

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

EMPIRE TECHNOLOGY DEVELOPMENT LLC,
Patent Owner.

Case No. IPR2024-00896
U.S. Patent No. 8,798,120

PATENT OWNER'S RESPONSE

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LIST OF EXHIBITS

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Ex-2001	Master License Agreement
Ex-2002	Assignment and Assumption Agreement
Ex-2003	Amendment No. 2 to Master License Agreement
Ex-2004	U.S. Patent No. 8,081,698 (“Xu”)
Ex-2005	U.S. Patent App. Pub. No. US 2002/0056066 A1 (“Gesbert”)
Ex-2006	Docket Control Order, <i>Empire Technology Development LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:23-cv-00427, ECF No. 25 (E.D. Tex. Feb. 5, 2024)
Ex-2007	<i>United States District Court—National Judicial Caseload Profile</i> , UNITED STATES COURTS (Dec. 31, 2023), https://www.uscourts.gov/sites/default/files/fcms_na_distprofile1231.2023_0.pdf .
Ex-2008	Defendants’ Patent Local Rule 3-3 Disclosure of Invalidity Contentions and Subject Matter Eligibility Contentions, <i>Empire Technology Development LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:23-cv-00427, ECF No. 25 (E.D. Tex. Mar. 29, 2024)
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Ex-2010	Defendants’ Identification of Preliminary Claim Constructions, <i>Empire Technology Development LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:23-cv-00427, ECF No. 25 (E.D. Tex. Oct. 9, 2024)
Ex-2011	Preliminary Constructions, <i>Empire Technology Development LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:23-cv-00427 (E.D. Tex. Jan. 22, 2025)

Ex-2012	Markman Hearing Transcript, <i>Empire Technology Development LLC v. Samsung Electronics Co., Ltd., et al.</i> , 2:23-cv-00427, ECF No. 80 (E.D. Tex. Jan. 22, 2025)
Ex-2013	Transcript of Matthew C. Valenti, Ph.D., dated Mar. 7, 2025, IPR2024-00896
Ex-2014	Bin Zhao and Matthew C. Valenti, "Position-Based Relaying with Hybrid-ARQ for Efficient Ad Hoc Networking," EURASIP J. on Wireless Communications and Networking, 2005:5, 610-624
Ex-2015	Matthew C. Valenti and Bin Zhao, "Hybrid-ARQ Based Intra-cluster Geographic Relaying"
Ex-2016	Bin Zhao, Rohit Iyer Seshadri and Matthew C. Valenti, "Geographic Random Forwarding with Hybrid-ARQ for Ad Hoc Networks with Rapid Sleep Cycles"
Ex-2017	Isabella D. Lutz and Matthew C. Valenti, "Bridging the Security Gap: Lessons from 5G and What 6G Should Do Better"
Ex-2018	Excerpts from Telecom Dictionary, 2007
Ex-2019	Excerpts from Newton's Telecom Dictionary, 2008
Ex-2020	U.S. Patent No. 7,596,378
Ex-2021	U.S. Patent No. 7,912,518
Ex-2022	Declaration of Robert Akl, D.Sc.

I. INTRODUCTION

Empire Technology Development, LLC (“Patent Owner”) submits this Response to Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.’s (collectively, “Petitioners”) Petition challenging claims 25-29 of U.S. Patent No. 8,798,120 (the “’120 Patent”).

Based on a fully developed record, the Board should find that Petitioners have failed to demonstrate that any Challenged Claim of the ’120 Patent is unpatentable. The ’120 Patent relates to methods, systems, devices, and apparatus for selecting a transmit mode in a communications system. Ex-1001 at 2:12-14. Two transmit modes discussed in the patent specification and claims are multiple-input multiple-output mode (“MIMO”) and single-input multiple-output mode (“SIMO”). *Id.* at 1:18-28. The Challenged Claims are directed to a mobile station (*e.g.*, a mobile cellular device) that receives a control signal and is configured to select between a MIMO or SIMO transmission mode in accordance with the control signal. *Id.* at 19:1-20:24. In particular, each of the Challenged Claims includes a limitation in which the control signal is based in part on either an “idle power consumption of the mobile station” or “number of users of the communications system.” *Id.*

The Petition sets forth five Grounds of alleged obviousness, none of which has merit. First, none of Petitioners’ prior art references disclose a control signal based in part on the “idle power consumption of the mobile station” or “number of

users of the communications system” claim limitations, as those terms are used in the Challenged Claims. This alone defeats all five alleged obviousness grounds. Second, they fail for the separate reason that Petitioners have not demonstrated that a person of ordinary skill in the art (“POSITA”) would have been motivated to combine the prior art references in the manner proposed or have a reasonable likelihood of success in doing so. Instead, Petitioners cobble together references like academic papers with computer protocols and simulations to disclose specific claim elements and assert that, with the benefit of hindsight, a POSITA could have combined the references to come up with the claimed invention. Petitioners’ boilerplate motivations found nowhere in the references themselves would not have motivated a POSITA to take a single mention of a particular feature in an article to modify a mobile station in a communications system in a way that is not taught or suggested by any of the references to arrive at the claimed invention. This is insufficient to satisfy Petitioners’ burden as to their alleged obviousness combinations, such that all five Grounds of alleged unpatentability should be rejected.

II. BACKGROUND

A. Overview of the ’120 Patent

The ’120 Patent is directed to “Methods and Communication Systems Having Adaptive Mode Selection.” Ex-1001. The ’120 Patent concerns “methods, systems,

devices, and/or apparatus generally related to selecting a transmit mode in a communications system.” *Id.* at 2:12-14. Two transmit modes are multiple-input multiple-output mode (“MIMO”) and single-input multiple-output mode (“SIMO”). *Id.* at 2:37-39.

Through the use of multiple transmit antennas and multiple receive antennas, MIMO communication systems communicate data symbols over a communications system. By allowing a plurality of receivers to use the same frequency band, MIMO systems “advantageously increase an amount of data the communication systems are able to send to users.” *Id.* at 1:18-24. SIMO systems, on the other hand, employ a single transmit antenna and one or more receive antennas to communicate data symbols. *Id.* at 1:25-28.

MIMO and SIMO systems can, among other applications, be used in the wireless networks found in smartphones and smart tablets, among other devices. These networks include, *e.g.*, “3G and 4G systems, such as 3GPP LTE-Advanced, local and wide-area networks.” *Id.* at 1:31-32.

Figure 4 of the '120 Patent, below, depicts an example of the disclosed communications system. As stated in the specification, Figure 4 depicts “a schematic illustration of some example communications systems arranged in accordance with at least some examples of the present disclosure.” *Id.* at 7:1-3. Figure 4 depicts a base station 405, configured to communicate with mobile stations 410, 415, and 420

over the communications channel. *Id.* at 7:4-8. While Figure 4 depicts only three mobile stations, the base station may communicate with any number of mobile stations. *Id.* at 7:44-46. These “mobile stations” can be any number of devices, including but not limited to cell phones, laptop computers, desktop computers, and personal digital assistants. *Id.* at 10:52-57.

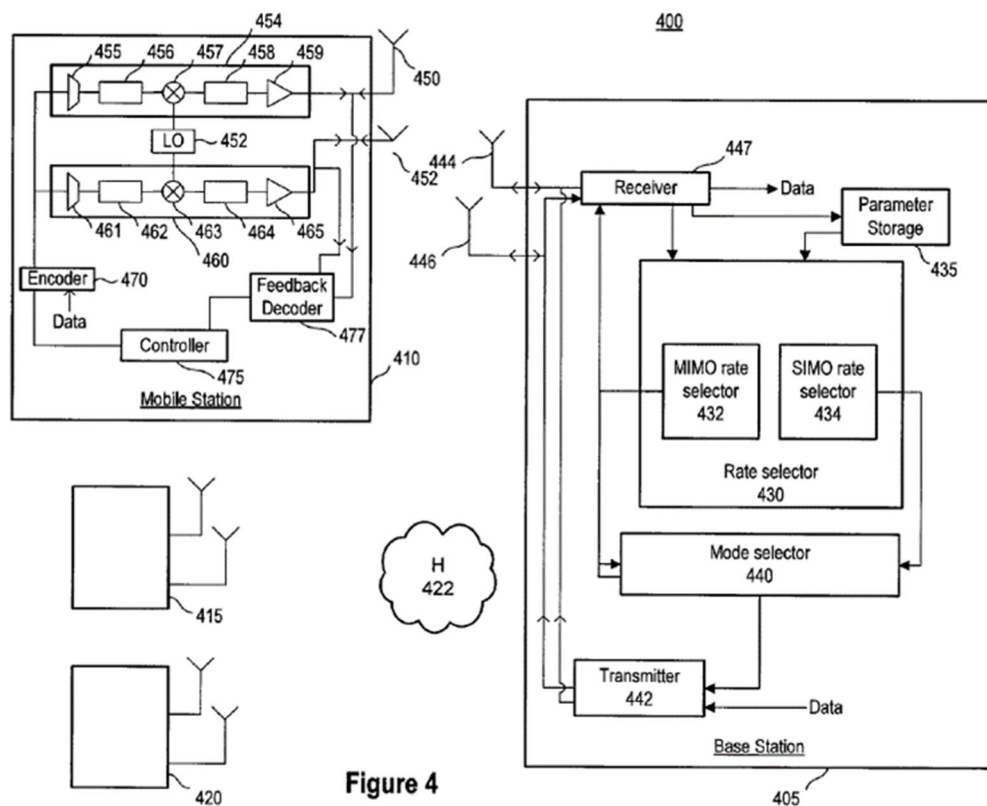


Figure 4

The '120 Patent further explains this figure as follows:

The mobile station 410 may include two antennas 450 and 452. First circuitry 454 is coupled to the antenna 450 and configured to process signals for transmission by the antenna 450. The first circuitry may include a digital-to-analog converter 455, a filter 456, a mixer 457, a filter 458, and a power amplifier 459. Second circuitry 460 may be

coupled to the antenna 452 and configured to process signals for transmission by the antenna 452. The second circuitry 460 may also include a digital-to-analog converter 461, a filter 462, a mixer 463, a filter 464, and a power amplifier 465. ... An encoder 470 may be coupled to the first and second circuitry. A controller 475 may be coupled to the encoder 470 and configured to provide a signal to the encoder 470 to operate in a MIMO mode or a SIMO mode.

Id. at 7:17-33.

The '120 Patent discloses several parameters that may be stored in parameter storage 435 including, but not limited to, data associated with power consumption of the mobile stations at an idle time or indicating a number of users of the communications system 400. *Id.* at 8:47-55, 9:20-23. For example, by using idle power consumption as a parameter, the '120 Patent accounts for power consumption during an idle time, which, *e.g.*, may be the “time during which the transceiver may be waiting to send data over the communications channel.” *Id.* at 2:60-62. With the circuitry powered on but still awaiting a signal, idling transceivers may continue to consume power. As explained in the '120 Patent: “Even if the idling transceivers turn off their transmission chains, some idle power may be consumed due to leakage current or other effects.” *Id.* at 3:5-7. As an alternative to storing information related to power consumption, “a signal indicative of the power consumption during an idle time may be provided.” *Id.* at 8:58-62. As another example, “a default value may be

stored and may be updated by a communication from the mobile station.” *Id.* at 8:63-65.

