

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WILSON ELECTRONICS, LLC,
Petitioner,

v.

CELLPHONE MATE, INC. d/b/a SURECALL
Patent Owner

Case No. IPR2018-01774
U.S. Patent 9,402,190

DECLARATION OF DR. TODD MOON

Wilson v. Cellphone-Mate (SureCall) IPR2018-01774 SureCall Exhibit 2001
--

1. I, Todd Moon, of Providence, Utah, declare as follows:

I. INTRODUCTION

2. I have been retained on behalf of Patent Owner Cellphone Mate, Inc. d/b/a Surecall to provide this Declaration relating to U.S. Patent No. 9,402,190 (“190 Patent”, Ex. 1001), which I understand is the subject of the Petition for *Inter Partes* Review IPR2018-01774, filed by Petitioner Wilson Electronics, LLC.

3. I am over 18 years of age. I have personal knowledge of the facts stated in this Declaration and could testify competently to them if asked to do so. My findings, as set forth herein, are based on my education, background, and experience in the fields discussed below.

4. I reserve the right to supplement this Declaration in response to additional evidence that may come to light.

5. I am not currently, nor have I ever been, employed by SureCall. I have not previously served as an expert witness on behalf of SureCall or Wilson Electronics. I have previously served as an expert witness for other entities including LG, MTel, Hitachi, and Intellectual Ventures in patent cases relating to cellular communications, compressed digital audio data, and high definition televisions.

6. I have no financial interest in Patent Owner, its affiliates, subsidiaries, or parent companies.

7. I am being compensated by Patent Owner for my time, billed at my normal hourly rate of \$450, for time spent reviewing materials, and performing my analysis of the technical issues relevant to this matter. My compensation is in no way dependent on the opinions I formulate or offer below, nor will I receive any additional compensation based on the outcome of this proceeding.

II. QUALIFICATIONS

8. My Curriculum Vitae (“CV”) is attached hereto as Exhibit 2002, and it includes a listing of my prior experience with patent litigation and *inter partes* reviews. My background, education, and professional experiences are summarized below.

9. I received my B.S. in Electrical Engineering and Mathematics (dual major) and M.S. in Electrical Engineering from Brigham Young University in 1988. I received my Ph.D. in Electrical Engineering from the University of Utah in 1991.

10. In 1991, I began teaching electrical and computer engineering at the Utah State University (“USU”). From 1991 to 1996, I was an Assistant Professor of Electrical Engineering, and from 1996 to 2002, I was an Associate Professor of Electrical Engineering. I currently serve as a Professor of Electrical and Computer Engineering and served as the department head from 2007 through 2016.

11. As further described in my CV, I have thirty years of experience in electrical engineering, including extensive experience in signal processing and

digital communications. I have taught numerous classes in the field of signals and systems. Some of the courses I have taught include digital communications, digital signal processing, circuits and signals/signals and systems, digital control systems, and digital systems design. I am a member of the IEEE Signal Processing Theory and Methods (SPTM) Committee and was the General Conference Chair of the IEEE Signal Processing/SP Education Workshop in 2015.

12. I have authored or co-authored two books: *Error Control Coding: Mathematical Methods and Algorithms*, Wiley, 2005, and *Mathematical Methods and Algorithms for Signal Processing*, Prentice-Hall, 2000. I have authored or co-authored more than 40 journal papers and over 100 conference papers on topics including signal processing, communication, filter designs, and error coding.

13. I have been involved in a variety of technologies related to cellphones. My dissertation was about spread spectrum communications. Spread spectrum has been used in some cellphone architectures, such as aspects of the high-speed packet download. Several years ago I worked with students who were studying the signal processing code from a cellphone base station. I have examined the use of cellphone signals for geolocation. I have implemented a receiver for dealing with signals that were very similar to cellphone signals having a very high intersignal interference. Recently we have been using cellphones for geolocation of transmitted signals using both multi-antenna beamforming and received signal strength.

14. Additional qualifications are detailed in my CV, which I understand has been submitted as Exhibit 2002 in this proceeding.

15. I have been asked to provide certain opinions related to the validity of the '190 Patent. In doing so, I have considered my own education and work experience that I believe render me well-qualified to opine on the level of ordinary skill in the art and the non-obviousness of certain claims in view of prior art presented in the petition.

III. SUMMARY OF MY OPINIONS

16. It is my opinion that Petitioner has not shown a reasonable likelihood of success that Claims 1-4, 6, 8, 18-20, and 24 of the '190 Patent are unpatenable as obvious over the prior art relied upon by the Petitioner. My opinions are based on my expertise in the technology of the '190 Patent, as well as my review of the '190 Patent, its file history, the prior art references asserted by the Petitioner, the Petition itself, the Declaration of Dr. William T. Ralston, the remaining exhibits to the Petition, and the declarations and evidence provided by Patent Owner with its Preliminary Response. If the Board were to institute a trial on the Petition, I intend to review any further evidence that may be submitted by either Petitioner or Patent Owner, as well as update my analysis and conclusions as appropriate, and as allowed under the rules of this proceeding.

17. I have reviewed and/or analyzed at least the following publications and materials, in addition to other materials that I may cite to in my Declaration. It should be noted that the opinions I express in this Declaration are not exhaustive of my opinions on the validity of any claims in the '190 Patents. Therefore, if a specific point is not addressed, it should not be construed that my opinion on that point indicates my agreement or disagreement with the patentability related to that point. The publications and materials I have reviewed and/or analyzed in preparation of this Declaration include:

- a. The Petition;
- b. The Declaration of William Ralston filed in connection with the Petition and Dr. Ralston's CV (Exs. 1002 and 1003);
- c. U.S. Pat. No. 9,402,190 (Ex. 1001);
- d. Prosecution history of the '190 Patent;
- e. Chinese Patent No. 201699704 ("Zhuo") (Ex 1005);
- f. U.S. Pat. App. Pub. No. 2004/0166802 ("McKay") (Ex. 1007);
- g. U.S. Pat. App. Pub. No. 2012/0302188 ("Sahota") (Ex. 1008);
- h. Duo-i6525 User Manual ("DUO Repeater") (Ex. 1009);
- i. TEK0 Repeater (Ex. 1006);
- j. Declaration of Patrick Cook (Ex. 1010);
- k. U.S. Pat. No. 7,250,830 ("Layne") (Ex. 1011);

- l. U.S. Pat. No. 9,660,687 (“Ella”) (Ex. 1012);
- m. U.S. Pat. App. Pub. No. 2008/0233865 (“Malarky”) (Ex. 1013);
- n. U.S. Pat. App. Pub. No. 2005/0227652 (“Kang”) (Ex. 1014);
- o. Patent Owner’s Preliminary Response;
- p. Force5 Schematic (Ex. 2007); and
- q. FCC Approval Documents for Product Code CM5000 (Ex. 2008).

