IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

(Attorney Docket No. 15420US01)

In the Application of: Shervin Moloudi Serial No.: 10/813,486 Filed: March 30, 2004 For: SYSTEM AND METHOD FOR REDUCING PHASE NOISE Examiner: Nhan T. Le Group Art Unit: 2618 Confirmation No.: 4921	Electronically Filed on 4 OCT 2010

RESPONSE UNDER 37 C.F.R. § 1.111

Mail Stop Amendments
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This paper responds to the non-final Office Action mailed July 20, 2010 ("Office Action") in the above-identified application. The Applicant respectfully submits that the claims of the present application define patentable subject matter and respectfully requests consideration of the following amendments and remarks.

Amendments to the Claims are reflected in the claim listing, which begins on page 2 of this paper.

Remarks/Arguments begin on page 11 of this paper.

AMENDMENTS TO THE CLAIMS

Claims 1-13, 15-32, and 34-40 are pending in the instant application. Claims 1, 21, and 32 have been amended to clarify the claim language. Claims 14 and 33 have been previously cancelled. Claims 1, 21, and 32 are independent. Claims 2-13, 15-20, 22-31 and 32-40 depend directly or indirectly from independent claims 1, 21, and 32, respectively.

Listing of claims:

1. (Currently Amended) A method for reducing phase noise, comprising:

generating, in a transmitter, a local oscillator (LO) differential signal at a particular frequency, the LO differential signal being associated with a LO harmonic frequency signal disposed at a LO harmonic frequency;

selecting, utilizing a harmonic trap in a differential buffer, said harmonic trap disposed at an output of said LO differential signal of ~~in~~ said transmitter, frequency content disposed in a region around the LO harmonic frequency; and

attenuating, in said transmitter, said selected frequency content disposed in said region around the LO harmonic frequency.

2. (Previously Presented) The method of claim 1, comprising:

associating the LO differential signal with a second LO harmonic frequency signal disposed at a second LO harmonic frequency; and

selectively attenuating frequency content disposed in a second region around the second LO harmonic frequency.

3. (Previously Presented) The method of claim 1, comprising:

applying at least one non-linear operation to the LO differential signal; and

transmitting the applied signal.

4. (Previously Presented) The method of claim 3, wherein applying at least one non-linear operation to the LO differential signal comprises dividing the LO differential signal.

5. (Previously Presented) The method of claim 3, wherein applying at least one non-linear operation to the LO differential signal comprises mixing the LO differential signal with a reference signal.

6. (Previously Presented) The method of claim 3, wherein applying at least one non-linear operation to the LO differential signal comprises amplifying the LO differential signal.

7. (Previously Presented) The method of claim 1, wherein the LO differential signal is generated by at least one of a fixed frequency oscillator, a voltage controlled oscillator, and a current controlled oscillator.

8. (Previously Presented) The method of claim 1, wherein the frequency content is selectively attenuated by at least one attenuating circuit.

9. (Previously Presented) The method of claim 8, wherein the at least one attenuating circuit comprises at least one of an integrated component and a discrete component.

10. (Previously Presented) The method of claim 8, wherein the at least one attenuating circuit comprises at least one harmonic trap.

11. (Previously Presented) The method of claim 1, comprising:

buffering the LO differential signal prior to selectively attenuating the frequency content.

12. (Previously Presented) The method of claim 11, wherein the buffering is performed by a buffer.

13. (Previously Presented) The method of claim 12, wherein the selective attenuating of the frequency content is performed within the buffer.

14. (Cancelled)

15. (Previously Presented) The method of claim 1, wherein the LO differential signal comprises a quadrature signal.

16. (Previously Presented) The method of claim 1, wherein the selective attenuating comprises canceling frequency content disposed in the region around the LO harmonic frequency.

17. (Previously Presented) The method of claim 16, wherein the canceling frequency content disposed in the region around the LO harmonic frequency comprises canceling frequency content disposed only at the LO harmonic frequency.