Another disclosed parameter is the number of users of the communications system. The parameter storage may provide “a signal indicative of the number of users.” *Id.* at 9:22-23.

Independent claim 25 of the '120 Patent reads as follows:

A mobile station for use in a communications system comprising:

- [a] a first antenna and a second antenna;
- [b] first circuitry coupled to the first antenna and configured to process signals for transmission by the first antenna; second circuitry couple to the second antenna and configured to process signals for transmission by the second antenna; and
- [c] a controller coupled to the first and second circuitry, wherein the controller is configured to receive a control signal and,
- [d] in accordance with the control signal, to select between a multiple-input multiple-output (MIMO) mode wherein both the first and second antennas transmit data over a communications channel and a single-input multiple-output (SIMO) mode wherein only one of the first and second antennas transmit data over a communications channel,
- [e] wherein the control signal is based, at least in part, on a power consumption of the first and second circuitry,

- [f] wherein the control signal is based, at least in part on an idle power consumption of a mobile station.

Id. at 19:1-20.

Independent claim 29 of the '120 Patent reads as follows:

A mobile station for use in a communications system comprising:

- [a] a first antenna and a second antenna;
- [b] first circuitry coupled to the first antenna and configured to process signals for transmission by the first antenna; second circuitry couple to the second antenna and configured to process signals for transmission by the second antenna; and
- [c] a controller coupled to the first and second circuitry, wherein the controller is configured to receive a control signal and,
- [d] in accordance with the control signal, to select between a multiple-input multiple-output (MIMO) mode wherein both the first and second antennas transmit data over a communications channel and a single-input multiple-output (SIMO) mode wherein only one of the first and second antennas transmit data over a communications channel,
- [e] wherein the control signal is based, at least in part, on a power consumption of the first and second circuitry,
- [f] wherein the control signal is based, at least in part on a number of users of the communications system.

Id. at 20:3-25.

B. Prosecution History of the '120 Patent

During examination of the '120 Patent, the Examiner expressly recognized that the limitations regarding consideration of idle power consumption and the number of users during mode selection were distinct from past methods in the prior art. Ex-1004 at 189.

Issued claim 25 is independent and appeared in the original patent application as claim 27, while issued claims 26-28 are dependent and appeared in the original patent application as claims 30, 31, and 33, respectively. *Id.* at 31-32. The “idle power consumption” limitation of claim 25 was originally included in another dependent claim (claim 32). *Id.* at 31-32. Issued claim 29 appeared in the original application as dependent claim 29, reading simply “the mobile station of claim [25], wherein the control signal is based, at last [sic] in part, on a number of users of the communications system.” *Id.* at 32.

On October 15, 2012, the Examiner rejected claims 27, 28, 31, and 32 as unpatentable over (1) U.S. Patent No. 8,081,698 (“Xu”) in view of (2) “Energy-efficiency of MIMO and cooperative MIMO Techniques in Sensor Networks” by Cui, et al. (“Cui-2004”). *Id.* at 94.

Original claims 29 and 32 were objected to as being dependent upon a rejected base claim, but were deemed “allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.” *Id.* at 100. With

respect to claim 29, the Examiner stated that “the prior art of record fails to anticipate or render obvious the limitations regarding the indication of the number of users in the channel environment factoring into the mode selection determination.” *Id.* With respect to application claim 32, now a limitation of issued claim 25, the Examiner stated, “the prior art of record fails to anticipate or render obvious the limitations regarding the consideration of power during idle periods in the mode selection processing.” *Id.*

On December 10, 2012, the applicant and Examiner conducted a telephone interview in which a possible amendment was discussed. *Id.* at 118. According to the summary of the interview, the applicant and Examiner agreed that Xu would not be applicable to amended claims that “explicitly state that the power consumption is with regards to the physical transceiver circuitry.” *Id.*

On January 14, 2013, the applicant amended application claim 27 to add “wherein the control signal is based, at least in part, on a power consumption of the first and second circuitry.” *Id.* at 125. The applicant argued that “Xu and Cui, individually or in combination, do not disclose or suggest the combination of elements of claim 27.” *Id.* at 130.

On April 10, 2013, the Examiner rejected claim 27 as being unpatentable over Xu in view of Cui-2004 and U.S. Patent No. 8,140,023 (“Bougard”). *Id.* at 147. According to the Examiner, Bougard “discloses wherein the control signal is based,

at least in part, on a power consumption of the first and second circuitry.” *Id.* at 149 (citations omitted). The Examiner again provided the same statement of reasons for allowable subject matter with respect to claims 29 and 32. *Id.* at 153.

On June 28, 2013, the applicant amended claim 27 to add the limitation from application claim 32 that the control signal for the claimed communications system “is based, at least in part, on an idle power consumption of the mobile station.” *Id.* at 173. In addition, applicant converted claim 29 into an independent claim. *Id.*

On March 20, 2014, the Examiner issued a notice of allowance and stated that, regarding claim 27, “the prior art of record fails to anticipate or render obvious the limitations regarding the consideration of power during idle periods in the mode selection processing.” *Id.* at 189. With respect to claim 29, the Examiner stated that “the prior art of record fails to anticipate or render obvious the limitations regarding the indication of the number of users in the channel environment factoring into the mode selection determination.” *Id.*

C. Related District Court Litigation

Currently, there is pending district court litigation between Petitioners and Patent Owner in the Eastern District of Texas in the matter captioned *Empire Technology Development LLC v. Samsung Electronics Co., Ltd., et al.*, 2:23-cv-00427 (E.D. Tex. Sept. 18, 2023). In that action, Patent Owner contends that Petitioners infringe at least claims 25 and 29 of the '120 Patent under 35 U.S.C.

§ 271. The Court issued preliminary claim constructions prior to the claim construction hearing held on January 22, 2025. A claim construction order is forthcoming.

III. LEVEL OF ORDINARY SKILL IN THE ART

Petitioners offer a definition of a person of ordinary skill in the art (“POSITA”) at the relevant time as one who had “a bachelor’s degree in electrical engineering, computer science, computer engineering, or a related field, and two-to-three years of experience in the research, design, development, or testing of wireless data communication systems at the physical and media access control (MAC) layer, with additional education substituting for experience and vice versa.” Pet. at 8. For purposes of this proceeding, Patent Owner does not challenge this definition.

IV. CLAIM CONSTRUCTION

In the Institution Decision, the Board preliminarily construed the claim limitation “idle power consumption.” Paper 15 at 25.

Patent Owner respectfully submits that the Board should re-consider its preliminary construction for the reasons set forth below. The Board preliminarily construed “idle power consumption” to mean “including power consumption during which the transceiver may be waiting to send data, *whether the transceiver is on or off.*” Paper 15 at 25 (emphasis added). The Board observed that the ’120 Patent specification refers to “idle time” as “time during which the transceiver may be

waiting to send data, where ‘even if the idling transceivers turn off their transmission chains, some idle power may be consumed due to leakage current or other effects.’” Paper 15 at 25 (citing Ex-1001 at 2:60-66, 3:5-7). Based on this excerpt, the Board stated that the ’120 Patent “does not appear to define ‘idle power consumption’ as requiring the circuitry to be powered on while ‘waiting to send data’ nor exclude circuitry that is powered off while waiting to send data.” *Id.* at 25-26. However, the Board expressly invited the parties to further address this issue at trial and requested that any claim construction arguments should “point out the specific portions of the specification, prosecution history, and relevant extrinsic evidence” to be considered in accordance with the Patent Trial and Appeal Board Consolidated Practice Guide. *Id.* at 26 n.13.

Patent Owner submits that the term “idle power consumption” has its plain and ordinary meaning and should be construed to mean “power consumed when the mobile station and first and second circuitry are powered on and waiting to send” or in a manner consistent with the preliminary claim construction of the district court discussed further below. Patent Owner’s understanding of “idle power consumption” is grounded in the specification, prosecution history, and claims as understood by a POSITA. When the ordinary meaning of claim language as understood by a POSITA is readily apparent, claim construction “involves little more than the application of the widely accepted meaning of commonly understood

words.” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (en banc).

That is exactly the case here with respect to the word “idle.” Idle is a well-understood word, *e.g.*, an idling car, which means powered on but not actively working. Ex-2022 ¶ 48. A car that is shut down or powered off is not idling. *Id.* Neither Patent Owner nor Petitioners contend that “idle,” as used in the ’120 Patent, has a different meaning in the field of wireless communications. Petitioners’ expert admits that the plain and ordinary meaning of the term “idle power consumption” that would have been understood by a POSITA is the power consumed when the mobile station is idle. Ex-2013 at 50:19-51:4 (“I mean, the meaning is kind of implied by the phrase. It would be power consumed when it is idle.”).

There are numerous examples in the specification that describe idle time as follows:

- The idle time is a time during which the transceiver may be ***waiting to send data over the communications channel***. Ex-1001 at 2:58-62 (emphasis added).
- However, if the transmission rate is too slow, a greater number of transceivers ***may become idle, waiting to send transmissions over the communications channel***. Even if the idling transceivers turn off their transmission chains, some idle power may be consumed due to leakage current or other effects. *Id.* at 3:2-10 (emphasis added).
- Recall the idle time may include ***times during which the mobile station 410 is waiting to send data over the communications channel***, such as waiting for a scheduled time to begin transmission. *Id.* at 8:55-58 (emphasis added).

Nowhere does the specification contemplate that a transceiver that is idle is off, powered off, or shut down. Indeed, a powered off transceiver is not waiting to do anything, let alone waiting to send data. Ex-2022, ¶ 51. Petitioners' expert agreed that such a transceiver is not waiting to send. Ex-2013, 60:19-61:5. To the extent Petitioners' expert is seeking to draw a distinction between powered off and shut down, a POSITA would not draw such a distinction in understanding the term "idle power consumption." Ex-2022, ¶ 49. He also agreed that when transceivers are idling at least some of the circuitry is consuming power. Ex-2013, 42:21-43:11 ("[Idling] is intended to be some kind of intermediate state. I think the patent is pretty clear here about when it is idling, it is still using power."). Yet, Petitioners' expert acknowledged that, under the Board's preliminary construction, the transceiver can be powered off and still be within the scope of idle power consumption. Ex-2013, 56:3-7. Thus, the Board's language of "whether the transceiver is powered on or off" is simply too broad and inconsistent with the intrinsic record. *See id.* at 49:20-50:7 (acknowledging that "idle power consumption" means that the circuits "are not powered off").

And the statement that "[e]ven if the idling transceivers turn off their transmission chains, some idle power may be consumed," further supports Patent Owner because it *confirms* that idle power consumption refers to times where the transceivers are idling and thus powered on (in contrast to their transmission chains,

which could be powered off). Petitioners' expert confirmed that when transmission chains are powered off, the mobile station and its circuitry may still be powered on. Ex-2013 at 43:12-15. This is exactly what this passage from the specification suggests. Ex-2022, ¶ 52.

Moreover, in the related district court litigation, the court issued a preliminary claim construction of the "idle power consumption" limitation that adopted Patent Owner's interpretation of being powered on. Applicable rules obligate the Board to take prior claim construction determinations by a district court into consideration. 37 C.F.R. § 42.100(b) ("Any prior claim construction determination concerning a term of the claim in a civil action ... that is timely made of record in the inter partes review proceeding will be considered."); *see also Samsung Elecs. Am., Inc. v. Collision Communs, Inc.*, IPR2024-01247, Paper 14 at 12 (PTAB Feb. 7, 2025) (finding the "District Court's analysis persuasive").