IV. LEGAL BACKGROUND

A. Legal Standards

18. I am not an attorney. My analysis and opinions are based on my expertise in this technical field, as well as the instructions I have been given by counsel for the legal standards relating to patent validity.

19. I understand that my opinion must be taken from the perspective of what would have been known or understood by a person of ordinary skill in the art at the time of the invention.

20. I understand that Petitioner has defined a person of ordinary skill in the art as of the claimed priority date of the ’190 Patent as being someone with “either (a) a Master’s or doctoral degree in electrical engineering, or a similar discipline; (b) a Bachelor’s degree in electrical engineering, or similar discipline, and at least two years of additional relevant experience; or (c) at least 6 years of relevant experience.” Pet. at 3. I understand that Petitioner has defined “relevant experience” to mean

“working in electrical engineering systems related to radio frequency signals.” *Id.* at 4. I agree with Petitioner’s assessment of the level of ordinary skill in the art.

21. I am informed and understand that for purposes of assessing the obviousness of a claimed invention, the level of ordinary skill possessed by a hypothetical person of ordinary skill in the art is informed by several factors including: the type of problems encountered in the relevant art, the prior art solutions to those problems, the rapidity with which innovations are made in the relevant art, the sophistication of the relevant technology, and the educational level of active workers in the field.

22. I understand that in this *inter partes* review proceedings, the claims of the ’190 Patent are to be given their broadest reasonable interpretation to one of ordinary skill in the art in light of the patent’s specification and file history. I understand that claim terms are generally given their ordinary and customary meaning as understood by one of ordinary skill in the art in the context of the patent. I have applied these standards in my analysis in this declaration.

23. I understand that a claim of an issued patent can be found to be unpatentable if the claim would have been obvious in view of the prior art. I understand that this determination is made from the perspective of a person having ordinary skill in the art who is presumed to be aware of all prior art.

24. I understand that a patent claim is unpatentable due to obviousness if it can be shown that the differences between the claimed invention and the prior art are such that the subject matter as a whole would have been obvious to one of ordinary skill in the art at the time of the invention.

25. I understand that the following factors, which are sometimes referred to as the *Graham* factors, are considered in assessing obviousness: (1) the scope and content of the prior art; (2) the differences between the prior art and the claimed invention; (3) the level of ordinary skill in the art at the time of the invention; and (4) “objective indicia of non-obviousness,” also referred to as secondary considerations of non-obviousness. Those objective indicia include considerations such as whether a product covered by the claims is commercially successful due to the merits of the claimed invention, whether there was a long felt need for the solution provided by the claimed invention, whether others failed to find the solution provided by the claimed invention, whether others copied the claimed invention, and whether there was acceptance by others of the claimed invention as shown by praise from others in the field.

26. I understand that a claim is not proved obvious merely by showing that each of the individual elements existed somewhere in the prior art. I understand that, when a combination of prior art references is relied upon to assert obviousness, the party asserting obviousness must identify a reason or motivation that would have

prompted one of ordinary skill in the art to combine the elements of the references in the same way as the claimed invention with a reasonable expectation of success. I also understand that in assessing obviousness, it is improper to rely upon hindsight and that one should avoid using the claimed invention as a roadmap to piece together disclosures in the prior art.

V. THE '190 PATENT

27. The '190 Patent, titled “Apparatus and Methods for Radio Frequency Signal Boosters,” discloses a multi-band signal booster that simultaneously boosts the uplink and downlink channels for two or more frequency bands. Ex. 1001 at Title, Abstract. Signal boosters, generally, are devices that are placed between the end-user device and the cell phone tower to amplify and repeat signals coming from the cell phone tower to the cell phone and vice versa. *Id.* at 1:45-58. Cell phone reception degrades as a cell phone is moved farther away from a cell phone tower (also known as a base station) or when there are buildings or mountains or other obstructions between the phone and the tower. *Id.* at 1:36-44.

28. According to the patent, the development of signal boosters was constrained by the increasing crowding of the radio spectrum, as more and more devices and networks have been given frequency bands. *Id.* 5:64-6:7. In particular, the patent explains that signal boosters that boost adjacent frequency bands can have a non-ideal passband with roll-off near the edges, meaning the band-pass filter does

not perfectly exclude frequency ranges slightly outside of the desired range. *Id.* 6:3-10. The roll-off may lead to an increase in spurious or out-of-band emissions. *Id.* 6:10-13. While a sharp filter such as a cavity filter can be used to mitigate the problem, the patent notes that such solutions are typically expensive and size constrained. *Id.* 6:13-16.

29. The '190 Patent provides signal boosters without these constraints by taking advantage of the fact that the Band XII and XIII downlink channels are adjacent to each other in frequency (specifically, Band XII downlink – 728 MHz to 746 MHz, Band XIII downlink – 746 MHz to 757 MHz). *Id.* at 6:60-7:8; 7:45-62; 5:19-38. As noted, this arrangement is not typical of most frequency bands. *Id.* 7:50-53. The claimed circuit takes advantage of this property by configuring a signal booster with a band-pass filter that passes both the Band XII and Band XIII downlink channels at the same time. *Id.* 7:55-62. As shown in Figure 3 below, the '190 Patent provides a signal booster with two amplification paths for uplink channels and a single combined amplification path for the two downlink channels.

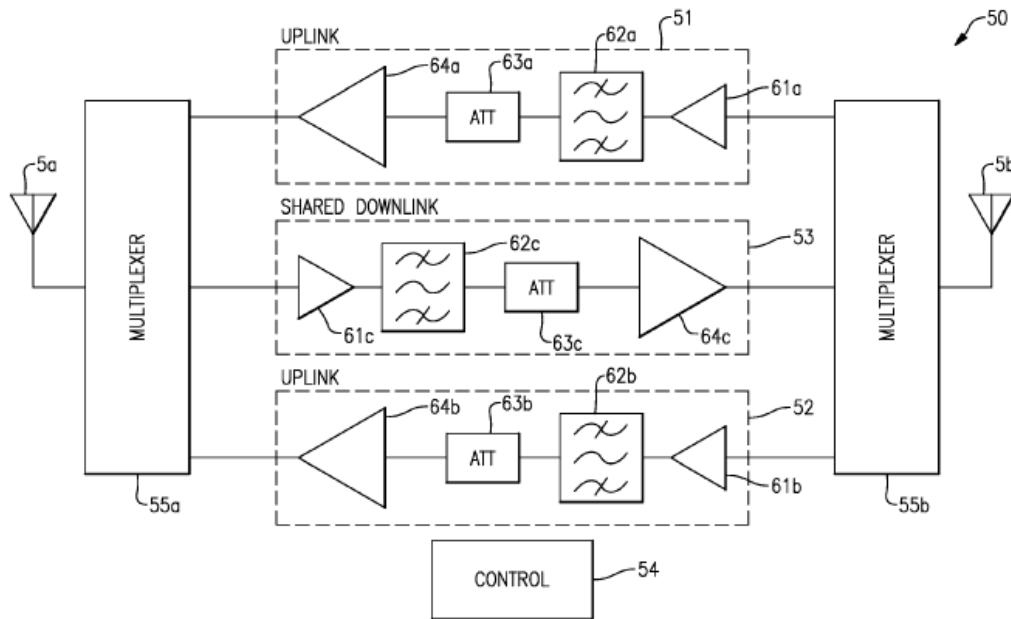


FIG.3

Id. at Fig. 3.

