

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

COLLISION COMMUNICATIONS, INC.
Patent Owner.

Case No. IPR2024-01248
U.S. Patent No. 9,814,071

**DECLARATION OF GIUSEPPE CAIRE REGARDING PATENT
OWNER'S PRELIMINARY RESPONSE FOR *INTER PARTES* REVIEW OF
U.S. PATENT NO. 9,814,071**

TABLE OF CONTENTS

	Page
I. Introduction.....	1
II. Qualifications.....	1
III. Materials Considered.....	4
IV. Wireless Communication Background.....	5
A. Wireless Channels	6
B. Detectors.....	7
V. The Challenged '071 Patent	8
VI. The Petition Should be Denied Because Each Asserted Ground Fails To Establish the Required Reasonable Likelihood of Success	10
A. Jin	10
B. Baum.....	13
VII. The Petition Should be Denied Because Each Asserted Ground Fails to Establish the Required Likelihood of Success	17
A. Grounds 1-3.....	17
1. The Petition Fails to Show that Jin Discloses or Renders Obvious Claims 1-11, 16, and 21.....	17
a. The Petition fails to identify the claimed estimated unique signal parameters required by both claim limitations 1c and 1d.....	17
b. The Petition fails to demonstrate that Jin discloses or renders obvious claim limitation 1d	20
B. Grounds 4-5.....	23
1. The Petition Fails to Show that Baum Discloses or Renders Obvious Claims 1-11, 16, and 21.....	23
a. The Petition fails to demonstrate that Baum discloses or renders obvious “requiring each transmitting node to transmit a parameter-estimating signal on an unshared parameter channel” as required by claim limitation 1b.....	23
b. The Petition fails to establish that Baum discloses or renders obvious “detecting and distinguishing	

information simultaneously received from each of the
transmitting nodes according to their respective said
unique estimated signal parameters” as require by claim
limitation 1d.....26

I, Dr. Giuseppe Caire, hereby declare as follows:

I. Introduction

1. My name is Giuseppe Caire. I have been retained in the above-referenced *inter partes* review proceeding by Collision Communications, Inc., to evaluate United States Patent No. 9,814,071 (the “’071 patent”) against certain references that are presented by the Petitioner. As detailed in this report, it is my opinion that the Petition does not establish that any of the challenged claims are anticipated or rendered obvious by the references presented by the Petitioner. If requested by the Patent Trial and Appeal Board, I am prepared to testify at trial about my opinions expressed herein.

II. Qualifications

2. I have over thirty years of experience in the field of electrical engineering. For the past nine years I have held a Full Professorship and faculty position as the Chair of Communications and Information Theory at Technische Universität Berlin. In my work and research, I have researched and written about Information Theory, Communication Theory and Coding Theory, Wireless Communication Systems, Signal Processing and Statistics.

3. Prior to my appointment at the Technische Universität, Berlin I was a tenured Full Professor at the University of Southern California, Los Angeles from

2005-2016. Although I am currently at the Technische Universität Berlin, I have retained the title of Adjunct Research Professor at the University of Southern California, Los Angeles since 2016. Prior to my tenure at the University of Southern California, Los Angeles, I spent seven years as a Professor at Eurecom Institute, and held various Assistant Professorships from 1995-1998.

4. I studied Electrical Engineering and received my Ph.D. in 1994 from the Politecnico di Torino, my Master's Degree in 1992 from Princeton University, and my Bachelor of Science Degree in 1990 from the Politecnico di Torino. In addition to my studies at undergraduate and graduate levels and academic qualifications, I have held industrial research positions such as my current role as the Director of the Huawei-TU Berlin Joint Innovation Center, which has a focus on fundamental research in wireless technology.

5. I have authored or co-authored over four hundred publications in the areas of computer networks, and telecommunications. My publication and patents are listed on my curriculum vitae, which is attached hereto as EX2002.

6. In 2021, I was awarded the Leibniz Price, which is awarded to “exceptional scientists and academics for their outstanding achievements in the field of research” and known as the most important research award in Germany. In 2022, I was elected a Member of the Berlin Brandenburg Akademie der Wissenschaften

(BBAW). Further, I served as President of the Institute of Electrical and Electronics Engineers (IEEE) Information Theory Society in 2011.

7. I am thanked in the preface of S. Verdu, *Multiuser Detection*, Cambridge University Press 1998, which is submitted by the Petitioner as EX1008.

8. As a result of my background in information and communication theory, I have extensive knowledge regarding the state of the technical art in this area at the time of filing of the '071 patent.

9. I am co-author of an article titled "Bit-Interleaved Coded Modulation" which was published in IEEE Transactions on Information Theory, Vol. 44, No. 3, May 1998 at pp. 927-946. This paper has been cited in other publications over thirty-three hundred (3300) times (Google Scholar).

10. In addition, I am co-author of an article titled "Iterative Multi-User Joint Decoding: Unified Framework and Asymptotic Analysis," which was published in IEEE Transactions on Information Theory 48, No. 7 (2002): 1772-1793. This paper has been cited 409 times, which makes it one of the most referenced papers on turbo multiuser joint decoding. In this paper, we presented the idea of feeding back to the MUD the soft-estimations of the symbols produced by the soft-output decoders and do partial interference cancellation in order to clean up the signal from interfering along the iterations.

