

(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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Subject to any disclaimer, the term of this (*) Notice:

patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

This patent is subject to a terminal dis-

claimer.

(21) Appl. No.: 13/710,346

(22)Filed: Dec. 10, 2012

(65)**Prior Publication Data**

US 2013/0099877 A1 Apr. 25, 2013

Related U.S. Application Data

Continuation of application No. 12/723,161, filed on Mar. 12, 2010, now abandoned.

(30)Foreign Application Priority Data

Jan. 28, 2010 (IN) 222/CHE/2010

(51) Int. Cl. H04B 1/00

(2006.01)

(Continued)

(52) U.S. Cl.

(2013.01); H01Q 3/32 (2013.01)

USPC 455/63.4; 455/562.1; 455/42; 455/304; 455/276.1; 455/523; 333/204; 333/219; 333/246; (10) Patent No.:

US 8,862,063 B2

(45) **Date of Patent:**

*Oct. 14, 2014

Field of Classification Search

CPC H01P 1/184 See application file for complete search history.

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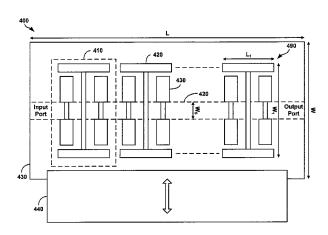
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ABSTRACT

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.

17 Claims, 9 Drawing Sheets



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