The preliminary claim construction of "idle power consumption" as determined by the district court is "power consumed by the first and second circuitry when the mobile station is *powered on*, enabled for transmitting, but waiting to send." Ex-2011 at 1 (emphasis added). At the claim construction hearing before the district court on January 22, 2025, the district court explained that, while not final, the preliminary constructions are a "way to allow counsel to focus their arguments where they think the Court may have most missed the mark." Ex-2012 at 4:11-13.

As relevant here, the district court agreed that the “waiting to send data over the communications channel” language in the specification was persuasive, noting that it “influenced heavily the language that you see in the preliminary construction.” *Id.* at 26:20-25 (referencing Ex-1001 at 2:58-62). Petitioners’ expert agreed that the district court’s preliminary construction is consistent with the plain and ordinary meaning of “idle power consumption” as understood by a POSITA. Ex-2013, 52:17-22. Thus, the district court, like Patent Owner, found that powered on and waiting to send are part of how the term would be understood by a POSITA.

The prosecution history of the ’120 Patent further supports a plain-and-ordinary-meaning construction of this term. During prosecution, and as a reason for allowance, the Examiner stated multiple times that the prior art failed to “anticipate or render obvious the limitations regarding the consideration of power during idle periods in the mode selection processing,” including in issued claim 25. Ex-1004, 100, 153, 189. This inadequate prior art included the disclosure in Cui-2005 of a “sleep mode” in which “all the circuits in the signal path are shut down for energy saving.” *Id.* at 41; *accord id.* at 105. Although Petitioners claim that “the examiner must have overlooked” Cui-2005’s teachings, Pet. 23, the law is that where prior art “is listed on the face” of a patent, “the examiner is presumed to have considered it.” *Shire LLC v. Amneal Pharm., LLC*, 802 F.3d 1301, 1307 (Fed. Cir. 2015). Petitioners have no support for their contrary view, and since the examiner stated that the prior

art did not disclose the limitation regarding the consideration of power during idle periods, a more reasonable interpretation is that examiner concluded Cui-2005's teachings of "sleep mode" did not disclose or suggest that limitation. *See* Ex-1004, 0189. Therefore, a POSITA at the time of the invention would have understood that the "sleep mode" referenced in the prior art is distinct from the "idle time" and "idle power consumption" limitations found in claim 25. Ex-2022, ¶ 54. Moreover, a POSITA would have understood based on Cui-2005's teachings that while circuitry is powered off or shut down in sleep mode, the plain and ordinary meaning of idle mode refers to circuitry that is powered on. *Id.*

In addition to the intrinsic evidence, a POSITA would understand that the plain and ordinary meaning of "idle" refers to times when the circuitry of the device is powered on and waiting to transmit data over the communications channel since extrinsic evidence also supports that understanding. *See* Ex-2018 (Telecom Dictionary 2007) ("A period of time that a mobile radio is not required to transmit or receive data."); Ex-2019 (Newton's Telecom Dictionary 2008) ("Not being used but ready"); Ex-2022, ¶ 55.

For the reasons set forth above, the plain and ordinary meaning of the term "idle," the language of the specification and the prosecution history all support construing the "idle power consumption" limitation to mean "power consumed when the mobile station and first and second circuitry are powered on and waiting to send"

or in a manner consistent with the preliminary claim construction of the district court.

V. OVERVIEW OF THE PRIOR ART CITED IN PETITION

A. Li (Ex-1005)

U.S. Patent Application Publication No. US 2006/0067263 titled “Techniques to Manage Multiple Receivers” by Qinghua Li et al. (“Li”) and was published on March 30, 2006. Ex-1005.

Figure 1 of Li discloses a wireless communications system that includes may include an access point (AP) 110, a station (STA) 120, a STA 130, and a STA 150. *Id.*, [0012]. Li states that STA 120, STA 150 and AP 110 may operate in at least one of the following operating modes: a SISO mode, a MISO mode, a SIMO mode, and/or a MIMO mode. *Id.*, [0017].

Li states that a “problem associated with wireless communication devices using carrier sense multiple access/collision detection (CSMA/CD) techniques (e.g., 802.11) is power consumption.” *Id.*, [0018]. According to Li, “a station in idle mode waiting for incoming signals may consume approximately 60% of its battery energy” and “a station may use less than 20% of its battery energy for communicating actual traffic.” *Id.*

Li describes embodiments that “may solve this and other problems.” *Id.*, [0019]. For example, “AP 110 operating in a MISO or a SISO operating mode may

send a request over wireless shared media 160 to switch STA 120 and STA 150 to a SISO or MIMO operating mode” and “power consumption for STA 120 and STA 150 may be reduced.” *Id.*

With reference to Figure 2, Li also describes node 200, which may be “implemented as part of AP 110, STA 120 and/or STA 150.” *Id.*, [0020]. Li states that that node 200 may include media access control (MAC) processor 210, which may receive a physical layer convergence procedure (PLCP) protocol data unit (PPDU). MAC 210 may output a receiver control signal in response to the received PPDU that may “cause MIMO system 230 to switch between a first operating mode and a second operating mode in response to the receiver control signal.” *Id.*, [0024].

B. Siam (Ex-1006)

“Adaptive Multi-Antenna Power Control in Wireless Networks” by Mohammad Siam et al. (“Siam”) is a paper from the IWCMC ‘06: Proceedings of the 2006 International Conference on Wireless Communications and Mobile Computing. Ex-1006, 875.

Siam proposes “a power-controlled channel access protocol for MIMO capable wireless LANs with two antennas per node.” *Id.* Siam discloses a protocol, called E-BASIC, for dynamically adjusting “the ‘transmission mode’ and the transmission power on a per-packet basis so as to minimize the total energy consumption.” *Id.* Siam describes a power consumption model where the “total power consumption

consists of transmission and circuit powers.” *Id.*, 876. According to Siam’s model, the circuit power P_c is represented as follows:

$$P_c \approx M_t(P_{DAC} + P_{mix} + P_{filt}) + 2P_{syn} + M_r(P_{LNA} + P_{mix} + P_{IFA} + P_{filr} + P_{ADC})$$

“where P_{DAC} , P_{mix} , P_{LNA} , P_{IFA} , P_{filt} , P_{filr} , P_{ADC} , and P_{syn} are the power consumption values for the digital-to-analog converter (DAC), the mixer, the low noise amplifier (LNA), the intermediate frequency amplifier (IFA), the active filters at the transmitter and the receiver sides, the analog-to-digital converter (ADC), and the frequency synthesizer, respectively.” *Id.*, 877.

C. Cui-2003 (Ex-1007)

“Modulation Optimization Under Energy Constraints” by Shuguang Cui et al. (“Cui-2003”) is a paper from the Institute of Electrical and Electronic Engineers International Conference on Communications.

Cui-2003 describes modulation strategies to minimize the total energy consumption in radio applications. Cui-2003 considers a communication link connecting two wireless nodes where the transceiver circuitry works on the following multimode basis: “when there is a signal to transmit all circuits work in active mode, when there is no signal to transmit they work in sleep mode, and when switching from sleep mode to active mode there is a transient mode.” Ex-1007, 0002. In sleep mode, “all the circuits in the signal path are shut down for energy saving” and “the

start-up process from sleep mode to active mode may be slow due to the finite Phase Lock Loop (PLL) settling time in the frequency synthesizer.” *Id.*

According to Cui-2003, the total energy is determined by three components:

$$E = P_{on}T_{on} + P_{sp}T_{sp} + P_{tr}T_{tr}$$

where P_{on} , P_{sp} and P_{tr} are power consumption values for the active mode, the sleep mode, and the transient mode, respectively. *Id.* Cui-2003 states that in sleep mode, “the power consumption is dominated by the leaking current I_l of the switching transistors” and “since the leaking current $I_l \approx 0$ compared with the active mode,” P_{sp} is set to zero. *Id.*

D. Tiirola (Ex-1008)

“Performance of a UMTS Uplink MIMO Scheme” by Esa Tiirola et al. (“Tiirola”) is a paper presented at the 2003 IEEE 58th Vehicular Technology Conference.

Tiirola presents studies of uplink (UL) performance in a 3G UMTS (Universal Mobile Telecommunications System) using SIMO and MIMO transmission schemes. Tiirola, Cover. The simulations in Tiirola assumed that the user equipment (UE) had a maximum of two transmit antennas and the base station employed up to four antennas. *Id.* The simulations used five different antenna configurations: “1x1 (one transmit antenna, one receive antenna), 1x2, 2x2, 1x4 and 2x4” and the link

performance of the configurations was “evaluated by means of Monte-Carlo simulations.” *Id.* at 658.

Figure 4 of Tiirola reproduced below presents simulated noise rise curves for the considered SIMO and MIMO transmission schemes given as a function of number of 64 kb/s users in an isolated cell. *Id.* at 659. Tiirola provides results demonstrating that “receive diversity is a dominant factor in improving uplink capacity and coverage” while “the MIMO concept does not seem feasible for improving UMTS uplink performance.” *Id.* at 657. Tiirola states that “doubling of the number of receiving antennas will almost double the isolated cell capacity, whereas the increase of the number of transmit antennas will mostly have negative impact on the isolated cell capacity.” *Id.* at 660. Based on these results, Tiirola concludes that “[d]oubling the number of receiving antennas is much more effective than introducing the 2nd transmit antenna.” *Id.*

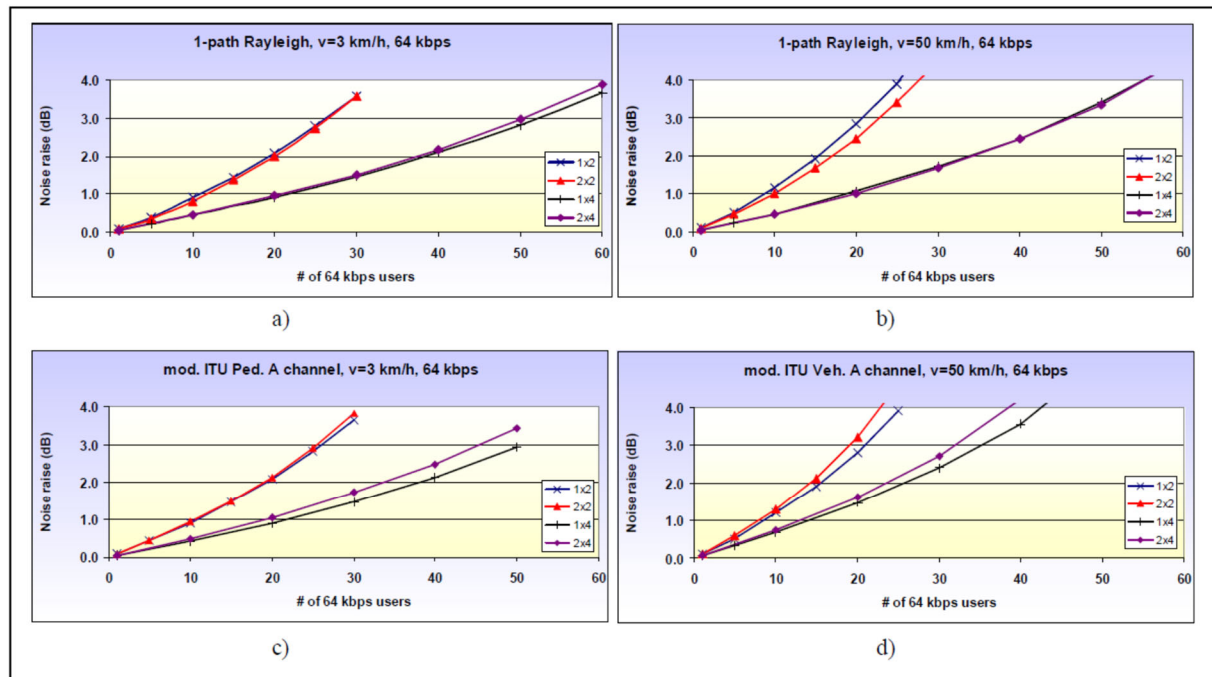


Figure 4. UL noise rise, SIMO and MIMO, 64 kb/s.

