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**Brown et al.**

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(54) **APPARATUS AND METHOD FOR WIRELESS COMMUNICATIONS**

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(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(22) Filed: **May 4, 1999**

**Related U.S. Application Data**

(63) Continuation-in-part of application No. 09/216,040, filed on Dec. 18, 1998, now abandoned.

(51) Int. Cl.<sup>7</sup> ..... **H04B 1/30; H04L 27/18**

(52) U.S. Cl. .... **375/322; 375/133; 375/222; 375/281; 375/345; 329/304**

(58) **Field of Search** ..... **375/132, 133, 375/136, 219, 222, 259, 279, 281, 316, 326, 327, 329, 332, 345; 329/304, 306, 307, 308; 455/234.1, 257, 276.1**

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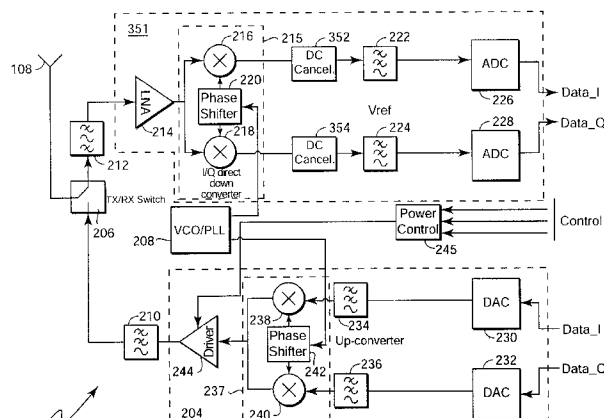
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(57) **ABSTRACT**

An apparatus for receiving signals includes a low noise amplifier (LNA) configured to receive a radio frequency (RF) signal. An I/Q direct down converter is coupled to the LNA. The I/Q direct down converter is configured to split the RF signal into real and imaginary components and to down convert the real and imaginary components directly to baseband signals. A local oscillator (LO) is coupled to the I/Q direct down converter and is configured to drive the I/Q direct down converter. First and second filters are coupled to the I/Q direct down converter. The first and second filters are configured to filter the down converted real and imaginary components, respectively. First and second analog-to-digital converters (ADCs) are coupled to the first and second filters, respectively. The first and second ADCs are configured to convert the real and imaginary components into digital signals. The first and second ADCs have a dynamic range that is wide enough to convert the filtered, down converted real and imaginary components to digital signals without using variable gain on the filtered and down converted real and imaginary components. An apparatus for use in wireless communications includes a radio, a modem and a controller integrated onto a single integrated circuit (IC). The radio includes a receiver for receiving data and a transmitter for transmitting data. The modem is coupled to the radio and is configured to demodulate received data and modulate data for transmission. The controller is coupled to the modem and includes a digital interface for external communications through which received data and data for transmission is sent, a connection state machine configured to accept commands through the digital interface and to respond to the commands by initiating a sequence, and a receive/transmit state machine configured to perform state control of the radio in response to the initiated sequence.