VI. CLAIM CONSTRUCTION

30. It is my understanding that Petitioner has offered constructions for the terms “contiguous,” “abutting,” and “adjacent.” Pet. at 4-5. However, the word “contiguous” is not even found in any of the challenged claims. Only the terms “abutting” and “adjacent” are found in Claims 1, 6, 19, and 24. Ex. 1001 at Claims 1, 6, 19, 24.

31. Additionally, I note that Petitioner’s construction of the term “abutting” is inconsistent with the ’190 Patent’s own definition of the term. Petitioner stated, “[b]ands that are directly next to each other (e.g., 910 MHz to 920 MHz and 921 MHz to 930 MHz) are ‘abutting.’” Pet. at 4. Petitioner’s construction allows for a small gap between the two frequency bands. But the ’190 Patent specifically notes

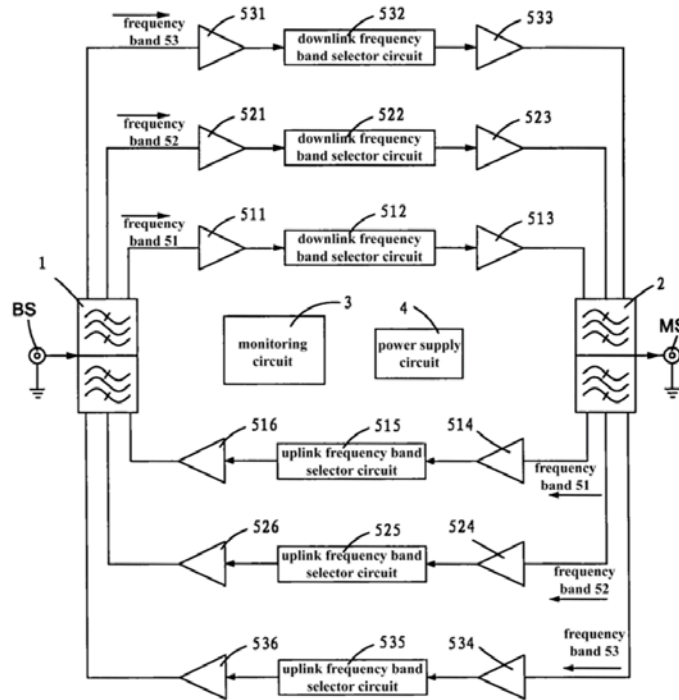
that abutting bands have substantially no gap. It states, “in certain implementations, the adjacent uplink channels or the adjacent downlink channels of the first and second frequency bands are **abutting**, such that there is substantially no separation or gap (e.g., about 0 MHz) between the channel frequencies.” Ex. 1001 at 11:7-11 (emphasis added). In other words, “abutting” is a subset of “adjacent” whereby two bands are abutting if they are adjacent and have substantially no gap between them. Petitioner’s construction is therefore incorrect.

32. For the purposes of this stage of the proceedings, I do not disagree with Petitioner’s definition of the word “adjacent.” However, as I note later on in this declaration, Petitioner’s arguments about the prior art are inconsistent with their own definition.

VII. REFERENCES RELIED ON BY PETITIONER

A. Zhuo

33. Chinese Patent CN 201699704 to Zhuo (“Zhuo”) discloses a “Tri-band Wireless Repeater.” Ex. 1005 at Title. The claimed circuit comprises a donor-end multiplexer, a retransmission-end multiplexer, a monitoring circuit, a power supply circuit, and six amplification paths for three frequency bands (one each for uplink and one for downlink). Zhuo does not disclose that any of the amplification paths may be combined. Petitioner appears to rely principally on the circuit disclosed in Figure 2 of Zhuo, shown below.

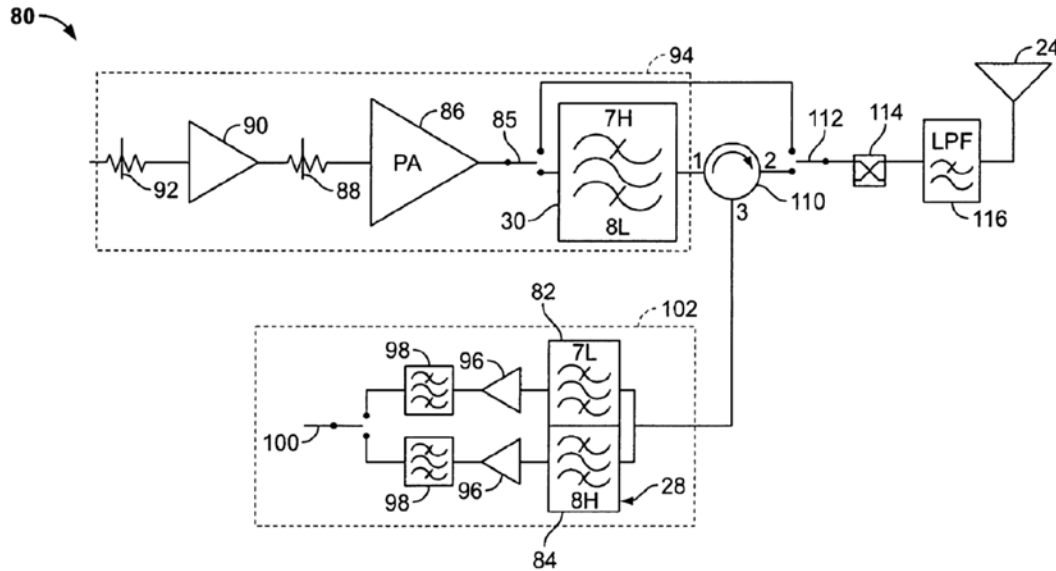


Ex. 1005 at Fig. 2.

B. Layne

34. U.S. Patent No. 7,250,830 to Layne, titled “Dual Band Full Duplex Mobile Radio,” discloses a mobile radio that operates in both the 700 MHz and 800 MHz operating frequencies, and more particularly, in the Public Safety Frequency Bands. Ex. 1011 at Title, 2:24-32. The patent explains that other mobile radio units were unable to provide “combined dual band operation with full duplex transmissions.” *Id.* at 1:20-21. In addition, known mobile radios were either limited to a single frequency band or required external devices to provide multiple modes of operation (e.g., simplex, half duplex, full duplex). *Id.* at 1:21-37. Layne provides a solution to these problems by providing a mobile radio with a single chassis and

having switches that allow the user to switch the radio between simplex, half duplex, and full duplex modes of operation. *Id.* at 4:39-5:27. A block diagram of Layne's radio is shown below:



Id. at Fig. 3. As seen in this figure, there is a transmitter portion 94, comprising an “amplifier” 90, a PA (power amplifier) 86, and a transmit filter 30. These are connected to a circulator 110. There is also a receiver portion 102, comprising a receive filter 28, with first and second filters 84, connected to amplifiers 96 and filter 98.

