UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

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

Petitioners,

v.

APEX BEAM TECHNOLOGIES LLC,

Patent Owner.

Patent No. 10,944,527
Filing Date: June 3, 2019
Issue Date: March 9, 2021

Inventor: Xiaobo Zhang
Title: METHOD AND DEVICE FOR MULTI-ANTENNA TRANSMISSION IN UE AND BASE STATION

---

# DECLARATION OF MIGUEL GOMEZ

Case No. IPR2023-00603

---

I, Miguel Gomez, declare as follows:

## I. BACKGROUND AND QUALIFICATIONS

1. The details of my education, work experience, and research are summarized in my curriculum vitae ("CV") which is attached to this Report as **Exhibit A**. I have summarized some of the relevant information about my experience and qualifications below.

2. I received my Bachelor's degree in Electrical Engineering from Yale University in 1983.

3. I am a co-inventor on the following patents: U.S. Patent No. 7,814,204 "Method of and system for analyzing the content of resource requests", U.S. Patent No. 7,447,777 "Switching System", U.S. Patent No. 7,321,926 "Method and system for allocating resources to resource requests", U.S. Patent No. 8,412,838 "Method and system for analyzing the content of resource requests", and U.S. Patent No. 7,298,746 "Method and system for reassembling and parsing packets in a network environment."

4. In summary, I have more than 35 years of experience as an Electrical Engineer with a broad background in integrated circuit design, storage, power conversion, telephony, and telecommunications.

5. I have prepared this Declaration as an expert witness retained by Apex Beam Technologies LLC. In this Declaration, I provide my opinions as to whether

the Challenged Claims of U.S. Patent No. 10,944,527 (the "'527 Patent") are valid. I provide technical bases for these opinions as appropriate.

6. This Declaration contains statements of my opinions formed to date and the bases and reasons for those opinions. I may offer additional opinions based on further review of the materials in this proceeding, including opinions and/or testimony of other expert witnesses.

## II. MATERIALS CONSIDERED

7. The materials I considered include the '527 patent and the prosecution history for the '527 Patent. I also considered the materials that I refer to and that I cite in this declaration.

8. I also considered all papers and exhibits filed in IPR2023-00603 including the petition ("Pet.") and the declaration of Dr. Apostolos Kakaes.

9. I have also considered the Board's Decision on Institution (IPR2023-00603, Paper 10) ("Inst.") in this proceeding.

10. I have also considered any exhibits attached to the Patent Owner's Response in this proceeding, including the deposition transcript of Dr. Apostolos Kakaes.

11. In addition, I have drawn on my experience and knowledge, as discussed above and described more fully in my CV.

## III. LEGAL PRINCIPLES

12. I understand that a patent claim is unpatentable as "obvious" if the subject matter of the claim as a whole would have been obvious to a person of ordinary skill in the art as of the time of the invention at issue.

13. I understand that the use of the "person of ordinary skill" rubric is to prevent one from improperly, in the present day, using hindsight to decide whether a claim is obvious.

14. I understand that the following factors must be evaluated to determine whether the claimed subject matter is obvious: (1) the scope and content of the prior art; (2) the difference or differences, if any, between the scope of the patent claim and the scope of the prior art; and (3) the level of ordinary skill in the art at the time of the invention.

15. I understand that, unlike anticipation, which allows consideration of only one item of prior art, obviousness may be shown by considering more than one item of prior art. I understand that, when considering a combination of prior art references as part of an obviousness analysis, it can be important to ascertain if the references are from the same field of endeavor and also to ascertain whether there is any reason that would have prompted a person of ordinary skill in the relevant art to combine the elements in the way the claim does. In other words, a claim generally cannot be rendered obvious by combining (i) art from across different fields,

including outside the field of the claimed invention, or (ii) art that itself teaches away from combination with other art that would otherwise provide its missing limitations, or (iii) art for which there is not at least an articulable, common sense reason to bridge the gap between its disclosure and the claim at issue.

16. Moreover, I understand that so-called "objective indicia of nonobviousness," also known as "secondary considerations," are also to be considered when assessing obviousness. I understand that this objective evidence includes at least: the commercial success of the invention; the long felt but unresolved need to develop the invention; any praise of the invention in the market; and copying by others. I also understand that evidence of objective indicia of non-obviousness must be commensurate in scope with the claimed subject matter; *i.e.*, that there must be a nexus or connection between the criteria and the claim itself.

17. I understand that the disclosure of an asserted prior art reference must provide an enabling disclosure of the desired subject matter and that mere naming or description of the subject matter is insufficient; to be enabling, I understand that it must be able to be produced without undue experimentation.

18. I understand that I must construe a claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and consistent with the prosecution history pertaining to the patent.

## IV. LEVEL OF ORDINARY SKILL IN THE ART

19. I understand that I should perform my analysis from the viewpoint of a person of ordinary skill in the art. I understand that this hypothetical person of ordinary skill in the art is considered to have the normal skills of a person in a certain technical field. I understand that factors that may be considered in determining the level of ordinary skill in the art include: (1) the education level of the inventor; (2) the types of problems encountered in the art; (3) the prior art solutions to those problems; (4) rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the education level of active workers in the field.

20. I understand that, in its Preliminary Response, Patent Owner utilized Petitioner's proposed level of skill in the art— a person of ordinary skill in the art ("POSITA") would have had "at least a master's degree in electrical engineering or a similar field and at least two years of experience working with multiple-input multiple-output (MIMO) technology in telecommunications systems" and that "[m]ore work experience can compensate for less education, and *vice versa*." Pet. at 9-10. I also understand that the Board noted that "Petitioner's last sentence regarding additional relevant work experience compensating for less education and *vice versa*, [] is vague." Inst. at 9-10. In view of the Board's guidance, my opinion is that a POSITA would have had either (i) at least a master's degree in electrical engineering or a similar field and at least two years of experience working with

telecommunications systems; or (ii) at least a bachelor's degree in electrical engineering or a similar field and at least five years of experience working with telecommunications systems.

21. My qualifications and experience exceed those of a person of ordinary skill in the art. Nonetheless, my analysis and opinions herein regarding the '527 patent are given from the perspective of a person of ordinary skill in the art.

## V. CLAIM CONSTRUCTION

22. I have been informed by Counsel that, for purposes of my analysis in this *inter partes* review proceeding, claim terms should be given their ordinary and customary meaning within the context of the patent in which the terms are used, *i.e.*, the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention in light of what the patent teaches, unless it appears that the inventors were using them to mean something else. Additionally, the specification and prosecution history must be consulted to confirm whether the patentee has acted as his/her own lexicographer (*i.e.*, provided special meaning to any disputed terms), or intentionally disclaimed, disavowed, or surrendered any claim scope).

23. I have further been informed by Counsel that a person of ordinary skill in the art is deemed to read a claim term not only in the context of the particular claim in which the disputed term appears, but also in the context of the entire patent,

including the specification and the prosecution history. The prosecution file history provides evidence of how both the Patent Office and the inventors understood the terms of the patent, particularly in light of what was known in the prior art. Further, where the specification describes a claim term broadly, arguments and amendments made during prosecution may require a more narrow interpretation. For these reasons, the words of the claim must be interpreted in view of, and be consistent with, the entire specification. The specification is the primary basis for construing the claims and provides a safeguard such that correct constructions closely align with the specification. Ultimately, the interpretation to be given a term can only be determined and confirmed with a full understanding of what the inventors actually invented and intended to envelop with the claim as set forth in the patent itself.

24. I have further been informed by Counsel that, to determine how a person of ordinary skill would understand a claim term, one should look to those sources available that show what a person of skill in the art would have understood disputed claim language to mean. Such sources include the words of the claims themselves, the remainder of the patent's specification, the prosecution history of the patent (all considered "intrinsic" evidence), and "extrinsic" evidence concerning relevant scientific principles, the meaning of technical terms, and the state of the art. I understand that one looks primarily to the intrinsic patent evidence, but extrinsic evidence may also be useful in interpreting patent claims when the intrinsic evidence

itself is insufficient. Additionally, the context in which a term is used in the Asserted Claims can be highly instructive. Likewise, other claims of the patent in question, both asserted and not asserted, can inform the meaning of a claim term. For example, because claim terms are normally used consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims. Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.