18. (Previously Presented) The method of claim 1, wherein the selective attenuating comprises notching frequency content disposed in the region around the LO harmonic frequency.

19. (Previously Presented) The method of claim 18, wherein the notching frequency content comprises notching frequency content disposed only at the LO harmonic frequency.

20. (Previously Presented) The method of claim 1, wherein the selective attenuating comprises bandstopping frequency content disposed in the region around the LO harmonic frequency.

21. (Currently Amended) A circuit for reducing phase noise, comprising:

a signal generator in a transmitter, said signal generator generates a local oscillator (LO) differential signal at a particular frequency, the LO differential signal being associated with a LO harmonic frequency signal disposed at a LO harmonic frequency; and

an attenuating circuit in said transmitter, said attenuating circuit selects, utilizing a harmonic trap in a differential buffer, said harmonic trap disposed at an output of said LO differential signal of said transmitter, frequency content disposed in a region around the LO harmonic frequency and attenuates said selected frequency content disposed in said region around the LO harmonic frequency.

22. (Previously Presented) The circuit of claim 21, comprising:

a buffer for buffering the LO differential signal, the buffer being coupled to the signal generator.

23. (Previously Presented) The circuit of claim 22, wherein the attenuating circuit is part of the buffer.

24. (Previously Presented) The circuit of claim 21, comprising:

a non-linear operation circuit that applies at least one non-linear operation to the LO differential signal to obtain an outgoing signal; and

a transmitting circuit for transmitting the outgoing signal.

25. (Previously Presented) The circuit of claim 24, wherein the transmitting circuit comprises an antenna.

26. (Previously Presented) The circuit of claim 24, wherein the non-linear operation circuit comprises a divider that divides the LO differential signal.

27. (Previously Presented) The circuit of claim 24, wherein the non-linear operation circuit comprises a mixer that mixes the LO differential signal with a reference signal.

28. (Previously Presented) The circuit of claim 24, wherein the non-linear operation circuit comprises an amplifier that amplifies the LO differential signal.

29. (Previously Presented) The circuit of claim 21, wherein the signal generator comprises at least one of a fixed frequency oscillator, a voltage controlled oscillator, and a current controlled oscillator.

30. (Previously Presented) The circuit of claim 21, wherein the attenuating circuit comprises at least one of an integrated component and a discrete component.

31. (Previously Presented) The circuit of claim 30, wherein the attenuating circuit comprises at least one harmonic trap.

32. (Currently Amended) A system for reducing phase noise, comprising:

a signal generator in a transmitter, said signal generator generates a local oscillator (LO) differential signal at a particular frequency, the LO differential signal being associated with a LO harmonic frequency signal disposed at a LO harmonic frequency; and

a buffer that buffers the LO differential signal, the buffer adapted to select, utilizing a harmonic trap in said buffer, said harmonic trap disposed at an output of

said LO differential signal of said transmitter, frequency content disposed in a region around the LO harmonic frequency and attenuate said selected frequency content disposed in said region around the LO harmonic frequency.

33. (Cancelled)

34. (Previously Presented) The system of claim 32, wherein the LO differential signal comprises a quadrature signal.

35. (Previously Presented) The system of claim 32, wherein the signal generator comprises a differential signal generator.

36. (Previously Presented) The system of claim 35, wherein the buffer comprises a differential pair of transistors, the differential pair of transistors being adapted to receive the LO differential signal.

37. (Previously Presented) The system of claim 32, wherein the buffer comprises a harmonic trap, the harmonic trap being adapted to attenuate the frequency content disposed in the region around the LO harmonic frequency.

38. (Previously Presented) The system of claim 37, wherein the harmonic trap is disposed across a differential output of the buffer.

39. (Previously Presented) The system of claim 32, wherein the buffer is adapted to band stop the frequency content disposed in the region around the LO harmonic frequency.

40. (Previously Presented) The system of claim 32, wherein the buffer is adapted to notch the frequency content disposed only at approximately the LO harmonic frequency.