C. DUO Repeater

35. The DUO Repeater is a user manual for a device called Duo-i6525. Ex. 1009 at 2. It is my understanding that SureCall contends that Petitioner has not shown that the DUO Repeater is available as prior art.

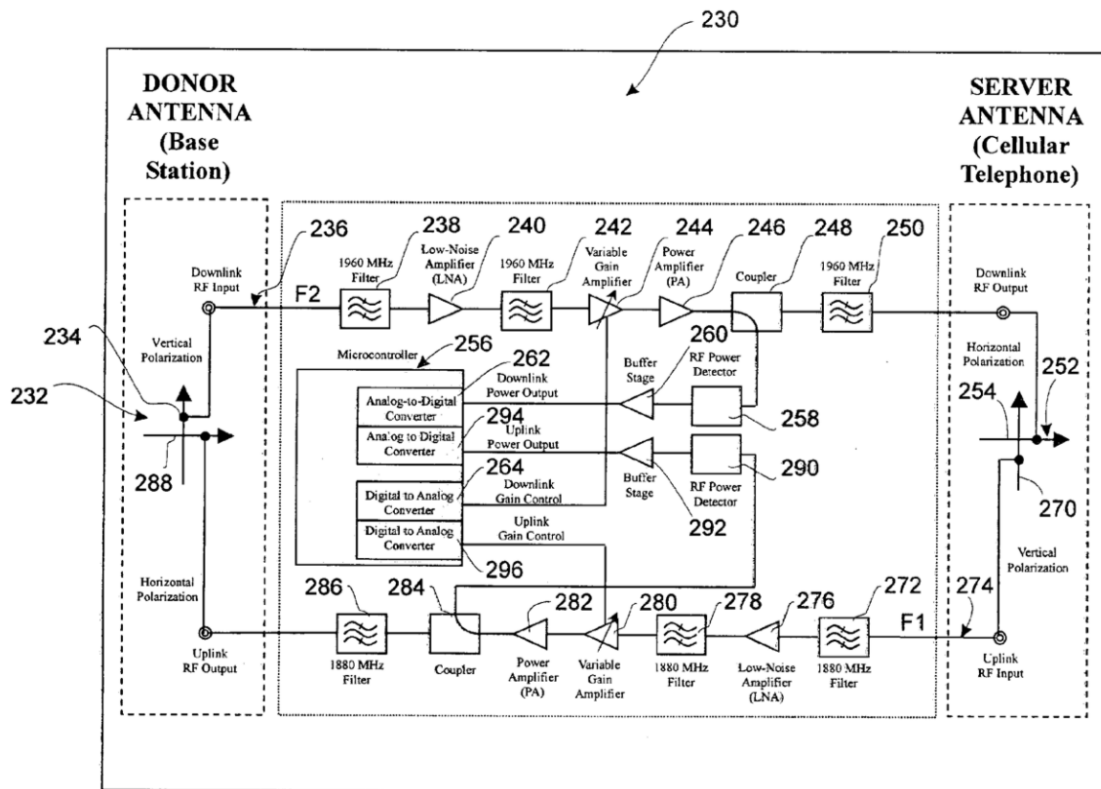
36. Regardless, the manual explains that the Duo-i6525 is a dual band SMR RF repeater that can be used as a stand-alone repeater with passive antennas connected to it or as a feeder repeater to a Distributed Antenna System. *Id.* at 6. The manual includes a block diagram of the device at Figure 4 showing a relatively complex system including digital filters having analog-to-digital and digital-to-analog converters. *Id.* at 10-11, Fig. 4. This is a markedly different class of product from the signal booster described in the '190 Patent, which does not appear to rely on digital signal processors.

D. Sahota

37. U.S. Patent Application Publication No. 2012/0302188 A1 to Sahota is titled "Tunable Multi-Band Receiver." Ex. 1008 at Title. Sahota discloses a multi-band receiver that uses a tunable notch filter to tune to a transmit band in a plurality of transmit bands. *Id.* at Abstract. Based on my read of the Petition, Petitioner does not appear to point to what Sahota invented—just a table in paragraph 69 that lists the frequency ranges for UMTS Bands I through XIV.

E. McKay

38. U.S. Pat. App. Pub. No. 2004/0166802 A1 to McKay is titled “Cellular Signal Enhancer.” Ex. 1007 at Title. McKay discloses a bi-directional amplifier that receives a user signal, amplifies the signal power, and retransmits the amplified signal to a base station. *Id.* ¶ 14. McKay’s bi-directional amplifier is used for a particular wireless communication service. *Id.* ¶ 15. Figure 19 from McKay is shown below.



Ex. 1007 at Fig. 19.

F. TEKO Repeater

39. The TEKO Repeater appears to be a collection of documents that were submitted to the FCC regarding an Optical Systems Remote Unit TRL7S8SC8A9S19AWAS with Master Device. Ex. 1006 at 2. It is my understanding that SureCall contends that Petitioner has not shown that the TEKO Repeater is available as prior art.

40. Regardless, the TEKO Repeater describes a signal repeater having a master unit and remote units. *See id.* at 32, 44. The remote units are connected via fiber optic cables to the master unit and are used to distribute wireless signals up to 20 km away from the master unit. Petitioner points mainly to the TEKO Repeater's disclosure of its operation in six frequency bands, the SMR700, SMR800C, AMPS, SMR900, PCS, and AWS bands. *See id.* at 15.

VIII. OPINIONS

A. Ground 1: The Combination of Layne, Sahota, and McKay Does Not Teach the Inventions of Claims 1-4, 6, 8, 19, 20, and 24

1. The Combination Does Not Teach a Shared Downlink Amplification Path

41. Petitioner alleges that Claims 1-4, 6, 8, 19, 20, and 24 are obvious over the combination of Layne, Sahota, and McKay. Of the challenged claims, only Claims 1 and 19 are independent. The remaining challenged claims depend on Claims 1 and 19 such that the missing limitations from Claims 1 and 19 also apply

to Claims 2-4, 6, 8, 20, and 24. Therefore, I will direct my analysis to Petitioner's arguments about Claims 1 and 19 for now. If the Board decides to institute an *inter partes* review, I reserve the right to add to, revise, or supplement my declaration to address other claims.

42. Claims 1 and 19 each contain a similar limitation: a shared downlink amplification path. Claim 1 recites, "a shared amplification path configured to provide amplification to at least a portion of a first downlink channel of a first frequency band and to provide amplification to at least a portion of a second downlink channel of a second frequency band, wherein the first frequency band and the second frequency band are different frequency bands." Ex. 1001 at Claim 1. Claim 19 recites a nearly identical limitation of "a shared amplification path configured to provide amplification to a first downlink channel of a first frequency band and to provide amplification to a second downlink channel of a second frequency band, wherein the first frequency band and the second frequency band are different frequency bands." *Id.* at Claim 19.

