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(12) United States Patent

Abhaikumar et al.

(54) DEVICES AND METHODS FOR PHASE SHIFTING A RADIO FREQUENCY (RF) SIGNAL FOR A BASE STATION ANTENNA

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58) Field of Classification Search

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See application file for complete search history.

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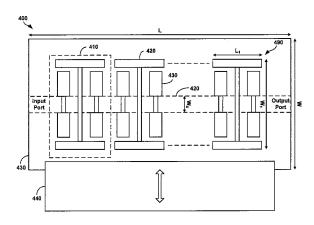
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(57) ABSTRACT

Methods and devices for phase shifting an RF signal for a base station antenna are provided. The device includes a transmission line that has a stationary ground plane coupled to the top of a substrate and a signal line on the bottom of the substrate. The signal line has an input port and an output port. The input port receives the RF signal with a certain phase and travels across the bottom of the substrate to the output port. The RF signal has a different phase at the output port because defected ground structures etched on the stationary ground plane shift the phase of the RF signal. In addition, the device includes a movable ground plane that may cover a portion of the defected ground structures, the substrate, and the stationary ground plane such that the moveable ground plane further adjusts the phase of the RF signal.

20 Claims, 9 Drawing Sheets



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