

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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MEDIATEK INC. and  
MEDIATEK USA, INC.,

Petitioners,

v.

NIPPON TELEGRAPH AND TELEPHONE CORPORATION,  
Patent Owner.

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Case IPR2020-01404  
Patent 7,280,551

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**DECLARATION OF JAMES T. GEIER IN SUPPORT OF  
PATENT OWNER'S RESPONSE TO  
PETITION FOR *INTER PARTES* REVIEW  
OF U.S. PATENT NO. 7,280,551**

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## I. INTRODUCTION

1. My name is James T. Geier. I have been retained by Nippon Telegraph and Telephone Corporation, which I may refer to as either the “Patent Owner” or “NTT,” for this *inter partes* review proceeding, which I may refer to as an “IPR.” I understand that this IPR proceeding involves U.S. Patent No. 7,280,551, which I may refer to as “the ’551 patent” for shorthand. I understand that the claims challenged in this IPR are Claims 1-8 of the ’551 patent.

2. I understand that the ’551 patent is assigned to NTT.

3. I understand that in this proceeding MediaTek Inc. and MediaTek USA, Inc., which I may also refer to collectively as the “Petitioner” or “MediaTek,” filed a Petition for review of Claims 1-8 of the ’551 patent.

4. I understand that the above claims are challenged on the following four grounds:

<b>Claims Challenged</b>	<b>Basis</b>	<b>References</b>
Claims 1, 3, 5, 7	Obviousness	Ground 1: Shpak, Ho
Claims 1, 3-5, 7-8	Obviousness	Ground 2: Shpak, Lundby
Claims 1-3, 5-7	Obviousness	Ground 3: Bugeja, Ho
Claims 4 and 8	Obviousness	Ground 4: Shpak-Ho-Thielecke, Bugeja-Ho-Thielecke

5. I have been asked to provide my objective, independent analysis of the '551 patent in view of the asserted prior art references cited in the Petition and to provide my opinion regarding the allegations in the Petition, as well as the supporting opinions of Dr. Tim A. Williams.

6. I am not currently, nor have I ever been, an employee of NTT. I received no compensation for this declaration beyond my normal hourly compensation based on my time actually spent analyzing the '551 patent, the asserted prior art references cited herein and in the Petition, and any related issues. I will not receive any added compensation based on the outcome of this IPR, any other IPR, or any other proceeding involving the '551 patent.

## **II. QUALIFICATIONS**

7. My general qualifications can be found in my curriculum vitae attached as Appendix A. It includes my educational and professional background, published books, articles, publications, public lectures and conference proceedings. A section details my assignments testifying at depositions and trial as an expert witness.

8. I am a practicing engineer and have 40 years of experience in the field of communications systems analyzing, designing, and implementing wired and wireless networks, mobile devices, databases, and software.

9. I received a B.S. in Electrical Engineering (BSEE) from California State University in 1985, a M.S. in Electrical Engineering (MSEE) from the Air Force Institute of Technology in 1990, and an M.B.A. from the University of Phoenix in 2001. The focus of my studies when obtaining my MSEE was on communications systems.

10. From 1978 to 1983, I was a radar technician in the U.S. Air Force responsible for installing and testing automatic tracking radar systems. Part of my responsibilities included factory testing the first computerized automatic tracking radar system and providing feedback on how to re-design the system to better meet operational needs.

11. From 1986 to 1989, I was a communications test engineer, with the rank of Lieutenant in the U.S. Air Force, where I tested and evaluated data networks used by U.S. Department of Defense organizations worldwide. The majority of the network I tested supported secret voice and data communications and included interaction with operational support centers. Based on the results of my testing, I provided recommendations on how to refine and further develop the systems. As part of my work during this period of time, I developed and instructed a six-week training course on how to perform data network testing, which was used for training test engineers throughout all branches of the militaries.

12. From 1990 to 1992, I was a systems design engineer, with the rank of Captain in the U.S. Air Force, where I designed and implemented IEEE 802.3 (Ethernet) local area networks (LANs) at Wright-Patterson Air Force Base. This involved designing and overseeing the installation of corresponding networks throughout Wright-Patterson Air Force Base for supporting thousands of users. It also involved interconnecting / integrating the Ethernet networks with a base-wide wide area network (WAN) and communications links to other bases. During this timeframe, I also tested the first wireless LANs being sought for use on military bases.

13. From 1992 to 1994, I was a senior systems engineer at Adroit Systems, Inc., where I researched and analyzed emerging wireless network technologies as part of the Department of Defense Airborne Reconnaissance Data Link Architecture (ARDA) study, supporting communications for airborne systems. I also designed a software tool that aids network engineers in planning, upgrading and maintaining shipboard computer networks - based on a Small Business Innovative Research (SBIR) government grant obtained from the U.S. Navy.

14. From 1994 to 1996, I was employed as a senior systems engineer at TASC, Inc., where I worked primarily on the design and implementation of wireless communication systems for civilian and military applications. For



example, I designed a highly secure communications system for a U.S. Navy attack submarine. In addition, while at TASC, I designed computer networks for various organizations, such as Dayton Power and Light, and developed centralized databases, such as a training database used by the U.S. Department of Defense and a wireless parts tracking and inventory database/system for car dealerships.

15. From 1996 to 2000, I was an engineer and manager at Monarch Marking Systems, where I designed and developed wireless printers / scanners and corresponding networks for customers. Some of these systems, such as warehouse management systems, involved wireless bar code scanners to support voice-activated warehouse operations (*e.g.*, inventory control and picking) and communications between warehouse personnel. In addition, I developed wireless database / systems for tracking inventory and usage of narcotics in hospitals and people attending the World Economic Forum. Also, during this timeframe, I designed and implemented a wireless middleware system that interconnected various client devices (*e.g.*, bar code scanner / data collectors, personal digital assistants, and desktop computers) with multiple types of servers and databases.

16. Since 2000, I have worked as an independent consultant for my firm Wireless-Nets, Ltd., where I have been analyzing, designing, and integrating Wi-Fi, Bluetooth, and Ethernet transceivers into mobile devices such as smart phones, hospital patient monitors, and bar code scanners and designing corresponding

network infrastructures and systems for a multitude of customers. Many of these designs have included telephone applications. For example, I have analyzed, designed, and tested voice-over-Wi-Fi telephones for dozens of organizations and implemented and tested the corresponding network infrastructure and telephone switch systems. In addition, I have implemented IEEE 802.11 wireless transceivers for use in a variety of applications, such as monitoring status of concrete truck mixing operations, providing wireless connectivity for Wi-Fi phones, etc.

17. I am the author of over a dozen books on mobile and wireless topics and have served as an active participant within multiple IEEE standards organizations.

18. I have attached a true and correct copy of my curriculum vitae as Exhibit A, which further sets forth my qualifications.

19. I have no financial interest in either party or in the outcome of this proceeding. I am being paid for my work as an expert in these matters on an hourly basis. My compensation is not dependent on the outcome of these proceedings or the content of my opinions. My opinions, as explained below, are based on my education, experience, and background in the fields discussed above, and my review of the patents-in-suit and their file histories, the materials provided by Patent Owners, and the other materials discussed herein.

20. I understand that the purpose of claim construction is to determine the meaning and scope of the limitations of the claims, so that they may be properly understood and applied in considering issues such as infringement or validity.

21. I understand that the claims themselves define the scope of the patented invention. I understand that, unless there is a clear disclaimer of claim scope, terms in the claims of a patent will generally be given their ordinary and customary meaning, as understood by one of ordinary skill in the art at the time of the invention in light of the intrinsic record. I also understand that the claims themselves can provide substantial guidance for the meaning of particular claim terms.

22. I understand that it is generally improper to read limitations of the preferred embodiments from the specification into the terms of the claims. However, I also understand that the claims must be read in view of the specification, of which they are a part.

23. I understand that the claims are generally interpreted so that they cover what was actually invented and what the inventor intended them to cover, and, in particular, that the claims will generally not be construed as excluding the preferred embodiments described in the specification.

24. I understand that the specification is always highly relevant to the claim construction analysis, particularly where it: (i) contains an explicit disclaimer

of subject matter as being outside the scope of the invention, (ii) distinguishes prior art or cites particular advantages of the invention over the prior art, (iii) defines the terms contained in the claims, and/or (iv) repeatedly and consistently characterizes “the invention” as having a certain limitation.

25. I understand that the prosecution history is often considered less helpful evidence than the specification. I understand that this is because the prosecution history lacks the clarity provided in the specification as the prosecution history represents an ongoing negotiation between the applicant and the Patent Office. However, I understand that statements made in the prosecution history can control the construction of the claim language if they constitute a clear and unambiguous disclaimer of claim scope. I understand that, for the purposes of claim construction, the reexamination history of a patent can be consulted in the same manner as the original prosecution history.

26. I understand that evidence extrinsic to the patent may be consulted in performing claim construction, including dictionaries or treatises, the prior art, and the testimony of experts. I understand that dictionaries may help in understanding the underlying technology, the manner in which one skilled in the art might use claim terms, and whether there is an established ordinary meaning of a claim term.

27. I understand that expert testimony can be useful in connection with claim construction particularly to provide the background of the technology at

issue, to explain how an invention works, and to explain that a particular term in the patent or the prior art has a particular meaning in the pertinent field.

28. It is my opinion that one of ordinary skill in the field of the patent would have at least a bachelor's degree in electrical engineering, computer engineering, or a comparable field, which included course work in digital wireless communications or comparable work experience, and at least two years of work experience in designing, operating, or maintaining wireless computer networks or networking products.

29. For consistency and ease of review, all of my column and line citations to the patent specifications are in "column:line" format.

### **III. MATERIALS CONSIDERED**

30. I have reviewed the '551 patent, including the challenged claims, and its prosecution history. I have also reviewed the Petition for *inter partes* review filed by Petitioner, as well as the Exhibits attached, including:

- Ex. 1003: Declaration of Tim A. Williams.
- Ex. 1005: U.S. Patent Appl. Pub. No. 2003/0206532 A1 ("Shpak")
- Ex. 1006: U.S. Patent Appl. Pub. No. 2003/0169769 A1 ("Ho")
- Ex. 1007: U.S. Patent Appl. Pub. No. 2003/0220112 A1 ("Bugeja")
- Ex. 1008: U.S. Patent No. 6,560,292 ("Lundby")
- Ex. 1035: U.S. Patent Appl. Pub. No. 2003/0003863 A1 ("Thielecke")

31. I have also reviewed various other sources cited within this Declaration.

32. In forming my opinions, I have considered the materials listed above and any documents cited in this declaration. I have also relied on my own education, knowledge, and experience in the relevant art.

33. I have also considered the understanding of a POSA around the time of the invention the '551 patent.

#### **IV. LEGAL PRINCIPLES**

34. I am not an attorney and will not offer opinions on the law.

35. In forming the analyses and conclusions expressed in my declaration, I have applied the legal principles described in the following paragraphs, which were provided to me by counsel for the Patent Owner.

##### **A. Priority**

36. I understand that a patent may claim the benefit of the filing day of an earlier filed application if the earlier filed application provides adequate disclosure of the patent's claims. I understand that the disclosure requirement is satisfied if a POSA could clearly conclude that the inventor invented the claimed subject matter as of the earlier filing date sought. I understand that the earlier filed application does not need to describe the claimed subject matter in precisely the same terms as found in the claims at issue.

**B. Anticipation**

37. I have been informed that a patent claim is invalid as anticipated under 35 U.S.C. § 102 if each and every element of a claim, as properly construed, is found either explicitly or inherently in a single prior art reference. Under the principles of inherency, if the prior art necessarily functions in accordance with, or includes the claimed elements, it anticipates.

38. I have been informed that a claim is invalid under 35 U.S.C. § 102(a) if the claimed invention was known or used by others in the U.S., or was patented or published anywhere, before the Applicant's invention. I further have been informed that a claim is invalid under 35 U.S.C. § 102(b) if the invention was patented or published anywhere, or was in public use, on sale, or offered for sale in this country, more than one year prior to the filing date of the patent application (critical date). And a claim is invalid, as I have been informed, under 35 U.S.C. § 102(e), if an invention described by that claim was described in a U.S. patent granted on an application for a patent by another that was filed in the U.S. before the date of invention for such a claim.

**C. Obviousness**

39. I have been informed that a patent claim is invalid as "obvious" under 35 U.S.C. § 103 in light of one or more prior art references if it would have been obvious to a person of ordinary skill in the art at the time of the alleged invention

(“POSA”), taking into account (1) the scope and content of the prior art, (2) the differences between the prior art and the claims, (3) the level of ordinary skill in the art, and (4) any so called “secondary considerations” of non-obviousness, which include “long felt need” for the claimed invention, commercial success attributable to the claimed invention, unexpected results of the claimed invention, skepticism of others, failure by others to achieve the claimed invention, and “copying” of the claimed invention by others.

40. I have been informed that a claim can be obvious in light of a single prior art reference or multiple prior art references. To be obvious in light of a single prior art reference or multiple prior art references, there must be a reason that would have prompted a Person of Ordinary Skill in the Art (POSA) to modify the single prior art reference, or combine two or more references, in a manner that provides the elements of the claimed invention. This reason may come from a teaching, suggestion, or motivation to combine, or may come from the reference(s) themselves, the knowledge or “common sense” of a POSA, or from the nature of the problem to be solved, and this reason may be explicit or implicit from the prior art as a whole. I have been informed that, under the law, the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. I also understand it is improper to rely on hindsight in making the obviousness determination.



**D. Claim Construction**

41. I understand that claim construction is a matter that will be decided by the Board presiding over this IPR. I understand that the relevant inquiry in claim construction is the question of how a POSA would have understood the claim terms at the time of the earliest priority date, in light of the patent specification, the prosecution history, and any other relevant intrinsic and extrinsic evidence.

**V. PERSON OF ORDINARY SKILL IN THE ART**

42. All of the opinions that I express here have been made from the standpoint of a person of ordinary skill in the art at the time of the invention of the '551 patent, which I may refer to as a "POSA."

43. I understand that, for the purposes of this proceeding, the '551 patent is entitled to a priority date of no later than September 9, 2003.

44. I understand that the Petitioner has proposed that a POSA at about the priority date of the '551 patent would have had at least a B.S. in Electrical Engineering or the equivalent, and 3-4 years of experience designing wireless packet communication devices, including 802.11-compliant devices. I understand that Petitioner has asserted that more education could substitute for less experience, and vice-versa.

45. For the purposes of this proceeding, I will accept Petitioner's proposed level of skill. At the relevant time frame, I was a person of more than

ordinary skill in the art during the relevant timeframe. However, I worked with and managed many people who fit the characteristics of the POSA, and I am familiar with their level of skill. When developing the opinions set forth in this declaration, I assumed the perspective of a person having ordinary skill in the art, as set forth above.

**VI. THE '551 PATENT ADDRESSES POWER LEAKAGE BY PREVENTING TRANSMISSION WHEN THE “MANDATORY CHANNEL” IS NOT IDLE**

46. I agree with the Board that the '551 Patent relates to multichannel systems, as opposed to single-channel systems. *See* Paper 14 at 20. More specifically, in my opinion the '551 Patent teaches a method that can avoid the problems caused by power leakage between frequency channels, by preventing transmission on otherwise available channels “when the mandatory channel is busy even if another wireless channel is idle.” *E.g.*, '551 Patent at 6:51-55.

**A. The '551 Patent Differentiates Between Multichannel Systems and Single-Channel Systems**

47. In my opinion, the '551 Patent clearly differentiates between single-channel and multichannel systems, and this context makes clear that the claims refer to a multichannel system.

48. The '551 Patent acknowledges the existence of conventional, single-channel systems, but deliberately uses different language from the claims to describe their operation. For example, the specification teaches that “[i]n a

conventional wireless packet communication apparatus, a wireless channel to be used **is determined in advance.**” ’551 Patent at 1:24-26 (emphases added).

Notably, the ’551 Patent’s claims deliberately use different language—“**setting** a mandatory channel...”—than that used to describe how single-channel systems are set up. *See e.g.*, cl. 1.

49. In my opinion, the specification further teaches that, under the legacy 802.11-1999 standard, access to this single channel is governed by a Carrier-Sense Multiple Access (CSMA) scheme, whereby “carrier sense...allows a plurality of stations (hereinafter STA) **to share one wireless channel** in a staggered manner.” ’551 Patent at 1:25-37 (emphasis added). However, the ’551 Patent contrasts this with systems wherein “**multiple wireless channels are found idle** by carrier sense,” such that “a plurality of wireless packets are transmitted simultaneously by using the wireless channels.” *Id.* at 1:43-47 (emphasis added). It is my opinion that the latter is what the ’551 Patent refers to as transmission “using multiple wireless channels at the same time,” (or, hereinafter, “multichannel” techniques). *Id.* It is further my opinion that the ’551 Patent teaches that multichannel systems provide **increased throughput** relative to single-channel systems. *See id.* at 1:43-55; 2:38-51.