43. Petitioner argues in Ground 1 that Layne teaches these limitations. *See* Pet. at 23-24, 37-39. Specifically, Petitioner points to Figure 3 of Layne and the disclosure of "the transmit filter 30 passes signals in the 7H and 8L frequency bands and rejects or filters signals in the 7L or 8H frequency bands." Pet. at 23 (citing Ex. 1011 at 3:57-59). However, the 7H and 8L frequency bands in Layne are **uplink**

bands. They are not downlink bands as required by Claims 1 and 19. Petitioner recognizes this but attempts to argue that “the circuitry for amplifying an uplink channel is no different than the circuitry for amplifying a downlink channel.” Pet. at 24.

44. The problem with Petitioner’s argument is that it relies on the teachings of the ’190 Patent to go from a combined uplink amplification path in Layne to a combined downlink amplification path when Layne itself does not suggest that the two are the same. Rather than identifying any teaching in the prior art, Petitioner actually cites the ’190 Patent as part of its basis for arguing that uplink and downlink paths are equivalent. *See* Pet. at 24 (citing ’190 Patent at 10:60-11:3). But using the ’190 Patent against itself is hindsight reasoning, which I understand is not permissible to show that a patent is obvious.

45. Layne itself also shows that uplink and downlink amplification paths are different. In Figure 3 of Layne, the uplink amplification path is shown as having an attenuator 92, amplifier 90, attenuator 88, power amplifier 86, switch 85, and then transmit filter 30. Ex. 1011 at Fig. 3, 3:65-4:1 (explaining what the numerals refer to). However, the downlink amplification paths are shown in parallel as having the receive filters 82 and 84, amplifiers 96 and 96, filters 98 and 98, and switch 100. *Id.* at Fig. 3, 3:44-52. Thus, Layne itself teaches that the downlink and uplink amplification paths are different.

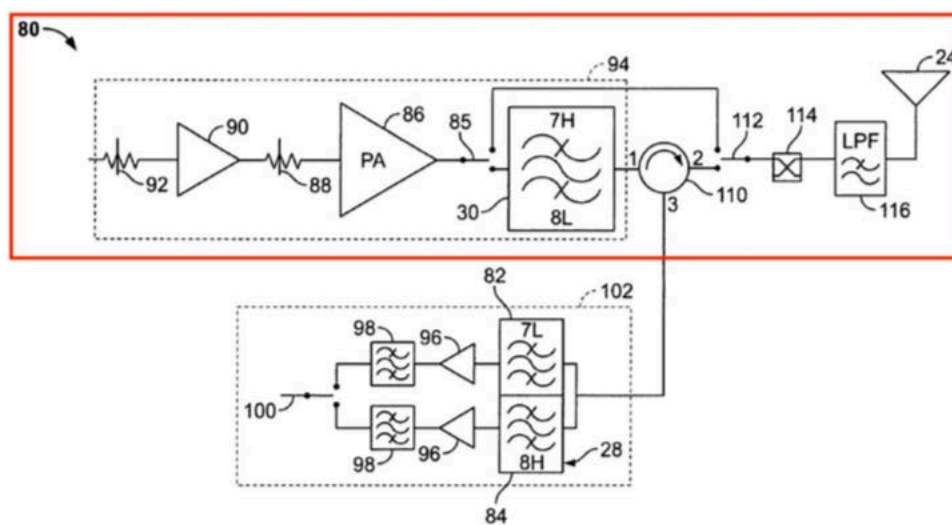


FIG. 3

Pet. at 24 (citing Ex. 1011 at Fig. 3). As shown in this Figure 3, the downlink bands, 7L and 8L, have separate amplification paths. Layne does not identify any shortcoming with its separate amplification paths. It provides no reason to substitute its downlink band structure for a different structure.

46. Additionally, the downlink amplification paths further have a switch 100 that Layne describes as being used to select between the two filtered signals. Ex. 1011 at 3:47-51. A POSITA would recognize on the basis of switch 100 that only one downlink amplification path is active at any given time. Layne's downlink amplification paths are vastly different from its uplink amplification paths, due in part to the various switches, such as switch 100, required to implement the simplex, half duplex, and full duplex modes of operation. *Id.* at 4:59-5:27. Thus, even if Petitioner had explained a reason for modifying Layne, the actual modification

would not be trivial because the uplink and downlink paths in Layne are structurally very different. Petitioner's statement that the circuitry for amplifying uplinks and downlinks are the same simply is not sufficient to explain how to modify the complex circuit of Layne to meet the shared downlink amplification path limitation.

47. In addition to the '190 Patent itself, Petitioner also relies on the McKay reference to support its argument that the uplink and downlink circuitry are the same. Pet. at 24 (citing Ex. 1007 ¶ 110). But McKay's circuit shown in Figure 19 and described in Paragraph 110 is different from Layne's circuit. Paragraph 110 of McKay also only states that in the specific circuit shown in Figure 19, circuit elements are "functionally identical." Ex. 1007 ¶ 110. In my opinion, that alone does not support Petitioner's conclusion regarding the uplink and downlink amplification paths being interchangeable, or how to make that modification. Additionally, McKay does not even have a shared amplification path at all. It only teaches a circuit with a single uplink amplification path and a single downlink amplification path. *Id.* at Fig. 19.

48. Petitioner and Dr. Ralston have not explained how a POSITA would modify Layne's mobile radio circuit, with its shared uplink amplification path and two different downlink amplification paths, into a signal booster with a shared downlink amplification path. As mentioned above, McKay does not even have a shared amplification path. Ex. 1007 at Fig. 19. Furthermore, Petitioner does not

explain whether a POSITA would have been motivated to combine McKay with Layne. Without explaining how or why the two references would be combined, I do not see how Petitioner contends that Layne, Sahota, and McKay render Claims 1 and 19 obvious. *See* Pet. at 37-39 (Ppetitioner made the same argument with respect to Layne and McKay for Claim 19).

2. A POSITA Would Not Have Been Motivated to Modify Layne in view of McKay or Sahota

49. In my opinion, a POSITA would not have modified Layne in view of McKay because it would render Layne useless for its intended purpose of a mobile radio. Layne teaches a full duplex mobile radio that can be used with two frequency bands. Ex. 1011 at Title, Abstract. Modifying Layne's radio in some unstated manner with McKay to arrive at a signal booster would render Layne unable to function as a mobile radio. A mobile radio is a user-operated device that transmits and receives radio signals. On the other hand, a signal booster is an intermediary device that repeats the uplink and downlink signals sent to/from cellphone towers and cellphones. A signal booster cannot be used to transmit original signals—in other words, a radio operator cannot talk into a signal booster and transmit that signal to other radios or a cellphone tower. Modifying Layne's radio to turn it into a signal booster would render Layne's radio incapable of being used as a radio. Thus, a POSITA would not have been motivated to modify Layne in view of McKay to arrive at a signal booster.