E. Wu (Ex-1009)

U.S. Patent Application Publication No. US 2007/0171808 titled “Adaptive Orthogonal Scheduling for Virtual MIMO System” by Jianming Wu et al. (“Wu”) and was published on July 26, 2007. Ex-1009.

Wu is directed to a system and method for scheduling cooperative uplink transmissions in a virtual MIMO wireless communication environment. Ex-1009, Abstract. Wu describes provides random and channel aware orthogonal scheduling techniques for identifying a subset of N mobile terminals to provide cooperative uplink transmissions for each transmit time interval. *Id.*

Figure 1 of Wu discloses a basic wireless communication environment in which a base station controller 10 controls wireless communications within multiple

cells 12, which are served by corresponding base stations 14 that facilitates communications with mobile terminals 16. *Id.*, [0024].

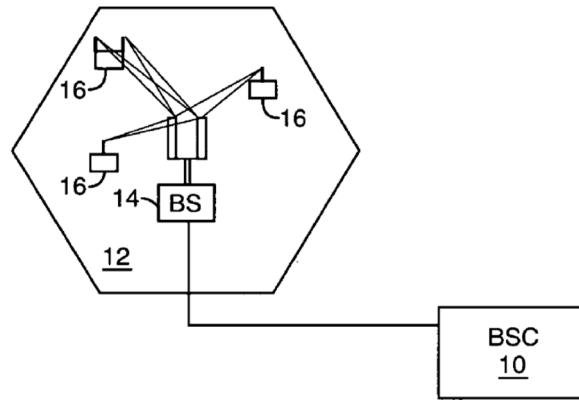


FIG. 1

Id., Fig. 1. Figure 12 reproduced below is a flow chart illustrating an exemplary virtual MIMO implementation, wherein the base station 14 groups the mobile terminals 16 into one of three groups: a Random User Scheduling (RUS) group, a SIMO group, and a Channel Aware Orthogonal Scheduling (CAOS) group. *Id.*, [0073]. Wu states that if the velocity of the mobile terminal 16 is not greater than the predetermined threshold, the base station 14 determines the transfer function for each of the sub-carriers within each of the sub-channels assigned to the mobile terminal 16. *Id.*, [0074]. As a next step, the base station 14 determines whether a channel quality associated with the mobile terminal 16 is poor based on the transfer functions. *Id.*, [0075]. If the channel quality is poor, base station 14 places the mobile

terminal 16 in the SIMO group, and if the channel quality is not poor, base station 14 places the mobile terminal 16 in the CAOS group. *Id.*

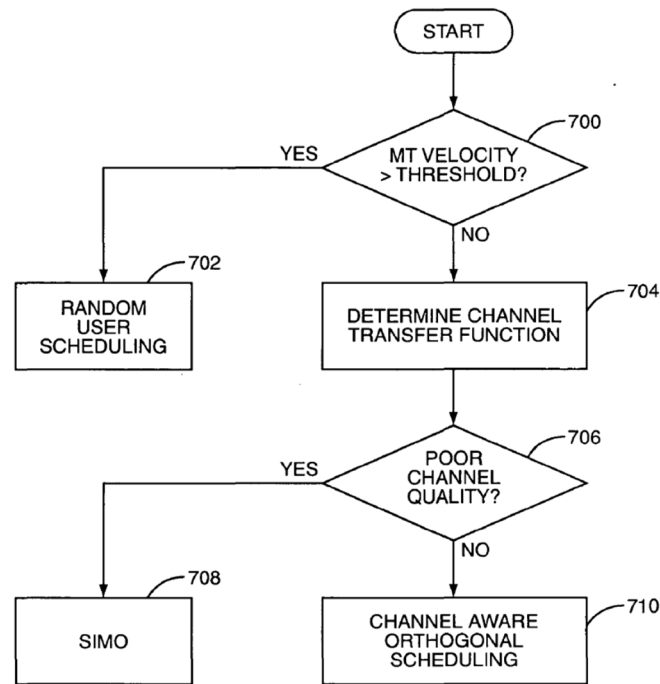


FIG. 12

VI. LEGAL STANDARDS

In an *inter partes* review, “the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). This burden never shifts to the patentee. *Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1378-79 (Fed. Cir. 2015). “Failure to prove the matter as required by the applicable standard means that the party with the burden of persuasion loses on that point—

thus, if the fact trier of the issue is left uncertain, the party with the burden loses.”

Id. (citation omitted).

A claim is unpatentable under § 103(a) only if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007); 35 U.S.C. § 103(a) (pre-AIA). The ultimate determination of obviousness is a question of law based on underlying factual findings. *In re Baxter Int'l, Inc.*, 678 F.3d 1357, 1362 (Fed. Cir. 2012). “To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.” *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380-81 (Fed. Cir. 2016) (citing *KSR*, 550 U.S. at 418).

The Supreme Court has held that “a patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art.” *KSR*, 550 U.S. at 401. When combining teachings from different references, the petitioner can carry its burden only by “explain[ing] why a person of ordinary skill in the art would have combined elements from specific references in the way the claimed invention does.” *ActiveVideo Networks, Inc. v.*

Verizon Commc'ns, Inc., 694 F.3d 1312, 1328 (Fed. Cir. 2012) (emphasis omitted).

The petition “should . . . ma[k]e explicit” this “reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR*, 550 U.S. at 417-18.

The “factual inquiry” into the reasons for “combin[ing] references must be thorough and searching,” and “the need for specificity pervades.” *In re NuVasive, Inc.*, 842 F.3d 1376, 1381-82 (Fed. Cir. 2016) (cleaned up); *see also id.* at 1384 (where a petition merely states that the POSITA would have been motivated to combine the prior art references but fails to articulate a “reason why,” the petition’s “arguments amount to nothing more than conclusory statements” that cannot support a finding of obviousness); *Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1066 (Fed. Cir. 2016) (“[T]he Board must still be careful not to allow hindsight reconstruction of references . . . without any explanation as to how or why the references would be combined to produce the claimed invention.”) (emphasis omitted); *KSR*, 550 U.S. at 421 (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning”).

VII. THE CHALLENGED CLAIMS OF THE '120 PATENT ARE NOT UNPATENTABLE UNDER 35 U.S.C. § 103

Petitioners challenge independent claims 25 and 29 along with dependent claims 26, 27, and 28. The Petition sets forth five Grounds of alleged obviousness: (1) Claims 25, 27, and 28 in view of Li and Siam; (2) Claims 25, 27, and 28 in view

of Li, Siam and Cui-2003; (3) Claim 26 in view of Li, Siam and Wu; (4) Claim 26 in view of Li, Siam, Cui-2003 and Wu; and (5) Claim 29 in view of Li, Siam and Tirola. Importantly, each of the Challenged Claims includes a limitation that receives a control signal based in part on either “idle power consumption of the mobile station” (Claims 25, 26, 27 and 28) or the “number of users of the communications system” (Claim 29). Each of the instituted Grounds fails for multiple reasons.

First, Petitioners have failed to provide specific, evidence-based reasoning demonstrating that a POSITA would have been motivated to combine their prior art references. All five Grounds rely, at a minimum, on the combination of Li and Siam, such that a finding by the Board that a POSITA would not have been motivated to combine those two references would defeat all five of Petitioners' theories of unpatentability. Ex-2022, ¶ 75. While Li is a patent publication, Siam is an article that describes simulations that were performed by the study's authors. It does not disclose a physical system or apparatus, nor did the study's authors build a physical realization of the simulations they performed. *Id.* There is insufficient evidence in the record that a POSITA would have been familiar with Siam's teachings and would have been motivated to combine it with Li's system. *Id.* Petitioners' other combinations fail for similar reasons: Each of their proffered combinations is conclusory, not supported by the evidence, and the result of hindsight. *Id.*

Second, none of the prior references cited in the Petition discloses “a control signal is based, at least in part, on an idle power consumption of the mobile station” in independent claim 25. *Id.* ¶ 76. Petitioners rely on Li in Ground 1 and Cui-2003 in Ground 2 for this limitation, but neither Li nor Cui-2003 discloses a control signal is based, at least in part, on an idle power consumption of the mobile station. *Id.* In fact, Li only contains a single reference to an “idle mode” in its specification, teaching that “a station in idle mode waiting for incoming signals may consume approximately 60% of its battery energy.” Pet. at 41 (quoting Ex-1005, [0018]). There is no mention of an “idle mode” anywhere else in Li. Ex-2022, ¶ 76. Although Li describes the mechanics for switching to a SIMO to MIMO operating mode, it does not identify any inputs, variables or other considerations used to determine whether and when to select modes, and there is certainly no indication based on a single mention that “idle mode” is in any way involved in that process. *Id.*

With respect to Ground 2, Cui-2003 is even further afield because it does not disclose or mention idle power or idling at all. Rather, Petitioners rely on Cui-2003’s “sleep mode,” an energy conserving state completely different from idling. Ex-1007, 2806 (“sleep mode where all the circuits in the signal path are shut down for energy saving”). In addition, there is nothing in Cui-2003 to suggest that the power consumed in sleep mode is used in any way (in fact, Cui-2003 assumes the power consumed in sleep mode is zero), and there is certainly no suggestion a control signal

is received that is based in part on the idle power consumption of the mobile station. Ex-2022, ¶ 77.

Third, none of the prior art references cited in the Petition discloses the “number of users” limitation in independent claim 29. Petitioners rely exclusively on Tirola for this limitation, arguing that it teaches considering the number of users of a communications system when selecting between SIMO and MIMO operating modes. Ex-1002 ¶ 165. However, Tirola merely describes a series of noise level simulations in which signal noise increases in SIMO and MIMO transmission modes as the number of users increase. *See* Ex-1008 at 659, 661. Petitioners argue that, while Li and Siam suggest that MIMO mode can be ineffective and consume a large amount of power, “Tirola teaches that if there are many users, selecting SIMO mode might increase noise levels sufficiently that RF power (and circuit power) would have to be increased to meet the same data throughput metric.” *Id.* ¶ 165. But Petitioners rely on a single simulation result that ignores the other simulation results as well as Tirola’s conclusion that “the MIMO concept does not seem feasible for improving UMTS uplink performance.” Ex-1008 at 657. Moreover, Tirola does not teach a control signal that takes into account the number of users or transmission mode selection, and it has no application with respect to transmission mode selection in a mobile device, which defeats Petitioners’ theory that a POSITA would have been motivated to combine Tirola with Li and Siam (Ground 5). Ex-2022, ¶ 78.