50. It is my opinion that the references cited by Petitioner also acknowledge the distinction between single-channel and multichannel systems.

For example, as the Petitioner’s cited Bugeja reference acknowledges, there are generally three non-overlapping 20 MHz channels that may be defined in the 2.4 GHz band, as allowed by federal regulation. Bugeja at ¶4. However, an 802.11-1999 user can use *only one* of these available channels, which is based on the channel configured in the access point (AP) and discovered by the user device monitoring beacon signals transmitted by the AP—*i.e.*, what the ’551 Patent describes as “determin[ing] a channel in advance.” *Id.*; ’551 Patent at 1:30-32. Thus, while an AP might have multiple users within its network, only *one channel* will be assigned to any given user at a time. It is my opinion that a POSA would consider this a “conventional,” *single* channel communication method within the terms of the ’551 Patent. *Id.* at 1:30-32. By contrast, Bugeja acknowledges that “multi-channel” communication techniques exist whereby a given “multi-channel client” has the capability to transmit and download on more than one channel, such that uplink and downlink speeds could be up to three times faster, thereby increasing throughput. *See* Bugeja at ¶46.

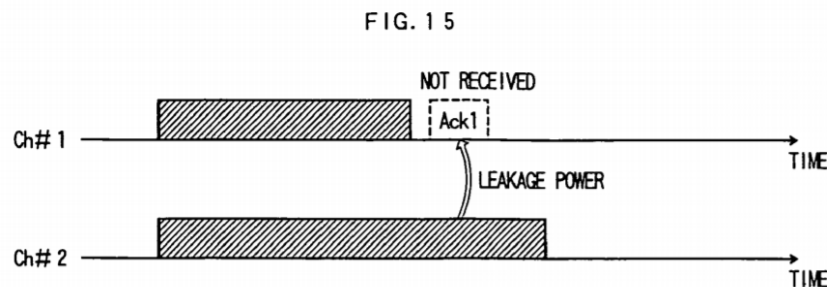
**B. The ’551 Patent Addresses Power Leakage in Multichannel Systems**

51. It is my opinion that a POSA would understand that the ’551 Patent is designed to address problems that arise specifically in the context of *multichannel* systems, such as the problem of “power leakage.”

52. It is my opinion that the specification defines the problem of leakage as follows: “In the case where center frequencies of **multiple wireless channels used at the same time are close to each other**, an effect of leakage power from one wireless channel to a frequency region used by another wireless channel becomes large.” ’551 Patent at 2:26-30 (emphasis added). Notably, the phrasing used to describe this problem matches the language used to describe multichannel systems, as distinguished from single-channel systems. *See e.g.*, ’551 Patent at 1:43-47 (contrasted from 802.11-1999, “[o]n the other hand...when **multiple wireless channels** are found idle by carrier sense,” “a plurality of wireless packets are **transmitted simultaneously by using the wireless channels.**”) (emphasis added). Thus, in my opinion a POSA would understand that the problem that the ’551 Patent is directed to solving is a *multichannel* problem.

53. In my opinion, a POSA would understand that the ’551 Patent teaches that power leakage reduces the enhancement in throughput that one may ordinarily expect from multichannel systems. To illustrate, the specification describes the effect of leakage on acknowledgement (ACK) packets when multiple channels are in use: “[I]n case of transferring a wireless packet, *a transmit-side STA* transmits the wireless packet and thereafter *a receive-side STA* transmits an acknowledgment packet (Ack) for the received wireless packet to the transmit-side STA,” while “another wireless channel used *for simultaneous transmission*” is in

use. '551 Patent at 2:30-37 (emphases added). In this scenario, if there is leakage between a channel #1 and channel #2 (Fig. 15, below), “the wireless channel #1 may not receive that ACK packet (Ack1) because of leakage power from the wireless channel #2.” *Id.* at 2:46-48. As a result, the data packet that Ack1 corresponds to would have to be retransmitted because the corresponding ACK is not received.



54. As a result, “*throughput* cannot be improved *even if simultaneous transmission is performed using multiple wireless channels* at the same time.” *Id.* at 2:48-51 (emphases added). A POSA would understand that “throughput,” as used in the '551 Patent, relates to transmission to a given user. Thus, in other words, although using multiple channels between two STAs would ordinarily improve throughput, the '551 Patent teaches that power leakage between these channels can erode this advantage by interfering with proper ACK receipt, prompting needless retransmissions.

55. It is my opinion that the '551 Patent relates to channel throughput, which depends on conditions relevant to the transmission channel and their effect

on receipt by a given user, such as data rate, radio frequency interference, cross-channel interference, and multipath propagation. *See e.g.*, '551 Patent at 3:33-35 (“It is an object of the present invention to avoid leakage power from affecting an adjacent channel so as to improve throughput by simultaneous transmission.”); EX2006. It is my opinion that the specification’s repeated references to interference occurring across frequency regions (*i.e.*, leakage) in the context of throughput (*e.g.*, 2:26-30, 34-37, 3:2-5), make this clear to a POSA. It is my opinion that the discussion of MIMO technology further confirms that the '551 Patent is directed to multiple channels accessible to a single user. Indeed, the '551 Patent treats single-channel MIMO and using “multiple wireless channels” as *alternatives* to each other for transmitting packets simultaneously, which would make little sense if each of the “multiple wireless channels” were assigned to different users. *E.g.*, '551 Patent at cl. 1.

56. Generally, efficient transmission of wireless packets in the context of 802.11 depends in part on proper function of acknowledgement, or ACK packets. A receiver sends these packets after receiving a packet containing information in order to inform the sender that the packet was received. In this way, ACK packets are similar to return receipt cards from the Postal Service. Thus, if a transmitter does not receive an ACK, it would attempt to retransmit the packet under the assumption that it was not received. Thus, although using multiple channels

between two STAs would ordinarily improve throughput, the '551 Patent teaches that power leakage between these channels can erode this advantage by interfering with proper ACK receipt, prompting needless retransmissions.

**C. The '551 Patent Avoids the Problems of Power Leakage By Preventing Transmission Based on State of a “Mandatory Channel”**

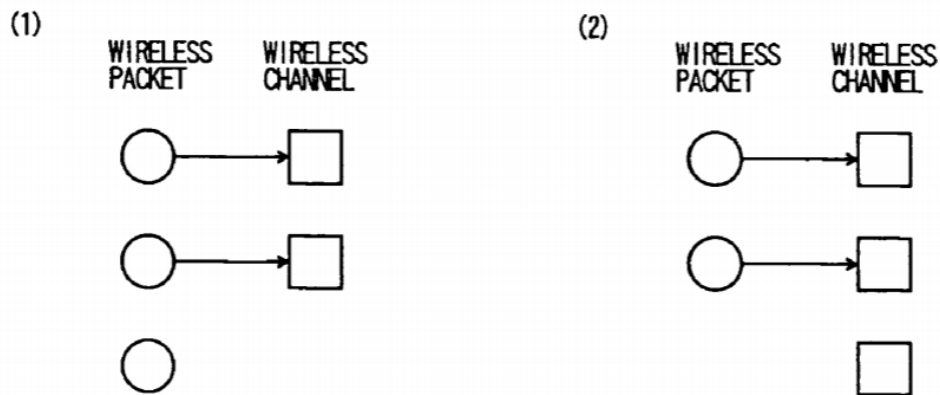
57. In my opinion, the '551 Patent addresses issues affecting throughput in multichannel systems by *preventing* transmission under circumstances that are likely to lead to leakage. *See* '551 Patent at 3:33-35 (“It is an object of the present invention to **avoid** leakage power from affecting an adjacent channel **so as to improve throughput by simultaneous transmission.**”) (emphasis added). Specifically, it is my opinion that the '551 Patent *changes* the way in which *the decision to transmit* is made in multichannel systems—rather than simply transmitting on a channel based on its idle state, as in the prior art, the '551 Patent further limits transmission based on the idle state of a “mandatory channel.”

58. It is my opinion that the '551 Patent teaches that, in conventional systems, carrier-sensing is used in multichannel transmission, such that transmission is performed using however many channels are found to be idle at a time. *See* '551 Patent at 1:43-47 (“when multiple wireless channels are found idle by carrier sense, a plurality of wireless packets are transmitted simultaneously by using the wireless channels.”). For example, as discussed below, “FIG. 13(1)



shows a case where two wireless channels are idle for three wireless packets. Two of the three wireless packets are transmitted simultaneously by using the two wireless channels.” *Id.* at 1:50-52. Thus, as would be understood by POSA, in a conventional application of carrier-sensing to a multichannel system, each channel is sensed and transmission on a particular channel depends on its *own* idle state. *See, e.g.*, EX2027 at 1403 (describing a “multichannel variation of the basic CSMA/CA...protocol used with the IEEE 802.11 standard,” wherein “[e]ach node monitors the N channels continuously,” and transmits using a channel on “the first channel to be IDLE”).

FIG. 13



59. As compared to the prior art, a POSA would understand that the '551 Patent changes the way in which the decision to transmit is by further tying this decision to the state of a “mandatory channel,” which is one of the channels in a

multichannel system. *See e.g.*, '551 Patent at 3:50-57. It may be assumed that leakage may affect the channels associated with this “mandatory channel.” *See e.g., id.* at 5:57-61. A POSA would understand that the '551 Patent teaches that transmission is limited to times “**only** when the mandatory channel” is idle, **even if** other channels may be available. *E.g.*, cl. 1. Thus, the POSA understands that when the “mandatory channel” is not idle, transmission would be **prevented** altogether. *See id.*

60. For example, as illustrated with reference to Figs. 1 and 2 (below), wireless channels 1, 2 and 3 are provided for simultaneous use, as in a multichannel system. *See id.* at 6:8-11. At step S2, the method shown in Fig. 1 uses carrier sensing to search for idle channels. At this time, “it is found that the wireless channel #3 is busy at a timing data is generated (1), and the wireless channels #1 and #2 are idle.” *Id.* at 5:64-66. **After this**, at a distinct step S3, “it is determined whether or not the mandatory channel is idle.” *Id.* at 5:64-66. In this case, since idle channel #1 has been set as the “mandatory channel,” a POSA would understand that “the wireless packets [are] simultaneously transmitted by using two wireless channels as the wireless channels #1 and #2” in step S4. *Id.* 6:8-11.

FIG. 1

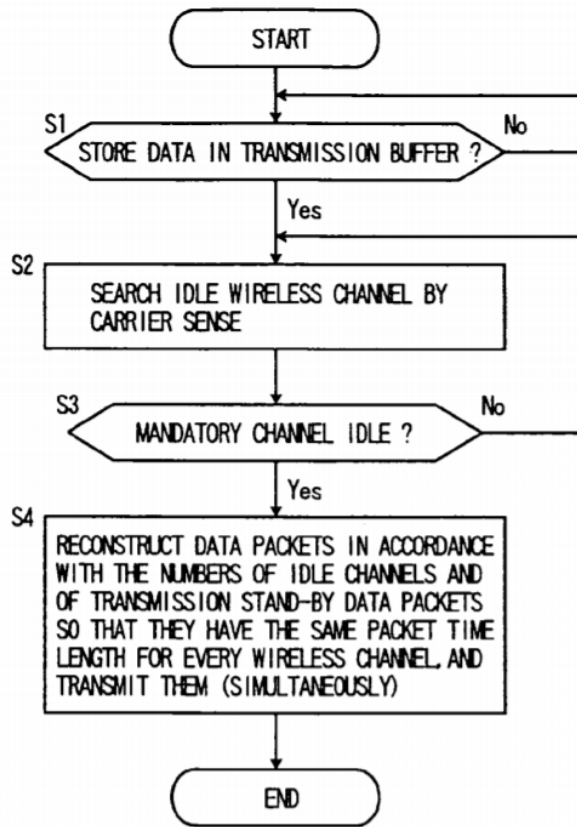
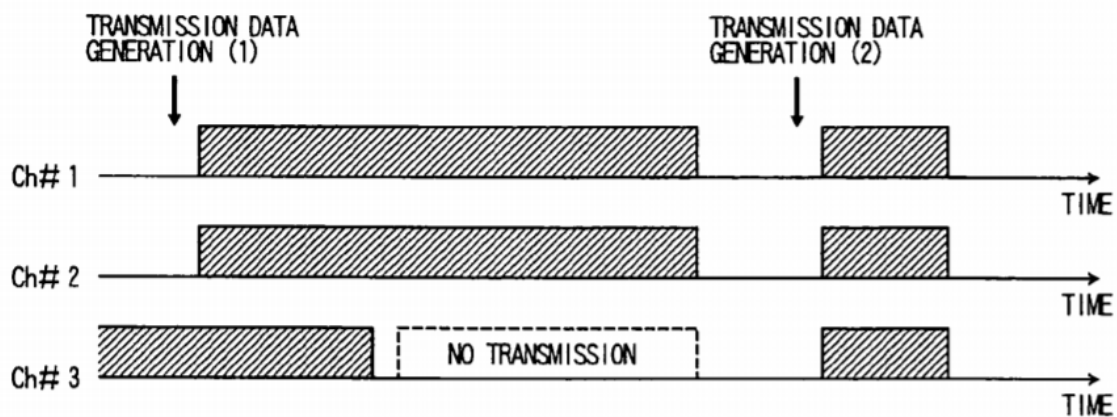


FIG. 2



61. Notably, the method illustrated in Fig. 1 shows that “[w]hen the mandatory channel is busy, a procedure goes back to the search of an idle wireless

channel,” and thus a POSA would understand that no transmission is performed.

*Id.* at 5:67-6:2. Thus, for example, “[e]ven when the wireless channel #3 becomes idle, another STA does not perform transmission because the wireless channel #1 set as the mandatory channel is busy.” *Id.* at 6:33-35; *see also* Pet. at 14 (“When Ch#3 subsequently becomes idle, it cannot be used for packet transmission—‘no transmission’—because the mandatory channel—i.e., Ch#1—is not also idle.”).

As a result, a POSA is taught from the ’551 Patent that the setting of a “mandatory channel” can help *avoid* a situation where ACK packets are not received, by *preventing transmission* when power leakage is especially likely to be a problem.

*See, e.g.*, ’551 Patent at 11:67-12:6 (“Thus, it is possible **to avoid a situation** that the transmit-side STA cannot receive a wireless packet addressed to an own STA.

On the other hand, the other STAs can surely transfer a wireless packet to the transmit-side STA by transmitting the wireless packet after the mandatory channel becomes idle. Thus, throughput can be improved.”) (emphasis added). Dr.

Williams agrees that the ’551 avoids power leakage by preventing transmission.

*E.g.*, EX2025 (hereinafter “Williams2”) at 7:12-18 (Q...Is it fair to say that the method shown in figures 1 and 2 of the patent results **in preventing transmission to otherwise idle channels** when the mandatory channel, i.e., channel 3, is not idle? A: **From the same transmitter that’s true.**) (emphasis added), 8:3-8(A: In this example, channels 1 and 2 may be used by other stations. And so **the ability**

**to prevent transmission** on channels 1 and 2 by inquiring whether channel 3 is idle or busy **allows for – for prevention of interference** by some other transmitter talking to another station.) (emphases added).

62. The claims clearly refer to these aspects of the “mandatory channel.” *See e.g.*, cl. 1. Specifically, the claims require “setting a mandatory channel that is always used for transmission,” while also limiting transmission to times “*only* when the mandatory channel is idle,” “using a wireless channel/wireless channels that includes/include the mandatory channel.” *E.g.*, cl. 1. Thus, because the “mandatory channel” must be used if any transmission is to occur at all, and transmission is explicitly limited to times “*only* when the mandatory channel is idle,” then a POSA would understand that no transmission can be performed when the “mandatory channel” is busy even if other channels might be idle. *See id.*

## VII. CLAIM CONSTRUCTION

63. I understand that Board has preliminarily construed certain terms of the '551 Patent's claims. DI at 15-22. In particular, I understand that the Board determined that, for the purposes of this proceeding, only the claim term “mandatory channel” need be construed. The Board's preliminary construction is as follows: “one channel in a wireless multichannel communication system **over which transmission must occur before transmission** over the other wireless channels.” *Id.* at 21. I generally agree with the multichannel aspect of the Board's

preliminary construction, with one proposed modification: “one channel in a wireless multichannel communication system **whose idle state determines whether there can be a transmission** over the other channels.”

64. As discussed below, while it is my opinion that the intrinsic record clearly teaches that the “mandatory channel” is one channel in a multichannel system, in my opinion the ’551 Patent provides no support for transmitting on the “mandatory channel” at a time “before” transmitting on other channels. Rather, the specification teaches that transmissions on the “mandatory channel” may occur *simultaneously* with other idle channels. In my opinion, a more accurate description of the “mandatory channel” is that its idle state is given preference over the idle state of other channels in terms of deciding whether a transmission can occur in a multichannel system.