50. In a similar fashion, a POSITA also would not have been motivated to modify Layne in view of the other reference, Sahota. Again, turning Layne into a signal booster would entirely defeat the purpose of Layne and would render it incapable of being used as a mobile radio.

51. Additionally, a POSITA would have recognized that Sahota is fundamentally incompatible with Layne. Sahota teaches the use of a tunable notch filter, which a POSITA would understand to be the opposite of a band-pass filter. Ex. 1008 at Abstract (“The tunable notch filter is tunable to a transmit band in a plurality of transmit bands and attenuates signal components in the transmit band.”). A band-pass filter allows a certain frequency range to pass through while excluding all other frequencies, while a notch filter allows all frequencies to pass through *except* a certain range. Accordingly, there is simply nothing from Sahota that a POSITA would want to combine with Layne, which uses band-pass filters.

52. For at least these reasons, I do not believe that Petitioner has shown a reasonable likelihood of success that Claims 1-4, 6, 8, 19, 20, and 24 are obvious over the combination of Layne, Sahota, and McKay.

B. Ground 2: The Combination of Zhuo, Layne, and Sahota Does Not Teach the Invention of Claim 18

53. As an initial matter, I find Petitioner’s actual position to be very unclear. Petitioner states that Ground 2 is based on the combination of Zhuo, Layne, and Sahota, but Claim 18 (the only claim in Ground 2) is dependent from Claim 1.

Meanwhile, Petitioner’s argument on Claim 1 relied on the combination of Layne, Sahota, and McKay. It is unclear how the addition of Zhuo but the deletion of McKay is able to meet the limitations of Claim 18, when McKay was necessary to meet the limitations of Claim 1 as Petitioner argued earlier. Additionally, Petitioner’s argument on Claim 18 suggests that a POSITA would *start* with Zhuo and then modify it with Layne and Sahota. *See* Pet. at 46 (“The POSITA wanting to amplify the bands recited in claim 18 would have been motivated to modify *Zhuo* in view of *Layne* and *Sahota* to do so.”). However, Petitioner did not make an argument about Zhuo relating to Claim 1.

54. To make matters worse, Dr. Ralston’s declaration seems to be arguing something totally different. Dr. Ralston’s declaration discusses the TEKO Repeater which is not part of Ground 2 or Ground 1. Ex. 1002 ¶¶ 82-83, 86. He concludes his section on Claim 18 by stating, “Therefore, the person of ordinary skill in the art wanting to amplify the bands recited in Claim 18 would have been motivated to modify Zhuo in view of Layne and Sahota or the TEKO Repeater to do so.” *Id.* ¶ 86. Based on this statement, it is not clear whether the combination that forms the basis for Dr. Ralston’s opinion is Zhuo, Layne, and Sahota, or, alternatively, Zhuo, Layne, and TEKO Repeater, or just Zhuo and TEKO Repeater. Thus, the Ground 2 argument is totally unclear. Furthermore, none of those combinations teach all the elements of Claim 18.

55. Petitioner does not explain how a POSITA would have combined Zhuo, Layne, and Sahota to meet the limitation of Claim 18. That claim recites, “The radio frequency signal booster of claim 1, wherein the PCB is configured to provide amplification to a plurality of frequency bands, wherein the plurality of frequency bands comprise Band II, Band IV, Band V, Band XII, and Band XIII.” Ex. 1001 at Claim 18. Petitioner uses Sahota to show that Bands I-XIV existed. *See* Pet. at 44; Ex. 1008 at Table 1. But other than showing the existence of those bands, Petitioner does not explain why a POSITA would want to amplify those specific bands in a signal booster with a shared downlink amplification path.

56. Claim 18 only recites one possible combination of five bands. Petitioner again assumes *a priori* that a POSITA would want to amplify the specific recited bands. Pet. at 46. But choosing those bands specifically because Claim 18 requires those bands is hindsight reasoning. Mathematically, there are 2002 possible ways to choose five elements from a fourteen element list. Specifically, the number of combinations of 5 elements from a 14 element list is given as $\binom{14}{5} = \frac{14!}{5!9!} = 2002$. The prior art references Zhuo, Layne, and Sahota do not teach or suggest that a POSITA should amplify those specific bands. Petitioner fails to explain what would have motivated the selection of specifically Bands II, IV, V, XII, and XIII. Accordingly, it is my opinion that Petitioner has not shown how Claim 18 is obvious

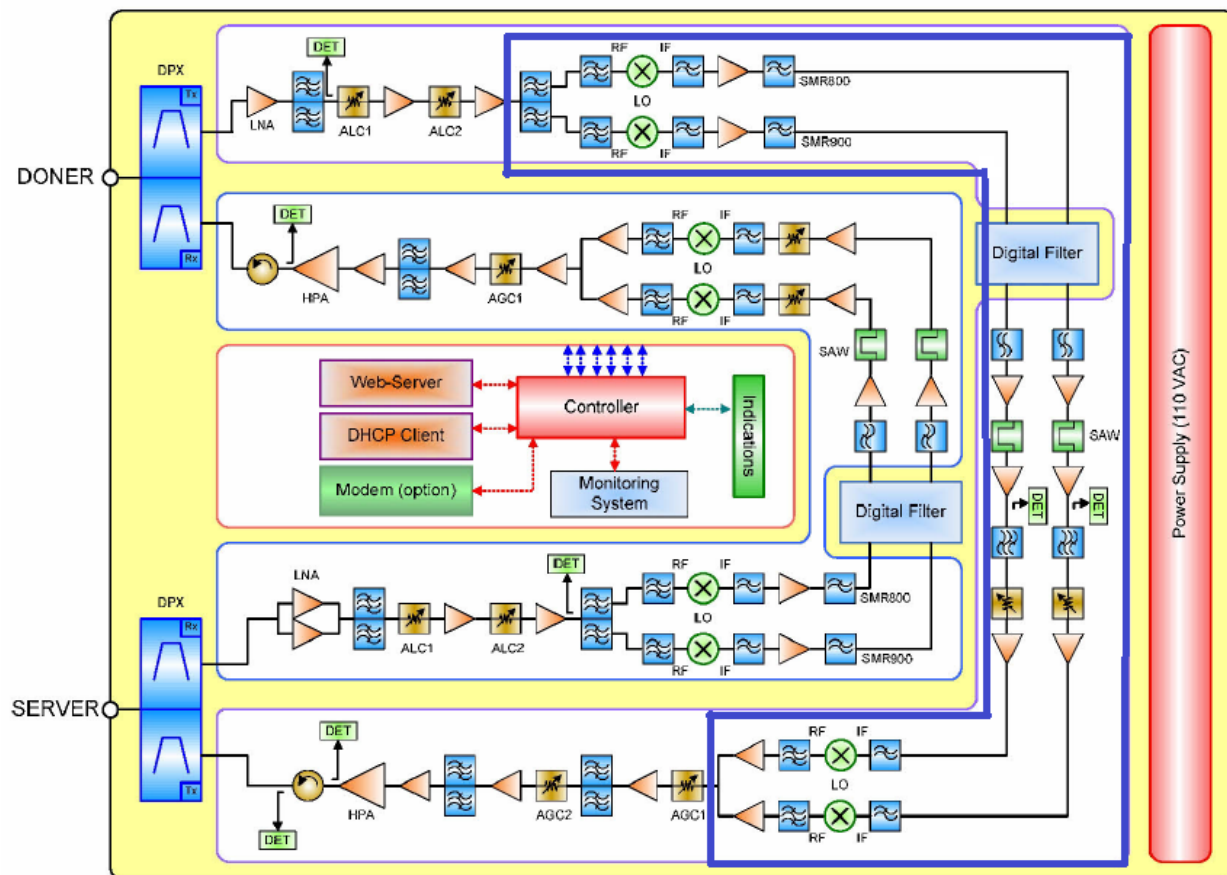
over Zhuo, Layne, and Sahota, in addition to the fact that Petitioner never explained how Zhuo or Layne and Sahota meet the limitations of Claim 1.