25. I have further been informed by Counsel that, while intrinsic evidence is of primary importance, extrinsic evidence, *e.g.*, all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises, can also be considered. For example, technical dictionaries may help one better understand the underlying technology and the way in which one of skill in the art might use the claim terms. Extrinsic evidence should not be considered, however, divorced from the context of the intrinsic evidence. Evidence beyond the patent specification, prosecution history, and other claims in the patent should not be relied upon unless the claim language is ambiguous in light of these intrinsic sources. Furthermore, while extrinsic evidence can shed useful light on the relevant art, it is less significant than the intrinsic record in determining the legally operative meaning of claim language.

26. I have been asked to provide my opinion on the terms "the first radio

signal is transmitted by K antenna port groups of the base station," and "time resource pool," in the context of the '527 Patent specification and claims.

### A. "the first radio signal is transmitted by K antenna port groups of the base station"

27. I note that the Parties did not propose any claim constructions during the Institution phase, but that Petitioner has apparently improperly construed "the first radio signal is transmitted by K antenna port groups of the base station" to read out the fact that at least 2 groups of antennas of the base station are collectively responsible for transmitting the claimed first radio signal. Section VI.A.1. In my opinion, a person of ordinary skill in the art would understand that "the first radio signal is transmitted by K antenna port groups of the base station" should be construed to mean "the first radio signal is collectively transmitted by K groups of antenna ports of the base station."

28. As a preliminary matter, I agree with Petitioner's expert, that a person of ordinary skill in the art would understand, from the explicit language of Claim 1, that "an antenna port group is a group of antenna ports" while antenna port groups is "more than one antenna port group":

> Q. What is your understanding of that term, "antenna port group" or "antenna port groups"?
>
> A. Well, antenna -- well, antenna port groups means it's more than one antenna port group. So an antenna port group is a group of antenna ports.

Ex. 2005, 22:11-17.

29. In my opinion, Petitioner's expert's understanding comports with the plain and ordinary meaning of "group" identified by Wiley Electrical and Electronics Engineering Dictionary:

> **group:**
>
> 1. ***A collection*** of things. Such a collection is usually located together, and/or ***regarded as a unit***. For example, a family of chemical elements with similar properties arranged vertically within a periodic table.
>
> 2. In communications, ***a number of channels treated as a unit***. For instance, a collection of associated voice channels in frequency-division multiplexing.
>
> 3. In computers, a collection of elements regarded as a unit. For example, a set of records in a database.

Steven M. Kaplan, Wiley Electrical and Electronics Engineering Dictionary, p. 324 (2006).

30. I note that another claim limitation in Claim 1 recites that "the K is a positive integer greater than 1," which, as Petitioner's expert confirms, means that K must be at least 2 and, therefore, Claim 1 requires at least 2 antenna port groups:

> Q. Do you see the claim limitation that says -- and it's at the end of Claim 1 – "the K is a positive integer greater than 1"?
> A. Yes, I do.
>
> Q. Based on that claim limitation, what is the lowest integer that K could be?
> A. Two.

Ex. 2005, 22:18-23:2.

31. Since the claimed "first radio signal" is transmitted by at least 2 groups of antennas, it is my opinion that a person of ordinary skill in the art would understand that claimed first signal is not transmitted by each group separately, but rather transmitted by the K groups collectively. Such an understanding is confirmed by the specification of the '527 Patent:

> In one embodiment, the first radio signal is ***transmitted by the K antenna port groups*** in a manner that the first radio signal ***carries the K reference signal groups***, and the antenna virtualization vectors ***corresponding to the K reference signal groups*** are respectively used to ***map the K reference signal groups*** to a set of physical antennas to be transmitted.

'527 Patent, 3:44-49.

32. In my opinion, Petitioner's improper construction of "the first radio signal is transmitted by K antenna port groups of the base station" ignores the collective transmission of the first radio signal, as noted below (Section VI.A.1). Instead, a person of ordinary skill in the art would understand that "the first radio signal is transmitted by K antenna port groups of the base station" means that "the first radio signal is collectively transmitted by K groups of antenna ports of the base station."

**B. "time resource pool"**

33. In my opinion, Petitioner's implied construction that reads out the word

"pool" from "time resource pool" runs contrary to the specification of the '527 Patent and, in particularly, reads out the word "pool," which should be read according to its plain and ordinary meaning. A person of ordinary skill in the art would understand "time resource pool" to be construed as "collection of time resources for a shared use" based on what a person of ordinary skill in the art would have understood a "pool" to be.

34. In my opinion, a person of ordinary skill in the art would have understood from the '527 patent specification that "time resource," "time resource pool, and "time resource sub-pool," each have different meanings:

> In Embodiment 4, ***the first time resource pool includes N1 time resources***; the first signaling indicates the distribution of the first time resource pool in the time domain. The second radio signal is transmitted on the first time resource sub-pool. The first time resource sub-pool includes N2 time resources #k1-#km in the N1 time resources. The second signaling indicates the number #k1-#km of the N2 time resources in the N1 time resources.

'527 Patent, 15:26-40.

> In Embodiment 5, the second radio signal is transmitted on ***the time resource #k1-#km of the first time resource sub-pool***. By the second signaling, the UE determines a ***first time resource sub-pool from the first time resource pool*** and determines the frequency domain resources occupied by the second radio signal, thereby determining the second time-frequency resource occupied by the second radio signal.

'527 Patent, 15:44-61.

35. I note that it appears that Petitioner's expert has also noted that the term "time resources" possesses a different meaning than the term "time resource pool" and that a person of ordinary skill in the art would understand "time resource pool" by its plain and ordinary meaning:

> Q. What is your understanding of a time resource pool?
> A. It's a pool of time resources.
>
> Q. In your opinion, does the term "time resource pool" mean anything different than the term "time resource"?
> A. Time resource pool is the pool of time resources. So yes, it's different. Time resource is a time resource. A time resource pool is a pool of time resources.
>
> Q. Could you describe what is a pool?
> A. So it's a plain and ordinary meaning of the word "pool."

2005, 23:6-20.

36. In my opinion, the plain and ordinary meaning of "pool" or "resource pool" can be identified by the various dictionaries below, and indicates that a pool requires a "shared" or "common" component:

> **Pool, verb(2):**
>
> ***to combine (things, such as resources)*** in a ***common*** pool or effort

https://www.merriam-webster.com/dictionary/pool.

> **Pool, noun (COLLECTION):**
>
> A number of people or a quantity of a particular thing, such as money, ***collected together for shared use*** by several people or organizations

**Pool, verb:**

To ***collect something*** such as money in order for it to be ***used by several different people or groups***

https://dictionary.cambridge.org/us/dictionary/english/pool.

37. Given the plain and ordinary meaning of the term, "pool," a person of ordinary skill in the art would have understood that a "time resource pool" should be construed differently from just a "time resource" or "time resources." Moreover, a person of ordinary skill in the art would understand "time resource pool" to be construed as "collection of time resources for a shared use."

## VI. ANY COMBINATION OF KIM, ZHANG, KANG, AND PARK DOES NOT RENDER CLAIMS 1-20 OBVIOUS

### A. Claims 1, 4-6, 9-11, 14-16, and 19-20 Are Not Obvious Over Any Combination of Kim, Zhang, and Kang

#### 1. Any Combination of Kim, Zhang, and Kang Does Not Disclose "wherein the first radio signal is transmitted by K antenna port groups of the base station," as Required by Claim 1

38. I note that Petitioner relies on only Kim to render obvious this claim limitation. Pet. at 17-20.

39. As I note above, a person of ordinary skill in the art would have understood that "the first radio signal is transmitted by K antenna port groups of the base station" should be construed to mean "the first radio signal is ***collectively*** transmitted by K groups of antenna ports of the base station." Section V.A.