**A. The Board Correctly Construed the “Mandatory Channel” As “One channel in a wireless *multichannel* communication system”**

**1. Claim language supports the “multichannel” construction**

65. The claim language clearly supports the Board’s conclusion that the “mandatory channel” is “one channel in a wireless multichannel communication system.” I agree that “the claim language means ‘there is nothing ‘mandatory’ about a channel if it is the only channel provided.’” DI at 20. Indeed, the use of the qualifier “mandatory” necessarily indicates the possibility of a “non-mandatory” channel, just as requiring that the “mandatory channel” “always” be

used indicates that, absent this language, another channel might be used. *E.g.*, '551 Patent at cl. 1. Moreover, if it were not possible to use other idle channels, there would be no meaning to the claimed step limiting transmission on “a wireless channel/wireless channels *that includes/include* the mandatory channel, *only* when the mandatory channel is idle.” '551 Patent at cl. 1.

66. By contrast, it is my opinion that the Petitioner’s interpretation that the “mandatory channel” may be the *only* channel would render the claim language a nullity—if only a single channel were provided at the outset, there would be no need to “set” a “mandatory channel,” nor require that transmission occur “only when the mandatory channel is idle.” *See* '551 Patent at cl. 1. Moreover, the '551 specification deliberately uses different language to describe identification of a single channel for use in “conventional” systems—“**a wireless channel** to be used **is determined** in advance.” *Id.* at 1:24-26 (emphases added). Although it was known that this single channel is one of 14 possible channels that may be defined in the 2.4 GHz band, the '551 Patent *does not* describe this process as “**setting** a mandatory channel.” Thus, it is my opinion that the claims deliberately describe “setting a mandatory channel” in different terms than that used to describe conventional systems, which likewise indicates to a POSA that the invention does not relate to single-channel systems.

67. In my opinion, the dependent claims provide further support for the “mandatory channel” being one of multiple channels in a multichannel system. For example, dependent claim 4’s requirement of an ability to “selectively [use] the multiple wireless channels or the MIMO” further confirms that, while the method of independent claim 1 may be performed using a single channel with MIMO transmission, it remains possible to select to use “multiple wireless channels” instead. *Id.* at cl. 4.

**2. The specification supports the “multichannel” construction**

68. I understand and agree with the Board that the claims must be interpreted in view of the specification, including the purpose of the invention. *See* DI at 19. Here, the specification clearly supports the “multichannel” aspect of the Board’s construction. Indeed, as I discussed above in §VI.B, the specification teaches that the problem addressed by the ’551 Patent arises specifically in the context of multichannel systems—*i.e.*, that power leakage “where center frequencies of multiple wireless channels used at the same time are close to each other” negatively impact the throughput gains of simultaneous transmission. ’551 Patent at 2:26-30. It is further my opinion that the specification teaches that the solution for this problem is to prevent transmission on otherwise idle channels based on the state of the “mandatory channel,” which is “a wireless channel having



the highest priority *among wireless channels* that have a plurality of priorities.”

*Id.* at 3:57-60 (emphasis added).

69. In fact, in *every* embodiment, a “mandatory channel” is identified from *one of multiple* available channels provided between a transmitting and receiving station (STA). *E.g.*, ’551 Patent, at 5:52-57 (“In this embodiment, wireless channels #1, #2, and #3 are provided, and the wireless channel #1 is set as a mandatory channel for every STA.”); 7:8-12 (“In this example, for wireless packets addressed to the STA A, simultaneous transmission is performed using two wireless channels as the wireless channels #1 and #2 because the wireless channel #1 set as the mandatory channel is idle.”). Thus, it is my opinion that nothing in the specification suggests that a “mandatory channel” can be the only channel assigned to a given user.

### **3. The prosecution history supports the “multichannel” construction**

70. It is my opinion that the prosecution history of the ’551 Patent likewise supports the multichannel aspect of the Board’s construction.

71. It is my opinion that the prosecution history demonstrates that both the applicant and examiner clearly regarded the ’551 patent as pertaining to multichannel systems. The examiner *only* cited references that disclosed multichannel systems in the sole substantive rejection: Mouldsley, for instance,

disclosed transmitting packets “using **multiple** wireless channels,” but “**does not disclose** determination of an idle channel...**and setting a mandatory channel.**”

EX1002 at 306 (emphases added); *see also* DI at 17 (taking note of “arguments made during prosecution where the claim language reciting ‘setting a mandatory channel’ was pointed out as distinguishing over the prior art”). Sonetaka disclosed assigning a “service channel” out of *multiple channels* provided, to carry traffic of a predetermined traffic rank. EX1002 at 306-307. Thus, in responding to the examiner’s rejection, the applicant clarified that the Sonetaka’s “service channel” cannot be a “mandatory channel” because it is not “regularly used” for transmission. *Id.* at 307. While the applicant pointed out that Sonetaka’s “service channel” was not “regularly used,” it never objected to its relevance as a multichannel reference. *See id.* Similarly, the applicant characterized the claimed “mandatory channel” as being “indispensable,” which necessarily indicates the possibility other channels being “dispensable” by comparison. *Id.* at 307.

72. The issue of whether a “mandatory channel” can be the sole channel provided simply never came up in the file history of the ‘551 Patent. Rather, in my opinion, the file history instead demonstrates that both applicant and examiner accepted as a given that the “mandatory channel” must be one of multiple provided channels.

**B. “Mandatory” Status is Based on Idle State, Not Timing for Transmission**

73. I propose a modification to the following bolded language of the Board’s preliminary construction, specifying that “transmission must occur [on the mandatory channel] **before transmission may occur** over the other wireless channels.” As written, this language suggests that there is a time-based preference for the “mandatory channel” in terms of when transmission can occur. However, neither the specification nor the claim language supports distinguishing the “mandatory channel” based on timing or order of transmission. Instead, the “mandatory channel” is distinguishable based on the special status accorded to its idle state, over and above that of the other channels in a multichannel system. Thus, I propose modifying the construction as follows: one channel in a wireless multichannel communication system **whose idle state determines whether there can be a transmission** over the other channels.” This modification is consistent with the Board’s finding that “the purpose of the ’551 patent is to transmit wireless packets only ‘via wireless channels including the mandatory channel, and when the mandatory channel is busy, **transmission is not performed even if there is another wireless channel.**’” DI at 19 (emphasis in original).

74. For example, as I discussed in §VI.C, the embodiment of Figs. 1 and 2 show that, prior to transmission, carrier-sensing is used to identify *all* channels that

are idle. Once idle channels are identified, a subsequent step is used to check whether the “mandatory channel” is idle. Assuming that the “mandatory channel” is idle, transmission is performed *simultaneously* on all idle channels including the “mandatory channel.” Indeed, as shown in Fig. 1, it is not until step S4—*after* determining which channels are idle (S2) *and* that the mandatory channel is idle (S3)—that the system proceeds to transmission on **all** idle channels “simultaneously.” Thus, it is, in my opinion, not the case that there must be a transmission on the “mandatory channel” *before* other channels. Petitioner’s expert Dr. Williams agrees with my interpretation. *E.g.*, Williams2 at 29:24-30:7 (“Also if you look back at the [’551] patent on figure 1, you see that [the Board’s] construction is at odds with figure 2 of the patent where there are two channels that are transmitting simultaneously after the mandatory channel has been tested to be idle and found to be idle. **So there’s no...temporal difference** between transmissions on channel 1 [the mandatory channel of Fig. 1] and channel 2.”) (emphasis added). It is further my opinion that there is no language in the claims themselves suggesting a time-based preference for transmitting on the “mandatory channel.”

75. Instead, the intrinsic record teaches that the “mandatory channel” is distinguishable over other channels in a multichannel system because its *idle state* is given higher priority in determining whether a transmission can occur. *E.g.*,

'551 Patent at 3:58-59 (“the mandatory channel can be regarded as a wireless channel having the highest priority among wireless channels”). For example, the claims indicate that a transmission can occur “**only** when the mandatory channel is **idle**.” *E.g., id.* at cl. 1. Further, the specification teaches that “[w]hen the mandatory channel is busy, each STA does not perform transmission **even if there is other idle wireless channel**.” *Id.* at 3:56-57 (emphasis added); *also* 3:57-60 (“transmission to the STA A is allowed only when the mandatory channel is idle, and is not performed when the mandatory channel is busy even if another wireless channel is idle.”). Thus, it is my opinion that the “mandatory channel” is identifiable as such because it is **its idle state** that governs whether a transmission occurs in a multichannel system, **regardless** of whether other channels are idle. Petitioner’s expert Dr. Williams agrees with my interpretation. EX2024 (hereinafter “Williams1”) at 28:25-29:11 (“Well, the patent makes clear and the claims make clear that there’s...**a test to be made of the idle nature of the mandatory channel, and then a decision to transmit based on that mandatory channel being idle**. The—if the mandatory channel is occupied, then there will be no transmissions per the claimed invention, and the temporal nature also comes out in the ...institution decision...” (emphasis added). This is consistent with the stated purpose and solution proposed by the ’551 Patent, which is to **prevent**

*transmissions* on otherwise idle channels under circumstances in which leakage will likely occur. DI at 12-15.

76. Thus, it is my opinion that a more accurate modification of the Board’s preliminary construction is “one channel in a wireless multichannel communication system **whose idle state determines whether there can be a transmission** over the other channels.”

**VIII. PETITIONER FAILS TO DEMONSTRATE THAT CHALLENGED CLAIM IS UNPATENTABLE UNDER GROUND 2 (SHPAK-LUNDBY): CLAIMS 1, 3-5, 7-8**

77. It is my understanding that, in its Decision on Institution, the Board determined that, based solely on the record presented at that time, the Petitioner had shown a reasonable likelihood that one or more claims of the ’551 Patent may be unpatentable over the combination of Shpak and Lundby (Ground 2, “Shpak-Lundby”). DI at 30. It is my understanding that the Board further instituted review of the remaining grounds based upon its conclusion as to Shpak-Lundby. *Id.* at 35, 41, 42. As such, I shall address Ground 2 first.

78. As discussed below, it is my opinion that none of the challenged claims are unpatentable over Shpak-Lundby because this combination fails to disclose the claimed “mandatory channel,” and fails to disclose the step of “transmitting...only when the mandatory channel is idle.” Specifically, unlike the ’551 Patent, it is my opinion that Lundby does not provide any methods for

**preventing** transmission based on the status of one of multiple channels in a multichannel system—rather, the **only** decision of Lundby is whether to transmit over one channel or two. *See* DI at 25. This is unsurprising considering that Lundby makes no mention of the problem of power leakage between channels with distinct center frequencies, nor describes any means of addressing leakage. It is my opinion that Shpak cannot fill this gap as it only describes a single-channel system, with no indication of how the decision to transmit would be handled in a multichannel system. As such, it is my opinion that there is no teaching or suggestion in the combination of Shpak-Lundby that would lead a POSA to either (i) set a “mandatory channel,” whose idle state governs whether there can be any transmission at all, nor (ii) limit transmissions to times **only** when the mandatory channel is idle.

**A. Shpak**

79. I agree with the Board’s analysis of Shpak, in that this reference only teaches transmission over a single channel, *i.e.* a “common frequency channel.” DI at 24. It is my opinion that Shpak teaches a method by which multiple access points (APs) can arbitrate amongst themselves to determine which AP should transmit to a mobile station. Shpak at ¶9. The APs preferably communicate over a hard-wired network, and “communicate among themselves using a novel protocol.” *Id.* at ¶¶8-9. However, communications to the mobile station over the

“common frequency channel” using then-existing standardized 802.11 methods. *Id.* at ¶38. In fact, “maintain[ing] 802.11 compatibility” with “legacy mobile stations” is one of Shpak’s alleged advantages. DI at 24, citing Shpak at ¶¶3, 16, 33, 38, 39, 46, cl. 3. At the time of Shpak, the 802.11 standards did not address multichannel systems.

80. Petitioner admits that Shpak only discloses a single-channel system. Pet. at 24 (“POSAs would have understood Shpak to disclose a conventional SISO system in which an AP transmits packets to a station over a SISO “common frequency channel”). Petitioner’s expert, Dr. Williams, likewise acknowledges that there is no explicit disclosure of multiple channels in Shpak. Williams<sup>2</sup> at 71:12-18 (Q:...Is there any discussion of these multiple channels in Shpak itself? A: I don’t see an explicit disclosure of multiple—multiple channels, but I don’t see a preclusion of it. So it’s silent on that point, only pointing to 802.11.). Shpak teaches only that standardized methods of carrier-sensing may be applied to its “common frequency channel.” Shpak at ¶¶5, 33.

81. At the time of Shpak, the 802.11 standards did not address multichannel systems. Dr. Williams testified that 802.11 standards existing at the time of Shpak did not include carrier sense (busy/idle determination) capabilities for multiple channels (Williams<sup>2</sup> at 72:21-25). At the time of Shpak, as at the priority date of the ’551 Patent, there were no *standardized* multichannel systems.



Thus, it is my opinion that there is no disclosure in Shpak that speaks to how carrier-sensing may function in a multichannel system, much less how the decision to transmit would be made in such a system. It is my opinion that there is likewise no disclosure relating to the problem of power leakage between channels with different center frequencies.

**B. Lundby**

82. The Lundby reference describes a method for “improving the transmission of information signals” by first and second communication links. Lundby at Abstract. In my opinion, two aspects of Lundby are particularly significant for understanding its scope:

83. **First**, Lundby only describes code channels that occupy *the same frequency channel*. As such, it is my opinion that Lundby neither describes nor addresses the problem of power leakage “where center frequencies of multiple wireless channels used at the same time are close to each other.” *See* ’551 Patent at 2:26-28.

84. **Second**, as Petitioner acknowledges, Lundby provides methods to “determine whether to transmit the signals over one channel (a primary channel) or two (primary and secondary channels).” Pet. at 39; *see also* EX1003 (“Williams Decl.”) at ¶120. A POSA would understand that this is the *only* decision addressed in Lundby—*i.e.*, whether to transmit over one channel or two. Critically, Lundby

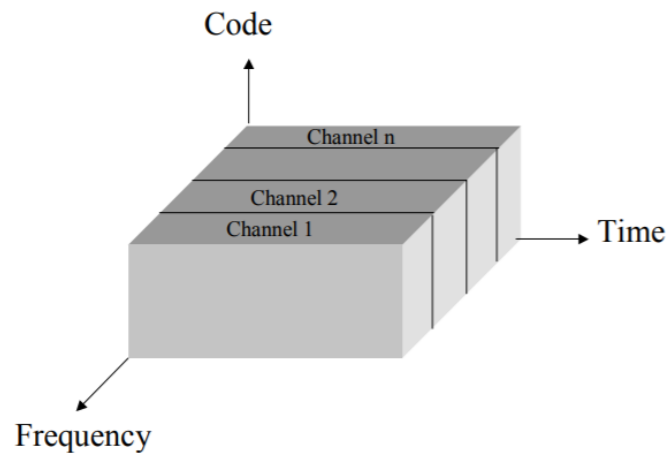
*does not* address the decision of whether to transmit or not—rather, as Petitioner’s expert Dr. Williams *repeatedly* emphasized, “**there’s no determination of whether to transmit disclosed by Lundby.**” *E.g.*, Williams2 at 27:17-19 (emphasis added).

**1. Lundby Addresses Signal-to-Noise of Code Channels Within the *Same* Frequency Channel**

85. Unlike the ’551 Patent, which pertains to CSMA-based systems, Lundby addresses the usage of code-based channels that occupy a single frequency channel as in a CDMA system. In my opinion, the distinction between CSMA and CDMA based access is significant for understanding the scope of the problems addressed by Lundby. In particular, because Lundby focuses on code channels, it does not disclose, or address, interference between distinct frequency channels.

86. As of 2003, a POSA understood that there are different classes of methods for allowing multiple users to share a wireless channel: (1) those that **partition** the channel among users using some parameter, such that each user has exclusive use within that parameter (“channel partition” methods), (2) those that allow users “**random access**” to the channel, and (3) those wherein users take turns in a fixed fashion (“**polling**” methods). *E.g.*, EX2007, EX2008, EX2009, EX2010 at 849, 862.