C. Ground 3: The DUO Repeater Does Not Teach the Invention of Claims 1, 2, 6, 8, and 19

57. In Ground 3, Petitioner argues that Claims 1, 2, 6, 8, and 19 are obvious over the DUO Repeater. I understand that Patent Owner contends that DUO Repeater is not a prior art reference. However, for purposes of my analysis, I will focus my opinions on whether the DUO Repeater renders the claims obvious.

58. Claim 1 recites a limitation of “wherein the shared amplification path comprises a first band-pass filter configured to pass the at least a portion of the first downlink channel and the at least a portion of the second downlink channel.” Ex. 1001 at Claim 1. Claim 19 also recites a similar limitation of “wherein the shared amplification path comprises a first band-pass filter configured to pass both the first downlink channel of the first frequency band and the second downlink channel of the second frequency band.” Ex. 1001 at Claim 19. In my opinion, the DUO Repeater does not disclose a “first band-pass filter” as required by Claims 1 and 19.

59. For this limitation, Petitioner points to the band pass filter labeled as C1 in the DUO Repeater. *See* Pet. at 48 (citing Ex. 1009 at Fig. 4) (shown below).



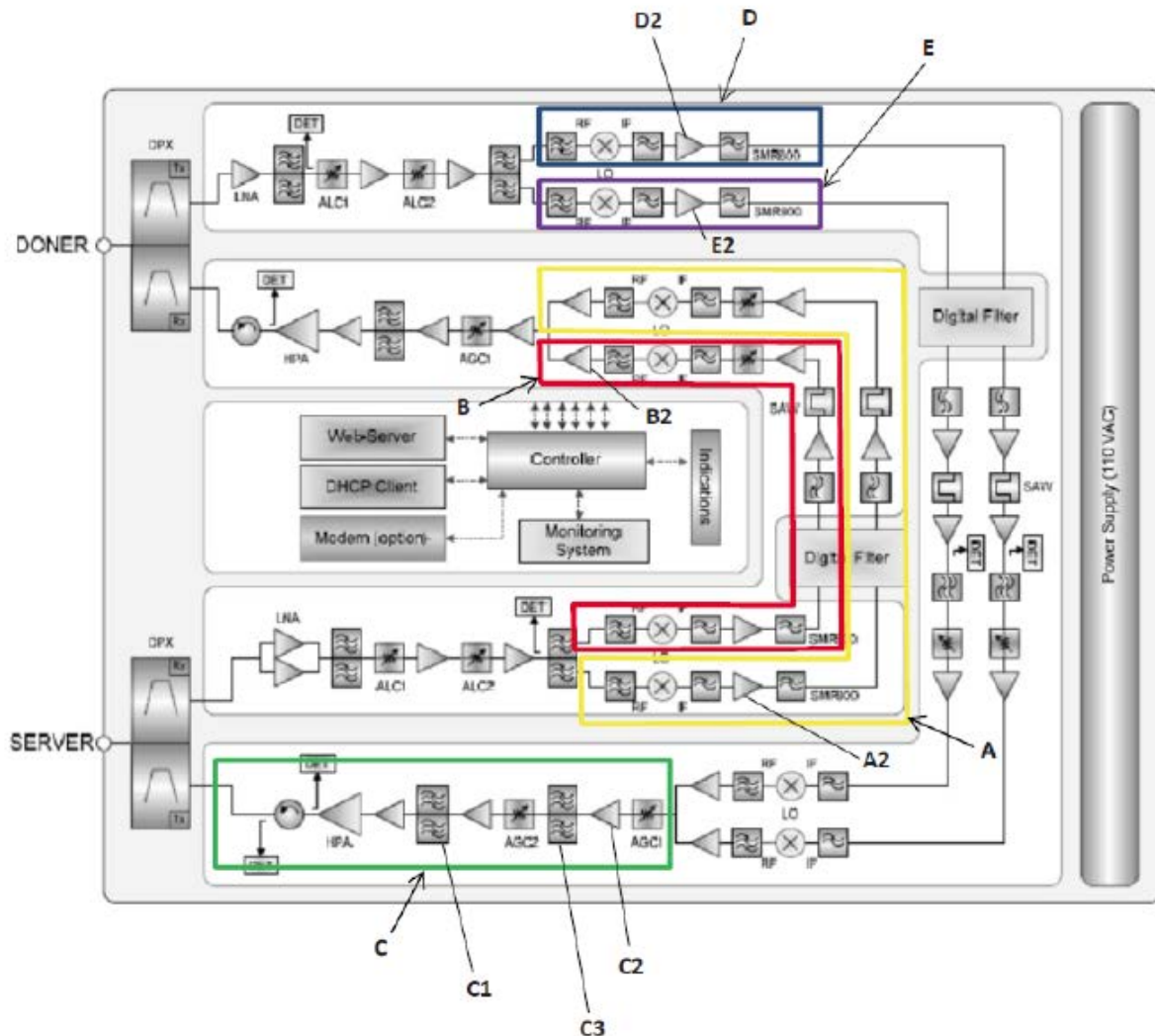
Ex. 1009 at Fig. 4 (annotated in blue). Each path uses its own band-pass filters for their respective frequency band. Thus, when the band-pass filters C1 and C3 are shown as two stacked band-pass filters, a POSITA would recognize that the DUO Repeater is actually implemented with two band-pass filters in parallel for the two frequency bands.