**38 Claims, 45 Drawing Sheets-**



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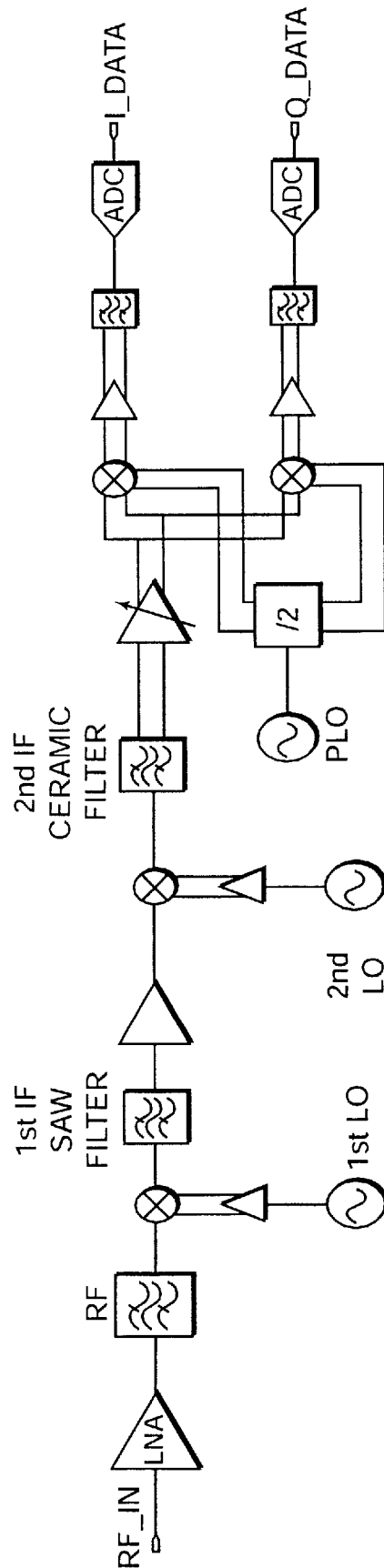


FIG. 1  
(PRIOR ART)