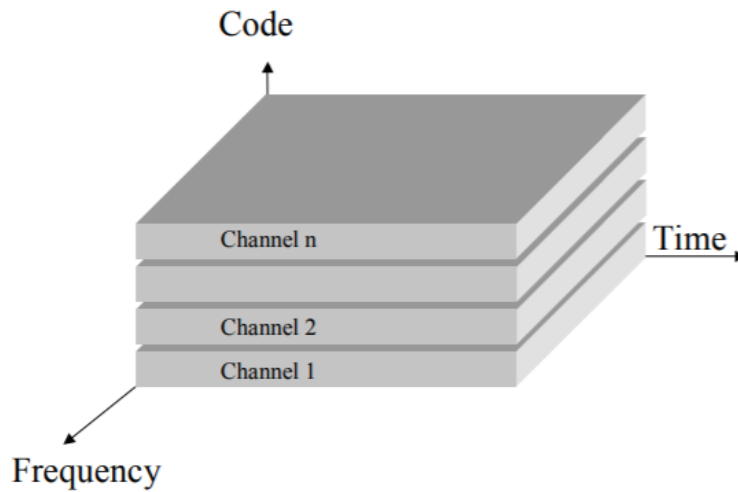
87. “Channel partition” methods manage user access to the channel in a static way, such as by assigning different frequencies, time slots, or codes to different users. For example, in Frequency Division Multiple Access (FDMA), each user is allotted a distinct frequency band, or channel, for their exclusive use, as illustrated in the figure below. *See, e.g.* EX2007 at 6.



EX2007 at 6.

88. Another channel partitioning method is Code Division Multiple Access (CDMA), wherein each user is assigned a different code for transmissions. Receivers of a transmission are able to use this code to retrieve transmissions. *E.g.*, EX2010 at 849, EX2008 at 126. When the selected codes are orthogonal to each other, multiple users can share the same frequency channel without interference. *Id.* CDMA may also be conceptualized as providing distinct “code-channels” in an abstract “code-space,” as illustrated below. But, as a practical

matter, CDMA is in fact a method for sharing access to a single channel. *See, e.g.*, EX2008 at 126 (“While FDMA and TDMA isolate transmissions into distinct frequencies or time instants, CDMA allow transmissions **to occupy the channel at the same time** without interference.”) (emphasis added); EX2010 at 843 (“In this method, each user is assigned a unique code sequence or signature sequence that allows the user to **spread the information signal across the assigned frequency band**....the signal transmissions among the multiple users **completely overlap both in time and in frequency**.”) (emphases added). CDMA is the multiple access method implemented in standards such as cdma2000. *See* Lundby at 6:35-42. Various types of codes may be used to implement CDMA-based access, of which a common type are Walsh codes, which are a type of orthogonal code. *See e.g.*, Lundby at 2:8-11 (“In a CDMA system, one could double the effective bandwidth on the forward link by halving the length of the Walsh codes used for orthogonally spreading the encoded bit stream.”); EX2011. Walsh codes are used to establish “channels” that occupy the same frequency, but are differentiated by assigned code. *See id.*; EX2007 at 6.



EX2007 at 6.

89. “Polling methods” are similar to “channel partitioning” methods in that there is a fixed system for awarding channel access, such as having an AP sequentially “poll” stations one after the other in a fixed cycle.<sup>1</sup> *E.g.*, EX2009 at 5.

90. CSMA, in contrast, falls within the category of “random access” methods. *See, e.g.*, EX2010 at 862. In a CSMA scheme, there is no assignment of channel access. *E.g.*, EX2009 at 5-6. Instead, each user must first “sense” whether the entire wireless channel is in use (busy) or clear (idle) before transmitting. *E.g.*, EX2010 at 868. Thus, CSMA is considered a “contention-based” method, because each user must “contend” for an opportunity to transmit. *E.g.*, EX2012 at 16.

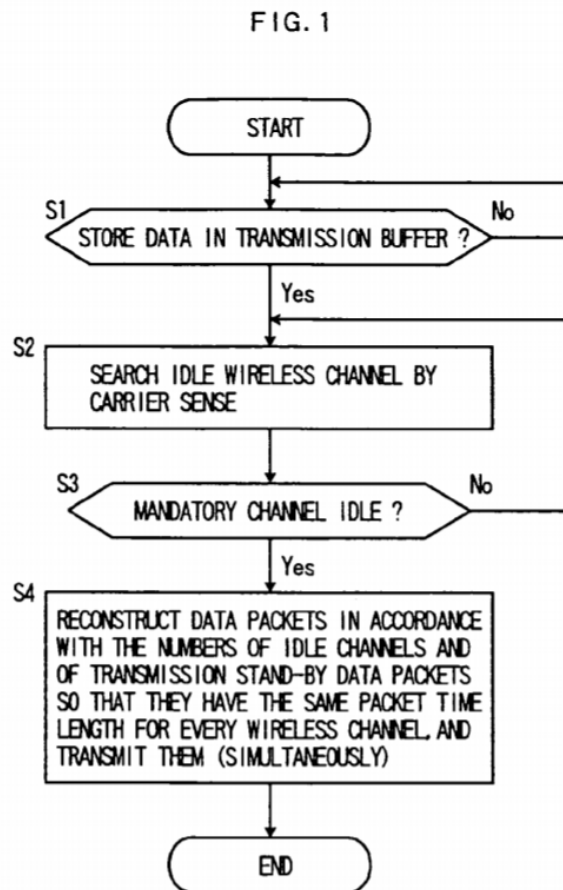
With CSMA, only a single user can transmit within the wireless frequency channel

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<sup>1</sup> Some commentators group channel partitioning and polling methods together as a form of “coordinated access,” to contrast these with “random access” methods such as CSMA. *See, e.g.*, EX2022 at 5.

at a given time. If a user is transmitting, other users needing to transmit a packet hold off transmitting until the current user has ceased transmissions. CSMA is implemented in 802.11-1999, and serves as the foundation on which multi-access is based for the entire 802.11 family of standards.

91. A POSA would understand that the '551 Patent pertains to a CSMA system, because the claims require that transmission be governed by detection of an “idle” state. *E.g.*, '551 Patent at cl. 1. The specification teaches that detection of an “idle” state by means of carrier sensing, such as shown in Fig. 1 below:



92. By contrast, channel partitioning systems such as CDMA, generally do not use such sensing methods because they rely on fixed codes for providing multi-user access, which is antithetical to the “random” access provided by sensing.

93. Lundby teaches a method of adding code-based channels in a CDMA system. Specifically, Lundby teaches that access to a particular frequency band, such as the forward link, may be shared by “primary” and “secondary” channels that are code-based channels. *See* Lundby at 6:42-45 (“It will be understood that performing signal transmission in this manner requires a base station to use **two Walsh codes** rather than one, **because two channels are being used** instead of one.”) (emphasis added), 15:46-78 (“Walsh despreader 720a multiplies the I 712 and the Q 714 inputs by **a first walsh code, which corresponds to the primary channel...**”) (emphasis added); *see also* Williams2 at 10:12-15 (Q: And what are the primary, secondary channels referred to in Lundby? A: In Lundby, that are **different coded channels.**) (emphasis added), 11:9-15(Q:...[A]re those specific channels in the preferred embodiment **distinct frequency ranges?** A: **No.** They’re CDMA-based separation between the channels in the primary embodiment.) (emphasis added). The number of available Walsh codes is limited because the system must make sure that these codes are orthogonal to each other. EX2028 (“Yang”) at 145-47; *see also* EX2032 (“Zhang”) at 2:62-3:7. Thus, it is possible

for a system to run out of orthogonal Walsh codes, which is what Lundby describes as being “code-limited.” Lundby at 2:20-23; EX2028 at 147; EX2032 at 2:62-3:7.

94. It is my opinion that, due to their orthogonality, the use of Walsh codes inherently eliminates interference between distinct code channels. EX2029; Williams<sup>1</sup> at 171:7-10 (“Separating channels, not the channels described by the ’551 Patent, by codes **does not have a power leakage issue**. Separating those channels by codes has a code limiting interference.”) (emphasis added). A POSA understands that *if* codes are not sufficiently orthogonal, decoded signals at the receiver may be degraded by noise resulting from transmissions from other users, which is termed “co-channel interference” and occurs within the *same* frequency channel. EX2030, (“Bi”) (cited in Lundby) at 1:25-29 (“Since the *same wide bandwidth* is available to all users, information signals in other channels may appear as *cochannel interference* or noise when the received signal is demodulated by the spreading code.”) (emphasis added). Significantly, a POSA understands that this form of co-channel interference is unlike interference caused by power-leakage across distinct frequency channels because co-channel interference between code channels is, by definition, within the same channel. EX2031 (“Mishra”). Thus, while Lundby discusses issues relating to signal-to-noise ( $E_b/N_0$ ) pertaining to the forward link, it is my opinion that this is properly viewed as co-channel interference within *the same communication link* rather



than as interference between distinct frequency channels with distinct center frequencies. Lundby at 1:11-14 (“The quality of *a communication link* over a noisy channel depends on the energy to interference noise ratio  $E_b/N_o$  of the signal. To achieve a required bit error rate over *the communication link*, a particular  $E_b/N_o$  is required.”) (emphases added). Thus, it is my opinion that the way in which Lundby deals with co-channel interference cannot involve preventing use of the channel (as in the ’551), as that would eliminate transmissions altogether. Instead, Lundby’s solution for co-channel interference is to use sufficiently orthogonal codes, so that transmission can occur on the same forward link even though this channel is not idle.

95. CDMA systems do incorporate the use of distinct frequency bands, in the form of duplexing. Specifically, a POSA understands that typical CDMA systems employ both a forward link for a base station to transmit information to users, as well as a reverse link for users to transmit to a base station. EX2030 at 1:49-2:11. However, it is my opinion that Lundby provides no teachings relating to the possibility of interference between distinct frequency channels, nor any teachings pertaining to how such interference might be addressed.

## 2. Lundby Neither Addresses the Decision to Transmit Nor Prevents Transmission

96. As Petitioner and its expert admit, Lundby provides a method to “determine whether to transmit the signals over one channel (a primary channel) or two (primary and secondary channels).” Pet. at 39; also Williams Decl. at ¶120. However, Lundby ***does not*** address the decision of whether to transmit or not. *Id.* Indeed, as Petitioner’s expert Dr. Williams ***repeatedly*** emphasized, “there’s no determination of whether to transmit disclosed by Lundby.” *E.g.*, Williams2 at 27:17-19; 44:20-23 (“In other words, Lundby, as we discussed before, is post the decision to transmit.”). As such, it is my opinion that Lundby’s methods also do not prevent transmission.

97. The method shown in Fig. 2 of Lundby (below) illustrates Lundby’s teachings. *See e.g.*, Williams Decl. at ¶¶140, 142 (referring to “decision tree” of Lundby and Fig. 2).

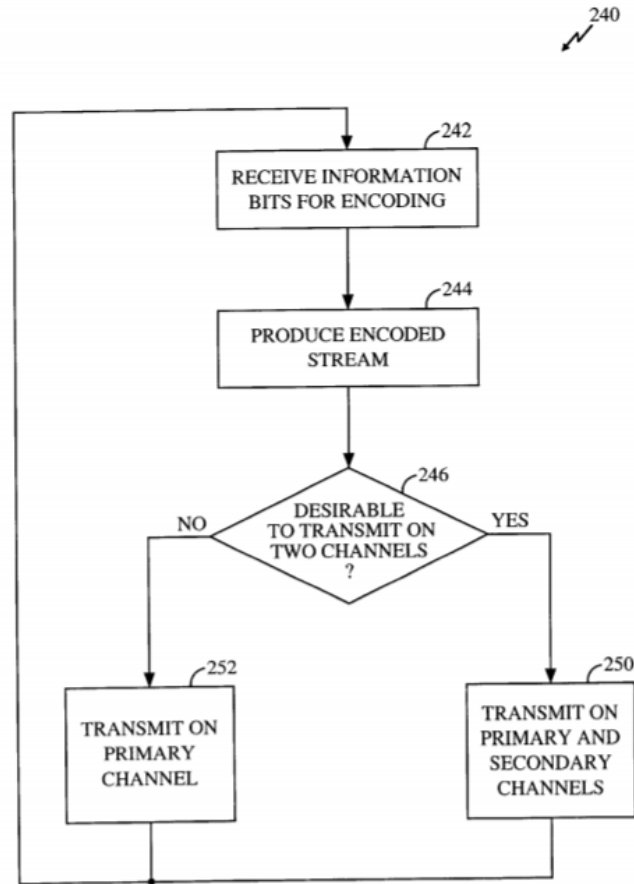


FIG. 2

98. As shown in Fig. 2, at decision block 246 “it is determined whether a single standard rate encoded bit stream should be transmitted **on a single channel** or whether a lower rate encoded bit stream should be transmitted **in portions over two channels.**” Lundby at 4:26-30 (emphases added). Further, “[a]ny parameter(s) within a CDMA communication system can be used as the basis of the decision in decision block 246.” *Id.* at 4:30-32. Thus, a POSA understands that Lundby **only** illustrates two outcomes—transmitting on the primary channel or on both the primary and secondary channels. Williams Decl. at ¶142. A POSA

further understands that Lundby's decision tree does not include any situation where transmission is *prevented*. See also Lundby Fig. 5.

99. In fact, Petitioner's expert Dr. Williams *repeatedly* acknowledges, and I agree, that Lundby's methods do not affect the decision to transmit at all. For instance, Dr. Williams indicates, and I agree, that Lundby's methods *presume* that a transmission will take place, because Fig. 2 does not come into play until *after* a positive decision has been made. E.g., Williams2 at 45:16-18 ("So that checking of—of **the decision to transmit or not—occurs before figure 2** in Lundby.") (emphasis added); 47:12-15 ("And the use of the decision tree from Lundby, figure 2, does not include the decision to transmit or not. **The decision's already been made**—been made to transmit in Lundby figure 2.") (emphasis added).

100. As such, it is my opinion that Lundby provides no teachings for whether to transmit when, for example, a primary channel code is unavailable, but another code, which might be used for a secondary channel, is available. See e.g., Williams2 at 62:10-13 (Q: Is there any embodiment described in Lundby that describes a situation where the primary channel is not available. A: Not that I recall.), 62:14-19 (Q:...Is there any embodiment in Lundby where the availability of the secondary channel is checked, even though the primary channel is unavailable? A: Not that I recall.). Indeed, it is my opinion that Lundby does not teach checking the availability of the primary channel at all, as it is always

assumed that a primary channel code is available. *E.g.*, Williams2 at 61:22-62:4 (“The disclosures in Lundby, again, **don’t check whether the primary channel is idle or busy**, as we’ve discussed in figure 2. The decision at [block] 246, figure 2, is whether there will be a transmission on the primary channel or on the primary channel and secondary channels. And so **there’s already been a decision to transmit** before entering figure 2, as we’ve discussed before.”) (emphases added). This is a stark difference from the ’551 Patent, which a POSA would understand is specifically targeted toward preventing transmission on otherwise available channels when a “mandatory channel” is busy.

101. In view of the above, it is my opinion that a POSA would understand that Lundby’s methods do not teach any means for *preventing* transmission, let alone preventing transmission based on the special status accorded to any particular code channel. Indeed, Lundby does not address or alter the methods by which CDMA systems decide whether to transmit in the first instance. However, it was known to a POSA that, in general, a transmission may occur if an available CDMA code, such as a Walsh code, is found. *See* Lundby at 4:62-67. A POSA would understand that if any particular Walsh code is unavailable because it is in use, the system would then proceed to generate additional codes, until an available orthogonal code is found. *See, e.g.*, EX2028 at 145-147; EX2032 at 1:38-61, 2:62-3:7. It is my opinion that Lundby provides no teachings altering this standard

practice, nor suggest that any particular code channel should be preferred over another. *See also* Williams<sup>2</sup> at 18:4-13 (Q:...If at the beginning of a transmission, one of these codes must be assigned to Lundby’s primary channel, **does Lundby teach or suggest any reason for – to prefer one of these example codes over another?** A: **Not that I recall**, and it has nothing to do with my opinion in this case.”) (emphases added). It is my opinion that a POSA would therefore understand that Lundby’s “primary channel,” as such, is simply the first available channel that is found.

### C. Shpak-Lundby

102. I understand that according to Petitioner, a POSA would have combined Shpak with Lundby by adding “another available 802.11b channel as a ‘secondary channel’ to augment the primary channel’s [Shpak’s common frequency channel] bandwidth such that wireless packets are transmitted on both channels simultaneously.” Pet. at 41-42. Further, Dr. Williams has explained that a “Shpak-Lundby access point would have applied Lundby’s decision tree to select which channel(s) to use: (a) the “primary channel” or (b) the primary and secondary channels when desirable.” Williams Decl. at ¶140. Petitioner treats Lundby’s decision tree shown in Fig. 2 as representative of the method performed by Shpak-Lundby. *See id.* at ¶141.

