UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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WILSON ELECTRONICS, LLC,
Petitioner

v.

CELLPHONE-MATE, INC.,
Patent Owner.

_____

Patent 9,402,190

_____

PETITION FOR *INTER PARTES* REVIEW
OF U.S. PATENT NO. 9,402,190

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I. INTRODUCTION

Wilson Electronics, LLC ("Petitioner") requests *inter partes* review of claims 1-4, 6, 8, 18-20, and 24 ("the challenged claims") of U.S. Patent No. 9,402,190 ("the '190 Patent") (Ex. 1001), which, according to PTO records, is assigned to Cell-Phone Mate, Inc. ("Patent Owner"). For the reasons discussed below, the challenged claims are invalid.

II. MANDATORY NOTICES

Real Parties-In-Interest: Petitioner identifies Wilson Electronics, LLC as the real party-in-interest.

Related Matters: The '190 Patent has been asserted by Patent Owner against Petitioner in Wilson Electronics, LLC v. Cellphone-Mate, Inc., Case No. 2:17-cv-00305-DB (D. Utah). Petitioner is filing one other IPR petition related to the '190 Patent and four other petitions related to U.S. Patent Nos. 8,867,572 and 9,100,839 which have also been asserted against Petitioner in the same proceeding.

Counsel and Service Information: Lead counsel: Jed H. Hansen (Reg. No. 59,106). Backup counsel: (1) Peter M. de Jonge (Reg. No. 47,521) and (2) Mark M. Bettilyon. Service information is Thorpe North & Western, LLP, 175 South Main, Suite 900, Salt Lake City, Utah 84111, Tel.: 801-566-6633, Fax: 801-566-0750, email: IPR3969-166A@tnw.com.

III. PAYMENT OF FEES

The PTO is authorized to charge any fees due during this proceeding to Deposit Account No. 20-0100.

IV. GROUNDS FOR STANDING

Petitioner certifies that the '190 Patent is available for review and Petitioner is not barred or estopped from requesting review on the grounds identified herein.

V. PRECISE RELIEF REQUESTED AND GROUNDS RAISED

The challenged claims should be canceled as unpatentable based at least on the following grounds:

Ground 1: Claims 1-4, 6, 8, 19, 20, and 24 are unpatentable under 35 U.S.C. 103 based on U.S. Patent No. 7,250,830 to Layne et al. ("*Layne*") (Ex. 1011) in view of U.S. Patent Publication No. 2012/0302188 to Sahota et al. ("*Sahota*") (Ex. 1008) and U.S. Pat. Pub. 2004/0166802 to McKay ("*McKay*") (Ex. 1007);

Ground 2: Claim 18 is unpatentable under 35 U.S.C. 103 based on Chinese Patent No. 201699704 to Zhuo ("*Zhuo*") (Ex. 1005) in view of *Layne* and *Sahota*;

Ground 3: Claims 1, 2, 6, 8 and 19 are unpatentable under 35 U.S.C. 103 based on Duo-i6525 User Manual ("*DUO Repeater*") (Ex. 1009);

Ground 4: Claims 3, 4, 20, and 24 are unpatentable under 35 U.S.C. 103 based on the *DUO Repeater* in view of *Sahota*;

Ground 5: Claim 18 is unpatentable under 35 U.S.C. 103 based on the *DUO Repeater* in view of the TEKO Repeater ("*TEKO Repeater*") (Ex. 1006).

Sahota and *Layne* both appear on the face of the '190 Patent. However, *Layne* did not receive record consideration nor was it cited by the Examiner during prosecution. For at least these reasons, there is no basis for a determination under 35 U.S.C. § 325(d) that substantially similar prior art and/or arguments have already been presented to the Office. None of the six factors identified in the PTAB's Becton Dickinson and Company decision (recently deemed informative) weigh in favor of such a finding. See *Dickinson and Company v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 at 17-28 (PTAB Dec. 15, 2017).

VI. LEVEL OF ORDINARY SKILL

Examples of a person of ordinary skill in the art as of the claimed priority date of the '190 Patent include 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.

Relevant experience means working in electrical engineering systems related to radio frequency signals. (Ex. 1002, ¶ 12.)

VII. CLAIM CONSTRUCTION

Because the '190 patent will not expire before issuance of a final written decision, the claims of the '190 patent should be given their broadest reasonable interpretation (BRI). See 37 C.F.R. § 42.100(b). Because of the different claim interpretation standards used in this proceeding and in district courts, any claim interpretations herein are not binding upon Petitioner in any litigation related to the '190 Patent. Moreover, Petitioner does not concede that the challenged claims are not invalid for reasons not raised herein.

The terms "contiguous," "abutting," and "adjacent," are terms referred to herein and in the art relating to the proximity of frequency bands on the radio frequency spectrum. While there is some variation in how those terms are used in the art, Petitioner uses the term "contiguous" to mean frequency bands that are overlapping or have a common boundary. For example, downlink band XII (729 MHz to 746 MHz) and downlink band XIII (746 to 756 MHz) share 746 MHz as a common boundary and are thus overlapping or contiguous. Bands that are directly next to each other (e.g., 910 MHz to 920 MHz and 921 MHz to 930 MHz) are "abutting." Two 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. For example, in the cellular service industry, 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. (Ex. 1002, ¶ 45.)

Under the broadest reasonable interpretation, abutting bands and/or adjacent bands on a shared an amplification path would be obvious in view of contiguous bands on a shared amplification path and vice versa. As will be shown more fully below, it was well known in the art to combine contiguous and adjacent frequency bands along a shared amplification path. (*Id.*, ¶ 45.)

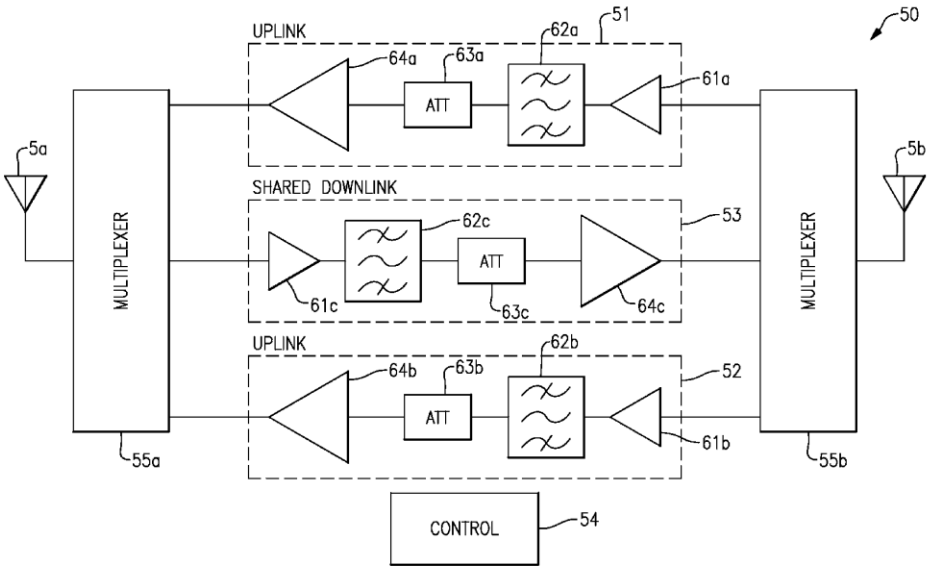
VIII. OVERVIEW OF THE '190 PATENT

A. The '190 Patent

The '190 Patent discloses a cell phone signal booster ('190 Patent, Ex. 1001, Title; "Apparatus and methods for radio frequency signal boosters.") The booster receives a signal from a cell phone station or tower, increases the strength of that signal, and retransmits it to the surrounding area so cell phones have a stronger signal. In the '190 Patent, terms like frequency band, uplink channel, and downlink channel are often used in describing how a cell phone signal booster works. A frequency band is an interval in the signal frequency domain, defined by a lower frequency and an upper frequency. It is not unlike a

broadcast radio station that has a certain frequency (e.g., 97.1 MHz) that is broadcast from the radio transmitter to the radio receiver. For cell phones, the frequency bands differ from the broadcast radio band because information is both sent and received. Thus, cell phone frequency bands have two components: (1) an uplink (or send) channel, and (2) a downlink (or receive channel). (*Id*., ¶¶ 15-16.)

FIG. 3 from the '190 is reproduced below and illustrates the claimed booster. That booster amplifies two different frequency bands (e.g., cell phone Bands XII and XIII). It does so by amplifying two uplink channels through separate paths; one for each of two different cell phone bands. The booster also amplifies the two downlink channels in a single or common path. ('190 Patent, Ex. 1001, 7:45-47.) In other words, the uplink channel for Band XII and Band XIII are on separate amplification paths, but the downlink channels for Band XII and Band XIII are on the same amplification path.



The alleged point of novelty of the '190 Patent is amplification of a combined frequency pathway where two different frequency channels are close or abutting.

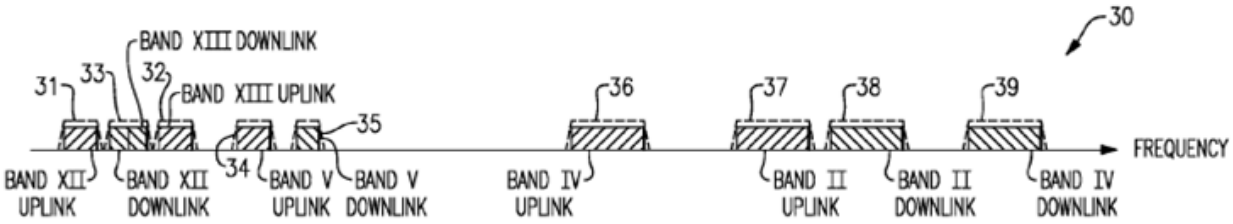
> Thus, in contrast to a conventional signal booster that includes a separate amplification path for each frequency channel that is boosted, the illustrated configuration includes a **shared amplification path for amplifying adjacent downlink channels**, such as close or abutting downlink channels.

(*Id*., 10:36-40) (Emphasis added). More specifically, the '190 Patent was filed on the basis that the combined frequency pathways for adjacent downlink frequencies for Band XII and Band XIII was patentable.

> As shown in FIG. 2B, the third band-pass filter passband 33 advantageously passes the downlink channels of both Band XII and

> Band XIII, **which are adjacent frequency bands**….Configuring a signal booster to have a **band-pass filter that passes both the Band XII and Band XIII downlink signals** can avoid a need for sharp band-pass filters for separately filtering the downlink bands, which can be difficult using relative small and/or low-cost filters such as SAW filters and/or ceramic filters, which can have a non-ideal passband and can provide insufficient channel filtering or selectivity.

(*Id*. 7:45-47 and 7:52-62) (Emphasis added). FIG. 2B from the '190 Patent illustrating the location of Bands XII and XIII on the radio spectrum is shown below.



B. Prosecution History of the '190 Patent

The '190 Patent was filed on January 15, 2016 and is the progeny of U.S. Pat. No. 9,100,839 and U.S. Pat. No. 8,867,572. The earliest of those patents (the '572 Patent) was filed on April 29, 2013. ('190 Patent, Ex. 1001, Cover.) The '190 Patent was examined under post-AIA standards. A request for prioritized examination was filed concurrently with the filing of the application for the '190 Patent. (Ex. 1004, at 138.) The request for prioritized examination

was granted on March 11, 2016. (*Id.*, 117.) A first office action on the merits was mailed on March 15, 2016. (*Id.*, 101-104.) The office action rejected the pending claims on the ground of nonstatutory obviousness-type double patenting in view of the claims in U.S. Pat. No. 9,100,839. No other grounds of rejection were provided. (*Id.*, 103-104.) A terminal disclaimer was filed on March 22, 2016. (*Id.*, 82-83.) A Notice of Allowance was mailed on April 28, 2016. (*Id.*, at 62-68.) The Notice of Allowance states that the prior art references then of record (e.g., *Sahota*, *Malarky*, and *Kang*) failed to show:

> "wherein the shared amplification path is further configured to simultaneously boost both the at least a portion of the first downlink channel and the at least a portion of the second downlink channel, wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another."

(*Id.*, 67.) As detailed in this Petition and as is readily apparent from the prior art, filtering and "simultaneous" amplification of two different "adjacent" frequency channels through a common filter and a common amplifier was well known in the art at the time of the '190 Patent.