62. Moreover, Petitioner's suggestion that a POSITA would find amplification of a 66 MHz gap "acceptable" and that "the POSITA is willing to amplify a certain amount of noise in order to minimize the number of components it must use in any one design" is not credible. Pet. at 51. The reasoning in the Petition

also runs counter to the facts. The actual downlink frequency bands listed in the DUO Repeater are 851-869 MHz for SMR800 DL and 935-940 MHz for SMR900 DL. *See* Ex. 1009 at 31 (also listing an alternative 862-869 MHz frequency band for SMR800). In other words, the downlink frequency band for SMR800 covers 18MHz and the downlink frequency band for SMR900 covers 5 MHz. The total frequency spectrum for these two downlink bands covers 23 MHz. A POSITA would not find it acceptable to amplify a frequency gap of 66 MHz, nearly three times larger than the actual signal of interest. As Petitioner itself explains, “As the separation between adjacent bands decreases (i.e., less separation, less amplification of noise), there is less concern about amplification of noise between adjacent bands.” Pet. at 51. That is simply not the case in the DUO Repeater. The separation between the bands is much greater than the bands of interest. Neither Petitioner nor Dr. Ralston address this issue.

63. Even further, the SMR900 uplink band is listed as 896-901 MHz. Ex. 1009 at 31. That’s right in between the SMR800 and SMR900 downlink frequency bands. Thus, a POSITA would not want to amplify the 66 MHz gap which also contains the uplink band for SMR900. Under no circumstance would a POSITA find that to be an “acceptable trade-off” because amplifying the uplink signal in conjunction with the downlink signal would cause significant interference with the actual amplification path for the uplink signal. The DUO Repeater has an uplink

amplification path for the SMR900 band, which Petitioner partially highlighted in yellow.



Pet. at 48 (annotating Fig. 4 of DUO Repeater). In other words, the DUO Repeater cannot be amplifying the 66 MHz gap between the two downlink bands because that would leave it incompatible with its own uplink bands.

64. Claims 1 and 19 also contain another limitation of “wherein the first downlink channel and the second downlink channel are adjacent in frequency to one

another.” Ex. 1001 at Claim 1, 19. Petitioner argued that “[t]wo frequency bands that are not contiguous or abutting would be considered ‘adjacent’ if the bands are separated by a frequency range that does not include another intervening, incompatible frequency band.” Pet. at 4-5. Furthermore, Petitioner gave an example: “a first band with a range of 910 MHz to 920 MHz would be considered ‘adjacent’ to a second band with a range of 930 MHz to 940 MHz if there is no intervening cellular service band between the two bands.” *Id.* at 5. Since the SMR900 uplink band is in between the SMR800 and SMR900 downlink bands, the two downlink bands are clearly not adjacent under this definition.

65. At least for these reasons, I do not believe that Petitioner has shown a reasonable likelihood of success of showing that Claims 1 and 19 are obvious over the DUO Repeater.

D. Ground 4: The DUO Repeater and Sahota Do Not Teach the Inventions of Claims 3, 4, 20, and 24

66. In Ground 4, Petitioner argues that Claims 3, 4, 20, and 24 are obvious over the DUO Repeater and Sahota. As I explained above, Petitioner has not shown how the DUO Repeater makes the independent Claims 1 and 19 obvious, and those limitations are also not taught for these dependent claims. Additionally, a POSITA would not have been motivated to look to Sahota.

67. As I explained above, Sahota teaches the use of a tunable notch filter, which a POSITA would understand to be the opposite of a band-pass filter. Ex. 1008

at Abstract. Therefore, for the same reasons as explained above, a POSITA would not have been motivated to combine Sahota with the DUO Repeater, which uses band-pass filters, because a POSITA would have recognized that Sahota's notch filters are not compatible with the DUO Repeater's band-pass filters.

E. Ground 5: The DUO Repeater and TEKO Repeater Do Not Teach the Invention of Claim 18

68. In Ground 5, Petitioner argues that Claim 18 is obvious over the DUO Repeater and the TEKO Repeater. I understand that like the DUO Repeater, Patent Owner is contending that the TEKO Repeater is not prior art. I have no opinion on that legal argument. However, at least for the same reasons as I described above with respect to the DUO Repeater by itself, the combination of DUO Repeater and TEKO Repeater does not satisfy all the limitations of independent Claim 1.

69. Additionally, Petitioner argues that the TEKO Repeater is a signal booster that operates in six different frequency bands over five amplification paths. Pet. at 64-65. Petitioner also points to the table in the TEKO Repeater listing the 728-757 MHz frequency band and states that TEKO Repeater shows a combined downlink amplification path. Pet. at 66; Ex. 1002 ¶ 124. However, that table only lists frequency bands. Petitioner does not point to a circuit diagram that actually shows a combined downlink amplification path for two frequency bands. Thus, the TEKO Repeater does not make up for the lack of disclosure in the DUO Repeater regarding a band-pass filter that is "configured to pass the at least a portion of the

first downlink channel and the at least a portion of the second downlink channel.”

Ex. 1001 at Claim 1.

**IX. SURECALL’S FORCE5 SIGNAL BOOSTER EMBODIES THE
CLAIMS OF THE ’190 PATENT**

70. I have also been asked by Patent Owner to provide my opinion on whether Patent Owner’s Force5 signal booster practices the claims of the ’190 Patent as it relates to secondary considerations of non-obviousness. Based on my review of the Force5 documents that were publicly released by the FCC and a confidential schematic of the Force5, it is my opinion that the Force5 signal booster practices all limitations of at least Claim 1 of the ’190 Patent.

71. I reviewed the following documents in arriving at my conclusion that the Force5 embodies Claim 1 of the ’190 Patent:

- a. Schematic of the Force5 Signal Booster (Ex. 2007); and
- b. FCC Approval Documents for Product Code CM5000 (Ex. 2008).

72. Attached hereto as Exhibit 2006 is a claim chart I prepared that sets forth how the Force5 signal booster practices each and every limitation of Claims 1-4, 6, 8, 18-20, and 24 of the ’190 Patent.

73. As shown in Exhibit 2006, the Force5 is a radio frequency signal booster that has a printed circuit board having a shared amplification path that is configured to amplify the Band XII downlink channel and the Band XIII downlink channel. Ex. 2006 at 1-4. The shared amplification path has a first band-pass filter

that is configured to pass the Band XII and Band XIII downlink channels and is further configured to simultaneously boost the Band XII and Band XIII downlink channels. *Id.* at 7. Additionally, the amplification path has at least one amplifier. *Id.* at 7-8.

74. As further shown in Exhibit 2006, the first frequency band (Band XII) and the second frequency band (Band XIII) are different frequency bands and are adjacent to each other. *Id.* at 4-5, 7.

75. Accordingly, the Force5 practices all the limitations of Claim 1 of the '190 Patent. The Force5 also practices the other claims at issue in the present proceeding, namely, Claims 2-4, 6, 8, 18-20, and 24, as I discuss in more detail in the chart. *Id.* at 9-22.

76. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated this 16th day of January, 2019.

A handwritten signature in black ink, reading "Todd L. Moon". The signature is written in a cursive, flowing style. The first name "Todd" is followed by a middle initial "L." and the last name "Moon". The signature is positioned above a horizontal line.

Todd Moon, Ph.D.