REMARKS / ARGUMENTS

Claims 1-13, 15-32, and 34-40 are pending in the instant application. Claims 1, 21, and 32 have been amended, as set forth above, to further clarify the language used in these claims and to further prosecution of the present application. The Applicant respectfully submits that the claims define patentable subject matter.

Claims 1-9, 11-13, 15-18, 20-30, 32, 34, 35, 37, 39, and 40 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicant's Admission of Prior Art ("APA") in view of USP 4,999,596 ("Nakatani") further in view of USP 6,542,724 ("Copeland"). Claims 10, 19, 31, 36, and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Applicant respectfully traverses these rejections at least based on the following amendments and remarks.

REJECTION UNDER 35 U.S.C. § 103

In order for a *prima facie* case of obviousness to be established, the Manual of Patent Examining Procedure, Rev. 6, Sep. 2007 ("MPEP") states the following:

> The key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385, 1396 (2007) noted that the

> analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Federal Circuit has stated that "rejections on obviousness cannot be sustained with mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness."

See the MPEP at § 2142, citing In re Kahn, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), and KSR International Co. v. Teleflex Inc., 82 USPQ2d at 1396 (quoting Federal Circuit statement with approval). Further, MPEP § 2143.01 states that "the mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art" (citing KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385, 1396 (2007)). Additionally, if a prima facie case of obviousness is not established, the Applicant is under no obligation to submit evidence of nonobviousness:

> The examiner bears the initial burden of factually supporting any prima facie conclusion of obviousness. If the examiner does not produce a prima facie case, the applicant is under no obligation to submit evidence of nonobviousness.

See MPEP at § 2142.

I. The Proposed Combination of APA, Nakatani, and Copeland Does Not Render Claims 1-9, 11-13, 15-18, 20-30, 32, 34, 35, 37, 39, and 40 Unpatentable

A. Independent Claims 1, 21, and 32

With regard to the rejection of independent claim 1 under 35 U.S.C. § 103(a), the Office Action the Applicant submits that the combination of APA,

Nakatani, and Copeland does not disclose or suggest at least the limitation of "generating, in a transmitter, a local oscillator (LO) differential signal at a particular frequency, the LO differential signal being associated with a LO harmonic frequency signal disposed at a LO harmonic frequency; selecting, utilizing a harmonic trap in a differential buffer, said harmonic trap disposed at an output of said LO differential signal of said transmitter, frequency content disposed in a region around the LO harmonic frequency; and attenuating, in said transmitter, said selected frequency content disposed in said region around the LO harmonic frequency," as recited in Applicant's independent claim 1.

The Office Action states the following:

> As to claims 1, 21, applicant's admitted prior art teaches generating in a transmitter, a local oscillator (LO) a signal at a particular frequency the LO signal being associated with a LO harmonic frequency signal disposed at a LO harmonic frequency (Fig.1, Fig.2, par [0004-0013]); selecting in transmitter frequency content disposed in a region around the LO harmonic frequency and (Fig.1, Fig.2, par [0004-0013]). **Applicant's admission of prior art fails to teach attenuating in said transmitter said selected frequency content disposed in said region around the LO harmonic frequency which is taught in related art by Nakatani (See col.6, lines 28-35, abstract).** It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of the conventional transmitter taught by applicant's admission of prior art with the filter circuit as taught by Nakatani so as to attenuate the second harmonic of the local oscillator. **The combination of Applicant's admitted prior art and Nakatani fails to teach wherein LO is differential LO. Copeland teaches wherein LO is differential LO (see fig. 1, 106, col. 4, lines 31-48).** Therefore, It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the teachings of Copeland into system of applicant's

> admission of prior art and Nakatani for achieving tunable image rejection in radio signal processing device.

See Office Action at pages 2-3 (emphasis added). The Applicant respectfully disagrees with this analysis.

