.11n D2.0 is in precisely the same field—wireless communication—and teaches precisely the sort of techniques claimed in the ’802 Patent.

The non-HT duplicate prior art likewise distinguishes this Petition from the cellular transmission art cited in the Petition in IPR2024-00606, and provides strong grounds for the PTAB to institute both Petitions. Specifically, the art cited here addresses the same functionality that Patent Owner claims infringes in the context of 802.11-compliant systems. This Petition thus presents a strong invalidity argument distinct from the arguments and art in IPR2024-00606.

When viewed holistically, the timing of the present Petition is reasonable, there has been relatively limited investment in the EDTX litigation, and there is minimal overlap between the present IPR and the parallel litigation. Further, coupling these *Fintiv* considerations with compelling evidence of unpatentability presented in the Petition, the efficiency and integrity of the IPR process is best served by instituting review.

VIII. MANDATORY NOTICES UNDER 37 C.F.R. §42.8

A. Real Parties-In-Interest Under 37 C.F.R. § 42.8(b)(1)

Petitioners are Hewlett Packard Enterprise Company and Cisco Systems, Inc. and are the real parties-in-interest.

B. Related Matters Under 37 C.F.R. § 42.8(b)(2)

The '802 Patent is asserted against Petitioners in *Cobblestone Wireless, LLC v. Cisco Systems, Inc.*, No. 2:23-cv-00454 (E.D. Tex.) and *Cobblestone Wireless, LLC v. Hewlett Packard Enterprise Co.*, 2:23-cv-00457 (E.D. Tex.), both filed on September 29, 2023.

To Petitioners' knowledge, as of the date of this filing, the '802 Patent was also involved in the following pending cases, which may be affected by a decision in this proceeding:

Style	Number	Tribunal	Filed
<i>Cobblestone Wireless, LLC v. Samsung Elecs. Co., Ltd. et al.</i>	2:23-cv-00285	Eastern District of Texas	06/16/2023
<i>Cobblestone Wireless, LLC v. Cellco Partnership d/b/a Verizon Wireless</i>	2:23-cv-00382	Eastern District of Texas	08/25/2023
<i>Cobblestone Wireless, LLC v. T-Mobile USA, Inc.</i>	2:23-cv-00381	Eastern District of Texas	08/25/2023
<i>Cobblestone Wireless, LLC v. AT&T Servs. Inc. et al.</i>	2:23-cv-00380	Eastern District of Texas	08/25/2023
<i>Cobblestone Wirelese, LLC v. CommScope Holding Company, Inc. et al.</i>	2:23-cv-00455	Eastern District of Texas	09/29/2023
<i>Samsung Elecs. Am., Inc. v. Cobblestone Wireless, LLC</i>	IPR2024-00606	Patent Trial and Appeal Board	02/26/2024

C. Lead and Back-Up Counsel Under 37 C.F.R. § 42.8(b)(3)

Lead Counsel	Back-Up Counsel
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D. Service Information Under 37 C.F.R. § 42.8(b)(4)

Service via hand-delivery may be made at the postal mailing address of either lead or back-up counsel. Petitioners consent to service by e-mail at the addresses listed above.

IX. CONCLUSION

Petitioners request the Board institute IPR and cancel all Challenged Claims.

/Patrick D. McPherson/

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ATTORNEY FOR PETITIONERS

Date: March 19, 2024

CERTIFICATION OF SERVICE ON PATENT OWNER

Pursuant to 37 C.F.R. §§ 42.6(e), 42.8(b)(4) and 42.105, the undersigned certifies that on the 19th of March, 2024, a complete and entire copy of this Petition for *Inter Partes* Review of U.S. Patent No. 7,924,802 and all supporting exhibits were served via email and/or electronic download by agreement of Patent Owner, to the correspondence address of record for the '802 Patent:

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24 *et seq.*, the undersigned certifies that this document complies with the type-volume limitations. This document contains 13,661 words as calculated by the “Word Count” feature of Microsoft Word 2010, the word processing program used to create it.

Dated: March 19, 2024

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