103. Specifically, Dr. Williams explained that the Shpak-Lundby process only differs from Lundby's by adding Shpak's step of checking idle status *before* entering Lundby's decision tree of Fig. 2: *E.g.*, Williams2 at 45:7-18 (Q: Do you have an opinion as to whether figure 2 would be modified to include the teachings of Shpak? A: ...the CCA algorithm inherent in 802.11 checks for the idle nature of the channel before transmissions. **So that checking of – of the decision to transmit or not is – occurs before figure 2 in Lundby.**) (emphasis added), 47:12-23 (“And the use of the decision tree from Lundby, figure 2, does not include the decision to transmit or not. The decision's already made – been made to transmit in Lundby figure 2. **So modifying Lundby's figure 2 to include a decision to transmit or not would include a block before block 242 in figure 2 of Lundby, which would decide whether to transmit or not.** And the teachings of Shpak with regards to 802.11 systems would teach the determination of the CSMA/CCA state of busy or idle is a process to determine whether the – the channel is busy...”) (emphasis added); 49:23-50:1 (“So to incorporate a decision to transmit, a POSITA would be taught to include the 802.11 CSMA/CC algorithm **prior to entering the flowchart of figure 2.**”) (emphasis added).

104. Thus, Dr. Williams indicates, and I agree, that because Lundby itself does not address the decision to transmit, the manner in which that decision is made must come from Shpak. Specifically, with reference to the '551 Patent's Fig.

1, Dr. Williams testified that Shpak allegedly provides *two distinct steps* taught in the '551: “And that disclosure in **Shpak would be equivalent to S3 and S2** in figure [1] of the '551, while the disclosure in Lundby figure 2 is equivalent to S4 in the '551 patent figure [1].” Williams2 at 66:22-25 (emphasis added). A POSA therefore understands that Steps S2 and S3 of Fig. 1 in the '551 Patent, as discussed in §VI.C, determine (i) which channels are idle in the multichannel system, and (ii) further checks whether one of these idle channels is the mandatory channel, and makes the decision to transmit based on its status. It is my opinion that it is the '551's addition of this second requirement for limiting transmission that changes the decision to transmit in multichannel systems. §VI.C *supra*.

105. However, Dr. Williams also acknowledges, and I agree, that Shpak by itself does not teach the use of multiple channels or a “mandatory channel” as used in the claims. Williams2 at 53:1-3 (“Through the 802.11 standard, as I discussed before, **Shpak, by itself, doesn't disclose the mandatory channel.**”) (emphasis added). Rather, as discussed above, it is my opinion that because Shpak only teaches a single-channel system, it only needs to perform one step—checking if the channel is idle—before transmitting. Thus, it is my opinion that it would be inaccurate to say that Shpak discloses two distinct steps of checking (i) first the state of all provided channels, and (ii) further checking the state of a “mandatory channel.” *Id.*



106. Indeed, Dr. Williams indicates, and I agree, that Shpak's decision process does not include any teachings addressing a scenario where the "common frequency channel" is busy while a "secondary channel" is idle: *E.g.*, Williams2 at 56:16-18 (Q: Would the idle state of the secondary channel still be checked? A: I believe **Shpak is silent on that.**) (emphasis added), 58:3-8 (Q:...[I]n the combination you've described, would the idle state of the secondary channel be checked? A: So as I've testified before, **Shpak is silent on that.**) (emphasis added). Further, as discussed in §VIII.B.2, Dr. Williams states, and I agree, that Lundby also does not teach any scenario in which a primary channel code is unavailable, nor any scenario where the status of the primary channel is checked. Thus, it is my opinion that there is no explicit disclosure in either reference of how the decision to transmit would be made in a multichannel Shpak-Lundby system when the alleged "primary channel" (the "common frequency channel") is busy, but the "secondary channel" is idle. It is my opinion that a POSA would understand that this is in stark contrast to the '551 Patent, which is explicitly directed to changing the decision to transmit on other idle channels when the "mandatory channel" is busy.

**D. Shpak-Lundby Cannot Render Any Challenged Claim (1, 3, 4, 5, 7, 8) Unpatentable**

107. It is my opinion that the combination of Shpak and Lundby (“Shpak-Lundby”) cannot render any claim of the ’551 Patent unpatentable. It is my opinion that the ’551 Patent, as discussed in §VI.C, changes the way in which the decision to transmit is made in multichannel systems, by adding a further requirement that transmission be limited to times “only when the mandatory channel is idle.” It is my opinion that neither Shpak nor Lundby, however, provide any teachings to modify the decision to transmit in multichannel systems. Further, it is my opinion that none of Petitioner’s alleged motivations for combining Shpak with Lundby provide any reason to change the way in which the decision to transmit is made. As such, it is my opinion that Shpak-Lundby fails to teach the claimed “mandatory channel” and the step of transmitting “only when the mandatory channel is idle.”

**1. Shpak-Lundby Does not Prevent Transmission when the “Common Frequency Channel” is Busy**

108. I agree with the Board’s conclusion that “the purpose of the ’551 patent is to transmit wireless packets only ‘via wireless channels including the mandatory channel, and when the mandatory channel is busy, **transmission is not performed even if there is another wireless channel.**’” DI at 19 (emphasis in original). It is my opinion that this, in fact, is the point of the claimed step limiting

transmission to times “**only** when the mandatory channel is idle.” It is my opinion that a POSA understands that the combination of Shpak-Lundby, however, does not limit transmission in this manner.

109. As I discussed in §§VIII.A-C, it is my opinion that a POSA understands that there is no explicit disclosure of how the decision to transmit is made in a multichannel system, such as the alleged Shpak-Lundby, when the “common frequency channel” (the purported “primary channel”) is busy but a “secondary channel” is idle. Indeed, Petitioner’s expert Dr. Williams **repeatedly** states, and I agree, that Lundby provides no teachings with respect to how the decision to transmit is made—rather, Lundby only addresses whether another channel may be used *after* a positive decision to transmit. It is my opinion that Shpak does not fill this gap because Shpak only addresses single-channel systems, and as such provides no teachings for how the decision to transmit is made in a multichannel system at all, let alone suggest that one channel should be prioritized over another. Rather, it is my opinion that all that Shpak teaches is that, consistent with basic operation of CSMA in 802.11, if a channel is detected to be idle, then a transmission would occur. Shpak at ¶5.

110. It is my opinion that in the absence of any teaching modifying the decision to transmit based on a special status accorded to one channel in a multichannel system, a POSA would understand that the default is to transmit

whenever a channel is available, as is consistent with Shpak and legacy 802.11 systems. Indeed, the '551 specification teaches that that is the case in prior multichannel systems—*i.e.*, the straightforward application of carrier-sensing to a multichannel setting is simply to sense multiple channels instead of just one, and transmitting on channel(s) sensed to be idle. *See* '551 Patent at 1:43-2:3. There are other examples of this being the case in the prior art: For example, Petitioner's Bugeja reference teaches that multiple channels are sensed and used based on their own idle state. Bugeja at ¶¶40-41, 44, 46. As another example, the Nasipuri reference teaches an exemplary extension of 802.11 sensing methods to a multichannel setting wherein each channel is sensed, and used based on its own idle state. EX2027 at 1403. It is my opinion that Shpak provides no teachings to the contrary, as Dr. Williams confirms. Williams<sup>2</sup> at 75:16-20 ("In paragraph 5 [of Shpak], the author's pointing to 802.11 process of CCA to determine whether to transmit or not and **doesn't restrict that determination to the common [frequency] channel.**") (emphasis added). In other words, a POSA understands that in CSMA-based multichannel systems, transmission is performed on a channel *based on that channel's own idle state*. EX2027, §VI.C. A POSA understands that CDMA systems are no different in this regard. As is known in the art, if a first code channel is unavailable, the system simply proceeds to generate new codes

until an available code is found, and then transmission is performed.<sup>2</sup> §VIII.B.2 *supra*. A POSA would understand that there is no reason to avoid usage of an available code based on a prior attempted code being unavailable. *See id.* It is my opinion that Lundby provides no teachings to address or modify the manner in which its “primary channel” is assigned. Thus, it is my opinion that in both CSMA and CDMA systems, a POSA understands that whether a transmission occurs on a given channel is based only on that channel’s *own* availability, not the status of another channel.

111. To the extent that Petitioner argues that transmission is prevented, or delayed, in Shpak-Lundby purely by implication—*i.e.*, as Dr. Williams testified, “in my opinion, a POSITA reading Lundby would understand that Lundby controls the transmission facility of the second channel due to system architecture,” and thereby argues that this implies that the transmission over the second channel cannot occur absent the primary channel being idle— I disagree. It is my opinion that this directly contradicts Dr. Williams’ assertions, with which I do agree, that Lundby does not address the decision to transmit, because Lundby’s process does not come into play until **after the decision to transmit has already been made.**

Williams<sup>2</sup> at 26:18-21, 27:15-21, 44:20-23, 47:12-15, 49:17-22, 50:20-22, 62:2-4,

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<sup>2</sup> Petitioner’s expert treats code availability as being analogous to idle state of a frequency channel. See Williams<sup>2</sup> at 60:25-61:4 (“That availability of the code to allocate to the secondary channel is a determination of whether the secondary channel is idle or busy in this particular embodiment in Lundby.”)

63:9-12, 66:17-18, 80:25-81:1, 83:15-18, 84:15-16; §VIII.B.2, VIII.C *supra*.

Indeed, it is my opinion that Lundby's methods do not show how transmission might be *prevented* under any scenario—rather, as I discuss above, every single embodiment in Lundby presumes that at least one channel will be used, because Lundby only teaches how to add a channel to an existing available channel.

§VIII.B *supra*. It is, in my opinion, illogical to say that Lundby's methods prevent transmission at the same time as assuming that a transmission will occur.

112. Thus, it is my opinion that even though Lundby teaches that a secondary channel may be checked *assuming a primary channel code is available*, this does not mean that Lundby would prevent transmission altogether where at least one code was available. Rather, it is my opinion that, because Lundby is entirely silent on this scenario, a POSA would reasonably conclude that Lundby's CDMA systems operates no differently from conventional CDMA systems, in that additional codes will be generated/attempted until an available one is found. Since, as Dr. Williams asserts, and I agree, that Lundby does not address the decision to transmit, it is my opinion that it follows that Lundby does not prevent a system from simply finding the next available code, and then transmitting using that code. It is my opinion that the only difference is that, since Lundby's method does not begin until *after* an available code is found, this available code would be treated as a "primary channel" within Lundby's Fig. 2. In

other words, a POSA would understand that Lundby does not change the decision to transmit based on a special status of one channel, because Lundby does not teach any means for preferring one code channel over another in assigning a “primary” channel. *See Williams2* at 18:8-13 (Q: ...[D]oes Lundby teach or suggest any reason for—to prefer one of these example codes over another? A: Not that I recall, and it has nothing to do with my opinion in this case.). It is my opinion that, although Lundby’s Fig. 2 may use the label “primary channel,” there is no indication in Lundby that the assignment of this name is reflects anything other than that this happens to be the *first available* channel. Thus, it is my opinion that Lundby itself provides no reason why *either* channel in Shpak-Lundby (whether the “common frequency channel” or otherwise) cannot serve as a “primary channel” in the steps of Fig. 2, so long as it is available.

113. From my review of his deposition testimony, Petitioner’s expert, Dr. Williams, could not point to anything *in Shpak-Lundby* tying the decision to use one channel to the idle state of another without reference to the ’551 Patent. When asked whether the state of the secondary channel would be considered in the decision to transmit in the event the primary channel is unavailable, Dr. Williams instead repeatedly referred to **the ’551 Patent**: *E.g.*, *Williams2* at 50:23-51:4 (Q: Would the secondary channel be checked in this decision tree [from Fig. 2 of Lundby], as modified by Shpak? A: It’s not necessary to check the nature of the

secondary channel, *according to the '551 patent.*) (emphasis added), 58:3-18 (Q:..Would—in the combination you've described, would the idle state of the secondary channel be checked? A: So as I've testified before, Shpak is silent on that...*And the claim [of the '551 Patent]* doesn't require determining if the secondary channel is idle or busy.") (emphasis added). It is my opinion that Dr. Williams' reliance on the '551 Patent represents hindsight. I am informed that it is improper to use the teachings of the '551 Patent to supply that which the prior art does not; yet this is, in my opinion, what Dr. Williams' testimony indicates. It is my opinion that Dr. Williams's expert reliance upon on the '551 Patent to provide a roadmap for how to combine Shpak with Lundby (*e.g.*, Williams2 at 26:12-21, 27:7-9, 46:19-47:15, 48:19-23, 50:23-51:15, 63:9-12, 65:24-66:5, 66:17-25, 67:24-68:1, 69:8-11, 85:10-18) confirms that a POSA would conclude that these references do not disclose the '551 Patent's invention without the use of the '551 Patent itself to supply the roadmap.

114. Thus, in Shpak-Lundby, it is my opinion that there is no teaching to suggest that the idle state of a second frequency channel in a multichannel system would not be checked if the first channel were busy, nor that the status of one channel in a multichannel system should play a special role in deciding whether to transmit. Rather, it is my opinion that both Shpak and Lundby suggest that transmission would occur so long as one channel is idle.



**2. Petitioner Fails to Allege Any Motivation to Modify the Decision to Transmit**

115. It is my opinion that Petitioner fails to allege any motivation for a POSA implementing the alleged Shpak-Lundby combination in such a way as to prevent transmission on an otherwise available channel, based on the status of another channel.

116. First, it is my opinion that there is no motivation to modify the decision to transmit in a multichannel system provided in the references themselves. It is my opinion that Shpak, as discussed, cannot supply such a motivation because Shpak only relates to single-channel systems. Further, it is my opinion that Shpak provides no disclosure of problems relevant to multichannel systems, such as power leakage. §VIII.A. It is my opinion that Lundby also does not provide any such motivation, at least because Lundby always presumes that a transmission will occur. §VIII.B.2 *supra*. Moreover, as discussed above in §VIII.B, Lundby does not describe the problem of power leakage between channels “where center frequencies are close,” as in the ’551 Patent. Rather, Lundby only address *co-channel* interference occurring on *the same* frequency range. Lundby does not describe or address interference caused by power leaking from one channel into another because Lundby’s orthogonal code channels, by definition, already prevents such interference. Petitioner’s expert has confirmed

that his understanding is the same. *See Williams1* at 171:7-10. As such, it is my opinion that Lundby provides no motivation to tie the use of one available channel based on a busy status sensed in another channel.

117. Petitioner may try to argue that Lundby does address prevention of transmission, as its expert suggested, in col. 2 lines 45-49. *See Williams2* at 83:15-84:1. I believe that such an argument would fail for at least two reasons: First, it is my opinion that this portion of Lundby merely addresses *prior* known circumstances where limits on transmit power may prevent transmission. Thus, this circumstance is not part of “Lundby’s decision tree.” Second, it is my opinion that, as Dr. Williams also acknowledged, this portion of Lundby describes the problem of being power-limited, *i.e.* that the amount of power transmissible **by a given base station**. *Williams2* at 86:17-20 (“So even if there are additional spread codes available, you’re limited by the amount of power that can be transmitted **by the base station**.”) (emphasis added). It is my opinion that this issue applies equally **to all code channels**, however, and as such does not address whether the state of any *particular* channel should affect the use of another. *See Williams2* at 86:22-25 (“So that limits whether – that determines whether you can transmit **on any channel**. It also limits whether you can transmit on a primary channel.) (emphasis added); 88:6-14 (Q: So in column 2...this is asking whether a code is available in transmission being allowed, is it not? Any—any code. A: No...This is

limiting the transmit power of the base station.), 88:24-89:5 (Q: But the power limited situation **would apply to all the codes**; is that – is that correct?...A: **Yes. True.**) (emphasis added). Thus, it is my opinion that power limits still would not motivate a POSA to prevent transmission on otherwise available channels based on the busy state of one channel.

118. It is my opinion that Petitioner's alternative motivations to combine Shpak-Lundby likewise cannot motivate a POSA to alter the decision to transmit, because these motivations only address the advantage of using two channels as opposed to one. None of Petitioner's alleged motivations suggest there may be circumstances where transmission should be prevented altogether based on the status of one channel in a multichannel system.

119. For example, Petitioner's first alleged motivation to combine Shpak with Lundby is to increase transmission speed. Pet. at 42; Williams Decl. at ¶126. It is my opinion that, at most, this motivation provides a reason to use two channels instead of one, but **does not** provide any reason to prevent transmission altogether based on the status of one of multiple channels. To the contrary, this motivation would suggest to a POSA that transmission should proceed whenever a channel is idle.

120. Petitioner has also alleged that a POSA would wish to combine Shpak with Lundby because adding an additional channel to Shpak's "common frequency

channel” would reduce interference on the “common frequency channel.” Pet. at 42; Williams Decl. at ¶127. However, in my opinion this motivation does not suggest any scenario where one would wish to prevent transmissions on available channels in a multichannel system, based on the state of one particular channel. As with increased speed, this motivation at most speaks to the advantages of using two channels instead of one, but does not, in my opinion, suggest one might wish to use *none*.