A. Ground 1: Claims 25, 27, and 28 Would Not Have Been Obvious Over Li in View of Siam.

- i. Petitioners fail to demonstrate that a POSITA would have been motivated to combine Li and Siam*

A POSITA would not have been motivated to combine Li and Siam to arrive at the claimed invention. Ex-2022, ¶ 79. When combining teachings from different references, a petitioner must explain (1) how a POSITA would combine the elements to reach the claimed invention and (2) why a POSITA would have been motivated to do so. *TriVascular*, 812 F.3d at 1066 (explaining that a determination of obviousness cannot be reached where the record lacks “explanation as to how or why the references would be combined to produce the claimed invention”) (emphasis omitted); *In re Nuvasive*, 842 F.3d at 1381-82 (“[t]he factual inquiry whether to combine references must be thorough and searching”). Here, Petitioners instead merely pluck features from these references in an attempt to reconstruct the claimed invention through hindsight.

The only alleged motivation to combine set forth in the Petition is that both references concern selecting an optimal data communication mode. Pet. at 24. Petitioners’ expert argues that a POSITA would have been “motivated to improve Li’s mode-switching system by adding Siam’s teaching that expressly considers both RF transmit power and circuit power consumption to select an optimal transmit

mode between SIMO and MIMO (or SISO and MIMO) at the mobile station to minimize battery power consumption.” Ex-1002 ¶ 91.

Petitioners’ purported motivation is conclusory, unsupported by the evidence, and based on hindsight. Ex-2022, ¶ 81. As an initial matter, Li and Siam in fact have little in common. *Id.* Li discloses a wireless communication system comprising mobile stations and access points, while Siam is an academic paper that discloses a software protocol and provides numerical results that “were all done on a computer as a simulation.” Ex-1005, Abstract; Ex-1006, 877-78, Ex-2013, 77:7-22. Petitioners’ expert confirms that the results reported in Siam were simply generated using a computer simulation platform. Ex-2013, 77:7-22.

Neither Petitioners nor their declarant adequately explained why modifying Li would improve the functionality over what is expressly disclosed in each prior art reference. Petitioners claims that a “POSITA would have been motivated to improve Li’s mode-switching system by adding Siam’s teaching that expressly considers transmission and circuit power consumption to select an optimal transmit mode between SIMO and MIMO.” Pet. at 26. But Petitioners’ assertion that a POSITA would have combined Li with Siam to improve Li’s system is nothing more than a conclusory statement and fails to articulate why a POSITA would have been motivated to combine these specific teachings in the prior art instead of many other possibilities. *See TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1359 (Fed. Cir.

2019) (“[A] conclusory assertion with no explanation is inadequate to support a finding that there would have been a motivation to combine.” (quoting *In re Van Os*, 844 F.3d 1359, 1361–62 (Fed. Cir. 2017))).

Nothing in Li or Siam suggest a need to improve their mode selection system. Ex-2022, ¶ 83. To the contrary, Li expressly states that its disclosed embodiments solve the power consumption problem. Ex-1005, [0019]. For example, Li states that by switching “STA 120 and STA 150 to a SIMO or MIMO operating mode” the “power consumption for STA 120 and STA 150 may be reduced.” *Id.* Siam simply touts the energy efficiency of its E-BASIC protocol. Ex-1006 at 877. Siam’s simulations using the E-BASIC protocol chose “one of the four modes (SISO, SIMO, MISO, or MIMO) according to the transmission distance, with the goal of minimizing” total energy consumption per bit. *Id.*

Even if Li identified and solved a problem with respect to power consumption in idle mode and even if Siam identified and solved a problem with respect to circuit power consumption, neither of which is true, there are many ways of solving these problems without using a control signal based in part on the power consumption of the first and second circuitry and a control signal based in part on idle power consumption of the mobile station. Ex-2022, ¶ 84. Petitioners provide no explanation for why in a combined Li-Siam system a POSITA would have used a control signal based at least in part on the power consumption of the circuitry and idle power

consumption of the mobile station instead of other various options. *Id.* “A more thorough explanation is needed to address whether, and why, a skilled artisan would be motivated to combine” Li’s system with Siam’s teaching regarding transmission and circuit power consumption to arrive at a control signal based at least in part on the power consumption of the circuitry and idle power consumption of the mobile station. *Kerry Group Servs. Int’l Ltd. v. Fla. Food Prods, LLC*, No. 2023-2092, 2025 WL 582881, at *5-6 (Fed. Cir. Feb. 24, 2025) (vacating unpatentability determination where the stated motivation to combine “lacks a reasoned explanation that is supported by substantial evidence”).

ii. *Petitioners fail to demonstrate that Li-Siam discloses the “idle power consumption” limitation of independent claim 25.*

Neither Li nor Siam discloses the selection of a MIMO or SIMO mode in accordance with a control signal based, at least in part, on an idle power consumption of the mobile station. Ex-2022, ¶¶ 85-86.

With respect to Li, Petitioners rely on a passing mention that “a station in idle mode waiting for incoming signals may consume approximately 60% of its battery energy.” Pet. at 41 (quoting Ex-1005 ¶ 18). Li also recognizes that switching from a SISO or a MISO mode to a MIMO mode may reduce power consumption of wireless communication devices. Ex-1005 ¶ 19. But these two observations are insufficient because Li ***does not teach selecting*** a SIMO or MIMO mode in accordance with a

control signal based, at least in part, on an idle power consumption of the device, as recited in '120 Patent claim 25. Ex-2022, ¶ 87. Indeed, Petitioners' expert concedes that there is only a single reference to idle mode in the entire disclosure of Li. Ex-2013, 66:20-67:2. Li does not disclose or suggest how "idle mode" could be used for power consumption, how "idle mode" could be relevant to mode selection, or how "idle mode" might be considered with respect to a control signal received by the mobile station. Ex-2022, ¶ 87. Petitioners' expert acknowledges that Li does not teach or suggest any inputs or variables that might be used in mode selection. Ex-2013, 68:14-69:3. Rather, Li only mentions idle mode to identify the problem of power consumption but offers no teaching or suggestion about the possible use of idle mode. Ex-1005, [0018]; *see also* Ex-2013 at 69:11-19 (confirming that "this problem" of power consumption is "the extent of Li's consideration of idle mode"). Absent some teaching about use of idle power, Li is insufficient to disclose a control signal based, at least in part, on an idle power consumption of the mobile station. Ex-2022, ¶ 87.

Instead, Li teaches that the base station requests that the device switch from a SISO or MISO operating mode to a SIMO or MIMO operating mode. *E.g.*, Ex-1005 ¶¶ 19-24. Reduced power consumption may be a result of the mode selection, *see id.* ¶¶ 19, 35, 43, but Li does not specify that the selection is in accordance with a control signal based, at least in part, on idle power consumption. Indeed, Li does not provide

any criteria to determine when mode switching should occur or identify the inputs used in determining mode switching; it simply describes the mechanics of how switching is accomplished. *See id.* ¶¶ 24-25, 31. Li describes how a media access control (MAC) processor can be arranged to receive a physical layer convergence procedure protocol data unit (PPDU); in response to the received PPDU, the MAC outputs a receiver control signal instructing the mobile station to switch its mode. *Id.* ¶ 24. No information is provided about generating this receiver control signal, and Li does not mention inputs or variables that might be used in the disclosed control signal. *See* Ex-1005 [0024]. This description does not include any variables, and certainly does not consider idle power consumption, in the receiver control signal or determining mode selection. Ex-2022, ¶ 88. Petitioners' and their expert's assertion that "a POSITA would have understood and been motivated to configure Li's control signal for switching communication modes to also be based at least in part on ... circuit power consumed while the mobile station is idle," Pet at 42, Ex-1002 ¶ 123, is a conclusory opinion and unsupported by any evidence. Ex-2022, ¶ 88.

Siam does not disclose the "idle power consumption" limitation of claim 25. *Id.*, ¶ 89. As stated in the Institution Decision, "Petitioner relies on Li, not Siam, for a control signal based on an idle power consumption of the mobile station." Paper 15, 35. Petitioners do not point to any disclosure in Siam relating to a control signal

based, at least in part, on idle power consumption. Nor can they, because, as Petitioners' expert agreed, Siam does not mention "idle power" or idle states at all. Ex-2013, 64:-11-14. Indeed, the Petition confirms that none of the inputs to the circuit power equation in Siam relate to idle power consumption. Pet. at 38 n.11 ("“ P_{DAC} , P_{mix} , P_{LNA} , P_{IFA} , P_{filt} , P_{flr} , P_{ADC} , and P_{syn} are the power consumption values for the digital-to-analog converter (DAC), mixer (MIX), low noise amplifier (LNA), intermediate frequency amplifier (IFA), filters at the transmitter and the receiver sides (FILT), analog-to-digital converter (ADC), and frequency synthesizer (SYN), respectively.” (quoting Ex-1006 at 877)). Rather than *idle* time, references to variation in circuit power are based on transmitter-receiver *distance*. This, rather than idle power consumption, is the variable by which Siam determines how to reduce total power consumption: “Depending on the transmitter-receiver distance, any of the four modes can be the ‘optimal’ one in terms of minimizing the total energy consumption.” *Id.* at 875. None of the inputs or variables in Siam’s circuit power equation represent or correspond to idle power consumption. *See id.* at 877.

Neither Siam nor Li discloses the “idle power consumption” limitation of claim 25[f], and there is no indication in either reference that combining them could introduce taking into account idle power. Ex-2022, ¶ 90. Therefore, Petitioners’ Ground 1 fails to render obvious claim 25 of the ’120 Patent.

- iii. *Petitioners fail to demonstrate that Li-Siam discloses dependent claim 27.*

Petitioners fail to demonstrate that Ground 1 renders obvious claim 27 of the '120 Patent, a claim depending from claim 25, for the same reasons explained *supra* Section VII.A.i. Ex-2022, ¶ 91.

- iv. *Petitioners fail to demonstrate that Li-Siam discloses dependent claim 28.*

Petitioners fail to demonstrate that Ground 1 renders obvious claim 28 of the '120 Patent, a claim depending from claim 25, for the same reasons explained *supra* Section VII.A.i. Ex-2022, ¶ 92.

B. Ground 2: Claims 25, 27, and 28 Would Not Have Been Obvious Over Li-Siam in View of Cui-2003.

- i. *Petitioners fail to demonstrate that a POSITA would have been motivated to combine Li-Siam with Cui-2003*

A POSITA would not have been motivated to combine Li, Siam, and Cui to arrive at the claimed invention. Ex-2022, ¶ 93. When combining teachings from different references, a petitioner must explain (1) how a POSITA would combine the elements to reach the claimed invention and (2) why a POSITA would have been motivated to do so. *TriVascular*, 812 F.3d at 1066 (explaining that a determination of obviousness cannot be reached where the record lacks “explanation as to how or why the references would be combined to produce the claimed invention”); *In re Nuvasive*, 842 F.3d at 1381-82 (“[t]he factual inquiry whether to combine references

must be thorough and searching”). Here, Petitioners instead merely pluck features from these references in an attempt to reconstruct the claimed invention through hindsight.