40. I note that Petitioner argues that Kim's CSI-RS is the claimed "first radio signal." Pet. at 17 (Kim discloses that the CSI-RS (first radio signal) is transmitted by K antenna port groups of the base station."). Assuming that Kim's CSI-RS may correspond to the claimed "first radio signal," however, a person of ordinary skill in the art would understand that Kim teaches away from the required collective transmission of the CSI-RS by K groups of antenna ports. In particular, Kim teaches that one of multiple CSI-RSs each correspond to an antenna port group ("CSI-RSs…are transmitted to each UE for each group of multiple antennas") and are each transmitted by a respective antenna group of an allocated transmission time interval for that antenna group ("each antenna group transmits a CSI-RS in each transmission interval"):

> ***CSI-RSs for massive MIMO are transmitted to each UE for each group of multiple antennas*** as illustrated in FIG. 4, so that CSI-RSs for more transmission antennas than the 8 transmission antennas supported by the LTE-A are transmitted.

Ex. 1004, [0058].

> For example, antenna groups 1 through 5 in FIG. 4 are allocated transmission time intervals and ***transmit CSI-RSs in the allocated transmission time intervals***. In FIG. 4, since each antenna group includes 8 transmission antennas, ***each antenna group transmits a CSI-RS in each transmission interval*** by using one CSI-RS resource (as indicated by reference numeral 500 of FIG. 5) for 8 ports.

Ex. 1004, [0060]. It is my understanding that Petitioner's citation to Fig. 7 is

similarly unavailing because Kim's description of Fig. 7 also notes that "each antenna group transmits CSI-RSs":

> FIG. 7 illustrates a grouping of a plurality of beams into five beam groups, wherein each beam group is transmitted in an individual time interval.
>
> Referring to FIG. 7, five beam groups 710 are illustrated, each antenna group includes 8 transmission antennas, and each antenna group transmits CSI-RSs by using one CSI-RS resource 700 for 8 ports in each transmission interval.

Ex. 1004, [0082]-[0083]. Therefore, a person of ordinary skill in the art would understand that Kim explicitly describes transmission of a different CSI-RS (not just one radio signal – "the first radio signal") from each of its disclosed antenna groups in contravention of Claim 1's requirement that "the first radio signal is ***collectively*** transmitted by K groups of antenna ports of the base station."

41. In view of Kim's teaching to the contrary of what a person of ordinary skill in the art would understand to be required by the claim language, it is my opinion that Kim in combination with Zhang and Kang does not render obvious this claim limitation.

**2. Any Combination of Kim, Zhang, and Kang Does Not Disclose "the first signaling is used to determine a first time resource pool," as Required by Claim 1**

42. I note that Petitioner only relies on Kim to disclose this claim limitation. Pet. at 20-22.

43. As I note above, a person of ordinary skill in the art would have

understood that "time resource pool" should be construed differently than merely "time resource." Section V.B. Yet, Petitioner improperly interprets the claimed "time resource pool" as the same as "time resource" because Petitioner ignores the term "pool" entirely. With respect to the "time resource pool" claim limitation, I note that Petitioner only states that "*Kim* discloses that the control information includes 'positions of time and frequency resources at which a CSI-RS for each antenna group is transmitted.'" Pet. at 20 (citing *Kim*, ¶ [0069]). Petitioner makes no distinction between time resources and a pool of time resources, and at most, only discloses time resources. A person of ordinary skill in the art would understand that the '527 Patent is clear that the two are separate concepts where "the first time resource pool includes [] time resources" but is not the time resources itself.

> In Embodiment 4, ***the first time resource pool includes N1 time resources***; the first signaling indicates the distribution of the first time resource pool in the time domain.

'527 Patent, 15:26-40.

44. I note that Petitioner also seems to argue that Kim's "separate time resource (subframes)," over which different CSI-RSs are transmitted by different antenna port groups, correspond to the claimed "time resource pool." Pet. at 21 ("*Kim* show[s] that CSI-RSs for each antenna port group are transmitted over ***separate time resources (subframes)***."); Ex. 1004, ¶¶ [0060], [0082]-[0083]. A person of ordinary skill in the art would not have understood that those "separate

time resources" are the claimed "time resource pool."

45. As I note in Section V.B, a person of ordinary skill in the art would understand "time resource pool" to be construed as "a collection of time resources ***for a shared use***." A person of ordinary skill in the art would understand that the shared use of the time resource pool described in the '527 Patent refers to the shared collection of time resources for transmission by all K antenna port groups. Section V.A. Kim contradicts that "shared use" because, as Petitioner admits, "*Kim* show[s] that ***CSI-RSs for each antenna port group are transmitted over separate time resources (subframes)***." Pet. at 21; Section VI.A.1.

46. Therefore, in my opinion, Kim in combination with Zhang and Kang does not render obvious this claim limitation.

**3. Any Combination of Kim, Zhang, and Kang Does Not Disclose "the first antenna virtualization vector is an antenna virtualization vector available to the base station in the first time resource pool," as Required by Claim 1**

47. As I note above in Section VI.A.2, any combination of Kim, Zhang, and Kang does not disclose the claimed "first time resource pool," and therefore cannot disclose, teach, or suggest "the first antenna virtualization vector is an antenna virtualization vector available to the base station ***in the first time resource pool***."

48. Therefore, in my opinion, any combination of Kim, Zhang, and Kang does not render obvious this claim limitation.

#### 4. Any Combination of Kim, Zhang, and Kang Does Not Disclose "the second antenna virtualization vector is an antenna virtualization vector available to the user equipment in the first time resource pool," as Required by Claim 1

49. As I note above in Section VI.A.2, any combination of Kim, Zhang, and Kang does not disclose the claimed "first time resource pool," and therefore cannot disclose, teach, or suggest "the second antenna virtualization vector is an antenna virtualization vector available to the user equipment ***in the first time resource pool***."

50. Therefore, in my opinion, any combination of Kim, Zhang, and Kang does not render obvious this claim limitation.

#### 5. Any Combination of Kim, Zhang, and Kang Does Not Disclose "the first antenna virtualization vector is an antenna virtualization vector available to the base station in the first time resource pool," as Required by Claim 1

51. I note that Claims 4 and 5 depend upon Claim 1. In my opinion, for at least the same reasons as Claim 1, any combination of Kim, Zhang, and Kang fails to render obvious Claims 4 and 5.

52. I note that Claims 6, 9, and 10 recite "method[s] for multi-antenna transmitting in a base station" that mirrors the claim limitations of Claims 1, 4, and 5, which recite "method[s] for multi-antenna transmission in a user equipment." In other words, a person of ordinary skill in the art would have understood that Claims 6, 9, and 10 disclose methods from the perspective of the base station that is in

communication with the UE in Claim 1. In my opinion, for at least the same reasons as Claims 1, 4, and 5, any combination of Kim, Zhang, and Kang fails to render obvious Claims 6, 9, and 10.

53. I note that Claims 11, 14, and 15 recite "user equipment (UE) for multi-antenna transmission," which are the apparatus claims of Claims 1, 4, and 5. In my opinion, for at least the same reasons as Claim 1, any combination of Kim, Zhang, and Kang fails to render obvious Claims 11, 14, and 15.

54. I note that Claims 16, 19, and 20 recite "base station equipment for multi-antenna transmission" that mirrors the claim limitations of Claims 11, 14, and 15, which recites "user equipment (UE) for multi-antenna transmission." In other words, a person of ordinary skill in the art would have understood that Claims 16, 19, and 20 disclose the base station equipment that is in communication with the UE in Claims 11, 14, and 15. In my opinion, for at least the same reasons as Claims 11, 14, and 15, any combination of Kim, Zhang, and Kang fails to render obvious Claims 16, 19, and 20.

### B. Claims 2-3, 7-8, 12-13, and 17-18 Are Not Obvious Over Any Combination of Kim, Zhang, Kang, and Park

#### 1. Any Combination of Kim, Zhang, and Kang Does Not Disclose "operating a second radio signal in a first time resource sub-pool," or "the second signaling is used to determine the first time resource sub-pool from the first time resource pool," as Required by Claim 2

55. I note that Petitioner only relies on Kim to disclose the claim limitation

of "operating a second radio signal in a first time resource sub-pool." Pet. at 58-59.