III. Materials Considered

11. In preparing this declaration, I have reviewed the specification and claims of the '071 patent (EX1001) and the file history of the '071 patent (EX1002). I understand the '071 patent was issued on November 7, 2017, from U.S. Patent Application No. 12/742,686.

12. I have also reviewed the Petition, declaration of Dr. Paul S. Min (EX1003) and all publications and exhibits cited in the Petition and declaration of Dr. Paul S. Min including:

- U.S. Patent Application Publication No. 2005/0286408 to Jin et al (“Jin” EX1004).
- U.S. Patent No. 5,867,478 to Baum et al. (“Baum” EX1005).
- U.S. Patent Application Publication No. 2010/0054200 to Tsai (“Tsai” EX1006).
- U.S. Patent Application Publication No. 2014/0161068 to Vrzic et al. (“Vrzic” EX1007).
- S. Verdu, *Multiuser Detection*, Cambridge University Press 1998 (“Verdu” EX1008).
- S. Verdu, “Computational Complexity of Optimum Multiuser Detection,” *Algorithmica* (1989) (EX1009).

- IPR2022-01233 - Petition for *Inter Partes* Review of United States Patent No. 9,814,071 (EX1010).
- Patent Owner’s Preliminary Response to IPR2022-01233 (EX1011).
- Decision Denying Institution of *Inter Partes* Review of IPR2022-01233 (EX1012).
- Infringement Contentions – Chart for U.S. Patent No. 9,814,071 (EX1013).
- U.S. Patent No. 6,947,505 to Learned (“Learned” EX1014).
- Curriculum Vitae of Paul S. Min, Ph.D. (EX1015).

13. I have also reviewed relevant parts of the publications and exhibits cited in this declaration, including the following publications:

- U. Madhow, *Fundamentals of Digital Communication*, Cambridge University Press 2008 (“Madhow” (EX2003));
- R.G. Gallagher, *Principles of Digital Communication*, Cambridge University Press 2008 (“Gallagher” (EX2004)); and

IV. Wireless Communication Background

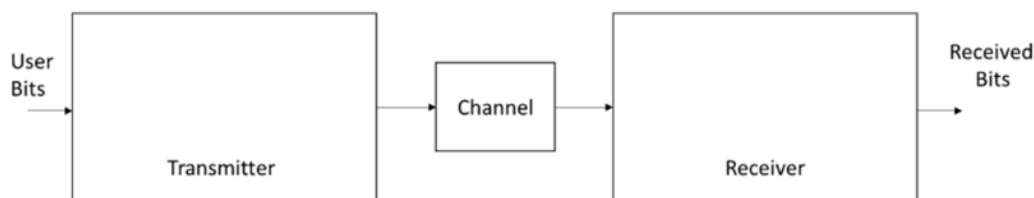
14. The challenged claims generally concern the processing of wireless signals. More specifically, the patent is directed to improved methods for a media access control protocol for multi-user detector enabled ad hoc wireless communications.

15. To provide context for the claimed subject matter and Samsung's Petition, the following brief background addresses the following topics:

- wireless channels; and
- detectors.

A. Wireless Channels

16. A wireless communications system typically includes a transmitter that sends information to a receiver over a wireless channel. (EX2003 at 2-4; EX2004 at 1-5, 95, 181-183, 208-209).



17. As illustrated in the above overview, information in the form of bits (sequences of 0s and 1s) is input to the transmitter, which first converts those bits into a high-frequency wave signal and then transmits that signal over the wireless channel to the receiver. (EX2003 at 2-4; EX2004 at 1-5, 95, 181-183, 208-209).

18. This wireless channel is the medium through which the signal is transmitted. For example, in a wireless cell phone communication, the channel could be affected by the relay towers used to transmit the waves and the physical spaces between those towers, including all buildings and other surfaces that may reflect, refract, or absorb parts of the travelling waves.

19. By the channel's very nature, as the electromagnetic wave signal passes through the channel, noise is introduced, and information can be lost or corrupted. (EX2003 at 2-4; EX2004 at 1-5, 95, 181-183, 208-209).

20. Thus, when a receiver receives the electromagnetic signal and attempts to convert it back into bits, the noise must be accounted for and can affect the accuracy of the conversion and reproduction of the original signal. (EX2003 at 2-4; EX2004 at 1-5, 95, 181-183, 208-209).

B. Detectors

21. Each receiver includes a "detector" that tries to recover the desired transmitted signal. A detector can fall into two categories: (1) single-user detectors or (2) multi-user detectors.

22. Regardless of the number of users or interferers, the goal of a single-user detector is to recover the signal from only a single user. Accordingly, instead of attempting to recover all signals from all users, a single-user detector uses algorithm that focuses on the signal from just one user and treats all other user signals as noise. (EX1001 at 2:43-47 and 3:1-6).

24. In contrast, the goal of a multi-user detector is to recover signals from two or more users. Thus, instead of treating and discarding the other user's signals as noise, a multi-user detector uses an algorithm designed to detect each such signal. (EX1001 at 4:4-23).

V. The Challenged '071 Patent

25. The '071 patent's claimed subject matter aims to boost the capacity of wireless networks by enabling multiple devices (or nodes) to transmit overlapping signals on a shared channel. This approach permits interference among signals and relies on Multi-User Detection (MUD) to differentiate them. (EX1001 at Abstract).