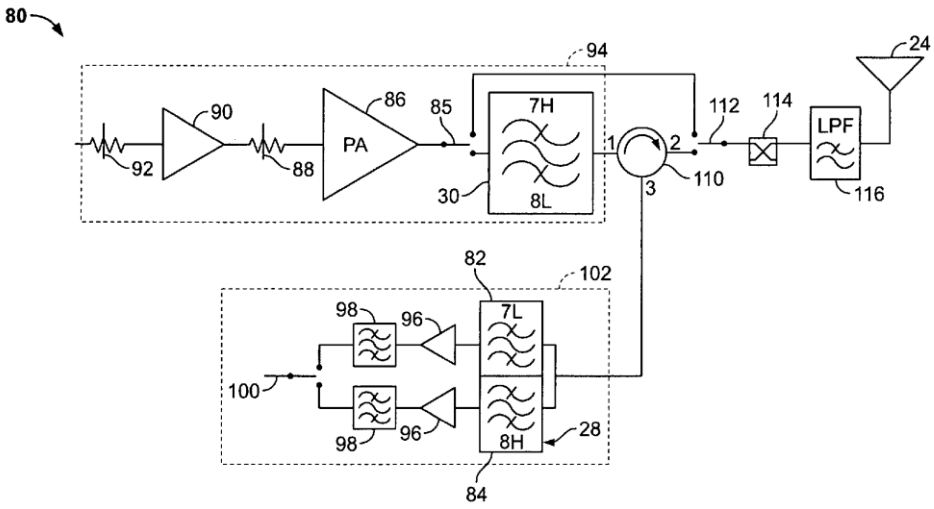
On June 6, 2016, Patent Owner filed a Request for Continued Examination. (*Id.*, 34-36.) An Information Disclosure Statement was filed two days after on June 8, 2016 listing U.S. Patent No. 7,250,830 to Layne et al.

("*Layne*.") (*Id.*, at 28.) On June 22, 2016 the Office issued a Second Notice of Allowance. (*Id.*, at 7-11.) No reference to any prior art (including *Layne*) or other reasons for allowance were provided in the Second Notice of Allowance.

IX. OVERVIEW OF THE PRIOR ART

A. Layne

U.S. Patent No. 7,250,830 ("*Layne*") entitled "Dual Band Full Duplex Mobile Radio" was filed on December 30, 2004. *Layne* discloses a mobile radio configured to amplify two different frequency bands and their respective uplink and downlink channels. The first frequency band has an uplink (or transmit) channel frequency of 794 MHz to 806 MHz and is referred to as the 7H band. The first frequency band has a downlink (or receive) channel frequency of 764 MHz to 776 MHz and is referred as the 7L band. The second frequency band has an uplink (or transmit) channel frequency of 806 MHz to 824 MHz and is referred to as the 8L band. The second frequency band has a downlink (or transmit) channel frequency of 851 MHz to 869 MHz and is referred to as the 8H band. (*Layne*, Ex. 1011, 3:3-21.) In other words, the uplink channel 7H is contiguous with the uplink channel 8L.

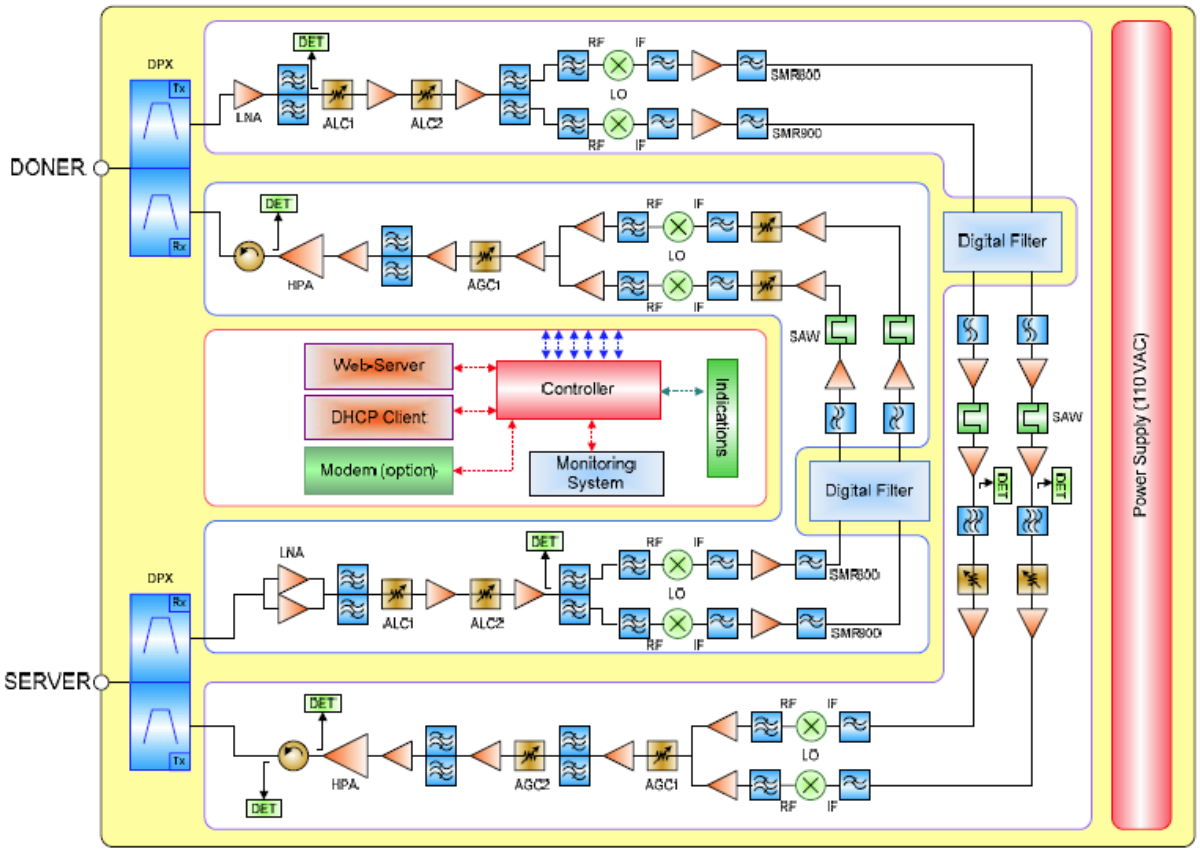


Layne discloses an uplink amplification path 94 that comprises a signal amplifier 90, power amplifier 86, and a bandpass filter 30 configured to pass/amplify signals simultaneously in both the 7H and 8L bands. These two bands are contiguous. That is, 7H ranges from 794 MHz to 806 MHz and 8L ranges from 806 MHz to 824 MHz. (*Id*. at FIG.3; *see also id*. at 2:34-39.)

Layne further discloses a downlink amplification path 102 with a first filter 82 configured to pass signals in the 7L band (764 MHz to 776 MHz), and a second filter 84 configured to pass signals in the 8H frequency band (851 MHz to 869 MHz). The 7L and 8H bands are further passed through low noise amplifiers 96 and additional filters 98. The filters disclosed in *Layne* are configured to pass the desired frequency band by rejecting (or attenuating) other bands. (*Id*. at 3:40-64.)

B. Duo Repeater

The *Duo Repeater* is a user guide for a multiband cell phone signal booster that was available at least from the public records of the Federal Communications Commission as of February 9, 2007. The *Duo Repeater* is stated to be an "RF repeater which enhances in-building wireless coverage in the most effective and cost efficient way." (See, *Duo Repeater*, Ex. 1009, pg. 5.) A block diagram of the amplification path for the *DUO Repeater* is shown below:



(*Id*. at 9.)

The *Duo Repeater* filters and amplifies signals for the frequency band designated as SMR800 (downlink channel 851-869 MHz and uplink channel 806-817 MHz) and the frequency band designated as SMR900 (downlink channel 935-940 MHz and uplink channel 896-901 MHz). Signals transmitted and received at the different antennas (i.e., the server and donor) are multiplexed (i.e., filtered) to the desired frequency range and initially sent as a combined signal where they are filtered and amplified in a combined process. They are then separated into their separate frequency bands, and again filtered and amplified. The separate frequency bands are combined, filtered, and amplified again before being multiplexed. (*Id*. at 5, 9-11, 30.)

C. Zhuo

Chinese Patent No. 201699704 ("*Zhuo*") entitled "Tri-Band Wireless Repeater" was filed on June 23, 2010. *Zhuo* discloses a wireless signal booster configured to receive at least three different frequency bands through a first multiplexer. Those bands are filtered and amplified, then sent through a second multiplexer. (*Zhuo*, Ex. 1005, Abstract, FIG. 2.) FIG. 2 from *Zhuo* is reproduced below:

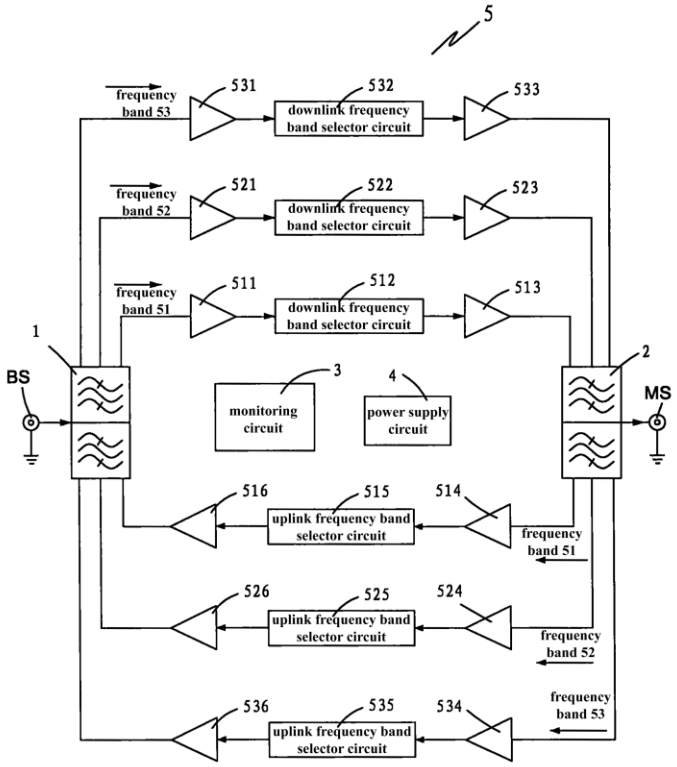


Fig. 2

More specifically, *Zhuo* discloses three different frequency bands (shown at 51, 52, and 53) travelling through three different uplink amplification paths and three different downlink amplification paths. After traveling through a multiplexer and being separated into different frequency ranges, each of the signals are processed through a low noise amplifier (e.g., 514, 524, 534), a selector circuit (i.e., a band pass filter, 515, 525, 535), followed by another power amplifier (e.g., 516, 526, 536). (*Id.*, ¶¶ 20-22.) *Zhuo* discloses that the signal booster can be applied to frequency band selection and amplification of numerous different uplink and downlink mobile communication signals. (*Id.*, ¶

29.) The circuitry shown for the uplink signal amplification is identical to that shown for the downlink signal amplification. (*Id.*, ¶ 27.)

Zhuo also notes that as 3G networks evolve, "multiple frequency bands simultaneously present are required" and that use of single band signal boosters in an era of multiple frequency bands is costly, impractical, and not competitive. (*Id.*, ¶ 10.)

D. Sahota

U.S. Patent Publication 2012/0302188 ("*Sahota*") entitled "Tunable Multi-Band Receiver" was filed on May 27, 2011. *Sahota* discloses a multi-band receiver/signal booster with an adjustable or "tunable" notch filter (i.e., a bandpass filter) FIG. 4A from *Sahota* is shown below.

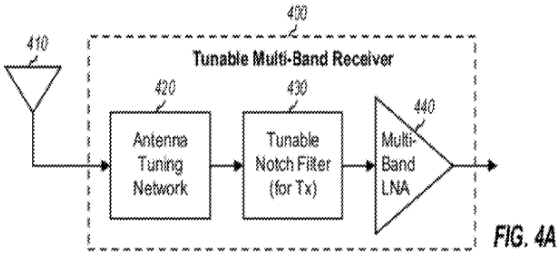
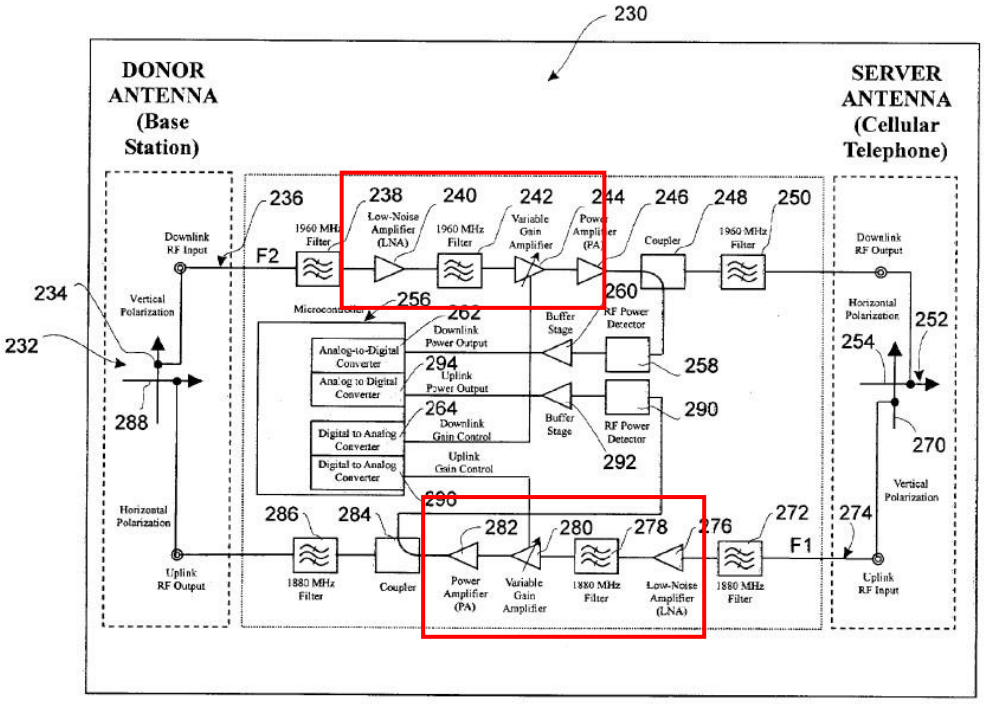


FIG. 4A

The receiver in *Sahota* is configured to support "any number of frequency bands and any particular frequency band," including the uplink channel and downlink channel for Bands XII and XIII. (*Sahota*, Ex. 1008, ¶69, Table 1.)