56. As I note above in Section VI.A.2, any combination of Kim, Zhang, and Kang does not disclose the claimed "first time resource pool." A person of ordinary skill in the art, including Petitioner's expert, would understand the first time resource sub-pool to be a "subset" of the first time resource pool:

> Q. Sure. Does Figure 6 show a time resource subpool?
> A. Yes, it does. It shows an example of a subpool.
>
> Q. In this figure, can you describe what the first time resource subpool is?
> A. As the word "subpool" suggests, it's a subset of the pool. It's something smaller than the pool. And in this example, the first time resource subpool that's indicated in Figure 6 consists of subframes No. 3 and No. 7.

Ex. 2005, 25:20-26:7. Again, I note that Petitioner provides no discussion of a "first time resource pool" outside of incorrectly stating that "*Kim* discloses [] a first time resource pool (subframe)." Pet. at 58-59. Since Kim does not disclose the claimed "first time resource pool" from which the claimed sub-pool depends upon, in my opinion, any combination of Kim, Zhang, Kang, and Park therefore cannot disclose, teach, or suggest "operating a second radio signal in a first time resource sub-pool" or "the second signaling is used to determine the first time resource sub-pool from the first time resource pool."

57. Therefore, it is my opinion that any combination of Kim, Zhang, Kang, and Park does not render obvious this claim limitation.

**2. Any Combination of Kim, Zhang, Kang, and Park Does Not Disclose "wherein the operating is receiving from the base station, or the operating is transmitting to the base station," as Required by Claim 2**

58. As I note above in Section VI.B.1, any combination of Kim, Zhang, Kang, and Park does not disclose the claimed "operating a second radio signal in a first time resource sub-pool," and therefore cannot disclose, teach, or suggest "wherein ***the operating*** is receiving from the base station, or ***the operating*** is transmitting to the base station."

59. Therefore, in my opinion, any combination of Kim, Zhang, Kang, and Park does not render obvious this claim limitation.

**3. Any Combination of Kim, Zhang, and Kang Does Not Disclose "[t]he method of claim, comprising: monitoring the second signaling in a second time resource pool, wherein the second signaling occupies one time resource block in the second time resource pool at most; and the second time resource pool includes a positive integer number of time resource block(s); or monitoring the second signaling in a second time resource pool and monitoring the first signaling in a third time resource pool, wherein the second signaling occupies one time resource block in the second time resource pool at most; the second time resource pool includes a positive integer number of time resource block(s); the first signaling is a dynamic signaling; the first signaling occupies one time resource block in the third time resource pool at most; the third time resource pool includes a positive integer number of time resource block(s); a minimum time interval between time resource blocks in the third time resource pool is greater than a minimum time interval between time resource blocks in the second time resource pool," as Required by Claim 3**

60. I note that Claim 3 depends upon Claim 2. In my opinion, for at least

the same reasons as Claim 2, any combination of Kim, Zhang, Kang, and Park fails to render obvious Claim 3. Specifically, as I note above in Section VI.A.2, any combination of Kim, Zhang, and Kang does not disclose the claimed "first time resource pool" or any "time resource pool, and therefore, even in combination with Park, cannot disclose, teach, or suggest "monitoring the second signaling in ***a second time resource pool***, wherein the second signaling occupies one time resource block in ***the second time resource pool*** at most; and the ***second time resource pool*** includes a positive integer number of time resource block(s)."

61. I note that Petitioner does not address "monitoring the second signaling in a second time resource pool and monitoring the first signaling in a third time resource pool, wherein the second signaling occupies one time resource block in the second time resource pool at most; the second time resource pool includes a positive integer number of time resource block(s); the first signaling is a dynamic signaling; the first signaling occupies one time resource block in the third time resource pool at most; the third time resource pool includes a positive integer number of time resource block(s); a minimum time interval between time resource blocks in the third time resource pool is greater than a minimum time interval between time resource blocks in the second time resource pool" and therefore cannot obviate this claim limitation.

62. Therefore, in my opinion, Kim in combination with Zhang, Kang, and

Park does not render obvious Claim 3.

#### 4. Any Combination of Kim, Zhang, Kang, and Park Does Not Render Obvious Claims 7-8, 12-13, and 17-18

63. I note that Claims 7-8 recite "method[s] for multi-antenna transmitting in a base station" that mirror the claim limitations of Claims 2-3, which recite "method[s] for multi-antenna transmission in a user equipment." In other words, a person of ordinary skill in the art would have understood that Claims 7-8 discloses a method from the perspective of the base station that is in communication with the UE in Claims 2-3. In my opinion, for at least the same reasons as Claims 2-3, any combination of Kim, Zhang, Kang, or Park fails to render obvious Claims 7-8.

64. I note that Claims 12-13 recite "[a] user equipment (UE) for multi-antenna transmission," which are the apparatus claims of Claims 2-3. In my opinion, for at least the same reasons as Claims 2-3, any combination of Kim, Zhang, Kang, or Park fails to render obvious Claims 12-13.

65. I note that Claims 17-18 recite "base station equipment for multi-antenna transmission" that mirrors the claim limitations of Claims 12-13, which recite "[a] user equipment (UE) for multi-antenna transmission." In other words, a person of ordinary skill in the art would have understood that Claims 17-18 disclose the base station equipment that is in communication with the UE in Claims 12-13. In my opinion, for at least the same reasons as Claims 12-13, any combination of Kim, Zhang, Kang, or Park fails to render obvious Claims 17-18.

## VII. SUMMARY OF OPINIONS

66. It is my opinion that the Board should confirm the validity of the challenged claims. I reserve the right to supplement my opinions in response to any additional contentions by Petitioner or opinions by Dr. Apostolos Kakaes, and as the Board permits.

67. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with 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.

Executed on January 12th, 2024 in Livermore, CA.

Miguel Gomez

# EXHIBIT A

# Curriculum Vitae of Miguel Gomez

**2178 Sirah Ct., Livermore CA 94550**
**miguel@rockslideanalytics.com**
**ph. 415.793.4103**

Mr. Gomez has thirty five years of experience in the design and development of hardware and software technology used in telecommunications, data communications, networking and storage infrastructure. He also is highly skilled in the use of microelectronics simulation software, ASIC & FPGA coding and Verilog. Mr. Gomez has designed and coded digital switching, optical encoders, and semiconductor memory hardware and software.

## Expertise

- ASIC & FPGA Design
- Computer Architecture
- Computer Buses, Cache, and I/O
- Hardware Emulators
- Hardware Programming Languages
- Hardware Verification & Test
- Software Programming Languages
- Network Protocols
- Telecom Protocols
- Storage, Raid Controllers
- Digital Switching Technology
- Modems
- Security in place, security in motion
- Compression Algorithms,
- Optical Encoders
- Video Capture and Display Systems
- Semiconductor Memories
- Power supply design
- Power Inverter design.
- Computer Vision

## Consulting Areas

Computer Architectures
- Data General
- IBM PC
- MIP 3000, 4000
- Intel 8051, x86, Pentium II
- Motorola 68000
- TI TMS320Cxx (DSP)
- PowerPC

Computer Buses:
- USB
- I2C
- PCI
- ISA
- EISA
- PCMCIA
- SBUS
- VME
- S100

Hardware Programming Languages:
- PALASM
- ABEL
- AHDL
- VHDL
- Verilog

Hardware Simulation and Compilation
- Synopsys VCD
- Synplicity
- ModelSim
- VerilogNC
- Spice, Hspice

ASIC and FPGA Design:
- Actel
- Altera
- Xilinx

Networking Protocols:
- ATM
- TCP/IP
- Ethernet
- VOIP
- HTTP/HTML
- SIP/SDP

Software Programming Languages:
- C,C++
- BASIC, VISUAL BASIC
- Assembly and Machine Languages
- FORTRAN
- Java
- Pascal
- Python/Django/bootstrap

Operating Systems:
- MSDOS
- Windows 3.1/NT/9x/2000/XP/CE
- UNIX

Communications
- Spread Spectrum (802.11a,b,g,n)
- LTE
- ODFM
- RF Transmission and reception
- CDMA/GSM

Power Electronics
- Solar Inverters
- 3-phase motors

CAD Tools
- Max+Plus II, Quartus (Altera)
- XACT, ISE (Xilinx)
- Mentor
- Orcad
- Allegro
- Viewlogic

- Schema
- P-Cad

Hardware Emulators
- Quickturn
- Ikos
- Zycad

Computer Memories
- SDRAM
- Rambus
- DDR I,II
- SDR

Compression:
- ADPCM

- H.264

## Education

| Year | College or University | Degree |
|---|---|---|
| 1983 | Yale University | BSEE |

## Engineering Experience

From: April 2013
To: Present
Organization: Rockslide Analytics, LLC.
Title: CEO
Summary: Mr. Gomez founded Rockslide Analytics in order to develop and eventually sell a depth sensing camera. A depth sensing camera can image a scene in three dimensions. Currently Rockslide Analytics is also used to promote Mr. Gomez's consulting and expert work.