26. While the '071 patent acknowledges the advantages of a shared multi-user environment where users can leverage a common communication medium, it recognizes the inherent limitation in traffic capacity due to resource allocation constraints. (EX1001 at 3:4-14). As seen in the prior art, the inability of different users to share the same time, frequency, and/or code for transmission restricts the amount of data that can be transmitted simultaneously. (*Id.*). The '071 patent seeks to overcome this limitation through the innovative use of MUD technology. (EX1001 at 3:18-23).

27. The '071 patent introduces a method for distinguishing multiple signals that overlap in time, frequency, and/or code on a shared channel using a MUD. This technique hinges on knowing or accurately estimating the signal parameters of each interfering signal. To achieve this, the '071 patent proposes a method where:

- Each node transmits a unique parameter-estimating symbol pattern on a separate, unshared channel. (EX1001 at 3:43-49).

- Simultaneously, each node transmits data on the shared channel, allowing the signals to overlap and interfere with one another. (EX1001 3:40-43).

28. The receiver uses the signal parameters, estimated from the parameter-estimating signals on the unshared channel, to distinguish and recover the overlapping signals. (EX1001 at 3:49-54). This separation of data signals on the shared communication channel can eliminate the need for anti-collision protocols, allowing simultaneous data transmission and increasing network capacity.

29. Further, by using these parameter-estimating signals on an unshared parameter channel, the receiver can operate with lower complexity because it does not need to estimate the parameters in the presence of interference from other nodes. (EX1001 at Abstract). This allows for more efficient use of the shared wireless channel.

30. The '071 patent explains that each signal transmitted by a node carries specific signal parameters. These parameters can be estimated by the receiver using parameter-estimating symbol patterns transmitted by each node on dedicated parameter channels.

31. This approach enables the receiver to effectively perform the following steps: (1) acquire parameter channels; (2) estimate unique signal parameters for each transmitting node using the parameter-estimating symbols; and (3) detect and

distinguish the received data by leveraging the unique estimated signal parameters, successfully separating the overlapping signals.

VI. The Petition Should be Denied Because Each Asserted Ground Fails To Establish the Required Reasonable Likelihood of Success

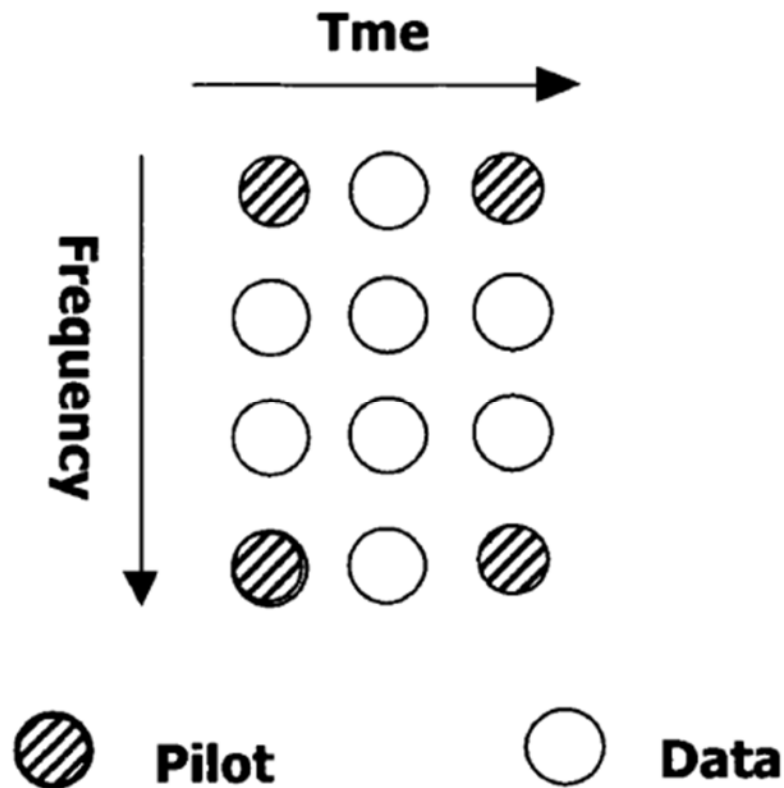
32. I understand that Samsung’s Petition asserts the following Grounds:

Ground	References	Basis	Challenged Claims
1	<i>Jin</i>	§ 103	1-11, 16, 21
2	<i>Jin</i> and <i>Tsai</i>	§ 103	6-7
3	<i>Jin</i> and <i>Vrzic</i>	§ 103	8-9
4	<i>Baum</i>	§ 103	1-11, 16, 21
5	<i>Baum</i> and <i>Tsai</i>	§ 103	6-7