E. McKay

U.S. Patent Publication 2004/0166802 ("*McKay*") entitled "Cellular Signal Enhancer" was filed on February 26, 2003. *McKay* discloses a cell phone signal booster that receives a base station signal, amplifies the signal power, and retransmits the amplified signal via a downlink path to an end-user device. (*McKay*, Ex. 1007, ¶ 14.) FIG. 19 of *McKay*, reproduced below, illustrates an example signal booster 230.

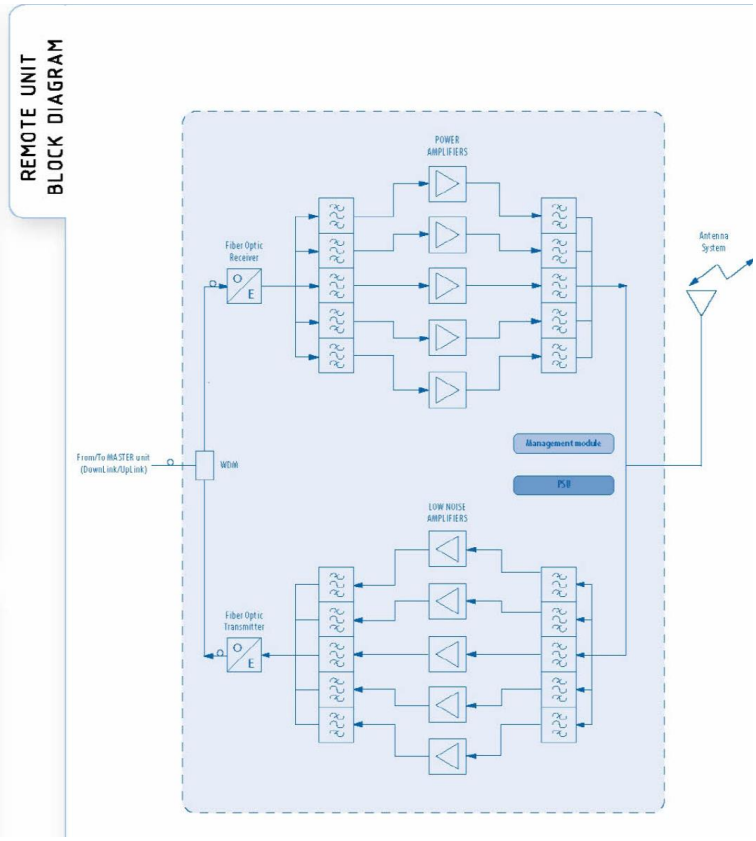


The red boxes drawn above emphasize the common practice of processing signals using a sequence of a low noise amplifier (LNA) followed by a bandpass filter (BPF) and a power amplifier (PA) in both an uplink path 274 and downlink path 236. (*Id.*, ¶¶ 96 and 110.) The downlink path 236 includes a first filter 238

coupled to a first antenna 232. (*Id*., ¶ 96.) The first filter 238 is designed to pass the downlink frequencies to the downlink path 236 and filter out the uplink and other frequencies. (*Id*.) The downlink path 236 further includes a low noise amplifier 240, a second filter 242, a variable gain amplifier 244, a power amplifier 246, and another filter 250 coupled to a second antenna 252. (*Id*. ¶¶ 103-105.) The second filter 242 is used to "filter the frequencies outside of the receiving band to more closely match the ideal receiving band," and is the same as the first filter 238. (*Id*., ¶ 103.) The variable gain amplifier 244 controls an output power of the downlink frequencies and can act as an attenuator. (*Id*.) The third filter 250 is the same as the first filter 238 and passes the downlink frequencies to antenna 252. (*Id*., ¶ 104.) The circuitry for the uplink path 274 operates in a fashion very similar to the downlink path with virtually identical circuitry. (*Id*.) *McKay* additionally discloses that the signal booster includes a housing that encloses an electronic board. (*Id*., ¶¶ 135, 144-147, FIGs. 25-29 and 35.)

F. TEKO Repeater

The *TEKO Repeater* discloses a remote wireless signal booster capable of operating in six different frequency bands over five different amplification paths: (1) SMR700, (2) SMR800 combined with AMPS850, (3) SMR900, (4) PCS1900, and (5) AWS. (*TEKO Repeater*, Ex. 1006, WE-SC 15825-15826.)



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SYSTEM SPECIFICATIONS		SMR700	SMR800C(*)+AMPS	SMR900	PCS	AWS
Uplink operating frequency band		698-716MHz 776-787MHz	817-848.5MHz	896.5-902MHz	1850 ÷ 1915 MHz	1710 ÷ 1755 MHz
Downlink operating frequency band		728-757MHz	862-893.5MHz	935.5-941MHz	1930 ÷ 1995 MHz	2110 ÷ 2155 MHz
Downlink Output Power GSM/TDMA (**) / CDMA (**)		29dBm (1 carrier)	29dBm (1 carrier)°	29dBm (1 carrier)	29dBm (1 carrier)	29dBm (1 carrier)
		23dBm (4 carriers)	23dBm (4 carriers)°	23dBm (4 carriers)	23dBm (4 carriers)	23dBm (4 carriers)
		17dBm (16 carriers)	17dBm (16 carriers)°	17dBm (16 carriers)	17dBm (16 carriers)	17dBm (16 carriers)
Downlink Output Power WCDMA (***) / LTE (****)		29dBm (1 carrier)	29dBm (1 carrier)°	29dBm (1 carrier)	29dBm (1 carrier)	29dBm (1 carrier)
		26dBm (2 carriers)	26dBm (2 carriers)°	26dBm (2 carriers)	26dBm (2 carriers)	26dBm (2 carriers)
		23dBm (4 carriers)	23dBm (4 carriers)°	23dBm (4 carriers)	23dBm (4 carriers)	23dBm (4 carriers)
Spurious emissions and intermodulation products		< -13 dBm (in the frequency band 9 kHz ÷ 12.75 GHz)				
UL setting 1	Noise Figure	6 dB	6 dB	6 dB °°	5.5 dB	5 dB

The SMR700 Band is noted as servicing two separate uplink frequencies (698-716 MHz and 776-787 MHz) and a single downlink frequency (728-757 MHz). The two uplink frequencies correspond to the U.S. uplink frequencies for Band XII and Band XIII. The single downlink frequency corresponds to the **combined downlink frequencies for both Bands XII and XIII**. The SMR800 and AMPS850 Bands are combined and correspond to the U.S. frequency for Band 5. The SMR900 frequency listing corresponds to U.S. Band 8. The PCS frequency listing corresponds to U.S. Band 2. The AWS frequency listing corresponds to U.S. Band 4. (Compare *id*. to *Ella* Table 2, cols. 8 and 9, Ex. 1012.)

X. TECHNICAL BACKGROUND

Generally speaking, signal boosters, sometimes called repeaters, were well known solutions to problems related to cell phone signal strength. (See, e.g., *Zhuo*, Ex. 1005, ¶ 2.) They were developed to receive, amplify, and retransmit the signals to a user device (also referred to as user equipment or UE) in order to extend the distance a cell phone (or other user) might be from a base station; and to receive, amplify, and retransmit signals to a base station from a user device. (See, e.g., *McKay*, Ex.1007, ¶¶ 2-4 and *Zhuo* Ex.1005, ¶ 2.)

At the time of the '190 patent, numerous nations around the globe, including the United States, had designated several different radio signal

frequency spectrums dedicated to specific radio signal functions. The table shown below provides an example of those spectrums and the different uplink and downlink components of each frequency band as of September 22, 2011.

Band #	Uplink Band (TX)	Downlink Band (RX)	EU	Asia	Japan	Americas
1	1920 MHz-1980 MHz	2110 MHz-2170 MHz	X	X	X	
2	1850 MHz-1910 MHz	1930 MHz-1990 MHz				X
3	1710 MHz-1785 MHz	1805 MHz-1880 MHz	X	X		
4	1710 MHz-1755 MHz	2110 MHz-2155 MHz				X
5	824 MHz-849 MHz	869 MHz-894 MHz		X		X
6	830 MHz-840 MHz	875 MHz-885 MHz			X	
7	2500 MHz-2570 MHz	2620 MHz-2690 MHz	X	X		
8	880 MHz-915 MHz	925 MHz-960 MHz	X	X		
9	1749.9 MHZ-1784.9 MHz	1844.9 MHz-1879.9 MHz			X	
10	1710 MHz-1770 MHz	2110 MHz-2170 MHz				X
11	1427.9 MHz-1447.9 MHz	1475.9 MHz-1495.9 MHz			X	
12	699 MHz-716 MHz	729 MHz-746MHz				X
13	777 MHz-787 MHz	746 MHz-756 MHz				X
14	788 MHz-798 MHz	758 MHz-768 MHz				X
15	Reserved	Reserved				
16	Reserved	Reserved				
17	704 MHz-716 MHz	734 MHz-746 MHz				X
18	815 MHz-830 MHz	860 MHz-875 MHz			X	
19	830 MHz-845 MHz	875 MHz-890 MHz			X	
20	832 MHz-862 MHz	791 MHz-821 MHz	X			
21	1447.9 MHz-1462.9 MHz	1495.9 MHz-1510.9 MHz			X	
22	3410 MHz-3500 MHz	3510 MHz-3600 MHz	X	X	X	X
23	2000 MHz-2020 MHz	2180 MHz-2200 MHz				X
24	1626.5 MHz-1660.5 MHz	1525 MHz-1559 MHz				X
25	1850 MHz-1915 MHz	1930 MHz-1995 MHz				X
26	814 MHz-849 MHz	859 MHz-894 MHz		X		X

(See, e.g., *Ella*, Ex. 1012, Table 2, cols. 8 and 9; *Sahota*, Ex. 1008, Table 1, ¶ 69, and Cook Declaration, Ex. 1010 ¶¶ 7-15.)

At the time of the '190 Patent, signal boosters were in use and/or known to comprise a receiving or "donor" antenna coupled to a receiving multiplexer. The donor antenna receives a signal propagated from the base station and, via a multiplexer, separates the signal into desired frequency band signals. Each of the different frequency band signals is processed through a series of amplifiers

and filters to enhance or boost the signal and then rebroadcast. (See, e.g., FIG. 2 from *Zhuo* shown below; Ex. 1005.)

Radio frequency signals were propagated over numerous different frequency bands of various bandwidths and co-exist in the ambient air space together. For example, in an urbanized area, radio signals from all the major cellphone carriers could be intermixed in the same air space, along with a number of different radio signals from numerous different sources (localized Wi-Fi signals, AM/FM radio transmissions, TV transmissions, etc). The result is a plurality of different frequency bands that could be received by an antenna on a user device. When these signals are received by signal boosters or user devices, the signals are processed through what is known as a multiplexer. A multiplexer is usually just a series of band pass filters that separates the signal into different subsets of frequencies, including different uplink and downlink channel frequencies. Likewise, a multiplexer is used to combine a plurality of signals into a single signal for rebroadcast. Duplexers, triplexers, and quadplexers are all specific examples of multiplexers and simply reference the number of subsets into which a signal may be separated (or combined). (See, e.g., *McKay*, Ex.1007, ¶ 74; *Zhuo*, Ex. 1005, ¶¶ 11-16 and *Sahota*, Ex. 1008, ¶¶ 22-25.)

At the time of the '190 Patent, band pass filters (BPFs) and power amplifiers (PAs) were designed to cover contiguous or non-contiguous

frequency bands. (Ex. 1002, ¶ 42.) As such, it was well within the grasp of a POSITA to design a band pass filter to pass a frequency range extending from 728 MHz to 757 MHz (i.e., the downlink channels for Bands XII and XIII) and attenuate other frequency ranges as well as an amplifier to boost that frequency range. (*Id*.)

XI. DETAILED EXPLANATION OF GROUNDS

"[A] combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416, 127 S. Ct. 1727, 167 L. Ed. 2d 705 (2007). This Petition asserts several grounds detailing why the challenged claims are obvious based on a combination of well-known prior art.