From: August 2006
To: March 30, 2009
Organization: ActSolar Inc.
Title: VP Engineering and System Architect
Summary: Mr. Gomez has designed and built a 400 watt power inverter which takes an input voltage of 30 volts DC and converts it to 240 VAC. Included in the design is an energy compensation circuit that recovers up to 40% of power normally lost due to power factor correction issues. Included as part of the inverter system was rooftop data collection for power and temperature with wireless connections to cloud management services.

ActSolar was sold to National Semiconductor Corp. on March 19, 2009.

From: September 2004
To: August 2005
Organization: BridgeWave Inc.
Title: Consultant
Summary: Mr. Gomez built a 10 gig Ethernet test platform to facilitate manufacturing tests of Bridgewave's high speed wireless network system. This system replaced the Smart Bits Ethernet test analyzer in the manufacturing test environment.

- Built test generator: Ethernet packet generator which generated packets of various sizes, address spaces, payload and checksums.
- Built test receiver and analyzer which detected various failure mechanisms, maintained statistics and reported them to a user interface written in Lab View.
- Used the Xilinx Vertex II in the 2003 version. Used Xilinx Spartan 3e in 2004 version.

From: September 2004
To: September 2004
Organization: PA Consulting Group
Title: Consultant

Summary: Miguel Gomez has provided hardware evaluation services for corporate mergers and acquisitions. These services include systems and hardware reviews in the following areas:

- Analysis of system performance to cost of the hardware implementation. Costs include development time, flexibility of the system for future growth and final product costs.
- Review of the VHDL and Verilog code implementations, documentation and development strategies.
- VHDL and Verilog code management including compilation processes, simulation, test coverage, bug tracking and source code control.
- FPGA and ASIC tool chain management.
- Circuit board design and layout for production environments
- Circuit board certification testing for FCC, UL, and Environmental tests
- Review of production line management including assembly and test processes.

From: Jan 2003
To: May 2003
Organization: Santel Networks
Title: Consultant
Summary: Mr. Gomez Developed an optical duo-binary (ODB) encoder. At 10.7 Giga bits per second (GBps) ODB reduces the spectral spread to ½ of the ordinary NRZ format. This format allows high spectral efficiency over long distances by reducing nonlinear penalties due to narrower channel spacing and allows a higher bit rate or increases transmission distances. The project was implemented in a Xilinx FPGA running at 667 Mbs with a 10.7 GHz Mux/Demux feeding 16 LVDS streams to the FPGA. The ODB behavior was simulated in a C-coded simulation. The circuit board's highest clock speed was 10.7 Gigahertz and was modeled in HSPICE. Board level simulation was performed using NCVerilog. Several Patents were applied for and the board was shown at the Optical Fiber Communication Conference & Exposition in March of 2003.

From: March 2001
To: December 2002
Organization: Extreme Networks, Inc.
Title: Director of Hardware, Content Networking Division
Summary: Mr. Gomez managed a team of Hardware and Software engineers, which developed and maintained a Layer 5 Content Addressable Switch. The switch is capable of L2, L3, L4 switching as well as L5 switching which uses HTTP headers to make routing decisions. All routing decisions were made in real time (1 GBPs) by hardware in FPGAs while a Power PC provided a user interface, configuration management and housekeeping diagnostics. Communications between the hardware elements and the PowerPC CPU was via a PCI bus.

From: January 2000
To: March 2001
Organization: Webstacks, Inc. (Now Extreme Networks, Inc.)

Title: Director of Hardware
Summary: Extreme Networks and several venture founding partners commissioned Webstacks to build a Content Addressable Switch. As the number four employee Mr. Gomez was hired to be the system architect and to in-turn to hire the hardware team which would implement it. He hired 13 ASIC, FPGA and software engineers into his department and managed them for the duration of the project. Time to development was one year and at that time functionality was proven to Extreme, which then bought Webstacks for $68MM cash and stock.

From: February 1997
To: December 1999
Organization: Philips Semiconductor
Title: Consultant
Summary:

- Developed the certification environment which was used by Philips Semiconductor and Microsoft to verify operation of Philips' Poseidon handheld chipset running Windows CE. This included board development, FPGA coding and simulation as well as porting Windows CE.
- Supported development of Philip's version of the Mips 4000 along with several of the peripheral devices that made up the system on a chip and the bus interconnect.
- Miguel Gomez also developed the ASIC logic and board level hardware for a 56Kbs software modem while at Philips.

From: September 1994
To: January 1997
Organization: Minden Group, Inc.
Title: President & Founder
Summary: After founding The Minden Group, Miguel Gomez developed several types of memory adapters used to adapt various sizes and types of memory sticks into Personal Computers. These were sold through retail stores throughout the nation. Over 250,000 memory adapters were sold at stores such as Fry's, CompUSA, Computer City and Future Shop. Miguel Gomez also designed a video conferencing system including a low cost video capture board and modified drivers. This system was also sold through the retail channels.
After developing these products he organized and managed a small team of 10 to 15 product managers and sales personal. Manufacturing was done in Taiwan with final assembly and distribution in the United States.

From: April 1989
To: August 1994
Organization: Spectrum Analysis, Inc.
Title: Founder & President
Summary: Consulting services company which Mr. Gomez founded specializing in computing, telephony and data systems. The company was a full service design firm capable of electrical circuit design with emphasis on ASIC, FPGA and ASIC emulation as well as complex PCB level designs. Responsibilities as founder were to identify specific business opportunities as well as to manage and implement portions of the technical projects.

| | |
|---|---|
| From: | August 1987 |
| To: | March 1989 |
| Organization: | Quickturn Systems, Inc. |
| Title: | Applications Manager |
| Summary: | Quickturn developed an ASIC emulator using Xilinx FPGAs. Mr. Gomez was hired as Quickturn's first applications engineer, and was initially responsible for developing the training and demonstration systems for Quickturn's initial customers. Later as the company matured, he managed the customer support team. Since this ASIC emulator worked at a fraction of clock speed, he developed a methodology of slowing board designs to 100s of KHz while maintaining clock and memory (DRAM) integrity. |

| | |
|---|---|
| From: | July 1987 |
| To: | September 1988 |
| Organization: | Telestream Corporation |
| Title: | Applications Engineer |
| Summary: | Applications engineer responsible for demonstration system development, training and sales support of the Telestream programmable voice and data management system. |

| | |
|---|---|
| From: | March 1985 |
| To: | April 1987 |
| Organization: | Stratacom, Inc. |
| Title: | Design Engineer |
| Summary: | Responsible for development and maintenance of an Adaptive Differential Pulse Code Modulation (ADPCM) voice compression board. This system allowed twice as many calls to be placed on Tl transmission lines. Also developed Stratacom’s digital data over T1 lines which was used in Stratacom's network management system, a precursor to frame-relay. |

| | |
|---|---|
| From: | June 1983 |
| To: | March 1985 |
| Organization: | ROLM Corporation |
| Title: | Design Engineer |
| Summary: | Responsible for the development of a multiplex/demultiplex hardware board used in the ROLM BUS 295 telephone switch. A novel elastic buffer was used to automatically determine the length of an inter-cabinet data bus, whose length varied based on the customer's requirements. This eliminated the need for manufacturing technicians to manually adjust clock skew. |