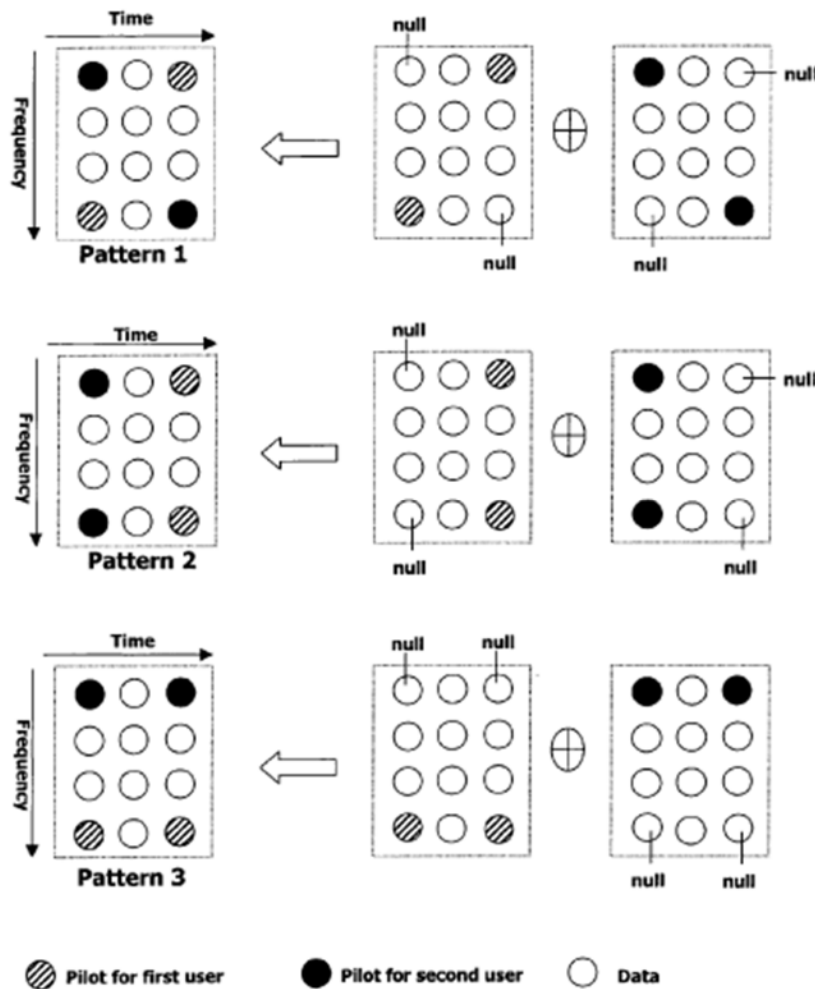
33. I understand the Petition relies on two primary references for all of its grounds, *Jin* and *Baum*, but both *Jin* and *Baum* fail to disclose all of the required claim limitations of independent claims 1 and 21.

A. *Jin*

34. *Jin* (EX1004) generally relates to the allocation of radio resources in an orthogonal frequency division multiplexing (“OFDM”) system. *Jin* discloses a method of sharing a basic allocation unit (“tile”) between two users. A tile includes many orthogonal subcarriers. Some of these subcarriers are used for pilot signals, whereas the other subcarriers are used for data transmission. A tile in *Jin*’s system is disclosed in FIG. 6 of *Jin*:



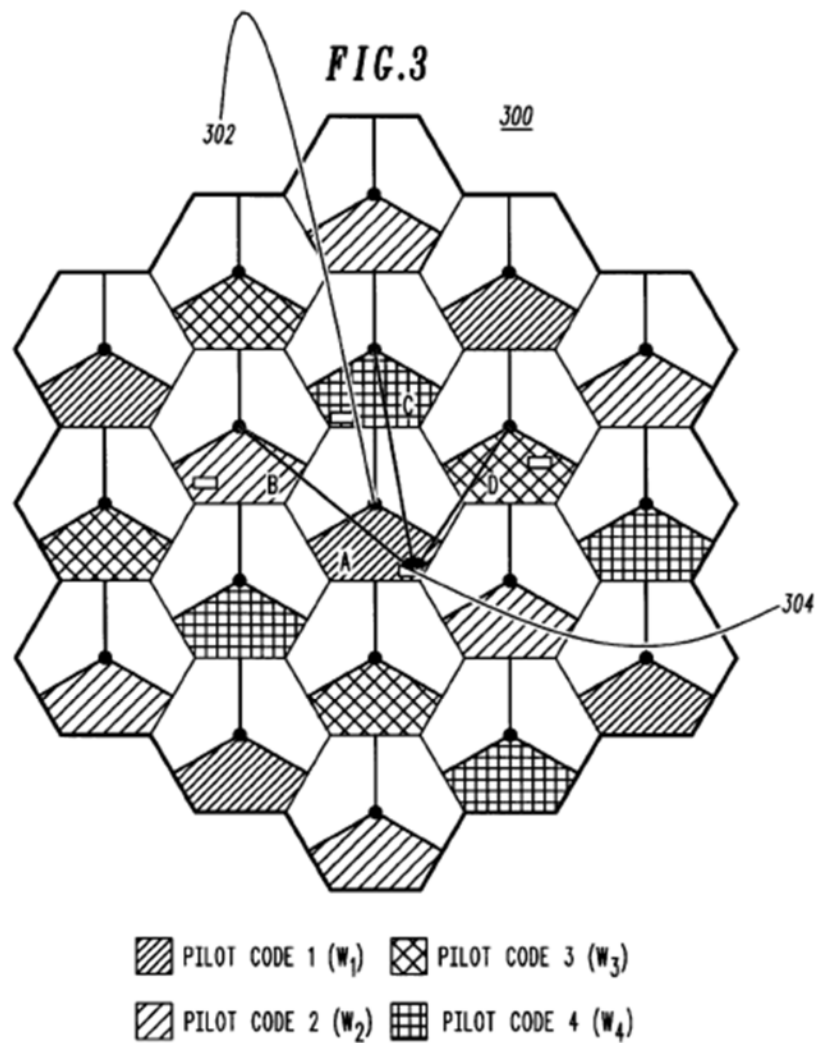
(EX1004 at FIG. 6). The tile disclosed in FIG. 6 includes one user's pilot signal on each corner. The pilot signal is a reference signal for the base station to identify a particular user. The base station uses a radio allocation map to indicate which pilot a user should use for transmission. (EX1004 at ¶ [0032]). In *Jin's* system, *Jin* discloses different pilot patterns that include two users as shown below in FIG. 7A:



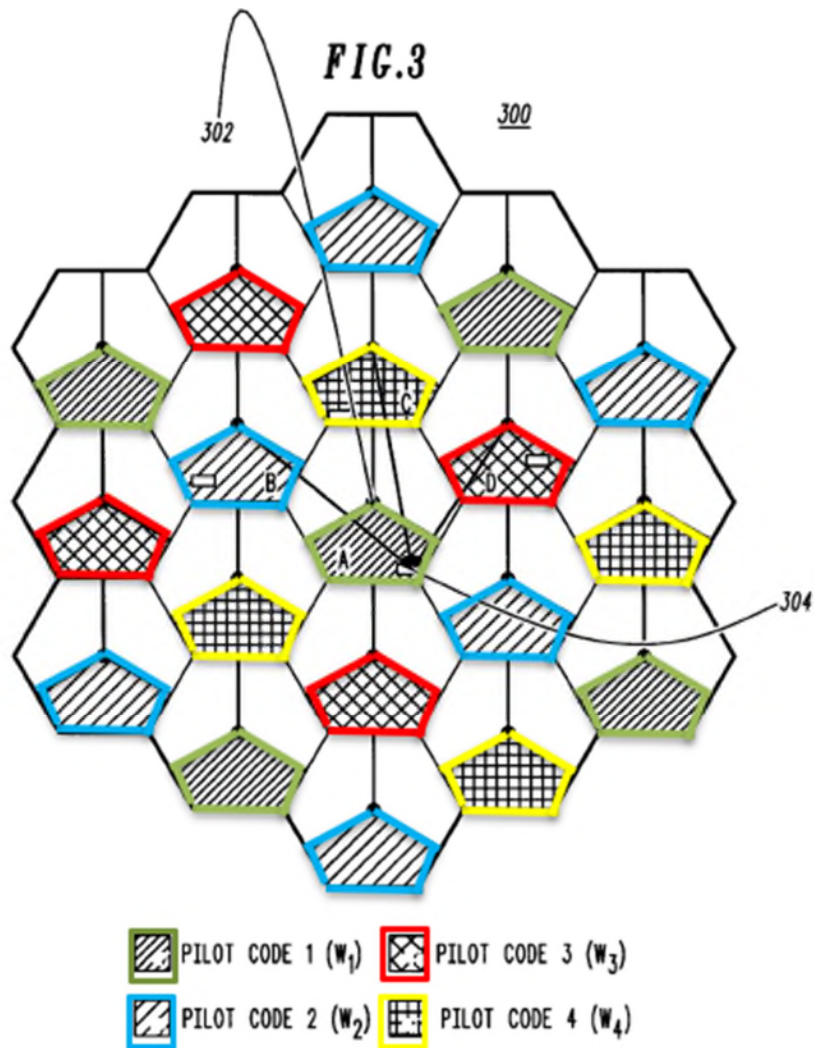
(EX1004 at FIG. 7A). In FIG. 7A orthogonal pilot signals are used in each pattern that do not overlap with one another. These orthogonal pilot patterns purport to allow the base station to identify which user is transmitting on a tile. (EX1004 at ¶ [0072]). In *Jin*, because two users can transmit on the same tile, the received signal at the base station will include multiple signals. *Jin* purports to use these orthogonal pilot patterns to identify the user that is transmitting and to divide the received signal into each of the users' signals.

B. *Baum*

35. *Baum* (EX1005) is directed to a synchronous coherent orthogonal frequency division multiplexing system. (EX1005 at Abstract). *Baum* explains that the invention relates to an OFDM wireless system that reduces the impact of interference. (EX1005 at 1:7-10). In particular, *Baum* calls his OFDM system a Synchronous Coherent OFDM (SC-OFDM) system, which includes a plurality of SC-OFDM transmitters and receivers comprised of base units and subscriber units. (EX1005 at Abstract). *Baum*'s SC-OFDM system is depicted in FIG.3:



(EX1005 at FIG. 3; 6:1-38). As can be seen in FIG. 3, *Baum* discloses a cellular re-use pattern that repeatedly re-uses four pilot codes in a hexagonal pattern. That is, *Baum* describes a system where the four pilot codes are re-used repeatedly in a pattern that attempts to spatially separate them. For example, the annotated figure below shows how each of the four pilot codes are reused as each pilot code is highlighted with the same color:



(EX1005 at FIG. 3 (annotated)).

36. *Baum*'s FIG. 3 describes a scenario where the base unit 302 in sector A is transmitting a desired signal to a subscriber unit 304 in the same sector. (EX1005 at 6:1-38). Neighboring sectors using different pilot codes interfere with this transmission and are considered co-channel interfering signals. (*Id.*). *Baum* describes these interferers as "primary co-channel interfering signals from the base units in the first ring of the surrounding cells." (EX1005 at 6:16-21; 9:24-36).