As stated above, Petitioners’ purported motivations are conclusory, unsupported by the evidence, and based on hindsight. Ex-2022, ¶ 94. As an initial matter, Li and Siam in fact have little in common. *Id.* Li discloses a wireless communication system comprising mobile stations and access points, while Siam is an academic paper that discloses a software protocol and provides numerical results that “were all done on a computer as a simulation.” Ex-1005, Abstract; Ex-1006, 877-78; Ex-2013, 77:7-22, Petitioners’ expert confirms that the results reported in Siam were simply generated using a computer simulation platform. Ex-2013, 77:7-22.

Neither Petitioners nor its declarant adequately explained why altering Li would improve the functionality over what is expressly disclosed in each prior art reference. Ex-2022, ¶ 95. Petitioners claim that a “POSITA would have been motivated to improve Li’s mode-switching system by adding Siam’s teaching that expressly considers transmission and circuit power consumption to select an optimal transmit mode between SIMO and MIMO.” Pet. at 26. But, Petitioners’ assertion that a POSITA would have combined Li with Siam to improve Li’s system is nothing

more than a conclusory statement and fails to articulate why a POSITA would have been motivated to combine these specific pieces of prior art. Ex-2022, ¶ 95.

Nothing in Li or Siam suggest a need to improve their mode selecting system. Ex-2022, ¶ 96. To the contrary, Li expressly states that its disclosed embodiments solve the power consumption problem. Ex-1005, [0019]. Siam simply touts the energy efficiency of its E-BASIC protocol. Ex-1006, 880.

Even if Li identified and solved a problem with respect to power consumption in idle mode and even if Siam identified and solved a problem with respect to circuit power consumption, neither of which is true, there are many ways of solving these problems without using a control signal based in part on the power consumption of the first and second circuitry and a control signal based in part on idle power consumption of the mobile station. Ex-2022, ¶ 97. Petitioners provide no explanation for why in a combined Li-Siam system a POSITA would have used a control signal based on the power consumption of the circuitry and idle power consumption of the mobile station instead of the other, various options. *Id.*

Petitioners' assertion that a "POSITA would have been motivated to improve Li-Siam's mode-switching system by adding Cui-2003's express teaching that power consumption during sleep [] mode should be expressly considered in determining the most efficient modulation strategy," Pet. at 46, is also conclusory, unsupported by the evidence, and based on hindsight. Ex-2022, ¶ 98. A POSITA

reading Cui-2003 would have noticed that in sleep mode “all the circuits in the signal path are shut down for energy saving,” Ex-1007 at 2806, and Cui-2003 sets the power consumed in sleep mode to zero. These facts suggest that sleep mode has no impact at all on selecting an efficient transmission mode. A POSITA would not have considered the power expended in sleep mode to be relevant to transmission mode selection since Cui-2003 sets the power consumed in sleep mode to zero. Ex-2022, ¶ 98.

Even if a POSITA understood Cui-2003's sleep mode to be consuming power, which is not the case, there are many ways of addressing sleep mode without using a control signal based in part on the idle power consumption of the mobile station. Ex-2022, ¶ 99. Petitioners provide no explanation for why in a combined Li-Siam system a POSITA would have thought that considering the power consumption in Cui-2003's sleep mode would improve Li-Siam's system. *Id.* Petitioners also do not explain why or how a POSITA would have taken Cui-2003's sleep mode and used it in Li-Siam's system to arrive at a control signal based in part on idle power consumption of the mobile station instead of other various options. *See TQ Delta*, 942 F.3d at 1359.

- ii. *Petitioners fail to demonstrate that Li-Siam-Cui-2003 discloses the “idle power consumption” limitation of independent claim 25.*

In Ground 2, Petitioners supplement Ground 1 with Cui-2003 solely for the limitation of “wherein the control signal is based, at least in part, on an idle power consumption of the mobile station” in claim 25. Pet. at 48-53.

As an initial matter, Petitioners' addition of Cui-2003 solely for claim element 25[f] confirms the insufficiency of Li and Siam for the “idle power consumption” limitation. Ex-2022, ¶ 101. For the reasons stated above, Ground 1 fails. Nevertheless, Cui-2003 does not remedy this problem because it also does not disclose a control signal “based, at least in part, on an idle power consumption of the mobile station,” as recited in claim 25. *Id.* Instead, Cui-2003 describes a “sleep mode,” not an idle mode, and it certainly does not teach or suggest a “control signal based, at least in part, on an idle power consumption of the mobile station.” *Id.* Since Cui-2003 does not disclose the “idle power consumption” limitation of claim 25, Ground 2 also fails.

The '120 Patent explains that “idle time is a time during which the transceiver may be waiting to send data over the communications channel. The transceiver may, for example, be waiting for a scheduled start time for the transceiver to use the communications channel. ... [I]f the transmission rate is too slow, a greater number of transceivers may become idle, waiting to send transmissions over the

communications channel.” Ex-1001 at 2:60-64, 3:3-5. Thus, the “idle time” and “idle power consumption” refer to times when the mobile station and the first and second circuitry of the device are powered on and waiting to transmit data over the communications channel. Ex-2022, ¶ 102. Petitioners and their expert even state that “idle power consumption means that the circuits are powered but have nothing to transmit or receive.” *E.g.*, Pet. at 49; Ex-1002 at 96.

Cui-2003 does not disclose or suggest an idle mode or idle power consumption at all. Ex-2022, ¶ 103. In contrast, Cui-2003 describes sleep mode as “where all the circuits in the signal path *are shut down* for energy saving.” Ex-1007 at 2806 (emphasis added). In fact, Cui-2003 sets the power consumption for the sleep mode P_{sp} to zero because the technology used has almost no power consumption in sleep mode.¹ *See id.* Petitioners’ expert agreed that the reason why Cui-2003’s sleep mode is able to conserve energy is because it is not consuming significant processing and transceiver power. Ex-2013 at 100:7-14. In addition, Cui-2003 explains that there is

¹ Cui-2003 states, “Since CMOS technology is exclusively used in our analysis, the leaking current $I_l \approx 0$ compared with the active mode. Thus, we set $P_{sp} = 0$.” Ex-1007 at 2806 (citation omitted). The ’120 Patent also mentions that “[*e*]/*ven if* the idling transceivers turn off their transmission chains, some idle power may be consumed due to leakage current or other effects.” Ex-1001 at 3:5-7 (emphasis added). Thus, the ’120 Patent indicates that the idling transceivers do not typically turn off their transmission chains, so the idle power consumption is generally not limited to the leakage current. *See id.*

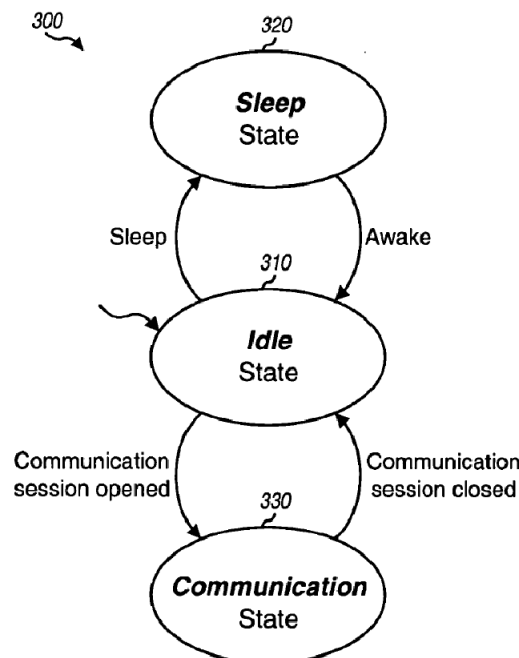
a transient mode when switching from sleep mode to active mode, indicating that the device is not ready and waiting to transmit in sleep mode. *Id.*

Cui-2003's sleep mode is completely different from the claimed "idle power consumption" because there is almost no power consumption in sleep mode, whereas the '120 Patent is focused on the power consumed while idling since it may be significant. Ex-2022, ¶ 104. For example, the '120 Patent recognizes that the "idle power spent at a lower transmission rate may accordingly make the lower transmission rate less desirable in some examples." Ex-1001 at 3:7-10. This suggests that during lower transmission rate periods the idle power consumption may represent a significant part of the power consumed. And Petitioner's expert stated that "there is a non-negligible energy consumption when idling," during which the mobile station may consume significant processing and transceiver power depending on implementation. Ex-2013 at 102:12-22. Thus, consistent with the plain and ordinary meaning of "idle power consumption" discussed *supra*, a POSITA would not understand a sleep mode "where all the circuits in the signal path are shut down" to disclose or suggest the claimed "idle power." Ex-2022, ¶ 104.

Cui-2003 never mentions power consumption during an idle time, just like the '120 Patent never mentions power consumption during sleep mode. *See* Ex-1001; Ex-1007. Petitioners and their expert spend considerable effort seeking to conflate these two distinct modes. Petitioners' other references confirm that sleep mode and

idle mode are distinct, showing that a POSITA would not treat sleep mode to disclose or suggest the claimed “idle power.” Ex-2022, ¶ 105. *First*, while Cui-2003 explains that there is almost no power consumed during sleep mode, Ex-1007 at 2806, Li states that a device in idle mode “may consume approximately 60% of its battery energy,” Ex-1005 ¶ 18. The vast difference in power consumed in sleep and idle mode demonstrates that these modes are distinct. Ex-2022, ¶ 105.

Second, U.S. Patent Publication No. 2005/0250452 (“Walton”) explicitly distinguishes idle mode from sleep mode. *E.g.*, Ex-1031 Fig. 3A-3B, ¶¶ 45-61. Walton explains that a wireless device may operate in a number of different states, including an idle state, a sleep state, and a communication state, as illustrated in Figure 3A below. *Id.* at ¶ 45.

**FIG. 3A**

Id. at Fig. 3A. Figure 3A shows that in the idle state, unlike the sleep state, the device is awake. *Id.*

Walton also explains that “[i]n the Idle state, the wireless device may enable only a Subset (e.g., one) of the N receiver units and only the processing unit(s) used for signal detection and acquisition.” *Id.* at ¶ 49. In contrast, Walton states that “[i]n the Sleep state, wireless device 100a may shut down as many circuit blocks as possible to conserve power,” *id.* at ¶ 51, which echoes Cui-2003’s description of sleep mode, Ex-1007 at 2806 (“all the circuits in the signal path are shut down for energy saving”). By quoting these two passages from Walton, Petitioners’ expert acknowledges that there are distinct idle and sleep states. Ex-1002 at 38. Furthermore, Walton establishes that sleep state and idle state are two separate states because the wireless device may “transition” from one to the other. *E.g.*, Ex-1031 ¶ 51 (while in sleep state, the wireless device may “monitor for certain interrupts (e.g., user input) that can trigger an immediate transition to the Idle state”).