A. Ground 1

Claims 1-4, 6, 8, 19, 20, and 24 are unpatentable under 35 U.S.C. 103 based on U.S. Patent No. 7,250,830 to Layne et al. ("*Layne*") (Ex. 1011) in view of U.S. Patent Publication No. 2012/0302188 to Sahota et al. ("*Sahota*") and U.S. Pat. Pub. 2004/0166802 to McKay ("*McKay*").

i. Claim 1 of the '190 Patent

A radio frequency signal booster comprising

a printed circuit board (PCB) comprising

A POSITA would understand that a printed circuit board (PCB) can be used in connection with radio frequency signal booster. (Ex. 1002, ¶ 48.) It is a well-

known implementation of this art. For example, *Sahota* discloses a printed circuit board radio signal booster implementation. (*Sahota*, Ex. 1008, ¶ 0081.)

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

Layne discloses or suggests this limitation. Specifically, *Layne* states that "the transmit filter 30 passes signals in the 7H and 8L frequency bands and rejects or filters signals in the 7L and 8H frequency bands." (*Layne*, Ex. 1011, 3:57-59) (see FIG. 3 below.) A POSITA would understand that the transmit filter 30 passes a portion of a first channel (7H) of a first frequency band (700 MHz Public Safety Frequency Band) and passes a portion of a second channel (8L) of a second frequency band (800 MHz Public Safety Frequency Band). A POSITA would also understand that the 700 MHz Public Safety Frequency Band and the 800 MHz Public Safety Frequency Band are different (i.e., first and second) frequency bands. A POSITA would also understand that the amplification path of *Layne* (highlighted below) simultaneously amplifies frequency band 7H and frequency band 8L. (Ex. 1002, ¶ 49.)

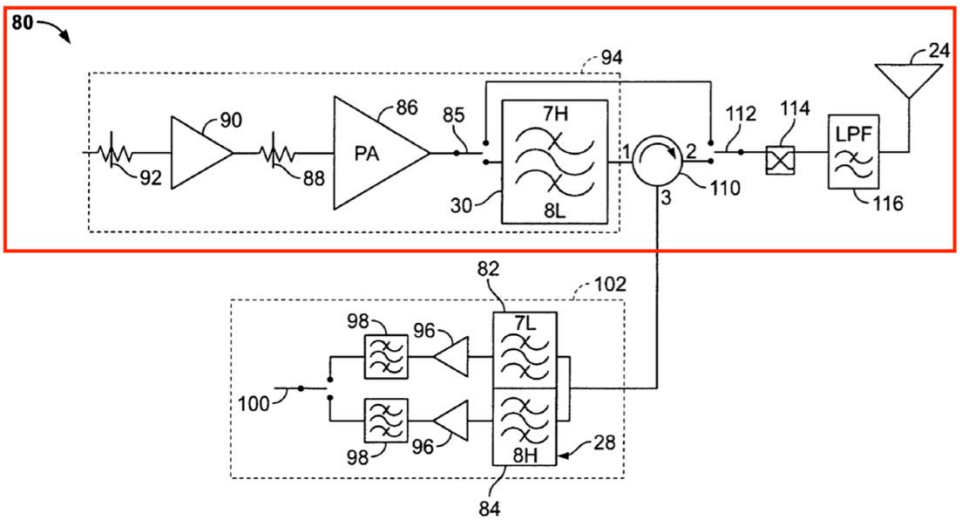


FIG. 3

(*Id.*, Ex. 1011, FIG. 3, annotated.) The combined frequency band 7H and frequency band 8L are uplink channels. However, the circuitry for amplifying an uplink channel is no different than the circuitry for amplifying a downlink channel. (Ex. 1002, ¶ 50; *see also McKay*, Ex. 1007, ¶110 and '190 Patent, Ex. 1001, 10:60-11:3.)

The alleged point of novelty of the '190 Patent is amplification of a combined frequency pathway where two different frequency channels are close or abutting. ('190 Patent, Ex. 1001, 10:36-40.) *Layne* clearly discloses a shared amplification path of contiguous uplink cellular bands. Under the broadest reasonable interpretation, amplification of adjacent cellular bands on a shared amplification path is obvious in light of the amplification of contiguous cellular bands on a shared amplification path. (Ex. 1002, ¶ 51.)

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, wherein the shared amplification path is further configured to simultaneously boost both the at least a portion of the first downlink channel and the at least a portion of the second downlink channel

Layne discloses this limitation. "[T]he transmit filter 30 passes signals in the 7H and 8L frequency bands and rejects or filters signals in the 7L and 8H frequency bands." (*Layne*, Ex. 1011, 3:57-59.) A POSITA would understand that the transmit filter 30 passes a portion of a first channel (7H) of a first frequency band (700 MHz Public Safety Frequency Band) and passes a portion of a second channel (8L) of a second frequency band (800 MHz Public Safety Frequency Band. A POSITA would understand that the amplification path of *Layne* can simultaneously amplify frequency band 7H and frequency band 8L. (Ex. 1002, ¶ 52.)

wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another

Under the broadest reasonable interpretation, *Layne* discloses or suggests this limitation. *Layne* discloses a shared amplification path for contiguous uplink channels. *Layne* discloses that "[t]he transmit filter 30, in this exemplary

embodiment, is a single bandpass filter configured to pass signals in the **7H and 8L** frequency bands (e.g., communicating signals in the 7H and 8L frequency band to be transmitted by the radio 20)." (*Layne*, Ex. 1011, 3:53-56) (Emphasis added.) More specifically, the mobile radio in *Layne* discloses an uplink amplification path 94 that comprises a signal amplifier 90, power amplifier 86, and a bandpass filter 30 configured to pass signals in both the 7H and 8L bands. (See *id.*, 3:65-4:6; FIG. 3.) 7H ranges from 794 MHz to 806 MHz and 8L ranges from 806 MHz to 824 MHz. (*Id*. at 2:33-38.) As shown on FIG. 2 of *Layne* (reproduced below), frequency bands 7H and 8L are contiguous.

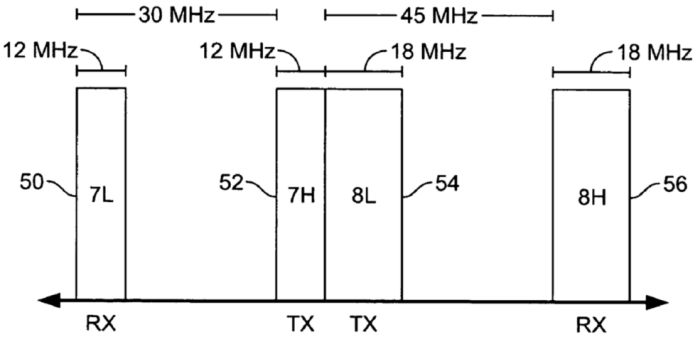


FIG. 2

(*Layne*, Ex. 1011, FIG. 2.) As noted above, the POSITA would understand that the circuitry for filtering and amplification of uplink signals is the same as that for downlink signals. (Ex. 1002, ¶ 55.)

During the process of assigning frequency designations for the different bands that would occupy the LTE domain, the downlink frequencies for Band XII

and Band XIII were assigned 728-746 MHz and 746-756 MHz. The upper boundary of the downlink frequency for Band XII and the lower boundary of the downlink frequency for Band XIII are contiguous. (See, e.g., Cook Declaration, Ex. 1010 and *Sahota*, Ex. 1008, ¶ 69 and Table 1.)

The POSITA would understand that amplification of adjacent frequency bands suggests that amplification of the separation between the frequency bands is an acceptable trade-off (i.e., between component count and some noise amplification) in light of the reduced size and number of components. Meaning, 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. As the separation between adjacent bands decreases (i.e., less separation, less amplification of noise), there is less concern about amplification of noise between the adjacent bands. Thus, when there is no separation (i.e., abutting or contiguous bands), the concern of that trade-off is non-existent because there is no amplification of unwanted noise. Thus the POSITA would understand that if adjacent bands may be amplified along a common pathway, abutting or contiguous bands may also be amplified along a common pathway. The reverse is also true. Meaning, a POSITA that would amplify abutting or contiguous bands would also amplify adjacent bands on a shared amplification path despite the amplification of noise

between the bands at least because it results in fewer components. (Ex. 1002, ¶ 44.)

At the time of the '190 Patent, a POSITA would understand from *Layne* that contiguous frequency bands could be amplified on a shared amplification path. The POSITA would understand that amplification of adjacent frequency bands on a shared amplification path is obvious in light of amplification of contiguous frequency bands on a shared amplification path. (Ex. 1002 ¶ 57.)

wherein the shared amplification path further comprises at least one amplifier.

Layne discloses that "[t]he input of the transmit filter 30 is connected to a switch 85, a **power amplifier 86** (providing a final amplifier stage) that is connected to a first attenuator 88, an **amplifier 90** and a second attenuator 92." (*Layne*, Ex. 1011, 3:65-4:1.) A POSITA would understand that the power amplifier 86 and the amplifier 90 are both amplifiers that are included on the common amplification path of the 7H and 8L channels. (Ex. 1002, ¶ 58.)

Layne suggests every element of claim 1 except the implementation of the recited elements on a PCB. However, this is a common implementation of signal booster technology and not new or innovative. (Ex. 1002, ¶ 48.) The POSITA would understand that *Layne* would be implemented on a PCB at least

for ease of manufacturing. (Ex. 1002, ¶ 59.) Where known elements in prior art are combined according to their known functions so as to achieve a predictable result that solved a known problem, the invention is obvious and not patentable under §103. *KSR*, 550 U.S. at 416.

ii. Claim 2 of the '190 Patent

The radio frequency signal booster of claim 1, wherein the first band-pass filter is further configured to attenuate both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band.

Layne also suggests this limitation. *Layne* states that "the transmit filter 30 passes signals in the 7H and 8L frequency bands and **rejects or filters signals in the 7L and 8H frequency bands**." (*Id.*, Ex. 1011, 3:57-58) (Emphasis added.) A POSITA would understand that the 7L frequency band is a "first channel of the first frequency band." *Layne* also discloses: "For the **700 MHz frequency band**, the **mobile radio receive band** (frequency band 50 labeled 7L for 700 Low) is 764 MHz to 776 MHz and the **mobile radio transmit band** (frequency band 52 labeled 7H for 700 High) is 794 MHz to 806 MHz." (*Id.*, Ex. 1011, 3:15-19) (Emphasis added.) A POSITA would understand that "mobile radio receive band" refers to a "downlink channel," and "mobile radio transmit band" refers to an "uplink channel." Therefore, a POSITA would understand that

that 7L frequency band is a "first channel" (i.e., downlink) of a "first frequency band" (i.e. the 700 MHz frequency band). (Ex. 1002, ¶¶ 60-62.)

A POSITA would understand that the 8H frequency band is a "first channel of the second frequency band." (Ex. 1002, ¶¶ 63.) *Layne* discloses: "In particular, the 800 MHz **mobile radio receive band** (frequency band 56 labeled 8H for 800 High) is 851 MHz to 869 MHz and the 800 MHz **mobile radio transmit band** (frequency band 54 labeled 8L for 800 Low) is 806 MHz to 824 MHz." (*Id.*, Ex. 1011, 3:11-15) (Emphasis added.) A POSITA would understand that "mobile radio receive band" refers to a "downlink channel," and "mobile radio transmit band" refers to an "uplink channel." Therefore, a POSITA would understand that the 8H frequency band is a "first channel" (i.e., downlink) of a "second frequency band" (i.e., the 800 MHz frequency band). (Ex. 1002, ¶¶ 63-64.)

Layne notes that "the transmit filter 30 passes signals in the 7H and 8L frequency bands and **rejects or filters signals in the 7L and 8H frequency bands.**" (*Id.*, Ex. 1011, 3:57-58) (Emphasis added.) A POSITA would understand that this discloses a band-pass filter configured to "attenuate both the first channel of the first frequency band and the first channel of the second frequency band." (Ex. 1002, ¶ 65.)

Layne discloses circuitry that facilitates processing of uplink channels of frequency bands that are contiguous. The POSITA would understand that circuitry

for filtering and/or amplifying uplink channels is the same as that for filtering and/or amplifying downlink channels. (See, e.g., *McKay*, Ex. 1007, FIG. 19.) The '190 Patent itself notes that the circuitry used for a shared amplification path for a downlink channel is equivalent to that of a shared amplification path for an uplink channel. ('190 Patent, Ex. 1001, 6:17-31.) The POSITA wanting to transmit downlink channels over *Layne* instead of uplink channels, would be motivated to do so. (Ex. 1002, ¶ 67.)

iii. Claim 3 of the '190 Patent

The radio frequency signal booster of claim 1, wherein the first downlink channel of the first frequency band comprises a Band XII downlink channel, and wherein the second downlink channel of the second frequency band comprises a Band XIII downlink channel.

Sahota discloses Band XII and Band XIII and the respective downlink channels for each of those bands. (*Sahota*, Ex. 1008, Table 1 and ¶ 0069.)