121. Petitioner has also suggested that a POSA would wish to use another channel to reduce the amount of transmit power on Shpak’s “common frequency channel,” so as to stay within regulatory limits. As above, it is my opinion that this motivation at most provides a reason to use two channels instead of one, but does not suggest any reason why a POSA would wish to prevent transmission altogether based on the status of one particular channel.

122. Petitioner has also suggested that a POSA would be motivated to add a second channel as it is allegedly one of a number of finite solutions and may be implemented using known techniques, citing 802.11. Pet. at 43-44. However, it is my opinion that these purported motivations likewise suggest that using two channels rather than one may be advantageous, but do not explain why transmission should be prevented altogether when any channels in a multichannel system are available.

**3. Claim 1**

**(a) [1A] setting a mandatory channel that is always used for transmission;**

123. It is my opinion that the Shpak-Lundby combination fails to disclose the step of “setting a mandatory channel that is always used for transmission” for at least the following reasons:

124. **First**, as discussed I in §VII.B, a proper construction of the claimed “mandatory channel” is “one channel in a wireless multichannel communication system **whose idle state determines whether there can be a transmission.**” It is my opinion that Shpak itself does not teach this because Shpak does not disclose a multichannel system. *See Williams2* at 53:1-3. Nor, in my opinion, does Shpak disclose the claimed “mandatory channel” when combined with Lundby. Per Petitioner, the combination of Shpak-Lundby includes two channels because another frequency channel has been added to Shpak’s “common frequency channel,” which would allegedly be the claimed “mandatory channel.” However, as discussed above, there is nothing in either Shpak or Lundby that prevents transmission on a given idle channel based on the status of another channel (§§VIII.A-C, VIII.D.1-2), and thus it is my opinion that Shpak-Lundby does not disclose a mandatory channel “whose idle state governs whether there can be a transmission.” Indeed, Shpak provides no suggestion that carrier-sensing should operate differently in a multichannel system, nor that any one channel in a

multichannel system should be accorded special status. *See* §VIII.A. Thus, given that Petitioner’s expert, Dr. Williams, contends that **Shpak** provides the method for deciding to transmit (Williams2 at 41:12-19, 45:13-23, 47:3-24, §IV.C *supra*), there is no reason, in my opinion, to assume that both channels in Shpak-Lundby would not be considered, nor any reason to assume that an otherwise idle “secondary channel” would not be used simply because Shpak’s “common frequency channel” is busy. *See* Williams2 at 75:16-20 (determination of idle state not limited to common channel); §VIII.C; §VI.C (describing prior art methods of sensing all available channels).

125. It is my opinion that Lundby provides no teachings to the contrary. Per Petitioner’s expert, Lundby’s process does not even come into play until **after** the decision to transmit has already been made. *See* §§VIII.B.2, C, D.1 *supra*. Thus, it is my opinion that Lundby does not speak to how the decision to transmit is made whatsoever, much less suggest that the idle state of one channel should be prioritized over another’s as part of that decision. §§VIII.B.2, D.1. Indeed, as Petitioner’s expert admits, Lundby does not teach checking the status of its “primary” channel at all. Williams2 at 61:22-24 (“The disclosures in Lundby, again, don’t check whether the primary channel is idle or busy as we’ve discussed in figure 2.”). Rather, it is my opinion that Lundby only teaches how to add a channel to an existing **available** channel, without changing how that available

channel was found in the first instance. §VIII.B.2. Thus, it is my opinion that Lundby does not provide any teaching or suggestion to alter Shpak’s teaching that a transmission would occur on a channel that is sensed to be idle. §§VIII.C, D.1. It is further my opinion that Lundby simply does not teach any method for preventing transmission at all—rather, its decision tree always assumes that transmission will take place. §VIII.B.2. In sum, if the “common frequency channel” was busy but another channel was idle, it is my opinion that the combination of Shpak and Lundby suggests that the idle channel would be used. Thus, in Shpak-Lundby, it is my opinion that the “common frequency channel” is not a channel “whose idle state determines whether there can be a transmission.”

126. Further, as discussed in §VIII.D.2, it is my opinion that Petitioner fails to allege any motivation to modify how the decision to transmit is made so as to prevent transmission on an idle channel, based on the state of another channel. For example, it is my opinion that Shpak provides no teaching relevant to the decision to transmit in multichannel systems whatsoever, nor does it address the possibility of leakage from one channel to another. §VIII.A. It is my opinion that Lundby also does not address interference between distinct frequency channels.

§§VIII.B.1, D.2. Instead, Lundby at most in my opinion pertains to co-channel interference *in the same frequency channel*, and does not address interference by *preventing* transmission but rather by relying on *orthogonal codes* that *permit*

*transmission* even when this channel is not idle. §VIII.B.1. It is my opinion that none of Petitioner’s proposed alternative motivations fill this gap, as discussed in §VIII.D.2.

127. **Second**, even if the Board wishes to maintain its preliminary construction that a “mandatory channel” is “one channel in a wireless multichannel communication system **over which transmission must occur before transmission over the other wireless channels,**” it is my opinion that Shpak-Lundby still does not disclose the claimed “mandatory channel.” As discussed above, neither Shpak nor Lundby provide any suggestion or reason to change the way in which the decision to transmit is made in multichannel systems. Thus, it is my opinion that if Shpak-Lundby’s “common frequency channel” was busy but another channel was idle, there is nothing to suggest that a decision to transmit would be prevented on the idle channel, based on the busy/idle state of the common frequency channel. Therefore, it is my opinion that even under the Board’s preliminary construction, the “common frequency channel” in Shpak-Lundby would not be a channel “over which transmission must occur before transmission over the other wireless channels.”

128. **Third**, because Shpak-Lundby does not prevent transmission on an idle channel, even if it is not the “common frequency channel,” it is my opinion



that this combination fails to teach “setting a mandatory channel **that is always used.**”

- (b) [1B] transmitting the wireless packets by using a wireless channel/wireless channels that includes/include the mandatory channel, only when the mandatory channel is idle.

129. Even if Shpak-Lundby is considered to teach a “mandatory channel” and step 1[A], it is my opinion that this combination still fails to teach the step of “transmitting...**only** when the mandatory channel is idle.” This is because it is my opinion that neither Shpak nor Lundby, alone or in combination, provide any teachings to change the way in which the decision to transmit would be made in a multichannel system. More particularly, it is my opinion that neither Shpak nor Lundby, alone or in combination, teach preventing transmission when a “primary channel” (such as Shpak’s “common frequency channel”) is busy but a “secondary channel” is idle.

130. As discussed above, it is my opinion that Lundby does not address how the decision to transmit is made in a multichannel system—rather, Lundby assumes that a channel is available to be treated as a “primary channel.”

§VIII.B.2. Indeed, Lundby does not address *any* scenario in which the “primary channel” is unavailable but the “secondary channel” is available, much less that transmission should be prevented. *Id.* This is in stark contrast to the ’551 Patent,

which explicitly teaches that transmission is prevented when the “mandatory channel” is busy, *even if* another channel was idle. ’551 Patent at 6:51-55. As I discussed in §§VI.B-C, limiting transmission *in this scenario* is precisely how the ’551 Patent addresses power leakage. Specifically, if the mandatory channel is idle, transmission may occur on (i) the mandatory channel by itself, or (ii) the mandatory channel together with other idle channels. *E.g. id.* at cl. 1, Fig. 1. **But**, if the mandatory channel is busy, then (iii) *no transmission* occurs, *even if* other channels are idle. *See, e.g.,* §VI.C. Lundby’s decision tree, on the other hand, does not include prevention of transmission at all. *See* §VIII.B.2. Rather, Lundby’s decision tree only contemplates something akin to scenarios (i) and (ii), which assume the availability of a “primary channel.” *See* §VIII.2. However, in my opinion, it is scenario (iii) of the ’551 Patent that gives meaning to the limitation “transmitting...**only** when the mandatory channel is idle.” This, in my opinion, is entirely absent from Lundby.

131. Shpak cannot fill these gaps, in my opinion, as Shpak only teaches that transmission occurs on a channel that is sensed to be idle. §VIII.A. Thus, it is my opinion that the combination of Shpak-Lundby likewise does not limit transmission in the manner claimed. *See* §§VIII.C, D.1.

132. Further, as I have discussed in §VIII.D.2, neither Shpak nor Lundby provide any motivation to modify the decision to transmit so as to prevent

transmission based on the state of one channel. For instance, neither Shpak nor Lundby address the problem of power leakage between channels having distinct center frequencies. Petitioner's additional alleged motivations to combine Shpak and Lundby fail to fill this gap in my opinion, as none of these motivations provide a reason to *prevent* transmission altogether. *See* §VIII.D.2 *supra*.

#### **4. Claim 3**

133. Dependent claim 3 depends from claims 1 or 2. Thus, it is my opinion that Shpak-Lundby does not disclose claim 3 for at least the reasons I addressed with respect to claim 1. Further, Petitioner has made no attempt to argue that Shpak-Lundby discloses the elements of claim 2, and thus it is my opinion that Petitioner cannot meet its burden as to claim 3 to the extent it incorporates claim 2.

134. Thus, it is my opinion that Shpak-Lundby does not disclose a “wireless packet communication method according to claim 1 or 2, wherein the plurality of wireless packets transmitted simultaneously are set to have a same or equivalent packet time length that corresponds to a packet size or a transmission time.”

#### **5. Claim 4**

135. Dependent claim 4 depends from claims 1 or 2. It is my opinion that Shpak-Lundby does not disclose any of the methods of claims 1 or 2 for at least the reasons addressed above in claim 3. Further, it is my opinion that neither Shpak

nor Lundby discloses the use of MIMO, or “multiple wireless channels” within the meaning of the ’551 Patent. Thus, it is my opinion that Shpak-Lundby does not disclose “simultaneously transmitting wireless packets selectively using the multiple wireless channels or the MIMO.”

**6. Claim 5**

136. Independent claim 5 is the apparatus analog of claim 1. As discussed with respect to claim 1, it is my opinion that Shpak-Lundby fails to disclose the step of “setting a mandatory channel that is always used for transmission” or “transmitting...only when the mandatory channel is idle by using ...wireless channels that include...the mandatory channel.” Thus, for similar reasons, it is my opinion that Shpak-Lundby fails to disclose a unit for performing these steps.

**7. Claim 7**

137. Claim 7 depends from claims 5 or 6, and is the apparatus analog of claim 3. Thus, it is my opinion that Shpak-Lundby fails to disclose claim 7 for reasons similar to those addressed for claims 5 and 3. Further, Petitioner has not attempted to show that Shpak-Lundby can meet the requirements of claim 6.

**8. Claim 8**

138. Claim 8 depends from claims 5 or 6, and is the apparatus analog of claim 4. Thus, it is my opinion that Shpak-Lundby fails to disclose claim 8 for

reasons similar to those addressed for claims 5 and 4. Further, Petitioner has not attempted to show that Shpak-Lundby can meet the requirements of claim 6.

**IX. PETITIONER FAILS TO DEMONSTRATE THAT THERE IS REASONABLE  
LIKELIHOOD ANY CHALLENGED CLAIM IS UNPATENTABLE UNDER  
GROUND 1: CLAIMS 1, 3, 5, 7**

139. Petitioner relies on Shpak as allegedly disclosing a “mandatory channel.” I disagree. As the Petitioner states, and as I agree, Shpak discloses only a *single channel* for wireless communication. Paper No. 2 at 24 (“POSAs would have understood Shpak to disclose a conventional SISO system in which an AP transmits packets to a station over a SISO “common frequency channel”). However, as I explained in §VII.A, it is my opinion that the ’551 Patent teaches, and that a POSA would understand, that the “mandatory channel” is necessarily one of several available channels between two stations (i.e., a “multichannel system”), and cannot merely be the *only* channel provided. Thus, as the Board reasoned, and with which I agree, “multiple transmission channels are required, which is not taught by Shpak.” DI at 35.

140. Further, because Petitioner relies on Ho only for the disclosure of MIMO applicable to a single channel, it is my opinion that the combination of Shpak and Ho (“Shpak-Ho”) also fails to disclose the claimed “mandatory channel.”

**1. Claim 1**

**(a) [1A] setting a mandatory channel that is always used for transmission;**

141. It is my opinion that the combination of Shpak-Ho does not disclose “setting a mandatory channel,” as this phrase is properly construed, because this step is directed to identifying *one of several* frequency channels provided for transmission between two associated stations as a “mandatory channel,” not merely “arranging” to use the only channel available.

142. As explained above in §VII.A, it is my opinion that the ’551 Patent is directed to multi-channel transmission techniques, wherein *multiple channels* are provided between two devices, such as an AP and client device. It is my opinion that a POSA would understand that the ’551 Patent teaches that the mandatory channel “can be regarded as a wireless channel having the highest priority *among wireless channels* that have a plurality of priorities.” ’551 Patent at 3:57-60 (emphasis added). Moreover, a POSA would understand that one of the stated goals of the ’551 Patent is to improve *throughput* of simultaneous transmission by addressing power leakage “where **center frequencies of multiple wireless channels** used at the same time are close to each other.” ’551 Patent at 2:26-30 (emphasis added).

143. Thus, it is my opinion that the combination of Shpak-Ho fails to disclose a “mandatory channel” because Shpak-Ho’s “common frequency channel”

is not one of multiple channels provided for transmission, but rather the *only* channel available. Further, it is my opinion that Shpak-Ho fails to disclose the step of “setting a mandatory channel” because the ’551 Patent teaches that identification of a “mandatory channel” does not render it the only channel available—rather, as some preferred embodiments indicate, stations with an associated “mandatory channel” have the ability to use this channel together with another channel that is idle. *E.g.*, ’551 Patent at 6:8-11 (“In this example, since the wireless channel #1 as the mandatory channel is idle, the wireless packets is simultaneously transmitted by using two wireless channels as the wireless channels #1 and #2.”). In other words, “setting a mandatory channel” does not change the fact that the “mandatory channel” is but one of multiple provided channels. Thus, it is my opinion that Petitioner’s interpretation of this phrase in the context of Shpak-Ho contradicts the specification.

144. Petitioner suggests that the phrase “that is always used for transmission” supports its reading of “mandatory channel.” *See* Paper 2 at 34. While it is true that the “mandatory channel” must always be used, it is my opinion that Petitioner’s interpretation of this step—that “setting a mandatory channel” can result in it being the *only* channel—would render it a nullity. Indeed, it is my opinion that the claim language itself indicates the presence of other channels. §VII.A. For example, the very use of the qualifier “mandatory” indicates the

existence of a non-mandatory state, which Petitioner's interpretation fails to acknowledge. Specifically, it is my opinion that the '551 Patent clearly teaches that a "mandatory channel" may be so termed because its idle state governs transmissions in a way that differs from that of other available channels. However, if "setting a mandatory channel" means little more than assigning a single channel for use, this channel paradoxically stops being "mandatory"; once assigned, every legacy 802.11 channel, such as in Shpak, would be used in exactly the same way as any other assigned channel—a transmission would occur if the assigned channel is idle, regardless of the state of other channels. Put another way, in a single-channel system, there are no other channels against which a purported "mandatory channel" may be distinguished as "mandatory."

145. As another example, the language requiring the "mandatory channel" to "always" be used likewise indicates that other channels are provided. Common sense dictates that if no other channels *could* be used (such as in a SISO system), there would be no need to specify that the "mandatory channel" must "always" be used. It is my opinion that Petitioner's interpretation of this language would render it trivial, as any wireless communication must use some form of channel, regardless of whether it is "mandatory" or not.



- (b) [1B] transmitting the wireless packets by using a wireless channel/wireless channels that includes/include the mandatory channel, only when the mandatory channel is idle.**

146. It is my opinion that the combination of Shpak-Ho fails to disclose the step of “transmitting...by using a wireless channel/wireless channels that include/includes the mandatory channel,” because, *inter alia*, Shpak-Ho fails to disclose the claimed “mandatory channel,” as I discussed above.

147. Further, similar to step [1A], it is my opinion that the language of step [1B] plainly indicates that multiple channels are provided for transmission, such as by sending wireless packets using “wireless channels that...include the mandatory channel. It is my opinion that the language limiting transmission to times “*only* when the mandatory channel is idle” also relies on the availability of other channels—were it otherwise, this language, too, would be rendered a nullity because single-channel CSMA systems have always waited for the channel to be idle before transmitting. *See* ’551 Patent at 1:30-37. It is not trivial, however, to limit transmission to times when only one of multiple channels is idle, even if other idle channels are available. In my opinion, a POSA would understand that this is precisely what the ’551 Patent teaches—“[w]hen the mandatory channel is busy, each STA does not perform transmission even if there is another idle wireless channel.” *E.g.*, ’551 Patent at 3:56-57; also §VI.C. It is my opinion that the claim

language limiting transmission to times “only when the mandatory channel is idle” is clearly directed to this type of scenario.