37. In *Baum*'s system, to detect the desired signal, the receivers can "measure/monitor" the relative propagation delay and the subcarrier phase difference of the dominant interfering signals. (EX1005 at 9:27-36). *Baum* discloses that these measurements can be made on a broadcast synchronization signal. (EX1005 at 19:50-59). But *Baum*'s broadcast synchronization signal is an optional signal for the SC-OFDM transmitters, as *Baum* explains that "[t]he SC-OFDM transmitter may, where selected, transmit at least one of: synchronization signals and identification signals." (EX1005 at 24:39-50). Therefore, *Baum*'s synchronization signal that can be used to measure the relative propagation delay and subcarrier phase differences of the interfering signals is not a required signal.

38. *Baum* discloses many embodiments of its SC-OFDM system, and in a separate embodiment than the embodiment depicted in FIG. 3, a "joint detection" is used. (EX1005 at 18:1-48). In this separate and distinct embodiment, *Baum* explains that the desired signal and the interfering signal components can be "treated as a new desired signal called the joint desired signal. (EX1005 at 18:9-17).

VII. The Petition Should be Denied Because Each Asserted Ground Fails to Establish the Required Likelihood of Success

A. Grounds 1-3

1. The Petition Fails to Show that *Jin* Discloses or Renders Obvious Claims 1-11, 16, and 21

39. In my opinion, the Petition fails to show that *Jin* discloses or renders obvious claims 1-11, 16, and 21 of the '071 patent for at least two independent reason: (1) The Petition fails to demonstrate that *Jin* discloses the claimed “unique signal parameters” required by both claim limitations 1c and 1d; and (2). The Petition fails to demonstrate that *Jin* discloses or renders obvious the claimed “detecting and distinguishing the information simultaneously received from each of the transmitting nodes according to their respective said unique estimated signal parameters.”

a. *The Petition fails to identify the claimed estimated unique signal parameters required by both claim limitations 1c and 1d*

40. In my opinion, the Petition fails to identify the claimed estimated unique signal parameters that are required in both claim limitations 1c and 1d. First, claim limitation 1c requires the “unique signal parameters” for each of the transmitting nodes to be estimated from the detected parameter-estimating signals on the unshared parameter channels. Then, claim limitation 1d requires the information simultaneously received from each of the transmitting nodes to be detected and distinguished “according to their respective said **unique estimated**

signal parameters.” (EX1001 at claim 1). The Petition fails to identify anything in *Jin* that satisfies both claim limitations.

41. To satisfy claim limitation 1c, the Petition alleges that “phase differences and radio channel parameters are unique signal parameters.” (Pet. at 34). But *Jin* never discloses “phase differences” or “radio channel parameters.” (See EX1004). For example, the Petition claims that “*Jin* discloses the base station uses the received pilot pattern signal to ‘identify which user (i.e., mobile terminal) has transmitted the received data’ by estimating phase differences and ‘measuring the radio channel for each user and compensating the channel, and applies it to a method for dividing data of users.’” (Pet. at 33-34). To support this proposition, the Petition cites to paragraphs 72 and 78 of *Jin* and paragraph 89 of Dr. Min’s declaration. (Pet. at 33-34; EX1004 at ¶¶ [0072], [0078]; EX1003 at ¶ 89). But paragraphs 72 and 78 of *Jin* are silent regarding estimating phase differences and radio channel parameters. (EX1004 at ¶¶ [0072], [0078]). Paragraph 78 of *Jin* discloses that the base station uses a pilot signal for measuring a radio channel, but *Jin* is completely silent regarding how it measures the radio channel and what it measures. (EX1004 at ¶ [0078]). And Dr. Min simply parrots the same language as the Petition and never explains how *Jin* discloses the estimated “phase differences” and “radio channel parameters” that the Petition alleges are the claimed estimated “unique signal parameters.” (EX1003 at ¶ 89). Thus, in my opinion, the

Petition fails to identify the required “unique signal parameters” estimated from the detected parameter-estimating signals on the unshared parameter channels for each of the transmitting nodes.

42. To satisfy claim limitation 1d, the Petition then claims that the required “unique estimated signal parameters” are not the previously alleged “phase differences” or “radio channel parameters” (neither of which are disclosed in *Jin*), but instead is the “unique pilot parameter”: “Jin discloses that the base station uses the unique pilot parameter (*i.e.*, ‘**unique estimated signal parameters**’).” (Pet. at 34 (emphasis in the original)).

43. As an initial matter, *Jin* does not disclose any “unique pilot parameter” and instead discloses unique pilot **patterns**. (See EX1004). But, not only is the “unique pilot parameter” different than the previously alleged “phase differences” and “radio channel parameters, the unique pilot patterns cannot be the claimed “unique estimated signal parameters” because the pilot patterns are known beforehand because they are transmitted from the base station to the transmitting nodes in a radio allocation map, and therefore, are not estimated as required by claim limitation 1d. (EX1004 at ¶ [0032]). Therefore, in my opinion, the “unique pilot parameter” does not qualify as a “unique estimated signal parameter” that is required to detect and distinguish the information simultaneously received from each of the transmitting as required by claim limitation 1d.