TABLE 1

Frequency Band	Transmit Band Uplink (MHz)	Receive Band Downlink (MHz)	Common Name	Frequency Band
UMTS Band I	1920-1980	2110-2170	IMT-2000	
UMTS Band II	1850-1910	1930-1990	PCS	GSM 1900
UMTS Band III	1710-1785	1805-1880	DCS	GSM 1800
UMTS Band IV	1710-1770	2110-2170		
UMTS Band V	824-849	869-894	Cellular	GSM 850
UMTS Band VI	830-840	875-885		
UMTS Band VII	2500-2570	2620-2690		
UMTS Band VIII	880-915	925-960		
UMTS Band IX	1750-1785	1845-1880		
UMTS Band X	1710-1770	2110-2170		
UMTS Band XI	1428-1453	1476-1501		
UMTS Band XII	698-716	728-746		
UMTS Band XIII	777-787	746-756		
UMTS Band XIV	788-798	758-768		
	890-915	935-960		GSM 900

(*Sahota*, Ex. 1008, Table 1.) During the process of assigning frequency designations for the different bands that would occupy the LTE domain, the downlink frequencies for Band XII and Band XIII were assigned 728-746 MHz and 746-756 MHz. The upper boundary of the downlink frequency for Band XII and the lower boundary of the downlink frequency for Band XIII are contiguous. (See, e.g., Cook Declaration, Ex. 1010 and *Sahota*, Ex. 1008, ¶ 69 and Table 1.)

Based on the combined teachings of *Layne* and *Sahota*, a POSITA would understand that: (1) uplink or downlink channels that are contiguous can be passed using a single bandpass filter and amplified using a single amplifier on a common pathway, and (2) the downlink channels of Band XII and the downlink channels of Band XIII are contiguous. Based on these combined teachings, a POSITA who

wanted to amplify Bands XII and XIII would modify *Layne* at least with the teachings of *Sahota* to amplify the downlink channels of Band XII and Band XIII. (Ex. 1002, ¶ 72.) When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. *KSR*, 550 U.S. at 416.

iv. Claim 4

The radio frequency signal booster of claim 3, wherein the first band-pass filter is further configured to pass at least a portion of a Band XII downlink channel having a frequency range of about 728 MHz to about 746 MHz, wherein the first band-pass filter is further configured to attenuate a Band XII uplink channel having a frequency range of about 698 MHz to about 716 MHz

Layne discloses has a band pass filter that is designed to pass the shared amplification path for two contiguous uplink channels and attenuate all other frequencies, including the downlink channels corresponding to the two uplink bands. (*Layne*, Ex. 1011, 3:57-59.)

At the time of the '190 Patent, it was known that the uplink and downlink frequencies for Band XII were 698-716 MHz and 728-746 MHz, respectively, at least from *Sahota*. There is nothing unique or special about these

frequency ranges. The frequency ranges are simply segments of the radio signal spectrum naturally available for use and apportioned by the FCC to facilitate a common system to use that radio signal spectrum. (See, e.g., Cook Declaration, Ex. 1010). The POSITA wanting to amplify the Band XII downlink would necessarily attenuate the Band XII uplink. The POSITA would understand that the frequency ranges recited in this portion of claim 4 necessarily correspond to Band XII and would design a band pass filter having these characteristics. (Ex. 1002, ¶ 75.)

> **wherein the first band-pass filter is further configured to pass at least a portion of a Band XIII downlink channel having a frequency range of about 746 MHz to about 757 MHz, wherein the first band-pass filter is further configured to attenuate a Band XIII uplink channel having a frequency range of about 776 MHz to about 787 MHz.**

Layne discloses a band pass filter that is designed to pass two contiguous uplink channels on a shared amplification path and attenuate all other frequencies, including the downlink channels corresponding to the two uplink bands. (*Layne,* Ex. 1011, 3:57-59 and FIG. 3.)

At the time of the '190 Patent, it was known that the uplink and downlink frequencies for Band XIII were 776-787 MHz and 746-757 MHz, respectively, at least from *Sahota*. There is nothing unique or special about these frequency

ranges. The frequency ranges are simply segments of the radio signal spectrum naturally available for use and apportioned by the FCC to facilitate a common system to use that radio signal spectrum. (See, e.g., Cook Declaration, Ex. 1010.) The POSITA wanting to filter and amplify the Band XIII downlink channel would necessarily attenuate the Band XIII uplink channel. The POSITA would understand that the frequency ranges recited in this portion of claim 4 necessarily correspond to Band XIII and would design a band pass filter having these characteristics. (Ex. 1002, ¶ 77.)

v. Claim 6 of the '190 Patent

The radio frequency signal booster of claim 1, wherein the first downlink channel of the first frequency band and the second downlink channel of the second frequency band are abutting in frequency.

Layne suggests this limitation. "It should be noted that the two mobile transmit bands, frequency bands 52 and 54 are adjacent as shown in FIG. 2." (*Layne*, Ex. 1011, 3:19-21.) While Petitioner believes the two mobile transmit bands in *Layne* are properly characterized as "contiguous," the POSITA would understand that abutting frequency bands on a common amplification path is obvious in light of contiguous frequency bands on a common amplification path. (Ex. 1002, ¶ 78.) Moreover, while the transmit bands in *Layne* represent first and

second uplink channels, the POSITA would understand that the circuitry for filtering and amplifying uplink signals is the same as that for filtering and amplifying downlink signals. (See, e.g., *McKay*, Ex.1007, ¶ 110.)

vi. Claim 8 of the '190 Patent

The radio frequency signal booster of claim 1, wherein the shared amplification path further comprises one or more additional band-pass filters, wherein each of the one or more additional band-pass filters are configured to pass the at least a portion of the first downlink channel and the at least a portion of the second downlink channel.

Layne suggests this limitation. *Layne* discloses "[t]he receive filter 28, and more particularly, the output of each of **the first and second filters 82 and 84**, are connected to an amplifier 96, for example, a low-noise amplifier (LNA) or preamplifier. Each of the amplifiers 96 is connected to **a filter 98**. For example, surface acoustic wave (SAW) filters, which are connected to a switch 100 for selecting between the filtered signals and connecting to a frequency mixer (not shown) as is known. This receive portion 102 provides for receiving signals in either the 7L or 8H frequency bands." (*Layne*, Ex. 1011, 3:44-52) (Emphasis added.) The POSITA would understand from *Layne* that multiple band pass filters in an amplification path with similar filtering properties are used. (Ex. 1002, ¶ 80.)

vii. Claim 19 of the '190 Patent

An apparatus comprising

a printed circuit board (PCB) comprising

Sahota discloses a printed circuit board used in connection with a radio frequency signal booster. (*Sahota*, Ex. 1008, ¶ 0081.)

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, wherein the shared amplification path is further configured to simultaneously boost both the first downlink channel and the second downlink channel

Layne suggests this limitation. Specifically, *Layne* states that "the transmit filter 30 passes signals in the 7H and 8L frequency bands and rejects or filters signals in the 7L and 8H frequency bands." (*Layne*, Ex. 1011, 3:57-59; see also FIG. 3 below.) A POSITA would understand that the transmit filter 30 passes a portion of a first channel (7H) of a first frequency band (700 MHz Public Safety Frequency Band) and passes a portion of a second channel (8L) of a second frequency band (800 MHz Public Safety Frequency Band). A POSITA would

understand that the 700 MHz Public Safety Frequency Band and the 800 MHz Public Safety Frequency Band are different frequency bands. A POSITA would also understand that the common amplification path of *Layne* (i.e., 90 and 86) can provide simultaneous amplification to frequency band 7H and frequency band 8L. (Ex. 1002, ¶¶ 88-89.)

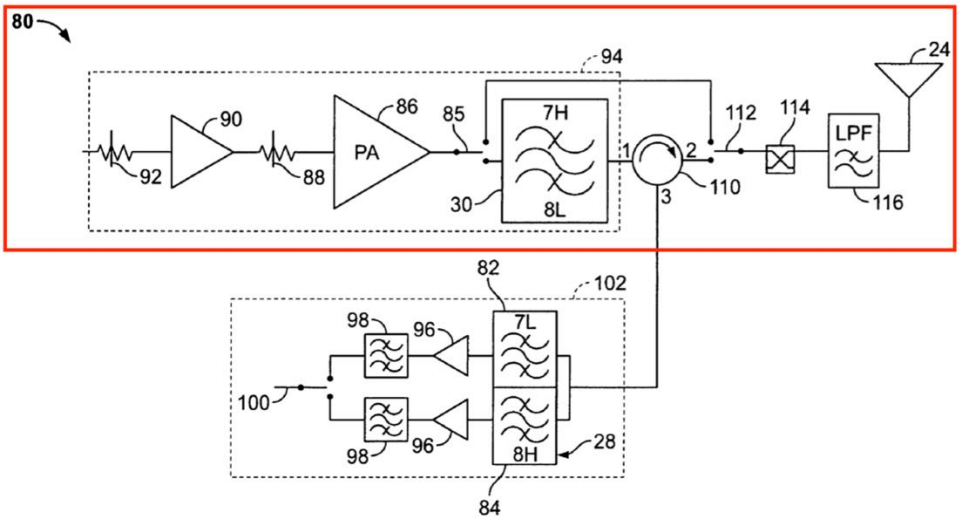


FIG. 3

(*Layne*, Ex. 1011, FIG. 3, annotated.)

The combined frequency band 7H and frequency band 8L are uplink channels. However, the circuitry for amplifying an uplink frequency is no different than the circuitry for amplifying a downlink frequency. (See e.g., *McKay*, Ex. 1007, ¶110 "With the exception of the frequency band, each of the elements of the uplink F1 signal path 274 is functionally identical to the corresponding element previously described with respect to the downlink signal F2 path 236;" and '190

Patent, Ex. 1001, 10:60-11:3.) A POSITA wishing to amplify contiguous downlink channels instead of contiguous uplink channels would be motivated to modify the system of *Layne* to do so. (Ex. 1002, ¶ 89.)

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, and to attenuate both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band

Layne discloses, "the transmit filter 30 passes signals in the 7H and 8L frequency bands and rejects or filters signals in the 7L and 8H frequency bands." (*Layne*, Ex. 1011, 3:57-59.) A POSITA would understand that the transmit filter 30 passes a portion of a first channel (7H) of a first frequency band (700 MHz Public Safety Frequency Band) and passes a portion of a second channel (8L) of a second frequency band (800 MHz Public Safety Frequency Band). (Ex. 1002, ¶ 90.) *Layne* discloses: "Thus, the transmit filter 30 passes signals in the 7H and 8L frequency bands and **rejects or filters signals in the 7L and 8H frequency bands.**" (*Id.*, Ex. 1011, 3:57-58) (Emphasis added.) A POSITA would understand that this discloses a band-pass filter configured to "attenuate both the first channel of the first frequency band and the first channel of the second frequency band." *Layne* discloses passing and attenuating uplink channels instead of downlink

channels, but the POSITA would understand that the circuitry for the two are functionally the same. (Ex. 1002, ¶ 91.)

wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another

Layne suggests this limitation. *Layne* discloses, "The transmit filter 30, in this exemplary embodiment, is a single bandpass filter configured to pass signals in the **7H and 8L** frequency bands (e.g., communicating signals in the 7H and 8L frequency band to be transmitted by the radio 20)." (*Layne*, Ex. 1011, 3:53-56) (Emphasis added.) *Layne* discloses an uplink amplification path 94 that comprises a low noise amplifier 90, power amplifier 86, and a bandpass filter 30 configured to pass signals in both the 7H and 8L bands. (*Id.*, FIG. 3.) 7H ranges from 794 MHz to 806 MHz and 8L ranges from 806 MHz to 824 MHz. (*Id*. at 3:3-21.) As shown on FIG. 2 of *Layne* (reproduced below), frequency bands 7H and 8L are contiguous frequency bands.

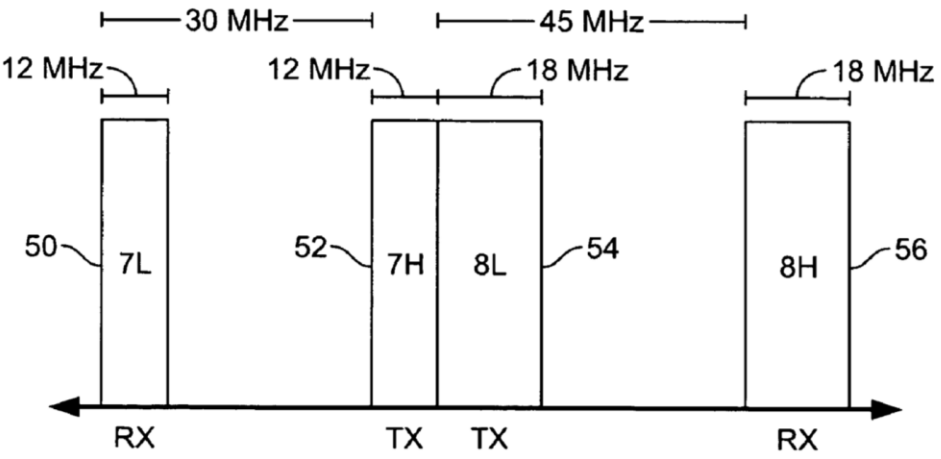


FIG. 2

(*Layne*, Ex. 1011, FIG. 2.)