## Litigation Support Experience

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Fabricant LLP |
| Case Names: | Rampart v. NXP Semiconductors<br>6:21-CV-01294-ADA<br><br>Supported Rampart |
| Services Provided: | Investigated DDR SDRAM memory systems |
| Dates | December 2022 - September 2023 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Winston Strawn LLP |
| Case Names: | Flypsi Inc. v. Google LLC<br>6:22-cv-00031<br><br>Supported Flypsi |
| Services Provided: | Investigated Voice over IP software code. |
| Dates | February 2023 - Present |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Sheridan Ross LLC |
| Case Names: | K.Mizra v. Cisco Systems<br>6:20-cv-01031<br><br>Supported K.Mizra |
| Services Provided: | Investigated infringement related to contagion detection, isolation and repair. |
| Dates | February 2023 - Present |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |

| | |
|---|---|
| Law Firm: | Procopio, Cory, Hargreaves & Savitch LLP |
| Case Names: | RICMIC LLC v. Teldata Enterprise Networks<br>3:21-cv-1334-CAB-MDD |
| | Supported Teldata |
| Services Provided: | Wrote invalidity report to a health care and safety alerting system patent. Investigated prior art source code. |
| Dates | June 2022 - May 2023 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Hoge Fenton LLP |
| Case Names: | Michael Joseph Costabile v. Ustopit, LLC<br>7:21-cv-00155-BO |
| | Supported Michael Constablile |
| Services Provided: | Investigated infringement of timing systems in sports events. Wrote claim construction report and defended opinions at deposition. |
| Dates | August 2022 - March 2023 |

*Expert Engagement:*

| | |
|---|---|
| *Type of Matter:* | Patent Infringement Case |
| *Law Firm:* | Fabricant LLP |
| *Case Names:* | RFCyber v. Apple Inc.<br>IPR2022-00412, IPR2022-00413 |
| | Supported RFCyber |
| *Services Provided:* | Wrote and defended a response to invalidity contentions concerning security used in financial transactions. |
| *Dates* | November 2022 - February 2023 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Fabricant LLP |
| Case Names: | Rampart Asset Management v. NXP, Renesas, Texas Instruments, Huawei and Silicon Motion.<br>6:20-cv-01031 |
| | Supported Rampart Asset Management |

Services Provided: Investigated infringement related to PCIe equalization circuits.

Dates January 2022 - February 2022

*Expert Engagement:*
Type of Matter: Patent Infringement Case
Law Firm: Fish and Richards
Case Names: Ikorongo v. Bumble Trading LLC
6:20-cv-00256

Supported Bumble Trading LLC

Services Provided: Investigated infringement related to collecting geographic location data from cell phones.

Dates October 2021 - November 2021

*Expert Engagement:*
Type of Matter: Patent Infringement Case
Law Firm: Folio Law PLLC
Case Names: K.Mizra v. Cisco Systems
6:20-cv-01031

Supported K.Mizra

Services Provided: Investigated infringement related to contagion detection, isolation and repair.

Dates June 2021 - October 2021

*Expert Engagement:*
Type of Matter: Patent Infringement Case
Law Firm: Mintz
Case Names: Philips v. MediaTek, RealTek
337-TA-1222

Supported Philips

Services Provided: Investigated infringement related to securing digital video.

Dates January 2021 - July 2021

*Expert Engagement:*

| | |
|---|---|
| *Type of Matter:* | Patent Infringement Case |
| *Law Firm:* | Russ August & Kabat |
| *Case Names:* | EcoFactor v. Google, ecobee, Alarm, Vivent<br>337-TA-1185 |
| | Supported EcoFactor |
| *Services Provided:* | Investigated infringement related to smart thermostat devices. |
| *Dates* | February 2020 - September 2020 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Russ August & Kabat |
| Case Names: | Pavo Technologies v. Kingston<br>8:14-cv-1352-JLS |
| | Supported Pavo |
| Services Provided: | Investigated infringement related to USB Flash Drives. I provided a written opinion, defended my opinions in a deposition and testified at trial. |
| Dates | February 2019 - February 2020 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Orrick |
| Case Names: | Infinity Computer Products Inc. v. Toshiba America Business Solutions'<br>2:12-cv-06796-NIQA |
| | Supported Konica Minolta Business Solutions (Defendant). |
| Services Provided: | Investigated infringement related to fax/business copy solutions |
| Dates | April 2019 - June 2019 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Contracts Dispute |
| Law Firm: | HorizonIP |
| Case Names: | Smith v. ORBCOMM |
| | Supported ORBCOMM |
| Services Provided: | Investigated geolocation services for asset tracking. |
| Dates | March 2019 - July 2019 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Russ August & Kabat |
| Case Names: | SPEX Technologies v. Kingston |
| | Supported SPEX |
| Services Provided: | Investigated infringement related to secure disk drives. I provided a written opinion, defended my opinions in three depositions and testified at trial. |
| Dates | January 2017 - July 2020 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Orrick, Herrington & Sutcliffe |
| Case Names: | Synopsys v. Mentor Graphics Inv. |
| | Supported Synopsys |
| Services Provided: | Analyzed FPGA based hardware emulators relative to patent infringement allegations. Provided written statements. |
| Dates | December 2014 – September 2017 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Inter Partes Review |
| Law Firm: | Schmeiser, Olsen & Watts |
| Case Names: | NA |
| Services Provided: | Researched prior art related to video conferencing systems. |
| Dates | May 2016 – March 2017 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement and Trade Secret Cases |
| Law Firm: | Russ August & Kabat |
| Case Names: | VIA Technologies, Inc., et al. v. ASUS Computer International, Inc.Case No. 5:14-cv-03586-BLF |
| | Supported VIA Technologies. |

| | |
|---|---|
| Services Provided: | Analyzed hardware infringement of USB and PCIE drivers. Analyzed trade secrets theft of the same hardware. Provided written statements and oral testimony. I provided a written opinion, defended my opinions in three depositions and presented our positions at an arbitration hearing. |
| Dates | June 2015 – August 2017 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | CALDWELL CASSADY CURRY P.C. |
| Case Names: | Smartflash LLC, et al. v Google Inc., et al.,<br>Case No. 6:14-cv-435- KNM |
| Services Provided: | Analyzed Google in-app purchase client-server software. |
| Dates | January 2015 – November 2015 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Orrick, Herrington & Sutcliffe |
| Case Names: | Certain Consumer Electronics and Display Devices with Graphics Processing and Graphics Processing Units Therein<br><br>Nvidia v. Qualcomm, Samsung, Imagination<br>Inv. No. 337-TA-932<br><br>Supported Nvidia |
| Services Provided: | Analyzed thread execution and video processing in graphics integrated circuits. |
| Dates | December 2014 – May 2015 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | CALDWELL CASSADY CURRY P.C. |
| Case Names: | Smartflash LLC, et al. v Apple Inc., et al.,<br>Case No. 6:13-cv-447-MHS-KNM<br><br>Supported Smartflash |
| Services Provided: | Analyzed Apple in-app purchase client-server software. |
| Dates | June 2014 – August 2014 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Young Basile Hanlon & MacFarlane P.C.<br>Durie Tangri |
| Case Names: | Narada Systems, LLC v. Tabula Inc.<br>Case No. 6:13-cv-336-LED<br><br>Supported Tabula Inc. |
| Services Provided: | Analyzed prior art related to FPGA switch and routing fabrics. |
| Dates | February 2014 – April 2014 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Morrison Foerster |
| Case Names: | Intellectual Ventures I & II, LLC et al. v. Altera Corporation et al.<br>Case No. 10cv 01065-LPS<br><br>Supported Altera and Xilinx |
| Services Provided: | Analyzed prior art related to systems on a chip. |
| Dates | September 2012 – May 2014 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | McKool Smith, Dallas Texas |
| Case Names: | ParkerVision Inc.  Inc. v. Qualcomm Incorporated.<br><br>Civil Action No. 3:11-cv-719-J-37-TEM<br><br>Supported ParkerVision |
| Services Provided: | Reviewed schematics related to the down conversion of  a radio frequency signal to a base band signal. |
| Dates | September 2012 – May 2013 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | McKool Smith, Dallas Texas |
| Case Names: | WI-LAN INC., v. HTC CORPORATION, HTC AMERICA, INC., and EXEDEA, INC. |

Civil Action No. 2:11-CV-68
Supported WiLAN

Services Provided: Investigated patent infringement related to the decoding and encoding of broadband transmission. I investigated VHDL, Verilog, C, and C++ source code related to Orthogonal Frequency Division Multiplexing and SC-OFDMA

Dates: September 2012 – August 2013

*Expert Engagement:*
Type of Matter: Patent Infringement Case
Law Firm: Orrick, Herrington & Sutcliffe
Case Names: Lantiq Deutschland GmbH v. Ralink Technology Corp., et al.