44. Thus, in my opinion, the Petition fails to show that the required “unique signal parameters” required in both claim limitations 1c and 1d is disclosed or rendered obvious by *Jin*.

b. *The Petition fails to demonstrate that Jin discloses or renders obvious claim limitation 1d*

45. In my opinion, the Petition fails to show that *Jin* discloses or renders obvious claim limitation 1d because the Petition fails to show that each and every claim element is disclosed.

46. For example, claim limitation 1d requires: “detecting and distinguishing the information simultaneously received from each of the transmitting nodes according to their respective said unique estimated signal parameters.” (EX1001 at claim 1). The Petition claims that “the data (*i.e.*, ‘**information**’) from each user (*i.e.*, ‘**transmitting node**’) is detected and distinguished when received by the base station by ‘analyz[ing] a pilot pattern of the basic allocation unit received ... to identify which user (*i.e.* mobile terminal) has transmitted the received data.’” (Pet. at 34 (emphasis in the original)). But *Jin*’s disclosure of analyzing a pilot pattern says nothing about detecting or distinguishing data according to the requirements of claim limitation 1d. (EX1004 at ¶ [0072]). *Jin* clearly states that the pilot pattern is used to identify which user transmitted the data:

[0072] The base station analyzes a pilot pattern of the basic allocation unit received over the uplink to identify which user (i.e., mobile terminal) has transmitted the received data. In other words, the base station identifies whether the received data is from user 1 or user 5 by analyzing the pilot pattern included in the basic allocation unit.

(EX1004 at ¶ [0072]). In other words, Jin discloses a method of identifying which user is transmitting on a basic allocation unit. Using a pilot pattern to identify which user transmitted data is not the claimed “detecting and distinguishing the information simultaneously received from each of the transmitting nodes according to their respective said unique estimated signal parameters” required by claim limitation 1d. The Petition also cites to ¶ [0074] of *Jin* to support its proposition, but that paragraph simply describes the different possible pilot patterns in *Jin*’s OFDM system. (EX1004 at ¶ [0074]; FIG. 7A).

47. The Petition then attempts to elaborate on its assertion that *Jin*’s analysis of a pilot pattern is the same as the claimed detecting and distinguishing, but the Petition fares no better here. (Pet. at 34). For example, the Petition then claims that “Jin discloses that the base station uses the unique pilot parameter (*i.e.*, ‘**unique estimated signal parameters**’) to ‘identify which user (*i.e.*, mobile terminal) has transmitted the received data’ (*i.e.*, ‘**detecting and distinguishing**’) by estimating phase differences and ‘measuring the radio channel for each user and compensating the channel.” (Pet. at 34 (emphasis in the original)). As previously discussed, the “unique pilot parameter” cannot satisfy the required “unique

estimated signal parameters,” so it cannot be used to detect and distinguish the information simultaneously received from each of the transmitting nodes as required by claim limitation 1d.

48. Finally, in my opinion, the Petition fails to show that estimating phase differences and measuring the radio channel for each user and compensating the channel and then applying it to a method for dividing data of users is the same as the claimed “detecting and distinguishing” of claim limitation 1d. (See Pet. at 34). As previously discussed, *Jin* does not disclose “estimating phase differences” as alleged in the Petition. Further, the Petition does not even attempt to explain how the two concepts are the same because they are not the same. For example, as *Jin* explains, the pilot signal is used to measure the radio channel and compensate it due to distortions. (EX1004 at ¶ [0078]). The Petition does not explain how a POSITA would understand that this concept is the same as the claimed “detecting and distinguishing” required by claim limitation 1d.

49. Further, in my opinion, the Petition does not explain how *Jin*’s disclosure of applying a method of dividing data of users meets the claimed “detecting and distinguishing” because a POSITA would understand “dividing” is a much “simpler” process than “distinguishing.” A POSITA would understand that “dividing” simply involves partitioning elements into parts or groups, without

necessarily recognizing their distinct identities or characteristics in order to differentiate and distinguish them.

B. Grounds 4-5

1. The Petition Fails to Show that *Baum* Discloses or Renders Obvious Claims 1-11, 16, and 21

50. In my opinion, the Petition fails to show that *Baum* discloses or renders obvious claims 1-11, 16, and 21 of the '071 patent for two reasons. First, the Petition does not demonstrate that *Baum* discloses or renders obvious “requiring each transmitting node to transmit a parameter-estimating signal on an unshared parameter channel” as required by claim limitation 1b. Second, the Petition does not establish that joint-detection embodiment in *Baum* is applicable to the non-joint detection embodiments and therefore does not show that *Baum* discloses or renders obvious the “detecting and distinguishing the information simultaneously received from each of the transmitting nodes” as required by claim limitation 1d.

a. *The Petition fails to demonstrate that Baum discloses or renders obvious “requiring each transmitting node to transmit a parameter-estimating signal on an unshared parameter channel” as required by claim limitation 1b*

51. In my opinion, the Petition fails to demonstrate that *Baum* discloses or renders obvious “requiring each transmitting node to transmit a parameter-estimating signal on an unshared parameter channel.” As an initial matter, neither the Petition

nor Dr. Min even attempts to address the “requiring” aspect of this claim limitation and simply ignore it. (Pet. at 64-65; EX1003 at ¶¶157-159). And for good reason because the “synchronization signal” that the Petition relies on in *Baum* is not required to be transmitted and is optional.