As noted above, while the 7H and 8L Bands in *Layne* are contiguous uplink bands, the amplification of an uplink band is no different than the amplification of a downlink band. The POSITA would understand that amplification of adjacent frequency bands on a common pathway is obvious in light of amplification of contiguous frequency bands on a common pathway. (Ex. 1002, ¶ 94.)

wherein the shared amplification path further comprises at least one amplifier.

Layne discloses that "[t]he input of the transmit filter 30 is connected to a switch 85, a **power amplifier 86** (providing a final amplifier stage) that is connected to a first attenuator 88, an **amplifier 90** and a second attenuator 92." (*Layne*, Ex. 1011, 3:65-4:1.) A POSITA would understand that the power

amplifier 86 and the amplifier 90 are both amplifiers that are included on the common amplification path of the 7H and 8L channels. (Ex. 1002, ¶ 95.)

The only limitation in claim 19 that is not suggested in the *Layne* is implementation of shared downlink amplification path on a PCB. The POSITA would understand at least from *Sahota* (or any other number of prior art references) that signal boosters are implemented on a PCB for ease of manufacturing. The POSITA would also understand (at least from *McKay* or any other number of prior art references) that the circuitry for amplification of uplink and downlink signals is the same. As such, the POSITA wanting to accommodate a shared downlink amplification path on a PCB would modify *Layne* at least in view of *Sahota* and *McKay* to arrive at the claim limitation of claim 19. (Ex. 1002, ¶ 96.)

viii. Claim 20 of the '190 Patent

The apparatus of claim 19, wherein the first downlink channel of the first frequency band comprises a Band XII downlink channel, and wherein the second downlink channel of the second frequency band comprises a Band XIII downlink channel.

Sahota discloses Band XII and Band XIII. (*Sahota*, Ex. 1008, Table 1 and ¶ 0069.) *Sahota* discloses that the downlink channel of Band XII occupies 728 MHz to 746 MHz and the downlink channel of Band XIII occupies 746 MHz to 756 MHz. (*Id*.) Based on the combined teachings of *Layne* and *Sahota*, a POSITA

would understand that: (1) bands that are contiguous can be passed using a single bandpass filter and amplified with a single amplifier, and (2) the downlink channels of Band XII and the downlink channels of Band XIII are contiguous. As such, the POSITA would understand that the downlink channels of Band XII and the downlink channels of Band XIII can be passed using a single bandpass filter and amplified with a single amplifier. The POSITA wanting to amplify Bands XII and XIII would modify *Layne* to include those bands. (Ex. 1002, ¶¶ 100-101.)

ix. Claim 24 of the '190 Patent

The apparatus of claim 19, wherein the first downlink channel of the first frequency band and the second downlink channel of the second frequency band are abutting in frequency.

Layne asserts that the two mobile transmit bands, frequency bands 52 and 54 are adjacent. (*Layne*, Ex. 1011, 3:19-21.) Petitioner believes the two mobile transmit bands in *Layne* are "contiguous." Regardless, *Layne* suggests this limitation. (Ex. 1002, ¶¶ 102.) As noted throughout this Petition, the POSITA accepts amplification a certain amount of noise in order to minimize the number of components in a signal booster system. As the separation between adjacent bands decreases (i.e., less separation, less amplification of noise), there is less concern about amplification of noise between the adjacent bands. Thus, when there is no

separation (i.e., abutting or contiguous bands), the concern of that trade-off is non-existent because there is no amplification of unwanted noise. Where the POSITA would understand from *Layne* that frequency bands that are contiguous may be amplified along a common pathway, the POSITA would also understand that abutting frequency bands (which also have no separation between them) may also be amplified along a common pathway. (*Id.*, ¶¶ 102 and 44.)

B. Ground 2

Claim 18 is unpatenable under 35 U.S.C. 103 based Chinese Patent No. 201699704 to Zhuo ("*Zhuo*") (Ex. 1005) in view of *Layne* and *Sahota*.

i. Claim 18 of the '190 Patent

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.

Sahota discloses Band XII, Band XIII, Band V, Band IV, and Band II. (*Sahota*, Ex. 1008, Table 1.) The different frequency band ranges used in the spectrums described in the '190 Patent, including those listed in this claim, are assigned by the Federal Communications Commission (FCC). At the time of the '190 Patent, these bands were all known and in use. (See, e.g., *Id.* ¶ 69 and Cook Declaration, Ex. 1010.)

Zhuo discloses a wireless signal booster configured to receive at least three different frequency bands through a first multiplexer. Those bands are filtered and amplified, then sent through a second multiplexer. (*Zhuo*, Ex. 1005, Abstract, FIG. 2.) FIG. 2 from *Zhuo* is reproduced below:

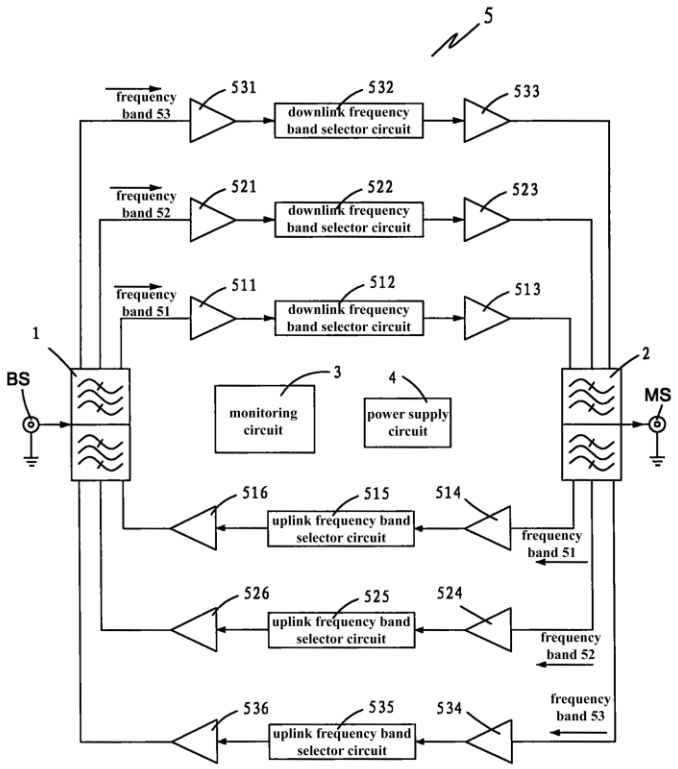


Fig. 2

More specifically, *Zhuo* discloses three different frequency bands (51, 52, and 53) travelling through three different uplink amplification paths and three different downlink amplification paths. After traveling through a multiplexer and being separated into different frequency ranges, each of the signals are processed through a low noise amplifier (e.g., 514, 524, 534), a selector circuit

(i.e., a band pass filter, 515, 525, 535), followed by another power amplifier (e.g., 516, 526, 536). (*Id*., ¶¶ 20-23.) *Zhuo* discloses that the signal booster can be applied to frequency band selection and amplification of numerous different uplink and downlink mobile communication signals. (*Id*., ¶ 29.)

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. *KSR*, 550 U.S. at 416. The POSITA would know from *Zhuo* that multiple different frequency signals could be amplified in a single signal booster. The POSITA would know from *Layne* that contiguous cellular frequency signals can be amplified on a common pathway. The POSITA would understand from *Sahota* that the downlink channels for Bands XII and XIII are contiguous cellular frequency bands and that Band II, Band IV, Band V are cellular frequency bands. 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.

C. Ground 3

Claims 1, 2, 6, 8 and 19 are unpatentable under 35 U.S.C. 103 based on the *DUO Repeater* (Ex. 1009).

i. Claim 1

A radio frequency signal booster comprising

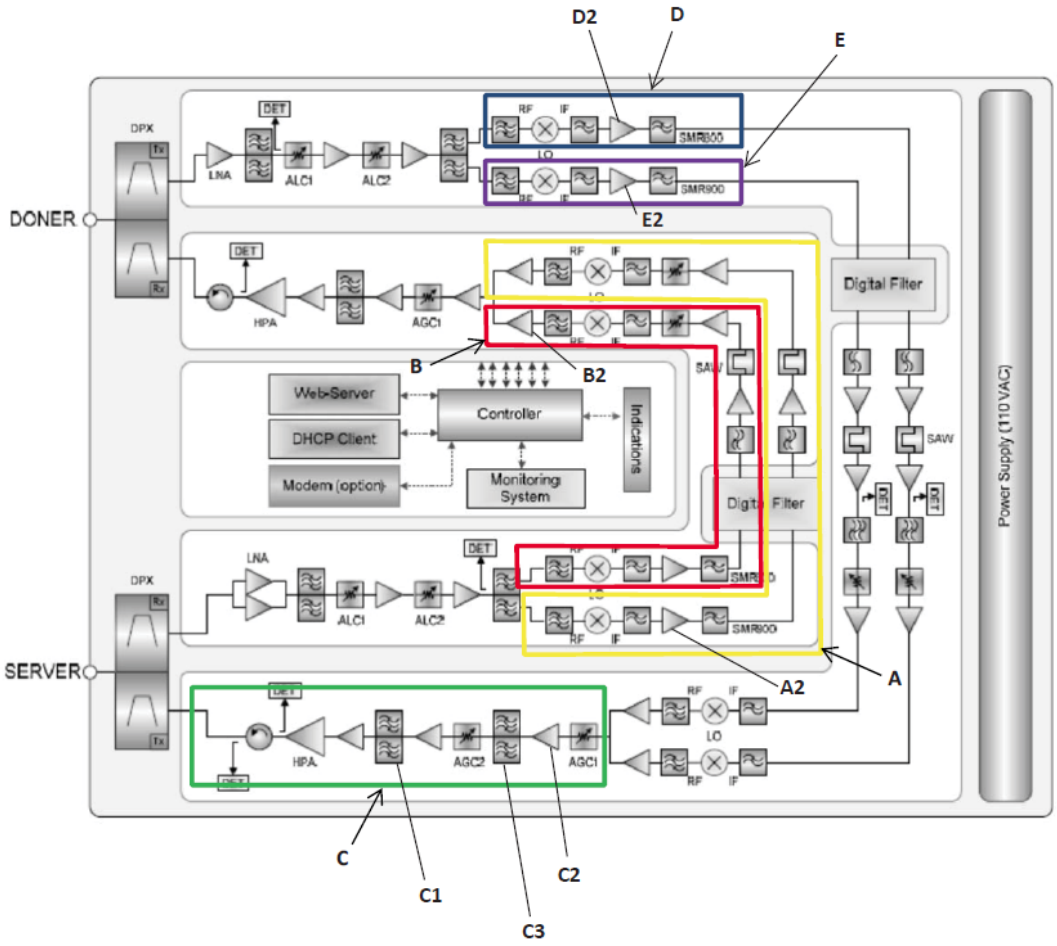
The *DUO Repeater* is a radio frequency signal booster. (*DUO Repeater*, Ex. 1009, at 5.)

a printed circuit board (PCB) comprising

The *DUO Repeater* discloses a housing (*Id*. at 6, 7) and a PCB within the cavity of the housing. (*Id*. at 11.)

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

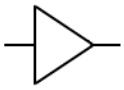
The *DUO Repeater* discloses this limitation. An annotated schematic for the *DUO Repeater* is shown below:



(*Id.*, FIG. 4, annotated.)

The following are some symbols that are used in *the DUO Repeater* and their meaning:

This symbol represents a bandpass filter or BPF. As stated elsewhere in this Declaration, a bandpass filter is a device that passes frequencies within a certain range and rejects (attenuates) frequencies outside that range.



This symbol represents an amplifier. The *DUO Repeater* specifically identifies this symbol as a signal amplifier. Additional annotations are used to specifically indicate when an amplifier is an LNA (low-noise amplifier) or an HPA (high-power amplifier). (Ex. 1002, ¶ 107.)

The *DUO Repeater* discloses a plurality of uplink amplification paths shown at A (shown in yellow) and B (shown in red) in the annotated FIG. 4, *supra*. (*See also DUO Repeater*, Ex. 1009, pp. 5, 9, and 30.) The amplification paths shown at A and B are uplink amplification paths and comprise a plurality of band pass filters and power amplifiers. (*Id*.) The *DUO Repeater* discloses a plurality of downlink amplification paths at C (shown in green), D (shown in blue), and E (shown in purple). Amplification path D is marked as propagating the SMR800 downlink frequency (i.e., 851 – 869 MHz). Amplification path E is marked as propagating the SMR900 downlink frequency band (i.e., 935-940 MHz). Amplification path C is a **common downlink amplification** path that provides amplification to the downlink channel for **both** the SMR800 and SMR900 bands. (*Id*. and see annotated FIG. 4, *supra*.)