Civil Action No. 11-cv-00234-EJD
Supported Ralink

Services Provided: Investigated patent infringement related to fractional phase lock loops and integer phase lock loops embedded in Ethernet and DSL circuits.

Dates: May 2012 – September 2012

*Expert Engagement:*
*Type of Matter:* Patent Infringement Case
*Law Firm:* Morrison and Foerster
*Case Names:* Sonic v. Arteris
UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
Case No. 11-CV-05311 MEJ

Supporting Sonic

*Services Provided:* Investigating infringement of hardware patents related to integrated circuit interconnections.

*Dates:* March 2012 – February 2013

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Quinn Emanuel |
| Case Names: | MotionPoint v. Transperfect |
| | Supported MotionPoint |
| Services Provided: | Investigated infringement of software patents related to language translation. Offered an opinion regarding MotionPoint's product infringement on the asserted patent and invalidity thereof. Testified at trial in the United States District Court, Northern District of California Oakland Division. |
| Dates: | August 2012 – July 1 2013 |

| | |
|---|---|
| *Expert Engagement:* | |
| *Type of Matter:* | Patent Infringement Case |
| *Law Firm:* | Faegre Baker Daniels |
| *Case Names:* | Honeywell International, Inc, v. Nest Labs Inc., and Best Buy Co. Inc. Case No. 12-cv-299 (SRN/JSM) |
| | Supporting Honeywell International |
| *Services Provided:* | Investigated infringement of hardware patents related to power stealing. |
| *Dates:* | July 2012 – August 2012 |

| | |
|---|---|
| *Expert Engagement:* | |
| Expert Engagement: | |
| Type of Matter: | Patent Infringement Case |
| Law Firm: | DLAPiper |
| Case Names: | MOTOROLA MOBILITY, INC. and GENERAL INSTRUMENT CORP. v. TIVO Inc.<br>UNITED STATES DISTRICT COURT<br>FOR THE EASTERN DISTRICT OF TEXAS<br>Civil Action No. 5:11-00053-DF |
| | Supported Motorola |
| Services Provided: | Investigated infringement of software patents related to Personal Video Recording devices. |

Dates: February 2012 – August 2012

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: Kellogg, Huber, Hansen, Todd, Evans & Figel. P.L.L.C. Washington D.C.
Case Names: TiVo Inc. v Verizon Communications Inc. et al.
UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS MARSHALL DIVISION
Case No. 2:09-cv-257-DF (E.D. Tex.)

Supported Verizon

Services Provided: Investigated infringement of software patents related to digital video recording.

Dates: April 2012 – June 2012

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: McDermott Will & Emery
Case Names: MotionPoint v. Transperfect
UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
Case No. 4:10-cv-02590-CW (JCS)

Supported MotionPoint

Services Provided: Investigated infringement of software patents related to language translation.

Dates: January 2012 – June 2012

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: DLA Piper LLP
Case Names: Freescale Semiconductor v. Funai Electric, MediaTek Inc., Zoran Corporation
INTERNATIONAL TRADE COMMISSION
Case No. ITC 337-TA-786
Supporting Funai, MediaTek, Zoran.

Supported Zoran

Services Provided: None

Dates: October 2011 – June 2012

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: Morrison and Foerster
Case Names: Altera v. LSI
UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
Case No. 11-cv-03139 CW
Supported Altera

Services Provided: Investigated infringement of hardware patents related to integrated circuit power management, clock recovery and high-speed bus implementations.

Dates June 2011 – September 2011

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: Jones Day
Case Names: Nielsen. v comScore Inc.
UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA ALEXANDRIA DIVISION
Case No. 1:11-cv-290-LMB-TRJ
Supported Nielsen

Services Provided: Investigated infringement of software patents related to the collection of demographic information from survey panels and automated user identification. I investigated C, C++, C#, Java and SQL code residing on servers and personal computers.

Dates June 2011 – September 2011

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: Kellogg, Huber, Hansen, Todd, Evans & Figel. P.L.L.C. Washington D.C.
Case Names: Active Video Networks Inc. v Verizon Communications Inc.
UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS MARSHALL DIVISION
Case No. 2:10-cv-248-RAJ-FBS

Supported Verizon

Services Provided: Investigated infringement of software patents related to communications between the set-top box and content providing servers at the communications head-end.

Dates December 2010 – March 2011

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.C. Washington D.C.
Case Names: HTC v. Apple Computers in the matter of Certain Portable Electronic Devices and Related Software.
UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON D.C.
Case 337-TA-721

Supported HTC

Services Provided: Investigated infringement of software patents related to power management in smart phones.

Dates November 2010 – January 2011.

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: Kellogg, Huber, Hansen, Todd, Evans & Figel. P.L.L.C. Washington D.C.
Case Names: Verizon Communications Inc. in the matter of Certain Digital Set-Top Boxes
UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON D.C.
Case 337-TA-712
Case 337-TA-717

Supported Verizon

Services Provided: Investigated infringement of software patents related to communications between the set-top box and content providing servers at the communications head-end.

Dates June 2010 – September 2010

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: WiLAN Inc. v. Acer, et. al.

THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

Civil Action No. 2-07CV-473 (E.D. Tex.)
WiLAN Inc. v. Acer, et. al.

Civil Action No. 2-07CV-473 (E.D. Tex.)
WiLAN Inc. v. Westell Technologies Inc.

Civil Action No. 2:08-CV-247 (TJW)
WiLAN Inc. v. RESEARCH IN MOTION CORPORATION,
RESEARCH IN MOTION LTD.,
MOTOROLA, INC., UTSTARCOM, INC.,
LG ELECTRONICS MOBILECOMM
U.S.A., AND LG ELECTRONICS, INC.,

Case No. 5:08-CV-04555-JW
WiLan v. Intel

Supported WiLAN

Services Provided: These cases consisted of 802.11a,b,g,n and Bluetooth investigations. In as much I investigated infringement of hardware patents related to the decoding and encoding of broadband transmission. Investigated Verilog, C, and C++ source code related to Bluetooth piconets, Orthogonal Frequency Division Multiplexing and Complementary Code Key incorporated in various integrated circuits. In addition to the above investigations, I was deposed and was asked to testify. This case settled before trial.

Dates: May 2009 – March 2011

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: Jones Day, Palo Alto CA.
Case Names: Agere Systems Inc. and LSI Corp. vs. Xilinx, Inc.
UNITED STATES DISTRICT COURT
SOUTHERN D1STR[CT OF NEW YORK
Case 09 Civ. 9717 (JSR)
Case 09 Civ. 9719 (JSR)

Supported Xilinx

Services Provided: Investigated infringement of hardware patents related to the implementation of Field Programmable Gate Arrays (FPGAs).