The Examiner's arguments are still deficient, because APA does not disclose or suggest the use of a harmonic trap in a differential buffer at the output of an LO differential signal to select frequency content. In addition, Nakatani also does not overcome these deficiencies of the APA. More specifically, the Examiner conceded that, "[t]he combination of Applicant's admitted prior art and **Nakatani fails to teach wherein LO is differential LO**." *See* Office Action at 2 (emphasis added). Second, Nakatani discloses "a **strip-type** second-harmonic wave choking filter" which operates based on **stubs of specific lengths**. *See* Nakatani at col. 2, lines 30-57. That is, Nakatani does not disclose a **"**selecting, **utilizing a harmonic trap in a differential buffer**, said harmonic trap disposed at an output of said LO differential signal of said transmitter, frequency content disposed in a region around the LO harmonic frequency" as recited in Applicant's claim 1.

To overcome the deficiencies of the combination of APA and Nakatani, namely "selecting, utilizing a harmonic trap in a differential buffer," the Examiner refers for support to the VCO 106 in Figure 1 of Copeland. With regard to Figure 1, Copeland states the following:

> The transceiver 100 includes primarily a receiver 102, a transmitter 104 and a shared Voltage-Controlled Oscillator (VCO) 106. Image

> Reject Filters (IRF) 112 and 118 are integrated into the receiver 102 and the transmitter 104, respectively. An external frequency control unit 108 is coupled to the VCO 106, responsible for generating and providing to the VCO 106 a control voltage V_{freq} at output 126. Alternatively, the frequency control unit 108 may be implemented as an integral component of the transceiver 100. Differential transmission lines 144, 146 convey the Local Oscillator (LO) signal, output by the VCO 106, to mixer 114 of the receiver 102 and to mixer 122 of the transmitter 104.

See col. 2, line 64 – col. 3, line 9 (emphasis added).

Copeland discloses a differential output (128, 130) to a differential buffer without the use of a harmonic trap in a differential buffer, disposed at the output of an LO differential signal. Therefore, Copeland does not disclose "selecting, **utilizing a harmonic trap in a differential buffer, said harmonic trap disposed at an output of said LO differential signal of said transmitter**, frequency content disposed in a region around the LO harmonic frequency," as recited in Applicant's claim 1.

Therefore, the Applicant respectfully submits that the Examiner has not provided an "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness" in the detailed manner described in *KSR*.

Accordingly, the Applicant maintains that the proposed combination of APA, Nakatani, and Copeland does not render independent claim 1 unpatentable, and a *prima facie* case of obviousness has not been established. The Applicant submits that claim 1 is allowable. Independent claims 21 and 32 are similar in many respects to the method disclosed in independent claim 1. Therefore, the Applicant

submits that independent claims 21 and 32 are also allowable over the references cited in the Office Action at least for the reasons stated above with regard to claim 1.

B. Dependent Claims 2-13, 15-20, 22-31, and 34-40

Dependent claims 2-13, 15-20, 22-31, and 34-40 depend directly or indirectly from independent claims 1, 21, and 32 respectively. Consequently, claims 2-13, 15-20, 22-31, and 34-40 are submitted to be allowable at least for the reasons stated above with regard to claim 1.

In general, the Office Action makes various statements regarding claims 1-40 and the cited references, which statements are now moot in light of the above. Thus, the Applicant will not address such statements at the present time. However, the Applicant expressly reserves the right to challenge such statements in the future should the need arise (e.g., if such statement should become relevant by appearing in a rejection of any current or future claim).

The Applicant also reserves the right to argue additional reasons beyond those set forth above to support the allowability of claims 1-13, 15-32, and 34-40.

CONCLUSION

Based on at least the foregoing, the Applicant believes that all claims 1-13, 15-32, and 34-40 are in condition for allowance. If the Examiner disagrees, the Applicant respectfully requests a telephone interview, and requests that the Examiner telephone the undersigned Attorney at (312) 775-8000.

The Commissioner is hereby authorized to charge any additional fees or credit any overpayment to the deposit account of McAndrews, Held & Malloy, Ltd., Account No. 13-0017.

A Notice of Allowability is courteously solicited.

Respectfully submitted,

Date: October 4, 2010

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