## 2. Claim 3

148. Claim 3 depends from claim 1 or claim 2. It is my opinion that Shpak-Ho fails to disclose the limitations of claim 3 for at least the following reasons: First, because claim 3 depends from claim 1, Shpak-Ho fails to disclose this claim because it fails to disclose the elements of claim 1, as I have discussed above. Second, Petitioner has not attempted to argue that Shpak-Ho discloses the elements of claim 2. Thus, it is my opinion that Petitioner fails to meet its burden to show that Shpak-Ho can meet the requirements of claim 3 to the extent it depends from claim 2.

## 3. Claim 5

- (a) **a unit setting a mandatory channel that is always used for transmission; and transmitting the wireless packets only when the mandatory channel is idle by using a wireless channel or wireless channels that includes/include the mandatory channel.**

149. Claim 5 is the apparatus-analog of claim 1. Thus, it is my opinion that Shpak-Ho fails to disclose claim 5 at least because it fails to disclose a unit for performing the steps of claim 1.

**4. Claim 7**

150. Dependent claim 7 depends from claims 5 or 6, and is the apparatus analog of claim 3. Because Shpak-Ho fails to disclose claim 5 as I explained above, it is my opinion that it necessarily also fails to disclose claim 7 for similar reasons. Petitioner has not attempted to show that Shpak-Ho can meet the requirements of claim 6.

**X. PETITIONER FAILS TO DEMONSTRATE THAT THERE IS REASONABLE  
LIKELIHOOD ANY CHALLENGED CLAIM IS UNPATENTABLE UNDER  
GROUND 3: CLAIMS 1-3, 5, 7**

151. Petitioner argues that Bugeja, in combination with Ho (“Bugeja-Ho”), discloses transmission using “a single wireless channel determined to be idle and MIMO” and therefore meets the claims’ requirement of transmitting on a “mandatory channel that is always used for transmission.” Just as I discussed above for Ground 1, it is my opinion that Ground 3 fails because Petitioner only relies on Bugeja’s teaching of a *single* channel that assigned to a given client. Pet. at 59; DI at 38 (“Petitioner relies on Bugeja’s ‘primary channel’ as the ‘single wireless channel’”). In my opinion a POSA would understand that this is not a “mandatory channel,” which is one channel in a multichannel system.

152. Moreover, it is my opinion that Bugeja teaches against the idea of using a “mandatory channel,” because it teaches that all available channels should be used indiscriminately. As the Board correctly reasoned, “Bugeja’s ‘primary

channel’ is not the recited ‘mandatory channel’ because there is no showing that there is no transmission on the secondary channels when the primary channel is transmitting, *i.e.*, is not idle.” DI at 38. I agree, and it is my opinion that Bujega fails to disclose this limitation for the same reason.

**1. Claim 1**

**(a) [1A]**

153. It is my opinion that Bugeja-Ho does not disclose the step of “setting a mandatory channel,” because these references, alone or in combination, fail to disclose a “mandatory channel.” Since Petitioner relies on Bugeja for the alleged disclosure of a “mandatory channel,” the below discussion focuses on this reference.<sup>3</sup>

154. As I discussed in §VII.A, it is my opinion that the Board correctly construed the claimed “mandatory channel” to be “one channel in a wireless multichannel communication system.” Thus, it is my opinion that Bugeja’s assignment of a single channel--“the primary channel or any of the secondary channels” (*id.* at ¶32)—to a given client cannot satisfy the claimed “mandatory channel.” In other words, for reasons similar to those I addressed for Ground 1, it is my opinion that assignment of a single channel cannot meet the step of “setting a mandatory channel,” because to do so results in a single-channel system.

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<sup>3</sup> As in Ground 1, Ho is cited only for a general disclosure of single-channel MIMO.

155. Moreover, it is my opinion that Bugeja *teaches against* setting of a “mandatory channel.” As I have discussed in §VI.B, the “mandatory channel” is mandatory because it is treated *differently* from other channels, in that transmission can occur “*only* when the mandatory channel is idle,” as opposed to when *any* channel is idle. ’551 Patent at 3:56-57. Thus, I agree with the Board’s conclusion that the “mandatory channel” is used to “control system transmission.” DI at 39. It is my opinion that Bugeja, however, teaches that transmission *does* take place on a secondary channel regardless of whether the primary channel is idle. For example, if a secondary channel is assigned to a single-channel client, then transmission would occur whenever this channel is idle, without regard for the idle state of the primary channel assigned to a different client. *See* EX1007 (“Bugeja”) at ¶32 (“A client 410 in the inner region 410 is assigned the primary channel **or any of the secondary channels...**”) (emphasis added); Pet. at 63 (Bugeja-Ho uses standard CSMA/MA to determine idle state). It is my opinion that Bugeja treats all channels the same because transmission on any channel—whether primary or secondary—does not depend on the idle state of another. In my opinion, this is the opposite of what the ’551 Patent teaches. As a consequence, it is my opinion that Bugeja also fails to meet either the Board’s preliminary construction (DI at 38-39) or my modified proposed construction addressed in §VII.A, because both

constructions require limiting transmissions based on the state of the “mandatory channel.”

156. I note that the Petitioner admits that a single-channel client may be assigned to only a secondary channel for transmission, but contends that this channel is not a “mandatory channel.” Paper No. 2 at 59, 68. However, it is my opinion that Petitioner’s arguments only reinforce the fact that Bugeja does **not** disclose a “mandatory channel.” In my opinion, one need only consider the logical implications of Petitioner’s proposal that a “mandatory channel” is only one that is always used for transmission “for a particular device” (*Id.* at 62). However, even under this interpretation, a secondary channel assigned to a single-channel client in the inner region also becomes “mandatory” for that device. In other words, if Petitioner’s understanding were adopted, in my opinion there would be no distinction between Bugeja’s primary and secondary channels—they would, paradoxically, all be “mandatory” upon assignment to a single-channel client, which in effect means that **none** of them are “mandatory” because they are treated the same way for transmission purposes. I am informed that one of the canons of claim construction is that a claim construction that gives meaning to all the terms of the claim is preferred over one that does not do so. It is my opinion that Petitioner’s argument violates this canon of claim construction.

157. It is my opinion that a similarly nonsensical result obtains for the Petitioner's treatment of Bugeja's multichannel clients. For example, Petitioner argues that Bugeja's secondary channels are not mandatory because a multichannel client in the inner region may transmit on *either* of the secondary channels, such that neither one is necessarily used. Pet. at 68, 70. In my opinion, this argument is self-defeating and contradicted by Bugeja's explicit teachings. First, Petitioner argues that the primary channel cannot be assigned to a client in the inner region (*id.* at 70), but this is not correct in my opinion. To the contrary, Bugeja teaches that "[a] client 410 in the inner region 410 is assigned **the primary channel or any of the secondary channels,**" (EX1007 at ¶32), that "[a] client 410 located within the inner region 406 can communicate **on all three channels**" (*id.* at ¶33), and that for a multichannel client 800 "**the three channels can be used simultaneously** to upload or download when the client is located in the inner region 614 of the cell" (*id.* at ¶46). I note that, because Petitioner admits that a multichannel client in the inner region need not use all channels provided to it at any given time (Pet. at 70), it is my opinion that it follows that this multichannel client could transmit on a secondary channel and not the primary channel. In my opinion, the logical extension of Petitioner's arguments shows that none of Bugeja's channels are "mandatory."

158. Aside from the foregoing, it is my opinion that Bugeja fails to teach any channel that is “always used for transmission.” Specifically, it is my opinion that since Bugeja explicitly teaches that a client in the inner region may be assigned to *one* of the secondary channels, this means that the primary channel **will not be used** if there is no client in the outer region, or if at a given moment the AP is only transmitting to the inner region client. *See* EX1007 at ¶35. Indeed, it is my opinion that Petitioner apparently admits as much by pointing out that the only scenario where Bugeja’s primary channel is “always used” is if *all* clients are in the outer region. *See* Pet. at 63.

**(b) [1B]**

159. It is my opinion that Bugeja-Ho fails to disclose the step of “transmitting wireless packets...only when the mandatory channel is idle.” As I have discussed with respect to [1A], Bugeja-Ho does not disclose the claimed “mandatory channel.” Thus, it is my opinion that Bugeja-Ho also fails to disclose transmission on a mandatory channel.

160. Further, it is my opinion that Bugeja teaches against transmitting “only when the mandatory channel is idle.” For example, as I discussed above with respect to [1A], Bugeja teaches that transmission on *any* channel—whether secondary or primary—will take place regardless of the state of any other channel.



Thus, it is my opinion that Bugeja does not teach transmitting *only* when the “mandatory channel” is idle.

161. It is my opinion that Bugeja teaches against tying transmission to the idle state of a “mandatory channel,” even when multiple channels are available. Specifically, there is only one embodiment in Bugeja that relates to a multichannel system—the multi-channel client in Bugeja’s inner region, which may use up to three channels to transmit and receive packets simultaneously. Bugeja at ¶46. Significantly, Bugeja indicates that this multi-channel client uses any one of, or all three channels, indiscriminately. *See id.* at ¶46. In my opinion, a POSA would understand that only discernable criteria for channel use in this embodiment of Bugeja is that channel’s own idle state, not the idle state of the primary channel.

## **2. Claim 2**

### **(a) [2A]**

162. It is my opinion that Bugeja-Ho does not disclose the step of “distinguishing an STA A from an STA B, the STA for which a mandatory channel is set, the STA B for which no mandatory channel is set, the mandatory channel being always used for transmission.”

163. First, as I discussed for claim 1, it is my opinion that Bugeja-Ho does not disclose a “mandatory channel” because, in general, only a *single channel* is assigned to a given client, and because Bugeja does not teach any distinction

between its primary and secondary channels based on whether it's idle state determines transmission.

164. Second, since Bugeja teaches that channel(s) assigned to a client are used indiscriminately, it is my opinion that there is no way to distinguish between an STA with an alleged “mandatory channel” from one without. For example, as I discussed for claim 1, Petitioner incorrectly interprets “mandatory channel” as being merely a channel that is always used for a particular device, even if it is the only channel available. However, *even if* this interpretation is adopted, then it is my opinion that there is no way to distinguish between clients that are assigned the primary channel from those that have been assigned a secondary channel on the basis of whether they have a “mandatory channel”—rather, under Petitioner’s interpretation, clients assigned to a secondary channel also have a “mandatory channel” because they have one channel that is “always used” for transmission. The same result applies for multichannel clients because Bugeja teaches that multichannel clients can access all three of the primary and secondary channels, but need not transmit on any particular one. *See supra* at §X.1.a. Thus, multichannel clients likewise in my opinion cannot be distinguished on the basis of whether they have a “mandatory channel.”

165. Petitioner argues that because Bugeja can distinguish between clients “based on their distance from the AP,” this can satisfy claim element [2A]. Pet. at

68. It is my opinion that this argument is beside the point—claim 2 requires distinguishing clients based on **whether it has a “mandatory channel,”** not whether it is close to an AP or not. As I discussed above, if Petitioner’s interpretation of “mandatory channel” were adopted, then a secondary channel assigned to a single-channel client in the inner region also has a “mandatory channel.”

**(b) [2B]**

166. It is my opinion that Bugeja-Ho does not transmit to an STA A using a mandatory channel, for at least the reasons addressed above for claim element [1B].

**(c) [2C]**

167. Bugeja-Ho does disclose transmission using idle wireless channels without use of a “mandatory channel,” as to a multichannel client in Bugeja’s inner region. However, as I pointed out above with respect to claim elements [1A] and [2A], this is the **only** form of transmission that Bugeja-Ho discloses. Indeed, as I discussed previously, it is my opinion that the only criterion for transmission on a given channel in Bugeja is its own idle state. *See* Pet. at 70. Thus, it is my opinion that by Petitioner’s own reasoning, a multichannel client in Bugeja’s inner region may transmit over any one, two, or all three available channels, including

transmitting over a secondary channel without concurrent use of a primary channel. *See supra* at §VI.1.a, Pet. at 70.

**3. Claim 3**

168. Claim 3 depends from claim 1 or claim 2. It is my opinion that Bugeja-Ho fails to disclose the limitations of claim 3 because it fails to disclose either the elements of claim 1 or 2 as I have discussed.

**4. Claim 5**

169. Claim 5 is the apparatus-analog of claim 1. Thus, it is my opinion that Bugeja-Ho fails to disclose claim 5 because it fails to disclose a unit for performing the steps of claim 1 as I have discussed.

**5. Claim 6**

170. Claim 6 is the apparatus-analog of claim 2. Thus, it is my opinion that Bugeja-Ho fails to disclose claim 2 because it fails to disclose a unit for performing the steps of claim 2 as I have discussed.

**6. Claim 7**

171. Claim 7 depends from claims 5 or 6, and is the apparatus analog of claim 3. Thus, it is my opinion that Bugeja-Ho fails to disclose claim 7 for reasons similar to those addressed for claims 3, 5, and 6 as I have discussed.

**XI. PETITIONER FAILS TO DEMONSTRATE THAT THERE IS REASONABLE  
LIKELIHOOD ANY CHALLENGED CLAIM IS UNPATENTABLE UNDER  
GROUND 4: CLAIMS 4 AND 8**

172. Claims 4 and 8 are dependent claims. Claim 4 depends from claims 1 or 2, and claim 8 depends from claims 5 or 6. It is my opinion that neither Shpak-Ho-Thielecke nor Bugeja-Ho-Thielecke disclose claims 4 or 8.

**1. Shpak-Ho-Thielecke fails to disclose claims 4 or 8**

173. As I discussed with respect to Ground 1, Shpak-Ho fails to disclose the elements of claim 1 because, *inter alia*, it fails to disclose the claimed “mandatory channel.” It is my opinion that Thielecke does not cure these deficiencies, as it, too, only pertains to the use of a single frequency channel on which MIMO transmissions may take place. *See e.g.*, EX1035 (“Thielecke”) at ¶9, 32. Thus, it is my opinion that Shpak-Ho-Thielecke fails to disclose claim 4 for at least the same reasons as those I discussed for claim 1. Petitioner has not attempted to argue that Shpak-Ho meets the requirements of claim 2.

174. Claim 8, which is the apparatus analog of claim 4, depends from claims 5 or 6. Thus, it is my opinion that Shpak-Ho-Thielecke does not disclose claim 8 for at least the same reasons as I addressed for claim 5. Petitioner has not attempted to argue that Shpak-Ho meets the requirements of claim 6.

175. Further, it is my opinion that Shpak-Ho-Thielecke fails to disclose claims 4 or 8 because merely reducing the number of MIMO streams cannot satisfy

“selectively using the **multiple wireless channels or the MIMO.**” Petitioner concedes that Shpak-Ho only discloses a single channel that is MIMO, but argues that selecting between “multiple wireless channels or the MIMO” can consist simply of adjusting the number of MIMO data streams. Pet. at 73. In my opinion, this is plainly not what the claim language requires—the choice presented in claims 4 and 8 is between “multiple wireless channels” and “MIMO,” **not** between “single channel without MIMO” and “single channel with MIMO.” As the ’551 Patent teaches, MIMO technology permits multiple data streams in a *single channel*, and thus it is my opinion that a POSA would understand that reducing or increasing the number of MIMO paths (“layers” or “strata” in Thielecke) does not affect the number of channels involved. *See e.g.*, ’551 Patent at 1:61-63 (“In MIMO, different wireless packets are transmitted from a plurality of antennas at the same time on **the same wireless channel.**”) (emphasis added). Indeed, Petitioner concedes that Thielecke at most contributes the ability to reduce the number of MIMO “subchannels,” not changing the number of channels provided in Shpak-Ho. *See* Pet. at 73.

## **2. Bugeja-Ho-Thielecke fails to disclose claims 4 or 8**

176. As I discussed above with respect to Ground 3, it is my opinion that Bugeja-Ho fails to disclose claims 1, 2, 5, or 6, because Bugeja-Ho fails to disclose a “mandatory channel,” and because Bugeja-Ho fails to disclose distinguishing

between stations based on whether they have a “mandatory channel.” It is my opinion that Thielecke fails to remedy these defects. Thus, it is my opinion that Bugeja-Ho-Thielecke fails to disclose claims 4 and 8 for at least the same reasons as those addressed with respect to claims 1, 2, 5 and 6.