Third, Petitioners’ expert has authored multiple articles distinguishing between sleep mode and idling. For example, several of his articles describe “put[ting] each radio into a sleep mode” as a common and effective way to “conserve energy.” Ex-2015, 1 [Hybrid-ARQ Based Intra-Cluster Geographic Relaying]; Ex-2014 [Position-Based Relaying with Hybrid-ARQ for Efficient Ad Hoc Networking]; *see also* Ex-2016 [Geographic Random Forwarding with Hybrid-ARQ

for Ad Hoc Networks with Rapid Sleep Cycles] (describing the use of sleep mode as “[p]erhaps the most effective way to conserve energy”). In his deposition, Plaintiff’s expert agreed that these articles differentiate between sleep mode and listening to idle channels, Ex-2013 104:7-105:15, 107:3-17, 108:11-109:7, and agreed that “listening for signals” consumes more energy than sleep mode. *Id.* In another article, Petitioners’ expert describes a circumstance where user equipment begins “camping on a cell,” meaning it begins listening for incoming signals. *Id.* at 111:6-20. When asked about camping on a cell, Petitioners’ expert testified that the during the idle time of the ’120 Patent the mobile station and transceiver are even more awake. *Id.* at 112:6-8 (“[When camping on a cell] it is not in a position where it is ready to transmit the way it might be in the ’120 patent.”); *id.* at 113:2:12 (“Q Is your understanding that in idle mode in the ’120 patent the mobile station is always waiting to send? A Yes, it would be waiting to send or receive.”). Petitioners’ expert own articles confirm a POSITA would understand that the energy saving “sleep mode” is quite different from the claimed “idle power consumption.” Ex-2022, ¶ 109.

In addition to Petitioners’ and their expert’s references, the prosecution history suggests that the “sleep mode” disclosure in Cui-2003 is insufficient to teach or suggest the claim limitation of “wherein the control signal is based, at least in part, on an idle power consumption of the mobile station.” Ex-2022, ¶ 110. The

“sleep mode” disclosure in Cui-2003 is identical to the “sleep mode” disclosure in Cui-2005 that is presumed to have been considered by the examiner during prosecution of the '120 Patent. *Compare* Ex-1007, *with* Ex-1025. Petitioners' expert could not identify any disclosure he is relying on Cui-2003 that is not in Cui-2005. Ex-2013 at 117:21-118:11, 120:21-121:10. Thus, the Board should find that the “sleep mode” disclosure in Cui-2003 was also presumptively considered during prosecution, and for this additional reason Cui-2003's sleep mode does not disclose or suggest the claimed “idle power consumption.” As the Federal Circuit has stated:

When no prior art other than that which was considered by the PTO examiner is relied on by the attacker, he has the added burden of overcoming the deference that is due to a qualified government agency presumed to have properly done its job, which includes one or more examiners who are assumed to have some expertise in interpreting the references and to be familiar from their work with the level of skill in the art and whose duty it is to issue only valid patents.

Ultra-Tex Surfaces, Inc. v. Hill Bros. Chem. Co., 204 F.3d 1360, 1367 (Fed. Cir. 2000) (quoting *Am. Hoist & Derrick Co. v. Sowa & Sons, Inc.*, 725 F.2d 1350, 1359 (Fed. Cir.1984). Here, since Petitioners are relying exclusively on Cui-2003's sleep mode in Ground 2 for purposes of the idle power consumption limitation, and the examiner found that the prior art of record, including disclosure identical to Cui-2003's sleep mode, did not disclose this limitation, Ex-1004, 0189, the Board should reject Petitioners' argument with respect to Cui-2003 for this addition reason.

Therefore, a POSITA would understand that Cui-2003's sleep mode does not disclose the '120 Patent's idle mode, despite Petitioners' assertion otherwise. Ex-2022, ¶ 111; *cf.* Pet. at 51. Petitioners' unsupported argument that "mobile stations in sleep mode may nevertheless continue to consume power since they are not completely shut down," Pet. at 51, is belied by Cui-2003's explicit description that in sleep mode "all the circuits in the signal path *are shut down* for energy saving," Ex-1007 at 2806 (emphasis added). Petitioners' other references also establish that in sleep mode, unlike in idle mode, as many circuit blocks as possible are *shut down* to conserve power. Ex-1031, ¶¶ 49, 51. Petitioners' attempt to equate Cui-2003's sleep mode with the '120 Patent's idle mode contradicts the teachings of the references, and a POSITA would understand that the power in sleep mode does not disclose idle power consumption. Ex-2022, ¶ 111. Petitioners' and their expert's assertions that "Li's control signal for switching communication modes in the combined Li-Siam-Cui-2003 system would be based at least in part on an idle power consumption of the mobile station," Pet at 52, Ex-1002 ¶ 147, is a conclusory opinion and unsupported by any evidence. Therefore, Ground 2 fails to teach the limitations of claim 25 of the '120 Patent because Cui-2003, and the other asserted art from Ground 1, do not disclose the "idle power consumption" limitation. Ex-2022, ¶ 111.

iii. Petitioners fail to demonstrate that Li-Siam-Cui-2003 discloses dependent claim 27.

Petitioners fail to demonstrate that Ground 2 renders obvious claim 27 of the '120 Patent, a claim depending from claim 25, for the same reasons explained *supra* Section VII.B.i. Ex-2022, ¶ 112.

iv. Petitioners fail to demonstrate that Li-Siam-Cui-2003 discloses dependent claim 28.

Petitioners fail to demonstrate that Ground 2 renders obvious claim 28 of the '120 Patent, a claim depending from claim 25, for the same reasons explained *supra* Section VII.B.i. Ex-2022, ¶ 113.

C. Ground 3: Claim 26 Would Not Have Been Obvious Over Li-Siam in View of Wu.

Petitioners fail to demonstrate that Ground 3 renders obvious claim 26 of the '120 Patent, a claim depending from claim 25, for the same reasons explained *supra* Section VII.A.i. Ex-2022, ¶ 114.

D. Ground 4: Claim 26 Would Not Have Been Obvious Over Li-Siam-Cui-2003 in View of Wu.

Petitioners fail to demonstrate that Ground 4 renders obvious claim 26 of the '120 Patent, a claim depending from claim 25, for the same reasons explained *supra* Section VII.B.i. Ex-2022, ¶ 115.

Additionally, Petitioners fail to demonstrate that a POSITA would have been motivated to combine Li-Siam-Cui-2003 with Wu, for the same reasons explained *supra* Section VII.C. Ex-2022, ¶ 116.

E. Ground 5: Claim 29 Would Not Have Been Obvious Over Li-Siam in View of Tirola.

i. Petitioners have not established a motivation to combine Li-Siam and Tirola.

A POSITA would not have been motivated to combine Li-Siam with Tirola. Ex-2022, ¶ 117. Petitioners argue that a POSITA would have been motivated to combine Li-Siam with Tirola “to improve the Li-Siam system in the presence of multiple users” because integrating Tirola allegedly will help indicate instances where a SIMO mode is not favorable. Pet. at 61-62.

But a POSITA seeking to optimize system performance would have been pulled in separate directions by reading Li-Siam and Tirola. Ex-2022, ¶ 118. While Li touts how “[t]echniques to improve control and management of a MIMO system may improve overall system performance,” Ex-1005 ¶ 1 (emphasis added), Tirola claims that “[b]ased on this study the MIMO concept does not seem feasible for improving UMTS [Universal Mobile Telecommunications System] uplink performance,” Ex-1008 at 657 (emphasis added). Far from “straightforward,” it would have been counterintuitive to combine Li-Siam’s system with Tirola in view of Tirola’s *express disparagement of MIMO*. Ex-2022, ¶ 118; *cf.* Pet. at 63.

More specifically, Li-Siam and Tirola contain conflicting views on the value of diversity gains based on the use of MIMO technology in uplink communications. Ex-2022, ¶ 119. Siam touts “[s]ignificant improvement in network performance” achieved by MIMO techniques “whereby multiple transmit and/or receive antennas are exploited to achieve spatial diversity.” Ex-1006 at 875. Indeed, Siam describes diversity gains as one of the three types of gains from MIMO, and as one of the two focuses of its assessments of MIMO’s benefits. *Id.* Tirola does not recognize any benefits associated with transmit diversity:

As a summary, it can be said that the doubling of the number of receiving antennas will almost double the isolated cell capacity, whereas the increase of the number of transmit antennas [i.e., MIMO] will mostly have negative impact on the isolated cell capacity ... The results showed that transmit diversity [i.e., MIMO] in UL does not increase the isolated cell capacity.

Ex-1008 at 660; *see also id.* at 657 (“For example, in terms of isolated cell capacity, a MIMO technique with 2 transmit (Tx) and 2 receive (Rx) antennas performed approximately 50% worse than a traditional approach with 1 Tx and 4 Rx antennas.”). Thus, Tirola concludes that “from the uplink coverage studies it can be stated that increasing the number of receive antennas is more feasible than employing the MIMO concept.” *Id.* Petitioners fail to show that a POSITA would

have known how to account from these discrepancies between the references or otherwise address problems that would arise from the proposed combinations.

Petitioners also state that “Tirola’s simulation of noise rise demonstrates that under certain conditions, noise rise is larger for a 1x2 (SIMO) mode than for a 2x2 (MIMO) mode and the advantage of a MIMO mode increases with increasing number of users.” Pet. at 61. But a POSITA would not draw such a conclusion from Tirola based on the entirety of its teachings. *See W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1550 (Fed. Cir. 1983) (finding error “in considering the references in less than their entireties”); *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1363 (Fed. Cir. 2017) (“Evidence suggesting reasons to combine cannot be viewed in a vacuum apart from evidence suggesting reasons not to combine.”). In fact, the other simulations in Tirola, depicted in Figures 4(a), (c), and (d), show that noise rise is approximately equal for a 1x2 (SIMO) mode and 2x2 (MIMO) mode, or even that noise rise is greater for the MIMO mode than the SIMO mode. Ex-1008 at 661. Petitioners’ expert concedes that based on the eight examples in Figure 4, ***five examples in Tirola showed the noise rise for MIMO mode was larger***, two showed the noise rise was about the same for MIMO and SIMO mode, ***and only one showed the noise rise for SIMO mode was larger***. Ex-2013, 143:16-144:3. This deposition testimony contradicts the testimony in Petitioners’ expert declaration that “a POSITA would have understood

that as the noise penalty of a SIMO mode grows with the number of users, it may be advantageous at some point to switch to MIMO operation.” Ex-1002 ¶ 166. A POSITA would not reasonably draw this conclusion from Tirola. Ex-2022, ¶ 120.