> **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,**

wherein the shared amplification path is further configured to simultaneously boost both the at least a portion of the first downlink channel and the at least a portion of the second downlink channel

The *DUO Repeater* discloses this limitation. The downlink amplification path C discloses bandpass filter or BPF (C1) that passes the downlink channel for the SMR800 and SMR900 Bands. The common downlink amplification path C has one or more power amplifiers (e.g., C2) that amplify the combined downlink signals for the SMR800 and SMR900 Bands. (*Id*. and see annotated FIG. 4, *supra*.)

wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another

The downlink channels for the SMR800 and SMR900 frequencies are separated by about 66 MHz. (*Id*.) The POSITA would be motivated to modify the *DUO Repeater* so that the downlink channel frequencies were closer together, particularly if a POSITA wanted to accommodate Bands XII and XIII in the repeater. The amplification of frequency bands on the common pathway of the *DUO Repeater* suggests to the POSITA that amplification of the separation between the frequency bands is an acceptable trade-off (i.e., between

component count and some noise amplification) in light of the reduced size and number of components. (Ex. 1002, ¶ 111.)

Meaning, 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. As the separation between adjacent bands decreases (i.e., less separation, less amplification of noise), there is less concern about amplification of noise between the adjacent bands. Thus, when there is no separation (i.e., abutting or contiguous bands), the concern of that trade-off is non-existent because there is no amplification of unwanted noise. As such, the POSITA would understand that if frequency bands with separation between them may be amplified along a common pathway, adjacent bands can be amplified along a common pathway. (Ex. 1002, ¶¶ 111 and 44.) The POSITA would thus be motivated to modify the *DUO Repeater* (which amplifies two frequency bands separated by 66 MHz on a common pathway) to amplify adjacent frequency bands on a common pathway. (Ex. 1002, ¶ 111.)

wherein the shared amplification path further comprises at least one amplifier.

The common amplification path of the *DUO Repeater* (shown at C in green) has at least one amplifier. (*DUO Repeater*, Ex. 1009, pp. 5, 9, 30; *see also, e.g.*, C2 in the annotated FIG. 4, *supra*.)

ii. Claim 2

The radio frequency signal booster of claim 1, wherein the first band-pass filter is further configured to attenuate both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band.

The *DUO Repeater* discloses a third amplification path (C; shown in green) with a BPF (C1). (See annotated FIG. 4, *supra*.) The third amplification path (C) amplifies radio signals in the downlink channel from both the SMR800 and SMR900 frequency bands. (*Id*.) The third BPF (C1) is configured to pass the downlink channel of these two bands (i.e., 851 to 869 MHz and 935 to 940 MHz) and to attenuate all other signals, including radio signals in the uplink channels for both the SMR800 and SMR900 bands. (*Id*.) A POSITA would know that a band-pass filter configured to pass certain frequencies is also configured to attenuate all other signals outside of that range. (Ex.1002, ¶ 114.)

iii. Claim 6

The radio frequency signal booster of claim 1, wherein the first downlink channel of the first frequency band and the second downlink channel of the second frequency band are abutting in frequency.

The downlink channels for the SMR800 and SMR900 bands are separated by about 66 MHz. The designation of different frequency bands and where they occupy the frequency spectrum is a designation by different government bodies, such as the FCC. During the process of assigning frequency designations for the different bands that would occupy the LTE domain, the downlink frequencies for Band XII and Band XIII were assigned 728-746 MHz and 746-756 MHz. The upper boundary of the downlink frequency for Band XII and the lower boundary of the downlink frequency for Band XIII are contiguous. (See, e.g., Cook Declaration, Ex. 1010, ¶ 14 and *Sahota*, Ex. 1008, ¶ 69 and Table 1.)

At the time of the '190 Patent, the POSITA would understand from the *DUO Repeater* that bands separated by a frequency range (e.g., 66 MHz) between them could be amplified on a shared path. As noted herein, the POSITA willing to amplify two frequency bands on a shared amplification or common path with that amount of noise, would be even more willing to amplify two frequency bands with little or no separation between them on a shared amplification path. (Ex. 1002, ¶ 111.) As such, the POSITA who wanted to amplify Bands XII and XIII (or any other contiguous pair of frequency bands) in a repeater would be motivated to modify the *DUO Repeater* so that the two downlink channels for Bands XII and XIII were on a shared amplification path. The POSITA would also understand that amplification of abutting bands on a

common amplification path would be obvious in light of an amplification of contiguous bands on a common amplification path. (*Id*., ¶ 121.)

iv. Claim 8

The radio frequency signal booster of claim 1, wherein the shared amplification path further comprises one or more additional band-pass filters, wherein each of the one or more additional band-pass filters are configured to pass the at least a portion of the first downlink channel and the at least a portion of the second downlink channel.

The *DUO Repeater* discloses this limitation. The common downlink amplification path (C) discloses an additional BPF (C3) that passes the downlink channels for both the SMR800 and SMR900 Bands and attenuates all other signals, including the uplink signals for the SMR800 and SMR900 Bands. (*DUO Repeater*, Ex. 1009, pp. 5, 9, 30, and annotated FIG. 4, *supra*.)

v. Claim 19

An apparatus comprising a printed circuit board (PCB) comprising

The *DUO Repeater* discloses a housing (*Id*. at 6, 7) and a PCB within the cavity of the housing (*Id*. at 11).

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, wherein the shared amplification path is further configured to simultaneously boost both the first downlink channel and the second downlink channel

The *DUO Repeater* discloses this limitation. Amplification path C shows an amplification path where both the SMR800 and SMR900 downlink channels are amplified. (*Id*. and annotated FIG. 4, *supra*.)

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, and to attenuate both a first uplink channel of the first frequency band and a second uplink channel of the second frequency band

The *DUO Repeater* discloses this limitation. The common downlink amplification path C discloses bandpass filter or BPF (C1) that passes the downlink channel for the SMR800 and SMR900 Bands. The common downlink amplification path C has one or more power amplifiers that amplify the combined downlink signals for the SMR800 and SMR900 Bands. (*Id*.; and annotated FIG. 4, supra.) The BPF (C1) is configured to attenuate all other signals, including radio signals in the uplink channels for both the SMR800 and SMR900 bands. (*Id*. and annotated FIG. 4, *supra*.)

wherein the first downlink channel and the second downlink channel are adjacent in frequency to one another

The downlink channels for the SMR800 and SMR900 frequencies are separated by about 66 MHz. (*Id*.) The POSITA would be motivated to modify the *DUO Repeater* so that the downlink channel frequencies were closer together, particularly if a POSITA wanted to accommodate Bands XII and XIII in the repeater. The amplification of frequency bands on the common pathway of the *DUO Repeater* suggests to the POSITA that amplification of the separation between the frequency bands is an acceptable trade-off (i.e., between component count and some noise amplification) in light of the reduced size and number of components. (Ex. 1002, ¶ 128.)

Meaning, as noted elsewhere in this Petition, a 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. As the separation between adjacent bands decreases (i.e., less separation, less amplification of noise), there is less concern about amplification of noise between the adjacent bands. Thus, when there is no separation (i.e., abutting or contiguous bands), the concern of that trade-off is non-existent because there is no amplification of unwanted noise. As such, the POSITA would understand that if frequency bands with separation

between them may be amplified along a common pathway, adjacent bands may also be amplified along a common pathway. (Ex. 1002, ¶¶ 128 and 44.)

wherein the shared amplification path further comprises at least one amplifier.

The common amplification path of the *DUO Repeater* (shown at C in green) has at least one amplifier. (*DUO Repeater*, Ex. 1009, pp. 5, 9, 30; *see also, e.g.*, C2 in the annotated FIG. 4, *supra*.)

D. Ground 4

Claims 3, 4, 20, and 24 are unpatentable under 35 U.S.C. 103 based on the *DUO Repeater* in view of *Sahota*.

i. Claim 3

The radio frequency signal booster of claim 1, wherein the first downlink channel of the first frequency band comprises a Band XII downlink channel, and wherein the second downlink channel of the second frequency band comprises a Band XIII downlink channel.

The *DUO Repeater* in view of *Sahota* suggests this limitation. At the time of the '190 Patent, Bands XII and XIII had been designed by the 3GPP within the newly (circa 2009) created LTE radio signal frequency bands. This signal space had once been occupied, in part, by UHF TV channels 52-89 but was repurposed by the FCC to accommodate growing cell signal demand. (See, e.g., Cook

Declaration, Ex. 1010, ¶ 12-14 and *Sahota*, Ex. 1008, ¶ 69 and Table 1.) *Sahota* discloses that the downlink channel of Band XII occupies 728 MHz to 746 MHz and the downlink channel of Band XIII occupies 746 MHz to 756 MHz. (See *Sahota*, Ex. 1008, Table 1.) Sahota further discloses that the uplink channel of Band XII occupies 698 MHz to 716 MHz and the uplink channel of Band XIII occupies 777 MHz to 787 MHz. (*Id*.) *Sahota* further discloses a tunable filter that can be modified to accommodate multiple frequency bands.

At the time of the '190 Patent, a POSITA would understand from the *DUO Repeater* that two bands separated by at least 66 MHz could be amplified on a shared path to reduce components. The POSITA would understand from *Sahota* that the downlink channels for Bands XII and XIII are contiguous and thus not separated by any frequency range.

The POSITA wanting to amplify Bands XII and XIII in a repeater would thus be motivated to modify the *DUO Repeater* so that the two downlink channels for Bands XII and XIII were on a shared amplification path. The POSITA would understand from *Sahota* that the amplifiers and band pass filters used in the *DUO Repeater* to accommodate SMR800 and SMR900 bands could be designed to accommodate a different frequency range, including the range for Bands XII and XIII. That accommodation is nothing more than applying known

electrical engineering techniques to achieve a predictable result. (Ex. 1002, ¶¶ 117-118.)

ii. Claim 4

The radio frequency signal booster of claim 3, wherein the first band-pass filter is further configured to pass at least a portion of a Band XII downlink channel having a frequency range of about 728 MHz to about 746 MHz, wherein the first band-pass filter is further configured to attenuate a Band XII uplink channel having a frequency range of about 698 MHz to about 716 MHz

The *DUO Repeater* has a band pass filter that is designed to pass the downlink channel of the SMR800 and SMR900 Bands and attenuate all other frequencies, including the uplink channel for those two bands. (*DUO Repeater*, Ex. 1009, pp. 5, 9, and 30.) The different frequency band ranges used in the spectrums described in the '190 Patent, including Bands XII and XIII, are assigned by the Federal Communications Commission (FCC).

At the time of the '190 Patent, it was known that the uplink and downlink frequencies for Band XII were 698-716 MHz and 728-746 MHz, respectively, at least from *Sahota*. There is nothing unique or special about these frequency ranges. The frequency ranges are simply segments of the radio signal spectrum naturally available for use and apportioned by the FCC to facilitate a common system to use that radio signal spectrum. (See, e.g., Cook Declaration, Ex.

1010.) The POSITA wanting to amplify the Band XII downlink would necessarily attenuate the Band XII uplink. The POSITA would understand that the frequency ranges recited in this portion of claim 4 necessarily correspond to Band XII and would design a band pass filter having these characteristics. (Ex. 1002, ¶ 119.)

> **wherein the first band-pass filter is further configured to pass at least a portion of a Band XIII downlink channel having a frequency range of about 746 MHz to about 757 MHz, wherein the first band-pass filter is further configured to attenuate a Band XIII uplink channel having a frequency range of about 776 MHz to about 787 MHz.**

The *DUO Repeater* has a band pass filter that is designed to pass the downlink channel of the SMR800 and SMR900 Bands and attenuate all other frequencies, including the uplink channel for those two bands. (*DUO Repeater*, Ex. 1009, pp. 5, 9, and 30.) The different frequency band ranges used in the spectrums described in the '190 Patent, including Bands XII and XIII, are assigned by the Federal Communications Commission (FCC).

At the time of the '190 Patent, it was known that the uplink and downlink frequencies for Band XIII were 776-787 MHz and 746-757 MHz, respectively, at least from *Sahota*. There is nothing unique or special about these frequency ranges. The frequency ranges are simply segments of the radio signal spectrum

naturally available for use and apportioned by the FCC to facilitate a common system to use that radio signal spectrum. (See, e.g., Cook Declaration, Ex. 1010, ¶¶ 7-15.) The POSITA wanting to filter and amplify the Band XIII downlink channel would necessarily attenuate the Band XIII uplink channel. The POSITA would understand that the frequency ranges recited in this portion of claim 4 necessarily correspond to Band XIII and would design a band pass filter having these characteristics. (Ex. 1002, ¶ 120.)

iii. Claim 20

The apparatus of claim 19, wherein the first downlink channel of the first frequency band comprises a Band XII downlink channel, and wherein the second downlink channel of the second frequency band comprises a Band XIII downlink channel.