Dates: February 2010 – April 2010

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Goodwin Procter LLP |
| Case Names: | MedioStream, Inc. v. Acer, et al.<br>Consolidated Case No. 2:08-CV-369-CE, Eastern District of Texas |
| | Supported MedioStream |
| Services Provided: | Investigated infringement of software patents related to the decoding and encoding of video in Apple Computer products. Investigated C, C++ and Objective C source code in various video transcoding applications. |
| Dates | July 2009 – October 2010 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Womble Carlyle Sandridge & Rice. |
| Case Names: | Rembrandt Data Technologies vs. AOL LLC, et. al. |
| | THE UNITED STATES DISTRICT COURT<br>FOR THE EASTERN DISTRICT OF VIRGINIA - Alexandria Division<br>C.A. No. 1:08-cv-01009-GBL-IDD |
| | Supported Rembrandt Data Technologies. |
| Services Provided: | Investigated infringement of hardware and software patents related to the transmission of data, voice and video over cable networks. |
| | Miguel Gomez performed the following tasks:<br>▪ Investigated assembly level source code for a V.34 modem physical layer modulation and de-modulation circuit.<br>▪ Gave testimony at deposition. |
| Dates | April 2009 – June 2009 |

*Expert Engagement:*

| | |
|---|---|
| Type of Matter: | Patent Infringement Case |
| Law Firm: | Kellogg, Huber, Todd, Evans & Figel Washington D.C. |
| Case Names: | Rembrandt Data Technologies vs. Comcast, et. al. |
| | UNITED STATES DISTRICT COURT<br>FOR THE EASTERN DISTRICT OF TEXAS<br>MARSHALL DIVISION |
| | 2:06-cv-00047-TJW-CE<br>Rembrandt Data Technologies vs.<br>Rembrandt Data Technologies vs.<br>SHARP CORPORATION and<br>SHARP ELECTRONICS CORP. |

Case No. 2:06CV507 (LED)
Rembrandt Data Technologies vs.
CHARTER COMMUNICATIONS, INC., )
CHARTER COMMUNICATIONS )
OPERATING, LLC, and COXCOM, INC.

2:06-cv-00223-TJW-CE
Rembrandt Data Technologies vs.
CHARTER COMMUNICATIONS, INC,
CHARIER COMMUNICATIONS
OPERATING, LLC, COX
COMMUNICATIONS, INC, COXCOM,
INC, COX ENTERPRISES, INC., CSC
HOLDINGS, INC, and CABLEVISION
SYSTEMS CORPORATION,

**THE UNITED STATES BANKRUPTCY COURT**
**SOUTHERN DISTRICT OF NEW YORK**
Case No. 02-41729 (REG)
Rembrandt Data Technologies vs.
Adelphia Communications Corporation; )
Century-TCI California, LP; )
Century-TCI California Communications, LP; )
Century-TCI Distribution Company, LLC; )
Century-TCI Holdings, LLC; )
Parnassos, LP; )
Parnassos Communications, LP; )
Parnassos Distribution Company I, LLC; )
Parnassos Distribution Company II, LLC; )
Parnassos Holdings, LLC; )
Western NY Cablevision, LP

Supported Rembrandt Data Technologies.

Services Provided: Investigated infringement of hardware and software patents related to the transmission of data, voice and video over cable networks.

Miguel Gomez performed the following tasks:
- Investigated Verilog source code used to implement a modem physical layer modulation and de-modulation circuit.
- Investigated C and C++ software used to implement cable modems.

Dates September 2008 – February 2009

*Expert Engagement:*
Type of Matter: Patent Infringement Case
Law Firm: Hogan and Hartson, New York NY
Case Names: ProMOS Technologies vs. Freescale Semiconductor Inc.
Case No. 06-788 JJF (D. Del.)

Supported ProMOS

Services Provided: Investigated infringement of hardware logic patents related to cache controllers.

Miguel Gomez performed the following tasks:
- Investigated Verilog source code used to implement a cache controllers in integrated circuits designed and produced by Freescale Technologies.

Dates February 2008 – August 2008

*Expert Engagement:*
Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: i4i Limited Partnership vs. Microsoft., et al.

THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
TYLER DIVISION
Case No. 6:07-CV-113-LED

Supported i4i.

Services Provided: Investigated infringement of software patents related to the organization of XML data.

Miguel Gomez performed the following tasks:
- Investigated C and C++ software code that read, displayed and managed XML constructs in Microsoft office software products.

Dates November 2007 – August 2008

*Expert Engagement:*
Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: Rembrandt Data Technologies vs. Comcast., et al.
MDL Docket No. 07-mdl-1848 GMS

Supported Rembrandt Data Technologies.

Services Provided: Investigated infringement of software and hardware patents related to the transmission of data, voice and video over cable networks.

Miguel Gomez performed the following tasks:
- Investigated C and C++ software code in the cable modem management layer that controlled data flows through the various chip sets of the cable modem.
- Investigated DSP code that provided data connection services in cable modems.

Dates May 2007 – July 2007

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: Samsung vs. Ericsson et al.,

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.
Case No. 337-TA-583
Case No. 337-TA-577

Supported Ericsson.

Services Provided: Investigated infringement of patents in cell phones.

Miguel Gomez performed the following tasks:

- Investigated C and C++ software code that controlled the power management and clock calibrations.
- Reviewed hardware description language code and DSP firmware to trace the control flow from the managing software down to the hardware registers.
- Wrote an expert report that documented the findings.
- Acquired and wrote software tools to assist the investigation process.

Dates January 2007 – May 2007

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: American Video Graphics, L.P. vs. Sony Computer Entertainment America
American Video Graphics, L.P. vs. Hewlett Packard Co., et al.,

Supported American Video Graphics.

Services Provided: Investigated patent infringement in graphic chipsets used in personal computers and game consoles.

Miguel Gomez performed the following tasks:

- Investigated the accused chipsets by examining the hardware code for various sub-modules including the 2D and 3D rendering engines and the frame buffers that connect the graphics processing units to memory devices.
- Wrote claim charts and created exhibits.
- Acquired and wrote software tools to assist the investigation process.

Dates August 2005 – November 2005

*Expert Engagement:*

Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: American Video Graphics, L.P. vs. Sony Corporation of America, et al.,
American Video Graphics, L.P. vs. Hewlett-Packard Co., et al.,
American Video Graphics, L.P. v. Electronic Arts, Inc., et al., No. 6:04-CV-398 LED

Supported American Video Graphics.

Services Provided: Patent infringement investigation of computer game software.

Miguel Gomez performed the following tasks:

- Examined C and C++ source code for electronic computer games which ran on Sony, Microsoft and Nintendo game consoles as well as Personal Computers
- Wrote a claim chart and created exhibits.

Dates May 2005 – August 2005

*Expert Engagement:*

Type of Matter: Patent Infringement
Law firm: Dewey Ballantine, Palo Alto, California
Case Name: Matsushita vs. Texas Instruments

Supported Matsushita.

Services Provided:

- Read and interpreted approximately 50 patents issued to Matsushita for Dewey Ballantine attorneys in their preparation for litigation between Matsushita and Texas Instruments.

Dates: November 2004 – March 2005

*Expert Engagement:*

Type of Matter: Patent Infringment
Law firm: Wilson Sonsini Goodrich Rosatti
Case Name: Zoran vs MediaTek et, al.

Supported MediaTek.

Service Provided: Offered an opinion as to when a product was ready for patenting per the requirements for an on-sale bar.

Miguel Gomez performed the following tasks:

- Offered an opinion as to whether the product in this was ready to be patented
- Reviewed all available documentation.
- Wrote report and rebuttal to opposition expert report
- Gave testimony at deposition and provided a written opinion at the ITC hearing.

Dates

September 2004 – February 2005

## Patents

**Issued Patents**

| | |
|---|---|
| 7,814,204 | Method of and system for analyzing the content of resource requests |
| 7,447,777 | Switching system |
| 7,298,746 | Method and system for reassembling and parsing patents in a network environment |
| 7,321,926 | Method of and system for allocating resources to resource requests |
| 8,412,838 | Method of and system for analyzing the content of resource requests |

**Applications**

"System and Method for an array of intelligent inverters"
European: 09747629.5-1242/2291908
US PCT/US2009044033
Also published as: CN102067429A, US2090283129, WO2009140548A3