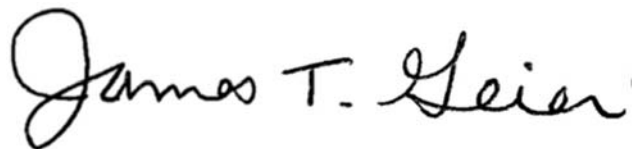
177. Further, as for Shpak-Ho-Thielecke, it is my opinion that Bugeja-Ho-Thielecke also discloses no more than adjusting the number of MIMO data streams *within a single channel*. It is my opinion that there is no selection between “multiple wireless channels” and MIMO, as claims 4 and 8 require.

## **XII. CONCLUSION**

178. I currently hold the opinions that I have expressed in this declaration. However, my analysis may continue, and I may acquire or receive additional information or insights that may result in revised or supplemental observations or opinions.

179. I declare that all statements made herein on my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 or Title 18 of the United State Code, and that such willful false statements may jeopardize the validity of the '551 Patent.

Executed: May 19, 2021 in Beavercreek, Ohio.

A handwritten signature in black ink that reads "James T. Geier". The signature is written in a cursive style with a large initial "J" and a small "T".

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James T. Geier



# **APPENDIX A**

**James T. Geier****CONTACT INFORMATION****Name:** James T. Geier**Title:** Principal Consultant**Company:** Wireless-Nets, Ltd.**Address:** 2468 Locust Hill Blvd., Beavercreek, Ohio 45431 U.S.A.**Email:** jimgeier@wireless-nets.com**Cell Phone:** +1 937-829-0008**Website:** www.wireless-nets.com**PROFILE**

James Geier has 40 years of experience in the communications industry designing, analyzing, and implementing communications systems, wireless networks, and mobile wireless devices. He has authored over a dozen books on mobile and wireless topics, including Designing and Deploying 802.11 Wireless Networks (Cisco Press), Implementing 802.1X Security Solutions (Wiley), Wireless Networking Handbook (New Riders) and Network Re-engineering (McGraw-Hill). He had been an active participant within standards organizations, such as the IEEE 802.11 Working Group and the Wi-Fi Alliance. He has served as Chairman of the IEEE Computer Society, Dayton Section, and various conferences dealing with wireless networking.

**PROFESSIONAL EXPERIENCE****Principal Consultant and Founder – Wireless-Nets, Ltd. (Apr 2000 - present)**

- Designs mobile devices and implements corresponding software / firmware.
- Designs and integrates Wi-Fi, Bluetooth, cellular, Ethernet and USB transceivers into mobile devices, such as smart phones, hospital patient monitors, cable T.V. boxes, and bar code scanners.
- Designs large-scale wireless networks for municipalities, hospitals, airports, and manufacturing facilities for supporting voice, video and data applications.

**President, CEO, and Cofounder – Health Grade Networks LLC. (Aug 2014 – Dec 2015)**

- Provided strategic direction and management of the company for implementing wireless network solutions.

**Product Engineer / Manager - Monarch Marking Systems (Aug 1996 – Mar 2000)**

- Designed and implemented RF radios for Monarch's bar code scanners and printers.
- Integrated Ethernet and USB transceivers into tabletop printers.
- Designed and implemented wireless middleware software for improving performance between mobile wireless devices and application servers.
- Designed and implemented wireless network infrastructures for wireless bar code scanners and portable printers used in retail and manufacturing applications.

**Senior Systems Engineer - TASC, Inc. (Mar 1994 to Jul 1996)**

- Designed and implemented an enterprise-wide Ethernet / IEEE 802.3 and wireless network for Dayton Power and Light to support the migration from mainframe to client/server systems.
- Designed an information system architecture that supports internal and external communications for the U.S. Navy's NSSN attack submarine.
- Analyzed requirements for hardware, software, and support of the Joint Logistics Systems Center (JLSC) Materiel Management Standard System (MMSS) for the combined U.S. militaries.

**Senior Systems Engineer - Adroit Systems, Inc. (Aug 1992 to Feb 1994)**

- Researched and analyzed emerging wireless network technologies as part of the Department of Defense Airborne Reconnaissance Data Link Architecture (ARDA) study, supporting communications for airborne systems.
- Designed a software tool that aids network engineers in planning, upgrading and maintaining shipboard computer networks - based on a Small Business Innovative Research (SBIR) government grant obtained from the U.S. Navy.

**Systems Design Engineer - Information Systems Center, Captain U.S. Air Force (Sep 1990 – Jun 1992)**

- Evaluated the effectiveness of wireless LAN technology for use in mobile and portable military environments.
- Represented the Air Force as part of the IEEE 802.11 Wireless LAN standards development.
- Designed and implemented large-scale Ethernet / IEEE 802.3 LANs and WANs for various government organizations.

**Communications Test Engineer - AFCC Operational Test and Evaluation Center, Lieutenant U.S. Air Force (Sep 1986 - May 1989)**

- Performed analog, digital, and protocol tests on various government wireless computer networks and long-haul communications systems.
- Developed approaches and methods for testing computer networks.

**Radar Technician - 75th TCF, U.S. Air Force (Dec 1977 - Jun 1983)**

- Performed acceptance testing of newly designed radar systems.
- Maintained automatic tracking radar systems in support of tactical Air Force operations worldwide.

**EDUCATION**

**M.S., Electrical Engineering, Air Force Institute of Technology (1990)** – thesis involved designing and implementing a wireless mesh network for the U.S. Department of Defense.

**B.S., Electrical Engineering, California State University (1985).**

**MILITARY EXPERIENCE**

U.S. Air Force, Dec 1977 – Jun 1992 (Commissioned Officer Mar 1986 – Jun 1992).

**BOOK PUBLICATIONS**

- *Designing and Deploying 802.11 Wireless LANs (2<sup>nd</sup> Edition)*, Cisco Press, 2015.
- *Designing and Deploying 802.11n Wireless LANs*, Cisco Press, 2010.
- *Implementing 802.1x Security Solutions*, Wiley, 2008.
- *Deploying Voice over Wireless LANs*, Cisco Press, 2007.
- *Computer Security*, Wiley, 2007.
- *Computer Transfer and Backup*, Wiley, 2007.
- *CCIE Routing and Switching – Official Exam Certification Guide*, 2nd Edition, Cisco Press, 2006.
- *Wireless Networks – 5-minute Fixes*, Wiley, 2006.
- *PCs – 5-minute Fixes*, Wiley, 2006.
- *Wireless Networks – First Step*, Cisco Press, 2005 (translated to Chinese, French, Hungarian, Italian, Korean, Polish, Portuguese, and Romanian).
- *Certified Wireless Analysis Professional - Official Study Guide*, McGraw-Hill, 2004.

- *Wireless LANs, 2nd Edition*, SAMS, 2001.
- *Wireless LANs*, Macmillan Technical Publishing, 1999.
- *Wireless Networking Handbook*, Macmillan (New Riders) Publishing, 1996.
- *Network Re-Engineering*, McGraw-Hill, 1996.

## **INDUSTRY AFFILIATIONS**

### **Chairman, IEEE Computer Society - Dayton Section:**

- Managed the 900-member organization and established a continuing education program.

### **Chairman, IEEE International Conference on Wireless LAN Implementation:**

- Managed all aspects of the conference from 5/91 to 12/92.

### **Member, Wi-Fi Alliance**

- Voting member of the Wireless ISP for Roaming (WISPr) committee.

### **IEEE 802.11 Wireless LAN Working Group**

- Represented interests of the Department of Defense for dealing with applications and frequency allocations.

## **TEACHING EXPERIENCE**

### **U.S. Naval Post Graduate School**

- Developed and regularly instructed a course on wireless network design and security to students and faculty.

### **Wright State University**

- Periodically instructed graduate courses on computer communications.

### **USAF Test and Evaluation School**

- Developed and instructed a 240 hour training course on wireless system test and evaluation.

### **Conferences**

- Regularly gives presentations at international conferences, including Supercomm (Asia), Scantech (Germany), and IBC (England).

### **Infocomm Solutions**

- Developed and instructed workshops in India, Singapore and Malaysia on wireless network implementation.

### **Technology Training Corporation (TTC)**

- Developed and instructed international training courses in Mexico and South America on wireless networking and network re-engineering.

### **Educational Services Institute**

- Developed and instructed courses on software project management, software testing, system integration and network re-engineering as part of the Project Management Institute (PMI) Project Management Professional (PMP) certification program.

### **Onsite Training**

- Regularly instructs workshops on wireless network design and deployment for product developers, system integrators, hospitals, and enterprises worldwide.

## **TESTIFYING EXPERIENCE**

Cases where James Geier has testified at depositions and trials:

### **Bertram Communications, LLC v. Simon Westlake, et al.**

Law Firm: Kilpatrick Townsend

Expert on behalf of the plaintiff (Bertram Communications) during 2019-2020 regarding trade secret litigation within the State of Wisconsin, Circuit Court, Sheboygan County. Analyzed wireless designs and other case documents associated with wireless ISP systems in relation to trade secret analysis; wrote expert reports regarding associated analysis; testified at deposition.

### **Ingenico, Inc.**

Law firm: Sunstein Kann Murphy & Timbers

Expert on behalf of Ingenico regarding an Inter Partes Review (IPR) with the USPTO Patent Trial and Appeal Board during 2018-2020. Analyzed patents, prior art and other case documents associated with wireless credit card processing systems; wrote declarations regarding patent invalidity; testified at depositions.

### **Next Caller, Inc.**

Law firm: McDermott Will & Emery

Expert on behalf of Next Caller regarding an Inter Partes Review (IPR) with the USPTO Patent Trial and Appeal Board during 2018-2019. Analyzed patents, prior art and other case documents associated with caller profile systems; wrote a declaration regarding patent validity; testified at deposition.

### **Samsung, Inc.**

Law firm: Kirkland & Ellis

Expert on behalf of Samsung regarding an Inter Partes Review (IPR) with the USPTO Patent Trial and Appeal Board during 2018-2019. Analyzed patents, prior art and other case documents associated with battery charging systems for mobile devices; wrote declarations regarding patent invalidity; testified at deposition.

### **Foxconn Technology Group**

Law firm: McDermott Will & Emery

Expert on behalf of Foxconn regarding an Inter Partes Review (IPR) within the USPTO Patent Trial and Appeal Board during 2018. Analyzed patents, prior art and other case documents associated with short circuit protection for reversible connectors; wrote a declaration regarding patent invalidity; testified at deposition.

### **ZTE, Inc.**

Law firm: McDermott Will & Emery

Expert on behalf of ZTE, Inc. regarding an Inter Partes Review (IPR) within the USPTO Patent Trial and Appeal Board during 2018. Analyzed patents, prior art and other case documents associated with supplying a power source to mobile devices over standardized ports; wrote a declaration regarding patent invalidity; testified at deposition.

### **Certain Wireless Headsets**

Law firm: Haynes Boone

Expert on behalf of defendants (BlueAnt, Creative, GN Netcom, Jawbone and Sony) during 2015-2018 regarding patent litigation within the International Trade Commission (ITC). Analyzed patents and other case documents associated with wireless audio headsets; wrote expert reports regarding patent written description and inception date; testified at deposition.

### **Camsoft Data Systems, Inc. v. Southern Electronics Supply and Active Solutions, LLC**

Law firm: Melancon & Rimes

Expert on behalf of the plaintiff (Camsoft Data Systems) during 2014-2018 regarding trade secret litigation within the 19<sup>th</sup> Judicial District Court – State of Louisiana. Analyzed wireless designs and other case documents associated with wireless video surveillance systems in relation to trade secret analysis; wrote expert reports regarding associated analysis; testified at deposition.

### **United States of America v. IBM Corporation**

Law firm: Jones Day

Expert on behalf of the defendant (IBM Corporation) during 2017 regarding litigation within the U.S. District Court, Northern District of Illinois - Eastern Division. Analyzed designs, contracts, and other case documents associated with wireless networks and integration methods; wrote an expert report regarding associated analysis; testified at deposition.

### **Emerson Electric Co.**

Law firm: Ropes & Gray

Expert on behalf of Emerson Electric Co. regarding an Inter Partes Reviews (IPRs) within the USPTO Patent Trial and Appeal Board during 2016-2017. Analyzed patents, prior art and other case documents associated with optimum route determination over computer networks; wrote declarations regarding patent invalidity; testified at multiple depositions.

### **Emerson Electric Co.**

Law firm: Ropes & Gray

Expert on behalf of Emerson Electric Co. regarding a Covered Business Method Patent Review (CBMPR) within the USPTO Patent Trial and Appeal Board during 2016-2017. Analyzed patents, prior art and other case documents associated with systems for communicating information; wrote declarations regarding patent invalidity; testified at multiple depositions.

### **Chrimar v. Aerohive**

Law firm: Wilson, Sonsini, Goodrich & Rosati

Expert on behalf of the defendant (Aerohive) during 2016-2017 regarding patent litigation within the U.S. District Court – Eastern Division of Texas (Judge Gilstrap). Analyzed patents, products, and other case documents associated with power-over-Ethernet technologies; performed testing of power-over-Ethernet products; wrote an expert report regarding patent non-infringement; testified at deposition and jury trial.

### **Intellectual Ventures v. AT&T**

Law firm: Dechert

Expert on behalf of the plaintiff (Intellectual Ventures) during 2014-2017 regarding patent litigation within the U.S. District Court - Delaware. Analyzed patents, prior art and other case documents associated with IEEE 802.11 encryption and quality of service (QoS) technologies; performed testing and protocol

analysis of Wi-Fi products; wrote expert reports regarding patent infringement and validity; testified at deposition.

### **Chrimar v. AMX**

Law firm: McDermott, Will & Emery

Expert on behalf of the defendant (AMX) during 2016 regarding patent litigation within the U.S. District Court – Eastern Division of Texas. Analyzed patents, products, prior art and other case documents associated with power-over-Ethernet technologies; performed testing of power-over-Ethernet products; wrote expert reports regarding patent non-infringement and invalidity; testified at deposition.

### **Universal Remote**

Law firm: Ostrolenk Faber

Expert on behalf of Universal Remote regarding an Inter Partes Review (IPR) within the USPTO Patent Trial and Appeal Board filed during 2015. Analyzed patents, prior art and other case documents associated with TV remote control technologies; wrote a declaration regarding patent invalidity; testified at deposition.

### **Skyhook v. Google**

Law firm: Tensegrity

Expert on behalf of the plaintiff (Skyhook) during 2012-2015 regarding patent litigation within the U.S. District Court - Boston. Analyzed patents, software, and other case documents associated with Wi-Fi-based location systems; performed in-depth review and analysis of associated software; wrote an expert report regarding patent infringement; testified at deposition.

### **MTEL v. UPS**

Law firm: Reed & Scardino

Expert on behalf of the plaintiff (MTEL) during 2014 regarding patent litigation within the U.S. District Court – Atlanta. Analyzed patents, prior art and other case documents associated with mail delivery notifications; wrote an expert report regarding patent validity; testified at deposition.

### **Motorola v. Microsoft**

Law firm: Sidley Austin

Expert on behalf of the defendant (Microsoft) during 2012 regarding patent litigation within the International Trade Commission (ITC). Analyzed patents, products, prior art and other case documents associated with data addressing and data update mechanisms; wrote expert reports on patent invalidity and indirect non-infringement; testified at deposition; testified at trial within the International Trade Commission (Judge Shaw).

### **Motorola v. Microsoft**

Law firm: Sidley Austin

Expert on behalf of the defendant (Microsoft) during 2011 regarding patent litigation within the International Trade Commission (ITC). Analyzed patents, products, prior art and other case documents associated with security and encryption protocols; analyzed product firmware; wrote expert reports regarding patent invalidity and non-infringement; testified at deposition; testified at trial within the International Trade Commission (Judge Shaw).

**Motorola v. Microsoft**

Law firm: Sidley Austin

Expert on behalf of the defendant (Microsoft) during 2011 regarding patent litigation within the U.S. District Court – Southern Florida. Analyzed patents, products, prior art and other case documents associated with application registry and data update technologies; wrote expert reports regarding patent invalidity and non-infringement; testified at deposition.

**Autocell v. Cisco Systems**

Law Firm: Hanify & King

Expert on behalf of the plaintiff (Autocell) during 2009-2011 regarding patent litigation within the U.S. District Court - Delaware. Analyzed patents, products, prior art and other case documents associated with transmit power control of 802.11 radios and access points; performed laboratory and field testing of associated products; analyzed product firmware; wrote expert reports regarding patent infringement and validity; testified at deposition.

**Truckstop.Net v. Sprint Communications**

Law Firm: Holland & Hart

Expert on behalf of the plaintiff (Truckstop.Net) during 2004-2010 regarding contract litigation within the U.S. District Court - Idaho. Analyzed case documents including wireless network designs and contracts associated with wireless networks installed at truck stops; performed in-depth field testing and analysis of wireless signal coverage and performance at truck stops located throughout the U.S.; wrote expert reports regarding test results and review of case documents; testified at deposition.