The *DUO Repeater* in view of *Sahota* suggests this limitation. At the time of the '190 Patent, Bands XII and XIII had been designed by the 3GPP within the newly (circa 2009) created LTE radio signal frequency bands. This signal space had once been occupied, in part, by UHF TV channels 52-89 but was repurposed by the FCC to accommodate growing cell signal demand. (See, e.g., Cook Declaration, Ex. 1010, ¶¶ 12-14 and *Sahota*, Ex. 1008, ¶ 69 and Table 1.) *Sahota* discloses that the downlink channel of Band XII occupies 728 MHz to 746 MHz and the downlink channel of Band XIII occupies 746 MHz to 756 MHz. (See

Sahota, Ex. 1008, Table 1.) Sahota further discloses that the uplink channel of Band XII occupies 698 MHz to 716 MHz and the uplink channel of Band XIII occupies 777 MHz to 787 MHz. (*Id*.) *Sahota* further discloses a tunable filter that can be modified to accommodate multiple frequency bands.

At the time of the '190 Patent, a POSITA would understand from the *DUO Repeater* that two bands separated by at least 66 MHz could be amplified on a shared path to reduce components. The POSITA would understand that amplification of two bands on a common path that are separated by less than 66 MHz is even more desirable, including amplification of contiguous or abutting frequency bands. (Ex. 1002 ¶¶ 131 and 44.)

The POSITA would understand from *Sahota* that the downlink channels for Bands XII and XIII are contiguous and thus not separated by any frequency range. The POSITA wanting to amplify Bands XII and XIII in a repeater would thus be motivated to modify the *DUO Repeater* so that the two downlink channels for Bands XII and XIII were on a shared amplification path. The POSITA would understand from *Sahota* that the amplifiers and band pass filters used in the *DUO Repeater* to accommodate SMR800 and SMR900 bands could be designed to accommodate a different frequency range, including the range for Bands XII and XIII. That accommodation is nothing more than applying known

electrical engineering techniques to achieve a predictable result. (Ex. 1002, ¶ 131.)

iv. Claim 24

The apparatus of claim 19, wherein the first downlink channel of the first frequency band and the second downlink channel of the second frequency band are abutting in frequency.

The downlink channels for the SMR800 and SMR900 bands are separated by about 66 MHz. (*DUO Repeater*, Ex. 1009, at 30.) During the process of assigning frequency designations for the different bands that would occupy the LTE domain, the downlink frequencies for Band XII and Band XIII were assigned 728-746 MHz and 746-756 MHz. The upper boundary of the downlink frequency for Band XII and the lower boundary of the downlink frequency for Band XIII are contiguous. (See, e.g., Cook Declaration, Ex. 1010, ¶ 14 and *Sahota*, Ex. 1008, ¶ 69 and Table 1.)

At the time of the '190 Patent, a POSITA would understand from the *DUO Repeater* that two bands separated by at least 66 MHz could be amplified on a shared path to reduce components. The POSITA would understand that amplification of two bands on a common path that are separated by less than 66 MHz is even more desirable, including amplification of contiguous or abutting frequency bands. (Ex. 1002, ¶¶ 132 and 44.) The POSITA who wanted to

accommodate Bands XII and XIII (or any other contiguous pair of frequency bands) in a repeater would be motivated to modify the *DUO Repeater* so that the two downlink channels for Bands XII and XIII were on a shared amplification path. The POSITA would understand that amplification of abutting bands on a common amplification path would be obvious in light of amplification of contiguous bands on a common amplification path. (*Id*.)

E. Ground 5

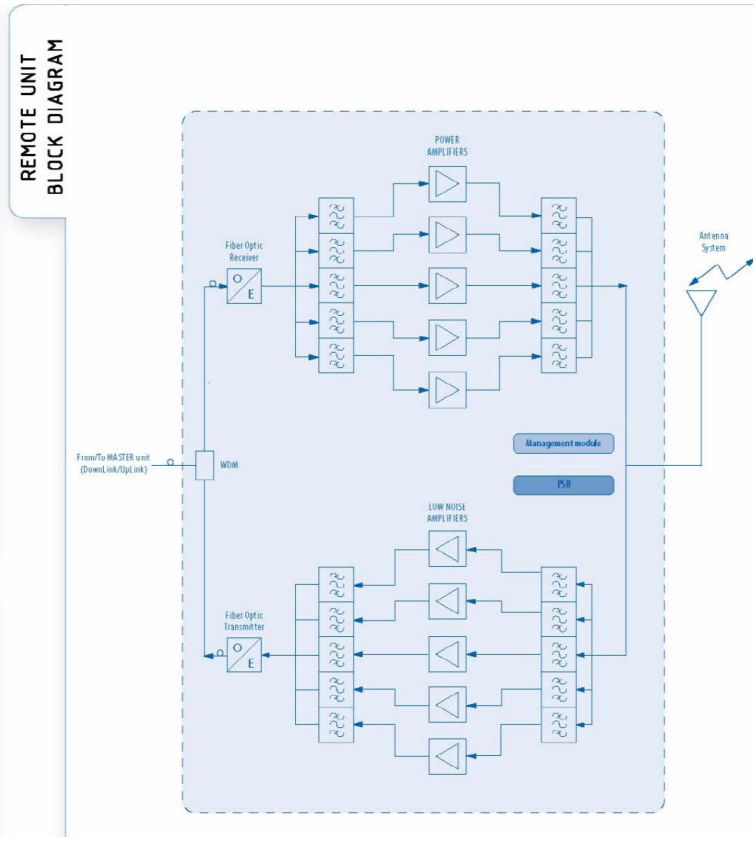
Claim 18 is unpatentable under 35 U.S.C. 103 based on the *DUO Repeater* in view of the *TEKO Repeater*.

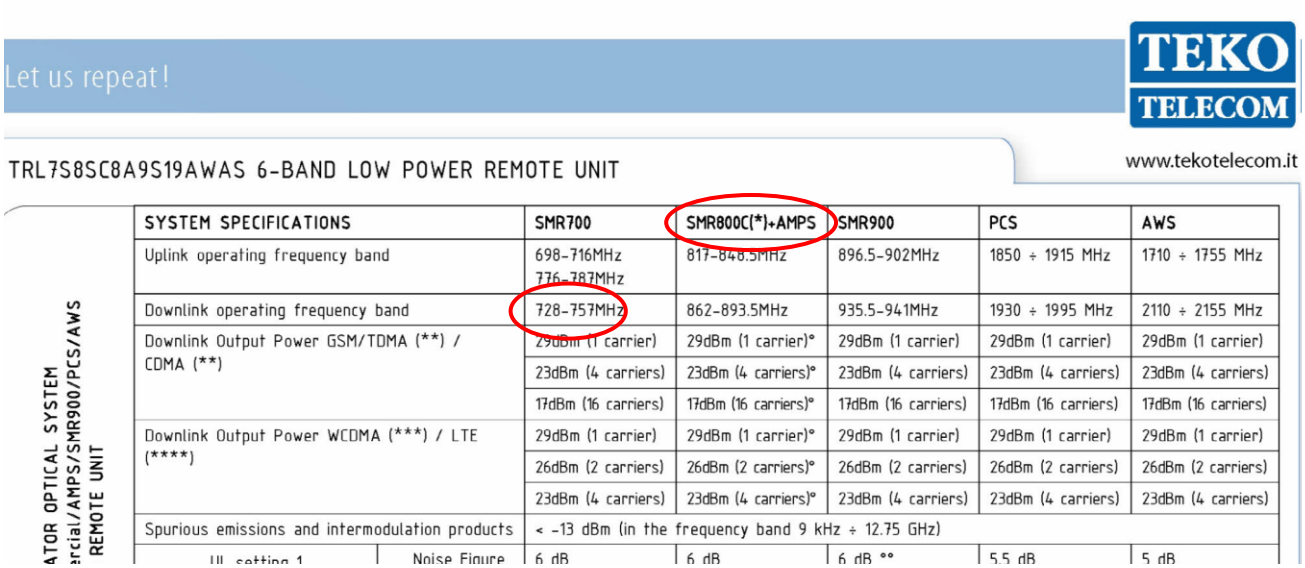
i. Claim 18

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.

The *DUO Repeater* suggests this limitation in view of the *TEKO Repeater*. The different frequency band ranges used in the spectrums described in the '190 Patent, including those listed in this claim, are assigned by the Federal Communications Commission (FCC). At the time of the '190 Patent, these bands were all known and in use. (See, e.g., Cook Declaration, Ex. 1010 ¶¶ 8-15.) The *TEKO Repeater* generally discloses a remote wireless signal booster capable of operating in six different frequency bands over five separate

amplification paths: (1) SMR700, (2) SMR800 combined with AMPS850, (3) SMR900, (4) PCS1900, and (5) AWS. (*TEKO Repeater*, Ex. 1006, WE-SC 15825-15826.) A portion of the specifications are shown below:





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SYSTEM SPECIFICATIONS		SMR700	SMR800C(*)+AMPS	SMR900	PCS	AWS
Uplink operating frequency band		698-716MHz 776-787MHz	817-848.5MHz	896.5-902MHz	1850 ÷ 1915 MHz	1710 ÷ 1755 MHz
Downlink operating frequency band		728-757MHz	862-893.5MHz	935.5-941MHz	1930 ÷ 1995 MHz	2110 ÷ 2155 MHz
Downlink Output Power GSM/TDMA (**) / CDMA (**)		29dBm (1 carrier)	29dBm (1 carrier)°	29dBm (1 carrier)	29dBm (1 carrier)	29dBm (1 carrier)
		23dBm (4 carriers)	23dBm (4 carriers)°	23dBm (4 carriers)	23dBm (4 carriers)	23dBm (4 carriers)
		17dBm (16 carriers)	17dBm (16 carriers)°	17dBm (16 carriers)	17dBm (16 carriers)	17dBm (16 carriers)
Downlink Output Power WCDMA (***) / LTE (****)		29dBm (1 carrier)	29dBm (1 carrier)°	29dBm (1 carrier)	29dBm (1 carrier)	29dBm (1 carrier)
		26dBm (2 carriers)	26dBm (2 carriers)°	26dBm (2 carriers)	26dBm (2 carriers)	26dBm (2 carriers)
		23dBm (4 carriers)	23dBm (4 carriers)°	23dBm (4 carriers)	23dBm (4 carriers)	23dBm (4 carriers)
Spurious emissions and intermodulation products		< -13 dBm (in the frequency band 9 kHz ÷ 12.75 GHz)				
UL setting 1	Noise Figure	6 dB	6 dB	6 dB °°	5.5 dB	5 dB

The SMR700 Band is noted as servicing two separate uplink frequencies (698-716 MHz and 776-787 MHz) and a **single downlink frequency (728-757 MHz)**. The two uplink frequencies correspond to the U.S. uplink frequencies for Band XII and Band XIII. The single downlink frequency corresponds to the **combined downlink frequencies for both Bands XII and XIII**. The SMR800 and AMPS850 Bands are also **combined** and correspond to the U.S. frequency for Band V. The SMR900 frequency listing corresponds to U.S. Band VIII. The PCS frequency listing corresponds to U.S. Band II. The AWS frequency listing corresponds to U.S. Band IV. (*TEKO Repeater*, Ex. 1006, WE-SC 15825-15826.)

At the time of the '190 Patent, a POSITA would understand from the *DUO Repeater* that multiple cellular frequency bands could be amplified on a shared path. The POSITA would understand from the *TEKO Repeater*, that all of the bands recited in claim 18 could be amplified in a cellular signal booster, including Bands XII and XIII on a shared path. The POSITA wanting to amplify all of the bands recited in claim 18 would thus be motivated to modify the *DUO Repeater* in view of the *TEKO Repeater* to include Band II, Band IV, Band V, Band XII, and Band XIII. (Ex. 1002, ¶¶ 123-124.)

XII. CONCLUSION

For the reasons given above, Petitioner requests institution of IPR for the challenged claims based on each of the grounds specified herein. Depending on the positions and/or interpretations taken by Patent Owner and/or the Board, these grounds may have strengths or weaknesses relative to the other. Petitioner reserves its right to use other combinations of prior art cited herein in order to enable fuller development of the record.

CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Petition for Inter Partes Review of U.S. Patent No. 9,402,190 contains, as measured by the word-processing system used to prepare this paper, 12, 314 words. This word count does not include the items excluded by 37 C.F.R. § 42.24 as not counting towards the word limit.

Dated: September 21, 2018

Respectfully submitted,

By: /Jed Hansen/

Jed Hansen (Reg. No. 59,106)
Counsel for Petitioner

CERTIFICATE OF SERVICE

I hereby certify that on September 21, 2018, I caused a true and correct copy of the foregoing Petition for Inter Partes Review of U.S. Patent No. 9,402,190 and supporting exhibits to be served via express mail on the Patent Owner at the following correspondence address of record as listed on PAIR:

CELLPHONE-MATE, INC.
48346 MILMONT DRIVE
FREMONT, CALIFORNIA 94538

A courtesy copy was also sent via electronic mail to the Patent Owner's litigation counsel listed below:

JOHN GURKA
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By: /Jed Hansen/
Jed Hansen (Reg. No. 59,106)