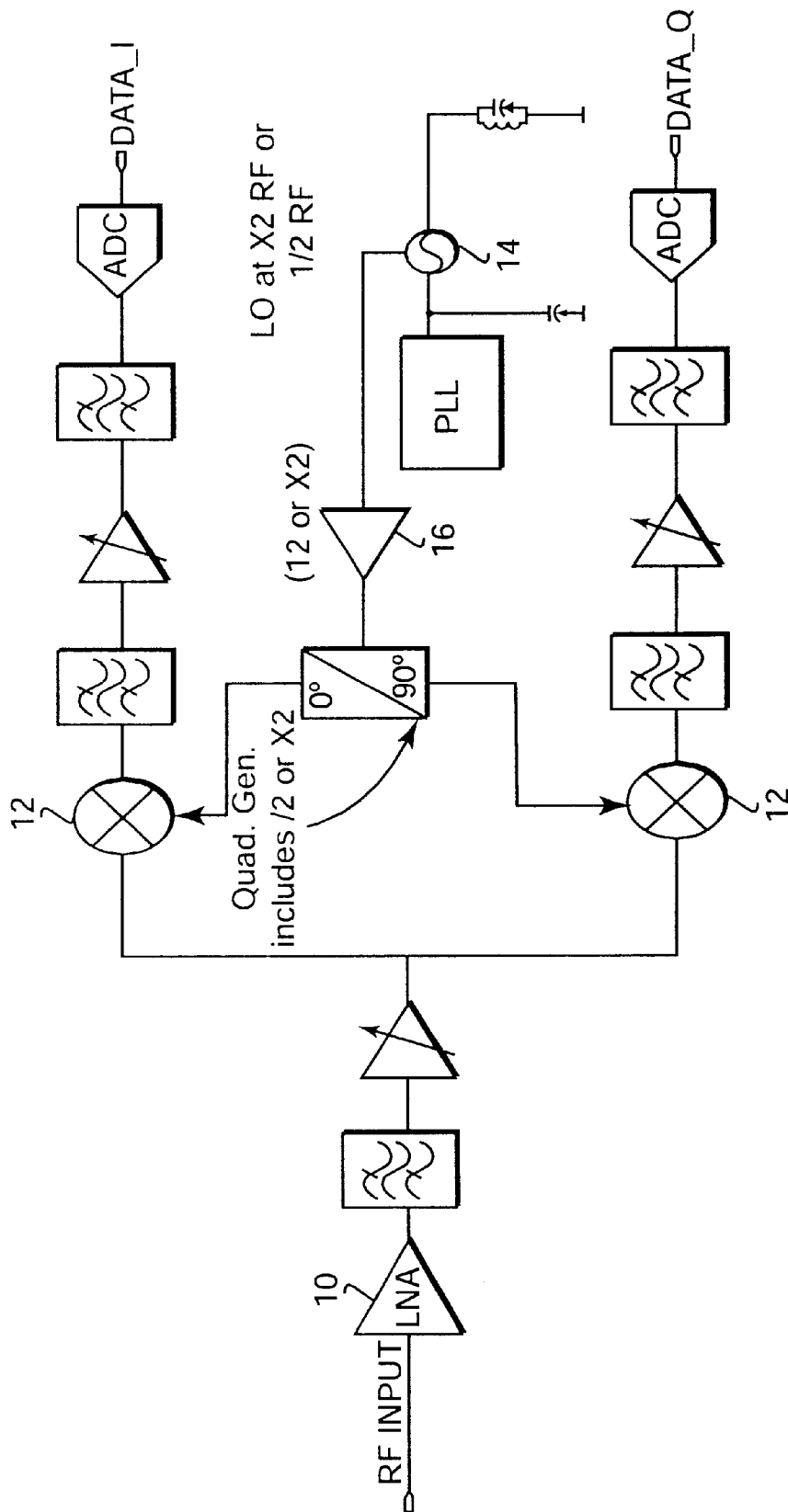


FIG. 2  
(PRIOR ART)

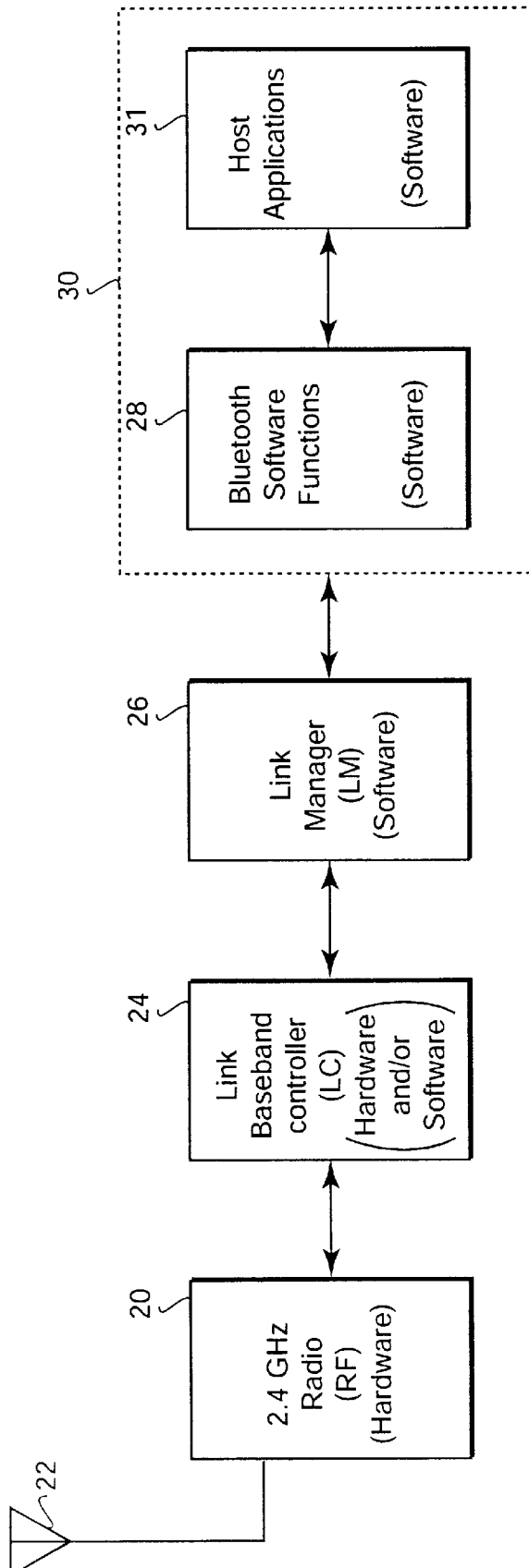


FIG. 3  
(PRIOR ART)

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