52. For example, claim limitation 1b recites “**requiring** each transmitting node to transmit a parameter-estimating signal on an unshared said parameter channel.” (EX1001 at claim 1). In the analysis for this claim limitation, the Petition never addresses it, and simply ignores it. (Pet. at 64-65). Similarly, Dr. Min ignores it in his declaration. (EX1003 at ¶¶157-159).

53. *Baum* does not require that each transmitting node transmit a parameter-estimating signal on an unshared parameter channel. The Petition relies upon *Baum*’s synchronization signal as the alleged parameter-estimating signal on an unshared parameter channel. (Pet. at 64). The Petition then argues that each transmitting node transmits a parameter-estimating signal on an unshared said parameter channel. (Pet. at 64). But *Baum* does not require all the transmitting nodes to transmit a parameter-estimating signal on an unshared parameter channel, and the portion of *Baum* relied upon in the Petition demonstrates just the opposite - that transmission of the synchronization signal is optional and not a required signal as in claim limitation 1b. For example, *Baum* explains:

The SC-OFDM transmitter **may, where selected, transmit at least one of: synchronization signals and identification signals. At least one of:**

the synchronization signals and the identification signals may typically be one of: A) non-interfering with a synchronization/identification signal from another SC-OFDM transmitter; and B) separable from a synchronization/identification signal from another SC-OFDM transmitter. Where selected, the SC-OFDM transmitter may transmit at least one of the synchronization signal and the identification signal at a different time/frequency/code than the synchronization/identification signal transmitted by the other SC-OFDM transmitter.

(Pet. at 64; EX1005 at 24:39-50). That is, *Baum* discloses that the SC-OFDM transmitter that the Petition relies upon need only transmit “**at least one of** the synchronization signal and the identification signal” at a different time and frequency as the signal transmitted by the other transmitter. Therefore, because the transmission of the synchronization signal is optional, there is no “requiring” that each transmitting node transmits the synchronization signal on the alleged unshared parameter channel. As *Baum* explains, instead of the synchronization signal, the SC-OFDM transmitter can transmit an identification signal.

54. Further, the lenient language in *Baum* such as “may” and “where selected” highlighted in the passage above is not consistent with the requiring element of claim limitation 1b.

55. For these reasons, in my opinion, the Petition fails to demonstrate that *Baum* discloses or renders obvious required claim limitation 1b: “requiring each transmitting node to transmit a parameter-estimating signal on an unshared parameter channel.”

- b. ***The Petition fails to establish that Baum discloses or renders obvious “detecting and distinguishing information simultaneously received from each of the transmitting nodes according to their respective said unique estimated signal parameters” as required by claim limitation 1d***

56. In my opinion, the Petition fails to establish that Baum discloses or renders obvious “detecting and distinguishing information simultaneously received from each of the transmitting nodes according to their respective said unique estimated signal parameters” as required by claim limitation 1d because the Petition fails to establish that the joint detection embodiment disclosed in *Baum* is applicable to the non-joint detection embodiments disclosed in *Baum*.

57. For example, for claim limitation 1d, the Petition relies on *Baum*’s “joint detection” embodiment. (Pet. at 75). But the Petition impermissibly combines multiple embodiments from *Baum*, but without any explanation of why the teachings relating to the ***non-joint detection*** embodiment would apply to the ***joint detection*** embodiment to teach distinguishing the individual signal components of the “joint desired signal.” Instead, of articulating why and how a POSITA could combine the different embodiments, the Petition summarily concludes that *Baum* discloses using joint detection with all its embodiments: “Baum discloses using joint detection with the detection scheme in all of the embodiments, as it states that ‘diversity reception [like that disclosed in all embodiments] is still beneficial even when joint detection is employed.’” (Pet. at 68 (quoting EX1005 at 18:6-8) (annotated by the Petition)).

58. But the Petition has not established that the joint detection embodiment is applicable to the other non-joint detection embodiments for a couple of reasons. First, *Baum*'s disclosure of "even when joint detection is employed" suggests that the use of joint detection is optional and not disclosed across all embodiments. Further, the statement that precedes that statement in *Baum* suggests that the diversity reception embodiment is indeed different than the joint detection embodiment as *Baum* contrasts joint detection and diversity reception: "[a] benefit of joint detection as compared to the diversity reception schemes described earlier is that joint detection does not require the use of diversity reception." (EX1005 at 18:3-6).

59. The Petition has not established that the other disclosures identified to support the alleged detecting and distinguishing claim element cited by the Petition such as "interpolation filtering" and the embodiment disclosed in *Baum*'s FIG. 3 are applicable to the joint detection embodiment. (Pet. at 68). The Petition fails to present any basis for applying the teachings of one embodiment in *Baum* to the other or whether it would have been obvious to a POSITA to somehow modify the teachings of the non-joint detection embodiment to apply to the joint detection embodiment.

60. For this reason alone, in my opinion, the Petition fails to demonstrate that *Baum* discloses or renders obvious "detecting and distinguishing information simultaneously received from each of the transmitting nodes according to their

respective said unique estimated signal parameters” as required by claim limitation

1d.

I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and 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 of Title 18 of the United States Code.

Dated: December 27, 2024



Dr. Giuseppe Caire