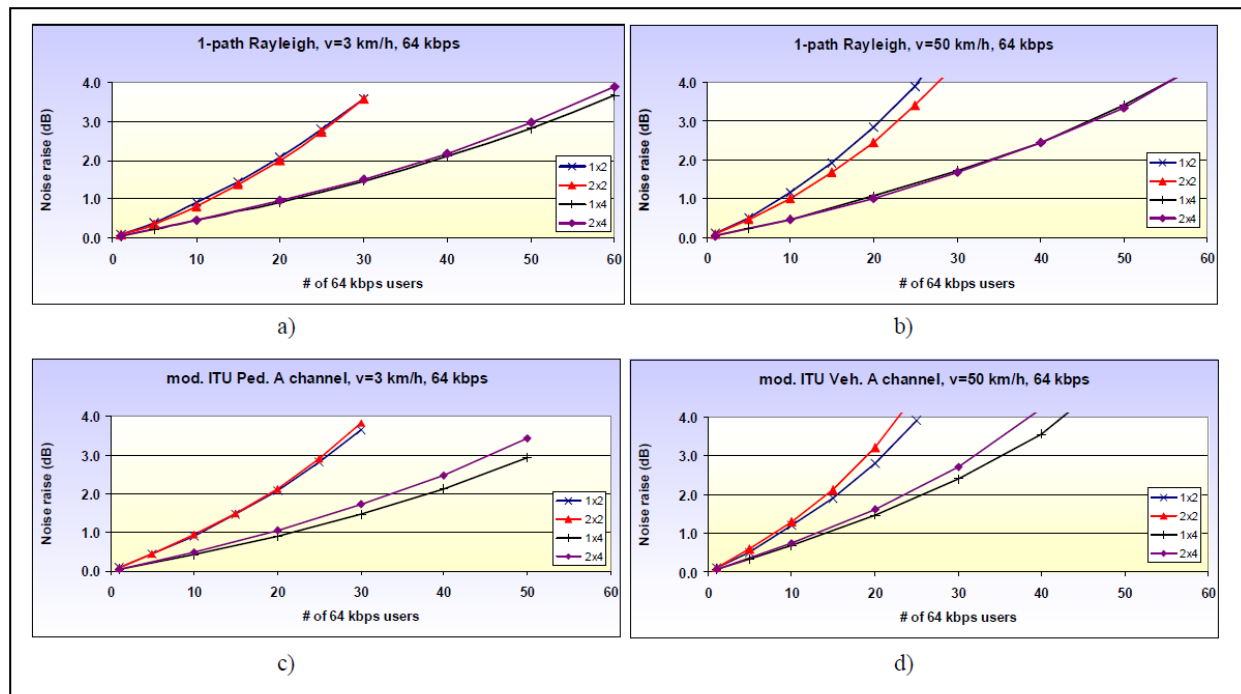


Figure 4. UL noise rise, SIMO and MIMO, 64 kb/s.

In fact, Tirola drew the opposite conclusion. Ex-2022, ¶ 121. The results of the *entirety* of Tirola's simulations led the authors to conclude that “the doubling of the number of receiving antennas [i.e., SIMO] will almost double the isolated cell capacity, whereas the increase of the number of transmit antennas [i.e., MIMO] will mostly have *negative impact* on the isolated cell capacity.” *Id.* at 660 (emphasis added). When confronted in his deposition, Petitioners' expert agreed with Tirola's conclusion of MIMO having a mostly negative impact. Ex-2013, 144:21-145:17 (“the majority of the cases that he looked at showed kind of a negative gain from

going from SIMO to MIMO”). Therefore, despite Petitioners’ claim, Tirola **does not** teach “that channel noise considerations might favor, for example, a MIMO mode over a SIMO mode based on the noise increase in the presence of a large number of users.” Pet. at 67.

Further, Petitioners err in suggesting that Tirola has relevance here by relying on a single result, not the entire teachings, in Tirola. The relevant inquiry is whether a POSITA would have been motivated to make the combination despite drawbacks that the combination might present. *Arctic Cat Inc. v. Polaris Indus. Inc.*, 795 F. App’x 827, 833 (Fed. Cir. 2019); *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1331-32 (Fed. Cir. 2019) (“benefits, both lost and gained, should be weighed against one another” in evaluating motivation to combine) (emphasis omitted). Here, Petitioners do not confront Tirola’s overarching conclusion and instead focus on the only instance where the results in Tirola suggest that MIMO may work—a set of results Tirola rejected and did not motivate Tirola to suggest MIMO. Ex-2022, ¶ 122; *compare* Pet. at 61-62 (citing Ex-1008, Fig. 4b), *with* Ex-1008 at 659 (identifying Fig. 4b as “the only simulated case in which the usage of the 2nd transmit antenna provides some capacity gain in an isolated cell”); *see also Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360-63 (Fed. Cir. 2017) (affirming determination of no motivation to combine where the “evidence may not rise to the level of teaching away”); *Polaris Industries, Inc. v. Arctic Cat*,

Inc., 882 F.3d 1056, 1069 (Fed. Cir. 2018) (“[E]ven if a reference is not found to teach away, its statements regarding preferences are relevant to a finding regarding whether a skilled artisan would be motivated to combine that reference with another reference.”).

Petitioners also argue that Li-Siam and Tirola address the issue of power consumption “in similar and predictable ways, namely, by selecting and/or switching to an optimal transmission mode to improve overall system performance” and a “POSITA would have understood that their teachings could be combined with little to no change in their respective functions.” *Id.* at 63. But “[t]he obviousness inquiry does not merely ask whether a skilled artisan *could* combine the references, but instead asks whether they *would* have been motivated to do so.” *Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020) (citation omitted). And “a clear, evidence-supported account of the contemplated workings of the combination is a prerequisite to adequately explaining and supporting a conclusion that a relevant skilled artisan would have been motivated to make the combination.” *PersonalWeb Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 994 (Fed. Cir. 2017). Petitioners’ arguments fail because they do not articulate how a POSITA would have incorporated a control signal based in part on the number of users of the communications system in the Li-Siam system. Ex-2022, ¶ 123. Petitioners failed to explain in their Petition how Tirola’s teachings about the number of users would be combined with the Li-Siam system and how the

proposed combination would have worked. Thus, a POSITA would not have been motivated to combine Li-Siam with Tirola. *See Arctic Cat*, 876 F.3d at 1360.

- ii. *None of Petitioners' asserted references disclose a control signal based, at least in part, on a number of users of the communications system.*

Petitioners' Ground 5 fails because none of the asserted references disclose a "control signal based, at least in part, on the number of users of the communication system," as recited in claim 29. Ex-2022, ¶¶ 124-25. Petitioners exclusively rely on Tirola for the "number of users" limitation. Pet. at 65-68. But Tirola merely describes a simulation in which signal noise increases in SIMO and MIMO transmission modes as the number of users increase. *See* Ex-1008 at 659, 661. As stated above, Petitioners rely on only one example of these simulations to assert that Tirola teaches that "the advantage of a MIMO mode increases with increasing number of users." Pet. at 66-67.

Regardless of these noise level simulations, Tirola does not teach or suggest using a control signal that considers the number of users in determining transmission mode selection. Ex-2022, ¶ 126. Petitioners cite equations from Tirola simulating "the number of users," Pet. at 66, but these equations are solely for Tirola's simulations and have no application with respect to any control signal received by a mobile station. Ex-2022, ¶ 126. As explained above, Tirola does not teach transmission mode selection at all. Instead Tirola provides results of simulations

run on both SIMO and MIMO modes and states that “the MIMO concept does not seem feasible for improving UMTS uplink performance.” Ex-1008 at 657.

Petitioners contend a “POSITA, therefore, would have understood that there could be a crossover point in Figure 4(b) such that consideration of both the power consumption and the number of users of the system might lead the system to choose a SIMO mode over a MIMO mode.” Pet. at 67. But Tirola does not teach or suggest a crossover point based on the number of users in Figure 4. Ex-2022, ¶ 127. Indeed, none of the graphs in Figure 4 of Tirola reproduced below disclose or suggest a crossover point.

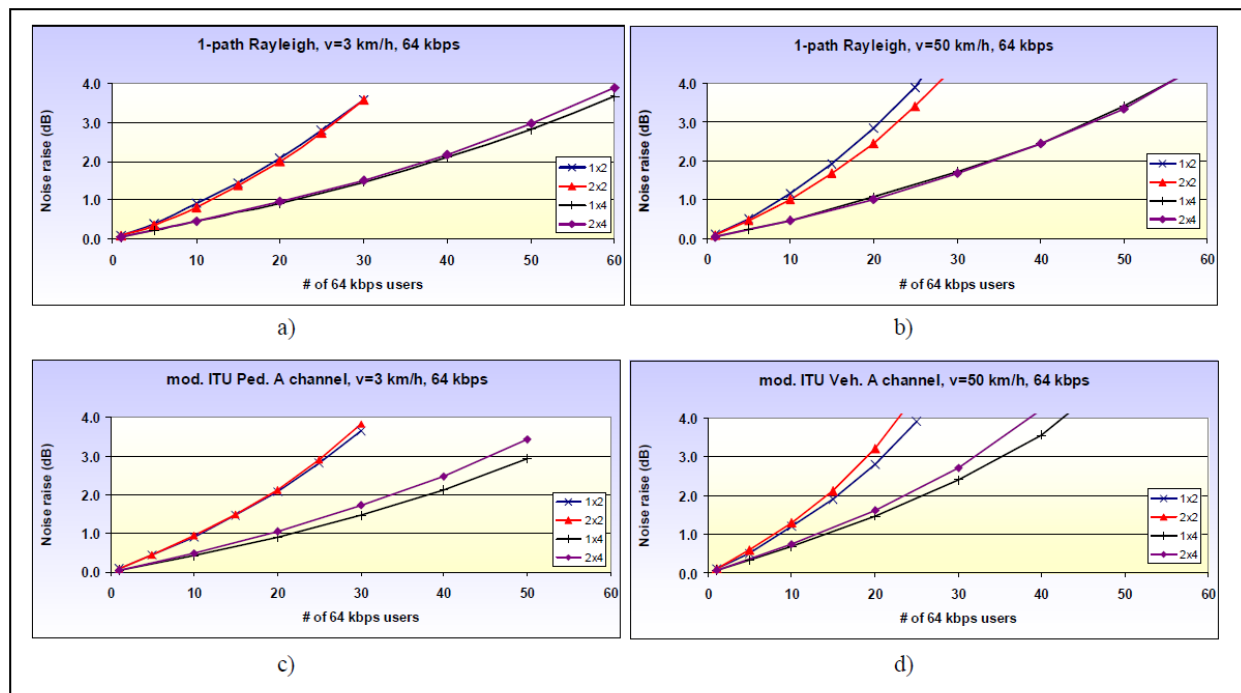


Figure 4. UL noise rise, SIMO and MIMO, 64 kb/s.

Although Li discloses switching operating modes, Li does not mention the number of users of the communications system and, and unlike the '120 Patent, does not use

the term crossover point. Ex-1001 at 4:62-64 (“A crossover point for when SIMO consumes less power than MIMO, or vice versa, may be considered a function of any of a variety of variables....”); *see also* *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998) (“Obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.” (cleaned up)). And Tirola’s rejection of the viability of MIMO also suggests that a POSITA would not have been motivated to combine Tirola’s teaching with the Li-Siam system to arrive at a mobile station that receives “a control signal based at least in part on the number of users of the communications system.” *See, e.g., id.*; Ex-1005 ¶ 24. Therefore, Ground 5 fails to render obvious claim 29 of the ’120 Patent because Tirola, and the other asserted art from Ground 1, do not disclose “a control signal based at least in part on the number of users of the communications system.” Ex-2022, ¶ 127.

VIII. CONCLUSION

For the foregoing reasons, the Board should find that Petitioners have failed to meet their burden of proving that any Challenged Claims are unpatentable under any of the instituted Grounds.

IPR2024-00896 (U.S. Patent No. 8,798,120)
Patent Owner's Response

Dated: March 21, 2025

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CERTIFICATE OF COMPLIANCE WITH 37 C.F.R. § 42.24

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the present paper contains 13,210 words as counted by the word-processing program used to generate the brief. This total does not include the tables of contents and authorities, the caption page, table of exhibits, certificate of service, or this certificate of word count.

Dated: March 21, 2025

Respectfully submitted,

/s/ Nathaniel Browand

Nathaniel Browand

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that this Patent Owner Response and Exhibits 2011-2022 were served on March 21, 2025, by filing them through the P-TACTS System, as well as delivering a copy via electronic mail upon the following attorneys of record for the Petitioners:

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